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LEAFLETS
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CONTENTS

	PAGE
The Genus <i>Malacothamnus</i> , Greene (Malvaceae) . . .	113
THOMAS H. KEARNEY	



SAN FRANCISCO, CALIFORNIA

APRIL 20, 1951

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of
WESTERN BOTANY

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THE GENUS MALACOTHAMNUS, GREENE (MALVACEAE)

BY THOMAS H. KEARNEY

It has been proposed to restrict the genus *Malvastrum* to species having indehiscent or merely apically dehiscent carpels, typified by *M. coromandelianum* (L.) Garcke (9). If this proposal is accepted, species having the carpels completely dehiscent, splitting into two valves when dry, belong to other genera, such as the South American *Nototriche* Turcz. and *Tarasa* Phil., and the North American *Malacothamnus* Greene and *Sidopsis* Rydb. Possibly additional segregates will need recognition when some of the South American species previously included in *Malvastrum* are better known.

The genus *Malacothamnus* was established by Edward L. Greene in 1906 (6) to comprise the more or less shrubby Californian plants which Gray and Robinson (5, pp. 310-313) had treated as species of *Malvastrum*, they having recognized 11 species of this group. Greene published a brief description of the genus and included in it the following species: *M. arcuatus* (Greene), *M. Fremontii* (Torr.), *M. orbiculatus* (Greene), *M. Davidsonii* (Robins.), *M. Palmeri* (Wats.), *M. aboriginum* (Robins.), *M. densiflorus* (Wats.), *M. marrubioides* (Dur. & Hilg.), and *M. fasciculatus* (Nutt.). These 9 species represent nearly the whole range of variation in the genus.¹

Malacothamnus as a genus has not been recognized by later authors except Abrams (1) who published *M. Nuttallii* as a new species and *M. fasciculatus splendidus* (Kell.) and *M. nesioticus* (Robins.) as new combinations. The species of southern California were treated (as *Malvastrum*) by Estes (4). Eastwood (2,3) in her treatment of the Californian species (likewise as *Malvastrum*) recognized 27 species, whereas Jepson (7, pp. 497-501), who mistakenly transferred them to *Sphaeralcea*, reduced the number to 8, relegating to varietal status or to synonymy several entities which previously had been regarded as species. McMinn (11) recognized 12 species and numerous varieties of shrubby Californian "*Malvastrum*." Two species that, so far as is defi-

¹Greene did not indicate a type-species but *M. fasciculatus*, having been the first species described (as *Malva fasciculata* Nutt.), may be designated as the lectotype.

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nately known, are confined to Baja California, have been discussed recently by Wiggins (13).

The present writer distinguishes 21 species and 6 varieties. It should be noted, however, that several of these entities are known only from a single or very few collections. With more abundant material, reduction in the status of some of them may become advisable.

The genus is wholly North American unless, as has been suggested by A. Krapovickas (personal communication), the Chilean *Malva obtusifolia* Walp. is a species of *Malacothamnus*.

DESCRIPTION OF THE GENUS

Plants perennial, usually shrubby but sometimes herbaceous above the woody caudex, with numerous ascending-spreading or nearly erect branches; herbage more or less densely pubescent with mostly stellate hairs, these with arms often very unequal; leaves short- or rather long-petioled, the blades mostly shallowly to somewhat deeply 3- to 5-lobed, crenate or dentate, rounded to acutish at apex, cuneate, truncate, or cordate at base, the veins (at least the five principal veins) usually prominent beneath; flowers in axillary (or sometimes terminal) glomerules, these dense and subsessile or loose (more or less racemiform) and stalked, the flowers sessile to rather long-pedicelled; involucrel of 3 subulate or filiform (in a few species broader) bractlets, these much shorter than to somewhat surpassing the calyx; calyx more or less deeply 5-lobed, sparsely to very densely pubescent with stellate (rarely simple) hairs, the lobes deltoid-ovate to lanceolate, acutish to attenuate-acuminate; petals pale to deep mauve, asymmetrically obovate, villous and often somewhat united at base; column much shorter than the corolla, the stamens numerous, crowded; style-branches of the same number as the carpels, the stigmas terminal, capitate; ovary and fruit depressed-hemispheric, usually about 10-merous; ovules solitary, ascending, the radicle inferior; carpels in fruit thin-walled, compressed, asymmetrically suborbicular or broadly ovate or obovate, muticous, very shallowly and broadly to rather deeply and acutely incised ventrally toward base, often with a stalk-like base below the sinus, sparsely to copiously stellulate apically and usually on the ventral edge, mostly glabrous dorsally and on the faces, otherwise smooth and unappendaged, completely dehiscent (splitting into two valves even before full maturity); seeds reniform, papillate-stellulate and often somewhat rugose.

The haploid chromosome number, as determined by J. M. Webber (12, p. 320) for 6 species is 17.

HABITAT AND TIME OF FLOWERING

These plants occur mostly, if not exclusively, on well-drained slopes and along washes and gullies, in areas now or formerly occupied by chaparral vegetation. Therefore, "Chaparral Mal-

low" would be a good choice for the common name of the genus. Since the genus, as a whole, ranges from Mendocino and Tehama counties in northern California to northern Baja California and from the coast and coastal islands to the desert-facing slopes of the Sierra Nevada, San Gabriel, San Bernardino, and San Jacinto mountains, the associated chaparral plants differ considerably as to species, but ecologically the environment is remarkably uniform. Most of the species begin flowering in late spring and early summer and, except at the higher elevations, produce few flowers, and these smaller than the early ones, after the advent of the dry season. The flowers, and often the herbage, are usually more or less fragrant.

PROBABLE AGE AND RELATIONSHIP OF THE GENUS

Several of the species are very rare and local, three of them being known only from a single collection. San Luis Obispo County ranks first in the number of endemic or very nearly endemic species and not one of the widely distributed species is found in that county. Two species, *M. foliosus* and *M. paniculatus*, are known certainly only from northern Baja California.

Miss Eastwood (3, p. 188) summed up her conclusions as follows: "The different species of *Malvastrum* [*Malacothamnus*] are widely scattered in California and so often isolated that to me it seems to be an old genus once much more abundant here but now declining." This conclusion seems justified when applied to the rare and very local species and to *M. Fremontii*, which has an extensive range but with widely separated stations and very few individuals at each station. On the other hand, *M. fasciculatus*, in its several forms, is common and sometimes abundant in mainland and insular southern California, from Santa Barbara County to northern Baja California, and has developed several more or less intergrading varieties. These are scarcely characteristics of a waning species. Furthermore, the relative homogeneity of the genus might be considered as an indication that it is not a very old one.

The phylogeny of the genus is obscure. In the writer's classification (10), *Malacothamnus* belongs to the uniovulate group of Subtribe *Abutilinae* of Tribe *Malveae*, a group which may be conjectured to have descended from some pluriovulate ancestor, such as are most species of *Sphaeralcea*. The other uniovulate

genera of subtribe *Abutilinae* are *Malvastrum* (sensu stricto), *Nototriche*, *Tarasa*, and *Sidopsis*. The first has indehiscent or but slightly dehiscent carpels, whereas in the other three genera the carpels split into two separate valves as in *Malacothamnus*. It is improbable that any of these four genera as they now exist could have been a direct ancestor of *Malacothamnus* and it would seem more likely that it derives from some more generalized form, now extinct and not likely to have been preserved in the geological record.

CLASSIFICATION OF THE SPECIES

There are two principal groups of closely allied species of *Malacothamnus*, one typified by *M. Fremontii* and the other by *M. fasciculatus*. The first, which includes also *M. Howellii*, *M. Helleri*, *M. marrubioides*, *M. orbiculatus*, and *M. niveus*, is characterized by suborbicular, shallowly incised carpels and usually by a densely lanate calyx, although in *M. marrubioides*, and commonly in *M. orbiculatus*, the calyx is more loosely and less densely pubescent.

The group which comprises *M. fasciculatus* and its varieties and with which may be associated, in various degrees of affinity, *M. mendocinensis*, *M. Hallii*, *M. arcuatus*, and *M. Parishii*, is characterized by having the calyx closely pubescent or sublepido with very short, many-rayed hairs and often by relatively narrow, usually deeply incised carpels, although *M. mendocinensis* and *M. Hallii* are exceptions as regards the characters of the carpels.

The remaining species show no very close relationship to either of the principal groups, or to one another. Delimitation of several of the species is difficult and numerous specimens are intermediate in their characters. It is suspected that in this, as well as in *Sphaeralcea* and other genera of *Malvaceae*, interspecific hybridization is not infrequent, but experimental evidence is lacking.

KEY TO THE SPECIES AND VARIETIES

The key is an artificial one and the position of a species in the key does not necessarily indicate its closest relationship. Unlike the condition in many genera of *Malvaceae*, the characters

of the fruit have proved to be of little value in distinguishing the species, most of which are represented in herbaria by very few specimens with mature fruit. In some cases it has been necessary to base the description of the carpels upon a single fruiting specimen. As often happens in the *Malvaceae* (8, p. 19), the fruits are much parasitized by insects. Furthermore, there is often as much variation within the species in the characters of the carpels as in the vegetative and floral characters. The characters that have been found to be of greatest diagnostic value are: nature of the pubescence of the herbage and calyx; shape and texture of the leaves; character of the inflorescence; shape and relative length of the bractlets of the involucler; and shape and relative length of the calyx-lobes.

1. Flowers in dense, subcapitate, terminal clusters, these conspicuously involuclerate with membranous or foliaceous bracts equaling or somewhat shorter than the calyces, or a few of the flowers axillary and subterminal (2).
 1. Flowers not in dense heads or, if so, then the clusters distributed along the stems and not conspicuously involuclerate (3).
 2. Bracts oblong-lanceolate; bractlets linear; calyx commonly about 15 mm. long; petals mostly 20-30 mm. long; leaves truncate, subcuneate, or subcordate at base, persistently pubescent or puberulent above. 1. *M. Palmeri*
 2. Bracts oblong to broadly ovate; bractlets oblong-lanceolate; calyx commonly 10-12 mm. long; petals mostly 15-20 mm. long; leaves usually distinctly cordate at base, glabrous or glabrescent above. 1a. *M. Palmeri* var. *involucleratus*
 3. Calyx-lobes 4-8 mm. wide at base (exceptionally only 3 mm. in *M. paniculatus*) and mostly subcordate, more or less abruptly caudate-acuminate, much longer than the turbinate calyx-tube (4).
 3. Calyx-lobes seldom more than 3 mm. wide at base, mostly acute or gradually acuminate but more abruptly acuminate in *M. Abbottii* and often in *M. densiflorus* and *M. marrubioides* (6).
 4. Bractlets of the involucler broadly lanceolate to deltoid-ovate, often connate at base, somewhat shorter than the calyx; leaves subcordate to deeply cordate at base. 2. *M. aboriginum*
 4. Bractlets subulate or filiform, distinct, $\frac{1}{4}$ - $\frac{2}{3}$ as long as the calyx; leaves truncate or cuneate at base (5).
 5. Leaves rather coarsely dentate; inflorescence narrowly thyrsoid, elongate, very leafy, the glomerules dense, the flowers sessile or subsessile. 3. *M. foliosus*
 5. Leaves crenate or crenulate; inflorescence open-paniculate, the lower branches elongate and racemiform, the flowers mostly long-pedicelled. 4. *M. paniculatus*

6. Calyx conspicuously and densely white-lanate, the hairs, at least in the bud, more or less concealing the calyx-lobes. Leaves mostly suborbicular, not or very shallowly lobed; calyx not, or very inconspicuously angulate in the bud, the buds nearly globose (7).
6. Calyx not conspicuously and densely lanate, the pubescence sparser, or looser, or the hairs very short (pubescence sublepidote), not concealing the calyx-lobes, or, if the calyx rather densely lanate (sometimes so in *M. Jonesii*) then the inflorescence very narrow (subracemose) and few-flowered (11).
7. Stems closely white-tomentose with very short hairs; leaves mostly truncate or subcuneate at base, rather finely crenate or crenate-dentate (8).
7. Stems more loosely pubescent with longer hairs; leaves mostly cordate at base, coarsely crenate (9).
8. Inflorescence open-paniculate, the lower branches usually elongate and loosely few-flowered, many of the flowers relatively long-pedicelled; carpels conspicuously and broadly stalked, deeply incised; seeds copiously papillate-stellate.....5. *M. niveus*
8. Inflorescence thyrsoid-glomerate or, if the lower branches somewhat elongate, then these many-flowered and the flowers short-pedicelled or sessile; carpels rounded at base, very shallowly incised; seeds obscurely stellate6. *M. Helleri*
9. Leaves relatively thin, sparsely to copiously but seldom densely pubescent; glomerules usually rather loosely flowered and more or less stalked7. *M. orbiculatus*
9. Leaves thick, velvety-tomentose; glomerules usually dense and sessile except sometimes in *M. Howellii* (10).
10. Calyx (6) 7-8 (10) mm. long, the lobes about as long as the tube, deltoid, acute or short-acuminate; inflorescences interrupted-spicate, the glomerules and individual flowers sessile or sessile.8. *M. Fremontii*
10. Calyx (8) 9-12 (13) mm. long, the lobes somewhat longer to more than twice as long as the tube, usually deltoid-lanceolate, acuminate (often sharply attenuate-acuminate); inflorescences more open, the glomerules often distinctly stalked and more or less racemiform, the flowers mostly pedicelled.....9. *M. Howellii*
11. Calyx and bractlets conspicuously hirsute or villous with long, few-armed (occasionally simple) hairs, the longest arm often 2 mm. or more long (12).
11. Calyx not conspicuously hirsute or villous, the hairs shorter (usually not much more than 1 mm. long) and many-armed (14).
12. Stems conspicuously shaggy-tomentose, the pubescence grayish; leaves angulately 3-5-lobed, deeply cordate at base, bicolored, soft-tomentose beneath; inflorescences not conspicuously interrupted; carpels conspicuously stellate at apex with relatively long hairs.....10. *M. clementinus*
12. Stems more closely pubescent, the pubescence yellowish; leaves not lobed or very shallowly so with rounded lobes, truncate, subcuneate, or cordate at base, not noticeably bicolored, not tomentose (usually

- rather sparsely pubescent) beneath; inflorescences conspicuously interrupted; carpels minutely or obscurely stellulate (13).
13. Bractlets mostly as long as or longer than the calyx; calyx 10–14 mm. long, the lobes attenuate-acuminate (exceptionally more abruptly acuminate), 2–3 times as long as the tube.....11. *M. densiflorus*
13. Bractlets $\frac{1}{2}$ – $\frac{2}{3}$ as long as the calyx; calyx 7–10 mm. long, the lobes more or less abruptly acuminate from a deltoid-ovate base, somewhat longer than to at least twice as long as the tube.....
.....11a. *M. densiflorus* var. *viscidus*
14. Inflorescences very open-paniculate, relatively few-flowered, the branches elongate, slender, somewhat flexuous, ascending-spreading to somewhat recurved (15).
14. Inflorescences contracted and short-branched or if open-paniculate and long-branched, then the branches ascending (16).
15. Bractlets broadly subulate, thick, whitish; calyx whitish-lepidote, angulate and pointed in the bud, 9–11 mm. long, the lobes 2–3 times as long as the tube, rather abruptly acuminate.....12. *M. Abbottii*
15. Bractlets narrowly subulate, thin, dark-colored; calyx dark-colored, not angulate in bud, opening before anthesis, 6–7 mm. long, the lobes less than twice as long as the tube, gradually acuminate.13. *M. gracilis*
16. Leaves usually distinctly and often somewhat angulately 3–5-lobed (17).
16. Leaves not lobed, or, if shallowly so, then the lobes rounded, exceptionally angulate (23).
17. Petioles and principal leaf-veins very stout; young branches shaggy-tomentose14. *M. Davidsonii*
17. Petioles and veins relatively slender; young branches closely short-pubescent to sublepidote (18).
18. Stems conspicuously angulate and striate; calyx 5–6 mm. long; petals 10–12 mm. long.....17. *M. mendocinensis*
18. Stems terete or nearly so, not conspicuously striate; calyx (5) 6–9 mm. long; petals commonly 15–20 mm. long (19).
19. Inflorescences narrowly thyrsoid-glomerate, the glomerules dense, short-stalked or sessile or (in *M. fasciculatus* var. *catalinensis*) the lower branches sometimes up to 6 cm. long and more loosely flowered; calyx often rather loosely pubescent (subtomentose) with relatively long hairs (20).
19. Inflorescences open-paniculate (at least below), the lower branches often very long and very loosely flowered; calyx closely pubescent (sublepidote) with very short hairs (21).
20. Leaves relatively small, the largest blades seldom more than 4 cm. long, usually shallowly lobed and truncate or subcordate at base, seldom conspicuously bicolored; carpels 2.5–3.2 mm. high. .21. *M. fasciculatus*
20. Leaves relatively large, the blades up to 8 cm. long and wide, commonly deeply lobed and deeply cordate at base, often conspicuously bicolored; carpels 3.2–3.8 mm. high. .21b. *M. fasciculatus* var. *catalinensis*
21. Flowers in a many-branched, fastigiata panicle, the ultimate divisions rather rigid, not obviously racemose; calyx 6–7 mm. long.....
.....21d. *M. fasciculatus* var. *nesioticus*

21. Flowers in a fewer-branched, more elongate panicle, the ultimate divisions commonly racemose; calyx 5-9 mm. long (22).
22. Leaves more or less bicolored, usually distinctly paler and more pubescent beneath, subcordate to deeply cordate at base; carpels 2-3 mm. high, nearly as wide, shallowly incised.....
.....21a. *M. fasciculatus* var. *laxiflorus*
22. Leaves essentially concolored, both surfaces about equally pale and pubescent, subcuneate to cordate at base; carpels 3-5 mm. high and about $\frac{2}{3}$ as wide, more or less deeply and often acutely incised.....
.....21c. *M. fasciculatus* var. *Nuttallii*
23. Inflorescences few-flowered, subracemose, the flowers 1-3 (rarely more) at each node. Herbage whitish-pubescent; leaves suborbicular to rhombic-cuneate; carpels usually deeply and acutely incised.....
.....19. *M. Jonesii*
23. Inflorescences usually many-flowered, thyrsoid-glomerate to openly paniculate (24).
24. Calyx and young branches closely pubescent or sublepidote (25).
24. Calyx and young branches loosely pubescent to shaggy-tomentose (26).
25. Leaves broadly ovate to suborbicular, not noticeably bicolored; calyx 5-6 mm. long.....18. *M. Hallii*
25. Leaves rhombic-ovate, conspicuously bicolored (whitish beneath); calyx 8-9 mm. long.....20. *M. Parishii*
26. Calyx 5-7 (9) mm. long; leaves usually longer than wide..16. *M. arcuatus*
26. Calyx usually more than 7 mm. long; leaves as wide as long or wider (27).
27. Calyx-lobes abruptly short-acuminate; inflorescences conspicuously interrupted, the internodes very long...11a. *M. densiflorus* var. *viscidus*
27. Calyx-lobes acute to gradually acuminate or (in *M. marrubioides*) somewhat abruptly long-acuminate; inflorescences not very conspicuously interrupted, the internodes of moderate length (28).
28. Leaves cordate at base, mostly crenate; calyx not angulate in the bud, the buds subglobose.....7. *M. orbiculatus*
28. Leaves truncate, cuneate, or subcordate at base, dentate or crenate-dentate; calyx usually conspicuously angulate and pointed in the bud...
.....15. *M. marrubioides*

DESCRIPTIONS OF THE SPECIES AND VARIETIES²

1. MALACOTHAMNUS PALMERI (S. Wats.) Greene, Leaflet Bot. Obs. 1: 208 (1906). *Malvastrum Palmeri* S. Wats., Proc. Amer. Acad. 12: 250 (1877). *Sphaeralcea Palmeri* (S. Wats.) Jeps., Man. Fl. Pl. Calif. 633 (1925).

²The names of herbaria in which the type-specimens are deposited are abbreviated as follows: CA, California Academy of Sciences; G, Gray Herbarium of Harvard University; ND, University of Notre Dame; NY, New York Botanical Garden; Po, Pomona College; St, Stanford University; UC, University of California; US, U. S. National Herbarium. The writer is indebted to the curators of these herbaria for the loan of specimens, and to Mr. John Thomas Howell of the California Academy of Sciences for many helpful suggestions and for aid in field work.

The writer has examined the type, or one or more isotypes, of all species and varieties recognized in this paper, excepting the type of *M. orbiculatus* (Greene) Greene. An excellent photograph of the latter, obligingly supplied by Prof. Albert L. Delisle of Notre Dame University, shows clearly that this species has been interpreted correctly by California botanists.

Stems up to nearly 2.5 m. high and 6 cm. in diameter, woody below, very leafy, densely rough-pubescent; leaves long-petioled, the blades large, broadly ovate to suborbicular, usually shallowly lobed with rounded lobes, coarsely crenate, truncate, subcuneate, or subcordate at base, obtuse or rounded at apex, thin and plane to thick and rugose, permanently short-pubescent above, the larger veins prominent beneath; flowers in dense, subcapitate, terminal clusters, these conspicuously involucrate with membranous or foliaceous, oblong-lanceolate bracts equaling or somewhat shorter than the calyces; bractlets linear or narrowly lanceolate, shorter than to about equaling the calyx, these and the calyx villous or hirsute with relatively few-armed or sometimes simple hairs, the longest arm up to 3 mm. long; calyx commonly 15–20 mm. long, more or less angulate in the bud, the lobes longer than the short tube, deltoid-lanceolate from a broader base, acuminate; petals mostly 20–30 mm. long; carpels up to 4 mm. long and about $\frac{3}{4}$ as wide, distinctly stalked, deeply and rather narrowly incised; seeds 2.5–3 mm. long, rugose-papillate and rather copiously stellulate.

Type from Cambria, San Luis Obispo Co. (*Palmer 50*, in 1876, G).—San Luis Obispo Co., chiefly in the foothills of the Santa Lucia Mountains, reported also from southern Monterey Co., ranging from near sea level to 2000 ft.

Malacothamnus Palmeri is very different from all other species of the genus but is probably related distantly to *M. aboriginum*. It is, apparently, more shade-tolerant than any other *Malacothamnus*.

1a. **Malacothamnus Palmeri** var. **involucratus** (Robins.), comb. nov. *Malvastrum involucratum* Robins. in A. Gray, Syn. Fl. N. Amer. 11: 310 (1897). *Malvastrum Palmeri* var. *involucratus* (Robins.) McMinn, Man. Calif. Shrubs 339 (1939).

Type from Jolon, Monterey Co. (*T. S. Brandegee*, G), cotype from between Jolon and King City, Monterey Co. (*Eastwood*, in 1893, CA).—Known from several localities in Monterey Co. and from Cuesta Pass, San Luis Obispo Co.

This variety, although intergrading rather freely with typical *M. Palmeri*, may be distinguished usually by having distinctly cordate leaves, these glabrous or glabrescent above, broader bracts and bractlets, and smaller flowers. The carpels, in the 2 fruiting specimens examined, are not stalked or shortly and broadly stalked.

2. MALACOTHAMNUS ABORIGINUM (Robins.) Greene, Leaf. Bot. Obs. 1: 208 (1906). *Malvastrum aboriginum* Robins. in A. Gray, Syn. Fl. N. Amer. 11: 311 (1897). *Sphaeralcea aboriginum* (Robins.) Jeps., Fl. Calif. 2: 498 (1936).

Stems up to at least 0.75 m. high, woody below, densely shaggy-tomentose with many-armed hairs; petioles rather stout; blades up to 8 x 12 cm. but mostly much smaller, deltoid-ovate or suborbicular, shallowly to rather deeply 3-lobed, crenate or crenate-dentate, obtuse at apex, shallowly to deeply cordate at base, tomentose on both surfaces, in age thick and rugose; inflorescences spike-like, leafy or nearly naked, the glomerules dense but rather few-flowered, the flowers sessile or subsessile; bractlets broadly lanceolate to deltoid-ovate, subcordate and often somewhat connate at base, shorter than the calyx; calyx 7-9 mm. long, pointed and strongly plicate-angled in the bud, rather sparsely pubescent with very short, many-armed hairs, the lobes much longer than the tube, 5-7 mm. wide at base, abruptly acuminate; carpels 2.5-3 mm. high and about $\frac{3}{4}$ as wide, suborbicular or reniform, barely to conspicuously stalked, very shallowly to rather deeply incised; seeds minutely (often sparsely) papillate-stellulate.

Type from Indian Valley, Monterey (?) Co. (*M. K. Curran*, in 1885, CA).—Known otherwise from several localities in San Benito Co. and from Los Gatos Creek and Alcalde Canyon, western Fresno Co., at altitudes of 700 to 1400 ft.

This species, peculiar in the character of the involucler, has a very limited geographical distribution.

3. *Malacothamnus foliosus* (S. Wats.), comb. nov. *Malvastrum foliosum* S. Wats., Proc. Amer. Acad. 20: 356 (1885).

Stems apparently rather stout (height of plant unknown), shaggy-tomentose with short, many-armed hairs; petioles short, rather slender; blades suborbicular or broadly ovate, very shallowly angulate-lobed, rather coarsely dentate, acute at apex, strongly cuneate at base, thin, not rugose, copiously but not densely pubescent on both surfaces; inflorescence interrupted-thyrsoid-glomerate, very leafy to the apex, the lower glomerules more open (subracemose), the flowers sessile or short-pedicelled; bractlets filiform, about $\frac{1}{2}$ as long as the calyx; calyx 12-16 mm. long, pointed and distinctly angulate in the bud, copiously but not densely pubescent with short, many-armed hairs, the lobes about twice as long as the tube, abruptly long-acuminate, 4-5 mm. wide at base; carpels 2.5-3 mm. high, about $\frac{3}{4}$ as wide, not stalked or shortly and broadly so, very shallowly incised; seeds papillate, minutely stellulate.

Type from Santo Tomás, coast of northern Baja California (*Orcutt*, in 1884, G).—Known definitely only from the type-collection.

This species was reduced by Gray (5, p. 311) to synonymy under *Malvastrum marrubioides* Dur. & Hilg. and there is some resemblance in the shape and dentation of the leaves, but *M. marrubioides* has a less leafy inflorescence and narrower, more

gradually acuminate calyx-lobes. Wiggins (13), considered it to be more nearly related to *Malvastrum densiflorum* S. Wats., as did Watson himself, but from the latter, *M. foliosus* differs in its very leafy inflorescence and broader calyx-lobes, these with shorter hairs.

4. *Malacothamnus paniculatus* (A. Gray), comb. nov. *Malvastrum marrubioides* var. *paniculatum* A. Gray, Proc. Amer. Acad. 22: 290 (1887). *Malvastrum paniculatum* (A. Gray) Wiggins, Madroño 10: 184 (1950).

Plant shrubby, 1–2.5 m. high, the stems densely shaggy-tomentose with yellowish hairs; leaves short-petioled, the blades up to 8 cm. long and nearly as wide, broadly deltoid-ovate, scarcely to shallowly 3-lobed, obtuse or acutish at apex, more or less cuneate at base, coarsely to finely crenate, rather thin, not rugose, copiously pubescent on both surfaces with short, many-armed hairs; inflorescences open-paniculate, the branches up to 30 cm. long, loosely cymose, the flowers mostly on long slender pedicels; bractlets filiform, about $\frac{1}{2}$ as long as the calyx; calyx 11–15 mm. long, pointed and plicate-angled in the bud, copiously but not densely pubescent with short, many-armed hairs, the lobes about twice as long as the tube, (3) 5–8 mm. wide at the subcordate base, abruptly and sharply long-acuminate; carpels about 2.5 mm. high and nearly as wide, suborbicular, not stalked, moderately incised; seeds papillate-stellulate.

Type from Ensenada de Todos Santos, Baja California (*Orcutt*, in 1886, G).—Known definitely only from northwestern Baja California, presumably near sea level, although reported by McMinn (11, p. 345) “from the hills bordering Lake Elsinore, Riverside County.”

This differs from the other species with wide calyx-lobes in the open-paniculate inflorescence and the mostly long-pedicelled flowers.

5. *Malacothamnus niveus* (Eastw.), comb. nov. *Malvastrum fragrans* Eastw., Leaf. West. Bot. 1: 218 (1936), non Gray & Harv. *Malvastrum niveum* Eastw., ibid. p. 232. *Malvastrum Fremontii* var. *niveum* (Eastw.) McMinn, Man. Calif. Shrubs 343 (1939).

A rather small shrub, the stems densely and closely white-tomentose (sublepidote) with very short hairs; leaves relatively small, the blades up to 4 x 4 cm., broadly deltoid-ovate or suborbicular, very shallowly 3-lobed, shallowly crenate or crenate-dentate, rounded at apex, truncate, subcuneate, or subcordate at base, rather thick, soft-tomentose on both surfaces; inflorescences paniculate, usually open and relatively few-flowered, the longest branchlets usually 4–5 cm. long, the flowers 1–4 on the branchlets, short- to rather long-pedicelled; bractlets subulate (exceptionally filiform), $\frac{1}{3}$ – $\frac{3}{4}$ as long as the calyx, dark-colored; calyx (6) 7–8 (12) mm. long, densely white-lanate (the longest hairs mostly about 1 mm. long), the lobes as long as to

nearly twice as long as the tube, mostly deltoid-ovate or deltoid-lanceolate, acutish to short-acuminate, 2–3 mm. wide at base; petals up to 2 cm. long; carpels 2.5–3 mm. high and nearly as wide, conspicuously and broadly stalked, deeply incised; seeds copiously papillate-stellulate.

Type from El Dorado School near Santa Margarita, San Luis Obispo Co. (*M. E. Wall*, in 1933, CA).—Known from several localities in San Luis Obispo Co., where apparently not infrequent, and from Tepusquet Canyon, Santa Barbara (?) Co., in washes, at elevations of 1300 to 1500 ft.

One of the handsomest species of the genus, with large, fragrant flowers. Although relationship to *M. Fremontii* is indicated by the white-woolly calyx, *M. niveus* is very different in the character of the leaves and inflorescences. The dark-colored bractlets contrast conspicuously with the calyx.

6. *Malacothamnus Helleri* (Eastw.), comb. nov. *Malvastrum Helleri* Eastw., Leaflet West. Bot. 1: 217 (1936). *Sphaeralcea Fremontii* var. *exfibulosa* Jeps., Fl. Calif. 1: 500 (1936). *Malvastrum Fremontii* var. *Helleri* (Eastw.) McMinn, Man. Calif. Shrubs 341 (1939).

A much-branched shrub 1 m. high or higher, the younger branches densely and closely pubescent with very short, many-armed hairs; leaves mostly small, suborbicular-deltoid, not lobed or obscurely so, finely to rather coarsely crenate-dentate, very obtuse to acutish at apex, truncate, subcordate, or subcuneate at base, thickish, the veins prominent beneath; inflorescences many-flowered, narrow, with dense subsessile glomerules, or more openly paniculate with racemiform branchlets up to 6 cm. long; bractlets subulate or filiform, $\frac{1}{2}$ – $\frac{3}{4}$ as long as the calyx; calyx (5) 6–8 mm. long, densely white-woolly, (the longest hairs up to 1.3 mm. long), the lobes about as long (exceptionally nearly twice as long) as the tube, deltoid, acute, 2–3 mm. wide at base; carpels 2.5 mm. high and nearly as wide, suborbicular, rounded at base, very shallowly incised; seeds obscurely stellulate.

Type of *M. Helleri* from Lodoga, Colusa Co., but labelled as from "near Ladoga, Lake County" (*Heller 13242*, CA), type of *S. Fremontii* var. *exfibulosa* from "Putah Creek, in gravel bed, near Winters," Yolo Co., (*Jepson 16741*).—Known also from near Lower Lake, Lake Co., and Capay Valley, Yolo Co. The type grew in the *Quercus Douglasii* belt with "*Ceanothus*, *Adenostoma*, and *Toxicodendron*." In the herbarium of the California Academy there are specimens of *M. Helleri* purporting to have been collected in Sespe Gorge, Ventura Co., but it is highly improbable that they were collected so far to the south.

The white-woolly calyx indicates relationship to *M. Fre-*

montii, but the close pubescence of the herbage and the shape of the leaves sufficiently distinguish *M. Helleri*. From *M. niveus* the characters given in the key afford ample distinction.

7. MALACOTHAMNUS ORBICULATUS (Greene) Greene, Leaf. Bot. Obs. 1: 208 (1906). *Malvastrum orbiculatum* Greene, Fl. Francisc. 109 (1891). *Malvastrum Fremontii* var. *orbiculatum* (Greene) Johnst., Pl. World 22: 109 (1919). *Sphaeralcea orbiculata* (Greene) Jeps., Fl. Calif. 2: 499 (1936).

Plant shrubby or the stems often herbaceous or nearly so above the caudex, up to about 2 m. high, the rather stout branches densely but rather loosely pubescent (more or less shaggy); leaves rather large, the petioles mostly short and stout, the blades up to 8 cm. long and wide, suborbicular or reniform (wider than long), nearly entire to shallowly 3-5-lobed, mostly crenate (often coarsely so), rounded or truncate at apex, subcordate to deeply cordate at base, thin, more or less copiously but not densely stellate on both surfaces, only the larger veins prominent beneath; inflorescences narrow, elongate, leafy only at base, the longest branchlets up to 10 cm. long but usually much shorter, the glomerules often rather loosely flowered or shortly racemose, the flowers subsessile or short-pedicelled; bractlets subulate or filiform, $\frac{1}{4}$ - $\frac{3}{4}$ as long as the calyx; calyx 7-10 (14) mm. long, woolly or (commonly) more loosely and sparsely pubescent (the longest hairs up to 2 mm. long, but usually shorter), the lobes about as long as to 2.5 (commonly at least 1.5) times as long as the tube, deltoid or deltoid-lanceolate, acute to sharply attenuate-acuminate, 1.5-3 (rarely 4) mm. wide at base; carpels 2.2-3.2 mm. high and nearly as wide, ovate to suborbicular, not or shortly stalked, very slightly to rather deeply incised; seeds sparsely to copiously stellulate and often papillate.

Type from "mountains south of Tehachapi," Kern (?) Co., (Greene, in 1889, ND).—Mountains of northern Ventura, Kern, Los Angeles, San Bernardino, and Inyo counties, especially abundant on the northern slopes of the San Gabriel and San Bernardino mountains and the eastern slopes of the Sierra Nevada, at elevations of (2770) 4000 to 9000 ft., attaining higher altitudes than any other species of *Malacothamnus*. The plant ascends to the pine belt (ponderosa and Jeffrey pines). West of Independence, Inyo County, it occurs as widely scattered individuals in very open chaparral of *Arctostaphylos*, *Castanopsis*, *Ceanothus*, etc., at elevations of 7000 to 8500 ft. These plants were small, less than 1 m. high, with stems entirely herbaceous above the woody caudex.

Malacothamnus orbiculatus is the most difficult species of the genus to define satisfactorily. It is related on the one hand to *M. Fremontii* and on the other to *M. marrubioides*. It differs

from the former chiefly in the relatively thin and rather sparsely pubescent leaves. The calyx also is usually more sparsely pubescent than in *M. Fremontii* and the geographical distributions apparently do not overlap, *M. Fremontii* not being known from farther south than Tulare Co. and being a plant of usually much lower altitudes. As compared with *M. marrubioides*, *M. orbiculatus* is distinguished by its larger, cordate, crenate leaves.

8. MALACOTHAMNUS FREMONTII (Torr.) Greene, Leaflet Bot. Obs. 1: 208 (1906). *Malvastrum Fremontii* Torr. ex A. Gray, Mem. Amer. Acad. ser. 2, 4: 21 (1849). *Sphaeralcea Fremontii* (Torr.) Jeps., Man. Fl. Pl. Calif. 633 (1925).

A straggling shrub up to about 3 m. high, herbaceous above, the stout young stems densely shaggy-tomentose with rather long, many-armed hairs; petioles short and stout; blades suborbicular or reniform (wider than long), up to 6 x 7 cm., not lobed or very shallowly lobed with rounded lobes, coarsely crenate, mostly rounded at apex, more or less cordate (or the upper ones truncate) at base, thick, velvety-tomentose on both surfaces, the principal veins usually stout, prominent beneath; inflorescences narrow, interrupted, leafy only toward base, the glomerules dense, sessile or nearly so, the flowers sessile or subsessile; bractlets subulate or filiform, mostly $\frac{1}{2}$ – $\frac{3}{4}$ as long as the calyx; calyx (6) 7–8 (10) mm. long, conspicuously and densely white-lanate, the pubescence almost concealing the lobes at least in the (nearly globose) buds, the hairs many-armed, seldom more than 1.5 mm. long, the lobes in anthesis about as long as the tube, deltoid, acute or (exceptionally) short-acuminate, 2–3 (4) mm. wide at base; petals up to 18 mm. long; carpels 2.5 to nearly 4 mm. long, averaging $\frac{3}{4}$ – $\frac{4}{5}$ as wide, suborbicular or obovate, rounded at base to distinctly stalked, shallowly (seldom deeply) incised; seeds papillate-stellulate.

Type from "interior of California" (*Frémont*, in 1846, NY).³—Western foothills of the Sierra Nevada from (Placer?) Amador Co. to Tulare Co., with outlying stations in the Yollo Bolly foothills, Tehama Co., and at North Butte, Sutter Co., ranging from (200?) 500 to 2500 ft. Although having a rather extensive geographical distribution, *M. Fremontii* apparently is nowhere common, the plants occurring singly or in very small colonies at each station. Near Springville, Tulare Co., it grew in association with *Quercus Wislizeni*, *Rhus diversiloba*, *Eriodictyon* sp., *Lupinus albifrons*, *Diplacus* sp., etc.

9. *Malacothamnus Howellii* (Eastw.), comb. nov. *Malvastrum Fremontii* var. *cercophorum* Robins. in A. Gray, Syn. Fl. N. Amer. 11: 311 (1897).

³"Fremont probably collected the type specimens on the western slope of the Sierra Nevada, along the American Fork of the Sacramento River" (F. V. Coville, Contrib. U. S. Nat. Herb. 4: 73).

Sphaeralcea Fremontii var. *cercophora* Jeps., Man. Fl. Pl. Calif. 634 (1925). *Malvastrum Howellii* Eastw., Leaf. West. Bot. 1: 220 (1936). *Malvastrum Howellii* var. *cordatum* Eastw., ibid.

Inflorescences more or less expanded, the longest branchlets up to 10 cm. long, the glomerules usually distinctly stalked and often racemiform, the flowers mostly short-pedicelled; bractlets $\frac{2}{3}$ as long as to about equaling the calyx, subulate or filiform; calyx (8) 9–12 (16) mm. long, densely lanate, the hairs up to 2 mm. long, the lobes somewhat longer than to more than twice as long as the tube, usually deltoid-lanceolate, acuminate, often sharply attenuate-acuminate. Similar in other characters to *M. Fremontii*.

Type from Nortonville, Contra Costa Co. (*J. T. Howell* 6470, CA), type of var. *cordatum* from Junto del Puerto Canyon, western Stanislaus Co. (*C. Dudley*, in 1935, CA), type of *M. Fremontii* var. *cercophorum* from Arroyo del Valle, Alameda Co. (*Greene*, in 1895, UC).—Contra Costa, Alameda, eastern Santa Clara, and western Stanislaus counties, also Swiss Ranch, Calaveras Co., and Bissett's Ranch, Madera Co., centered principally on and near Mount Diablo and on the east side of the Mount Hamilton Range, ranging from 500 to 3500 (4300?) ft. At Nortonville, the type-locality of *M. Howellii*, the plants were associated with *Adenostoma*, *Artemisia californica*, *Salvia mellifera*, *Dendromecon*, etc.

Although there is some intergradation with *M. Fremontii*, the more open inflorescences and the larger, much more deeply cleft calyx together with the mainly different geographical distribution, seem to warrant recognition of *M. Howellii* as a species. The herbage and flowers are fragrant, as is also the case in *M. Fremontii*.

10. **Malacothamnus clementinus** (Munz & Johnst.), comb. nov. *Malvastrum clementinum* Munz & Johnst., Bull. Torr. Bot. Club 51: 296 (1924). *Sphaeralcea orbiculata* (Greene) Jeps. var. *clementina* (Munz & Johnst.) Jeps., Fl. Calif. 2: 499 (1936).

A rounded shrub up to 1 m. high with numerous ascending branches, these shaggy-tomentose when young with rather long, many-armed hairs; petioles short and rather stout; blades up to 5 cm. long, somewhat wider than long, rather deeply and somewhat angulately 5-lobed, rather deeply crenate with numerous teeth, acutish at apex, cordate at base with a broad or rather narrow sinus, thin, bright green above, pale beneath, sparsely pubescent or glabrescent above, copiously but not very densely pubescent beneath with both very short and longer hairs, not prominently reticulate beneath; inflorescences thyrsoid-glomerate, not conspicuously interrupted, leafy only at base, the glomerules dense, sessile or nearly so, the flowers

sessile or subsessile; bractlets filiform, about $\frac{3}{4}$ as long as the calyx, villous; calyx 7–9 mm. long, not angulate in the bud, densely villous (especially the tube) with relatively few-armed hairs up to 2 mm. long, the lobes about as long as to twice as long as the tube, deltoid-lanceolate, gradually and sharply acuminate, 2–2.5 mm. wide at base; petals about 15 mm. long, the claws conspicuously ciliate; mature fruit not seen but the carpels described as 2.5–3 mm. high and stellate-tomentose at apex (Munz & Johnst., *ibid.*).

Type from Lemon Tank, San Clemente Island (*P. A. Munz 6684*, Po).—Known only from the type-locality, where it is apparently very rare, growing at the “base of rocky walls in a deep canyon on the northeast side of the island” (Estes, p. 85).

This strikingly handsome and very distinct species is not closely related to any other, although, as the authors of the species suggested, it may have some affinity with *M. fasciculatus*. It differs from all forms of that species in the long-hairy calyx and other characters. To *M. densiflorus*, with which it is associated in the key on account of the long calyx-hairs, it has no near affinity.

11. MALACOTHAMNUS DENSIFLORUS (S. Wats.) Greene, *Leaf. Bot. Obs.* 1: 208 (1906). *Malvastrum densiflorum* S. Wats., *Proc. Amer. Acad.* 17: 368 (1882). *Malvastrum densiflorum* var. *typicum* Estes, *Bull. S. Calif. Acad. Sci.* 24: 85 (1925). *Sphaeralcea densiflora* (S. Wats.) Jeps., *Man. Fl. Pl. Calif.* 633 (1925).

Stems erect, woody below, up to 2 (3?) m. high; herbage yellowish-pubescent with stellate hairs and obscurely granular-puberulent; leaves rather small, seldom more than 4 cm. long, sometimes shallowly 3-lobed, broadly ovate, rounded to acutish at apex, subcuneate, truncate, or subcordate at base, shallowly crenate or dentate, thin or thickish, not conspicuously reticulate beneath; inflorescences spike-like, conspicuously interrupted (the internodes elongate), naked or nearly so, the glomerules dense, sessile or subsessile, the flowers sessile or short-pedicelled; bractlets filiform, equaling or longer than the calyx, hirsute-ciliate; calyx 10–14 mm. long, hirsute with few-armed or simple hairs, these 2–3 mm. long, the calyx-lobes 2–3 times as long as the strongly ribbed tube, lanceolate, attenuate-acuminate, 2–3 mm. wide at base; carpels 2.2–2.8 mm. high, about $\frac{4}{5}$ as wide, suborbicular, oval, or ovate, not stalked or very slightly so, shallowly incised; seeds minutely papillate-stellulate.

Types from the San Jacinto Mountains, Riverside Co. (*Parish Bros. 738*, *W. G. Wright*, in 1881, G).—Santa Ana and San Jacinto mountains, Riverside Co., to northern Baja California, 1000 to 3000 (4000?) ft.

McMinn (11, p. 345) considered *M. densiflorus* "identical to *M. marrubioides* D. & H.," but although these species superficially resemble each other, *M. densiflorus* differs from *M. marrubioides* in the longer, more interrupted inflorescence, denser glomerules, and much longer calyx-hairs, as well as in geographical distribution.

11a. *Malacothamnus densiflorus* var. *viscidus* (Abrams), comb. nov. *Malvastrum viscidum* Abrams, Bull. Torr. Bot. Club 34: 264 (1907). *Malvastrum densiflorum* var. *viscidum* (Abrams) Estes, Bull. S. Calif. Acad. Sci. 24: 85 (1925). *Sphaeralcea densiflora* var. *viscida* (Abrams) Jeps., Fl. Calif. 2: 498 (1936). *Malvastrum marrubioides* var. *viscidum* (Abrams) McMinn, Man. Calif. Shrubs 345 (1939).

Type from El Nido, San Diego Co. (*L. Abrams 3528*, St).—San Diego Co. and northern Baja California, from near sea level to 3000 ft., apparently commoner than typical *M. densiflorus*.

This variety differs usually from the species in its more deeply cordate leaves, relatively short bractlets (not more than $\frac{2}{3}$ as long as the calyx), and smaller calyx (7–10 mm. long) with deltoid-ovate, more abruptly acuminate lobes and often shorter hairs. Intergradation with typical *M. densiflorus* is complete, however, and specimens of more or less intermediate character are about as numerous as specimens of the typical phase and of var. *viscidus*. Occasional specimens of var. *viscidus*, as was noted by Fosberg, have the calyx-lobes glabrous except toward the margin. According to Estes (4, p. 86) the plant is similar in habit and habitat to typical *M. densiflorus*, being "a slender open shrub 6–8 feet high."

12. *Malacothamnus Abbottii* (Eastw.), comb. nov. *Malvastrum Abbottii* Eastw., Leaf. West. Bot. 1: 215 (1936).

"An erect shrub 3 to 6 feet high, with white-tomentose herbage" (11, p. 349); stems densely and closely stellate (sublepidote) with very short hairs; leaves up to 6 cm. long and very nearly as wide, scarcely lobed, rounded at apex, truncate or subcordate at base, coarsely crenate with broad rounded teeth, thickish, prominently reticulate beneath; inflorescence very open, with slender, more or less flexuous branchlets often 15 cm. long or longer, the flowers cymosely or racemosely disposed, mostly distinctly pedicelled; bractlets $\frac{1}{2}$ – $\frac{2}{3}$ as long as the calyx, broadly subulate, thick, whitish; calyx 9–11 mm. long, angulate and pointed in the bud, whitish-lepidote, the lobes 2–3 times as long as the tube, sharply and somewhat abruptly acuminate, about 3 mm. wide at base; petals 15–20 mm. long; mature fruit unknown.

Type from "among willows on the Salinas River, Monterey Co." (*E. K. Abbott*, in 1889, CA).—An exceptionally handsome, large-flowered species, apparently known only from the type-collection.

13. *Malacothamnus gracilis* (Eastw.), comb. nov. *Malvastrum gracile* Eastw., *Leaflet West. Bot.* 1: 219 (1936).

An erect, rather slender-branched shrub 1–2 m. high; young stems densely and closely whitish-stellate (sublepidote); leaves slender-petioled, the blades small (less than 3 cm. long and wide, so far as known), broadly deltoid-ovate, very shallowly lobed, crenate, very obtuse at apex, truncate or sub-cuneate at base, thickish, rather prominently reticulate beneath; inflorescence a very open, relatively few-flowered panicle with slender, more or less flexuous branchlets up to 8 cm. long, the flowers cymosely or racemosely disposed, mostly distinctly pedicelled; bractlets about $\frac{1}{2}$ as long as the calyx, narrowly subulate, thin, dark-colored; calyx 6–7 mm. long, not angulate in the bud, opening before anthesis, dark-colored, the lobes less than twice as long as the tube, gradually acuminate, not more than 2.5 mm. wide at base; petals 15–20 mm. long; carpels 3 mm. high and about $\frac{2}{3}$ as wide, broadly short-stalked, shallowly incised; seeds stellulate in patches.

Type from between Arroyo Grande and Huasna, San Luis Obispo Co. (*Eastwood 14996*, CA).—Apparently known only from the type-collection and one from Arroyo Grande (*R. F. Hoover 7905*).

This beautiful and rare plant is evidently related to *M. Abbottii* but is readily distinguishable by the characters given in the key. It seems to be unique in the dark color and early opening of the calyx.

14. *MALACOTHAMNUS DAVIDSONII* (Robins.) Greene, *Leaflet Bot. Obs.* 1: 208 (1906). *Malvastrum Davidsonii* Robins. in Gray, *Syn. Fl. N. Amer.* 11: 312 (1897). *Sphaeralcea Davidsonii* (Robins.) Jeps., *Man. Fl. Pl. Calif.* 634 (1925).

A large shrub up to 5 m. high, with stout, shaggy-tomentose branches; petioles very stout; blades very large, up to 9 x 11 cm., mostly wider than long, usually deeply and often angulately 3–5-lobed, crenate or crenulate, rounded to acutish at apex, deeply cordate at base, thick, velvety-tomentose on both surfaces, the principal veins very stout and prominent beneath; inflorescences paniculate, mostly narrowly so, commonly leafy, the ultimate branchlets short and stout, several- to many-flowered, the flowers more or less racemosely disposed, mostly short-pedicelled; bractlets less than $\frac{1}{2}$ as long as the calyx, subulate; calyx 6–9 mm. long, copiously but rather loosely pubescent with many-armed hairs, slightly angulate in the bud, the lobes about equaling to twice as long as the tube, deltoid, acute or short-acuminate, 2–3 mm. wide at base, the margins white-lanate; carpels 2.5–3.5 mm. high and $\frac{2}{3}$ – $\frac{4}{5}$ as wide, asymmetrically ovate, distinctly stalked, moderately to rather deeply incised.

Type from San Fernando Valley, Los Angeles Co. (*A. Davidson*, in 1895, G).—Los Angeles Co., especially in and near the San Fernando Valley, where apparently rather common, reported by Estes (4) also from Ojai Valley, Ventura Co., up to 1000 (1500?) ft., along washes and on dry slopes.

An apparently very local species, *M. Davidsonii* is notable in having thick, velvety-tomentose leaves (as in *M. Fremontii*) that are also rather deeply and angulately lobed (as is often the case in *M. fasciculatus*). Hybridization with the latter (var. *laxiflorus*) may occur, a collection in Pacoima Wash, Los Angeles Co. (*J. T. Howell* 5169, in part) being nearly intermediate in its characters.

15. MALACOTHAMNUS MARRUBIOIDES (Dur. & Hilg.) Greene, Leaf. Bot. Obs. 1: 208 (1906). *Malvastrum marrubioides* Dur. & Hilg., Jour. Acad. Phila. ser. 2, 3: 38 (1855). *Malvastrum gabrielse* Munz & Johnst., Bull. Torr. Bot. Club 52: 223 (1925). *Sphaeralcea densiflora* var. *gabriensis* (Munz & Johnst.) Jeps., Fl. Calif. 2: 498 (1936).

Plant shrubby, up to about 2 m. high, the branches rather slender, densely but not closely stellate-tomentose when young; leaves (so far as known) slender-petioled, the blades rather small, usually not more than 4 cm. long and wide, suborbicular-deltoid, not or obscurely lobed, dentate or crenate-dentate, mostly acute at apex, truncate or subcordate at base, thickish, somewhat prominently reticulate beneath, copiously but not densely pubescent on both surfaces with short, many-armed hairs; inflorescences interrupted-thyrsoid-glomerate, usually short, leafy nearly to the apex or naked except at base, the glomerules few-flowered, sessile or short-stalked, the flowers sessile or short-pedicelled; bractlets $\frac{1}{2}$ as long as to nearly equaling the calyx, subulate or filiform; calyx 9–12 mm. long, more or less pointed and angulate in the bud, loosely short-pubescent with many-armed hairs (the longest arm scarcely more than 1 mm. long), the lobes 1.5–3 times as long as the tube, lanceolate or lance-ovate, somewhat abruptly and sharply long-acuminate, 2–3 (4) mm. wide at base; carpels 2.5–3.5 mm. high and usually nearly as wide, obovate to nearly orbicular, truncate or rounded (exceptionally distinctly stalked) at base, shallowly (seldom rather deeply) incised; seeds copiously papillate-stellulate.

Type of *M. marrubioides* from Fort Miller (Millerton), Madera or Fresno Co. (*Heermann*, in 1853, isotypes G, US), type of *M. gabrielse* from "Arraster" (Arrastre Creek?) north slope of the San Gabriel Mountains, Los Angeles Co. (*F. W. Peirson* 774, Po).—The site of Fort Miller or Millerton is now within the Friant Reservoir and the species has not been collected since so far to the north. It is known from the mountains of Kern, Ven-

tura, and Los Angeles counties, 1500 to 7000 ft., but apparently is quite rare. A specimen in the herbarium of the University of California (*K. Curran*, in 1885), labelled as from Livermore, Alameda Co., was almost certainly collected much farther south.

Jepson (7, p. 500) reduced *M. marrubioides* to synonymy under *Sphaeralcea* [*Malacothamnus*] *Fremontii*, but it is readily distinguished from that species by its smaller, dentate rather than crenate, less tomentose leaves and less densely pubescent calyx. Also, according to J. T. Howell, who collected the plant in the Tehachapi Mountains, it lacks the characteristic fragrance of *M. Fremontii*. Although superficially resembling *M. densiflorus*, the nearest relative of *M. marrubioides* seems to be *M. orbiculatus*, which differs in its larger, thinner, cordate, crenate leaves and looser inflorescences. Specimens from Mt. Pinos, Alamo Peak, and Sespe Gorge, Ventura Co., however, approach *M. orbiculatus* in their looser, longer-stalked inflorescences. They tend also to have a smaller and less deeply cleft calyx with more gradually acuminate lobes than in typical *M. marrubioides*.

16. *MALACOTHAMNUS ARCUATUS* (Greene) Greene, *Leaflet Bot. Obs.* 1: 208 (1906). *Malveopsis arcuata* Greene, *Man. Reg. S. F. Bay* 66 (1894). *Malvistrum arcuatum* (Greene) Robins. in A. Gray, *Syn. Fl. N. Amer.* 11: 311 (1897). *Sphaeralcea arcuata* (Greene) Arthur, *Torreyia* 21: 11 (1921).

Stems up to 2 m. high, woody below, stout, copiously and loosely stellate-tomentose (more or less shaggy) with many-armed hairs; leaves suborbicular to rhombic-ovate, up to 6 cm. long, usually longer than wide, very shallowly 3-5-lobed (the lobes rounded to somewhat angulate), rounded to acutish at apex, subcuneate, truncate, or subcordate at base, coarsely crenate to rather finely crenate-dentate, sparsely to copiously but not densely pubescent on both surfaces, usually thin and plane but sometimes thickish and prominently rugose-reticulate beneath; inflorescences elongate, narrow, interrupted-thyrsoid-glomerate, usually naked except at base, the glomerules dense, few- to many-flowered, sessile or nearly so, the flowers sessile or subsessile; bractlets $\frac{1}{3}$ - $\frac{2}{3}$ as long as the calyx, subulate; calyx 5-7 (9) mm. long, not angulate in bud, rather sparsely to copiously but not densely pubescent with short, many-armed hairs, the lobes deltoid, acute, about as long as the tube; carpels about 3 mm. high and nearly $\frac{3}{4}$ as wide, obovate, more or less stalked, very shallowly to rather deeply incised, copiously stellulate apically and for a short distance ventrally and dorsally; seeds (always?) papillate-stellulate and somewhat rugose.

Type from the "Coast Range back of Belmont," San Mateo Co. (*E. L. Greene*, in 1886, UC?).—San Mateo, Santa Clara, and

Santa Cruz counties, apparently rather common on the eastern side of the Outer Coast Range, up to about 800 ft., slopes, canyons and bottom lands. A specimen in the herbarium of the California Academy of Sciences (*Eastwood 4925*), labelled as from Duarte, Los Angeles Co., seems to be typical *M. arcuatus*, but it is highly improbable that the species extends so far to the south.

This species is quite variable in its vegetative characters, the variation probably due largely to differences in habitat. Although it is placed next to *M. marrubioides* in the key, its nearest relative is probably *M. Hallii*, which, in turn, seems to be allied to *M. fasciculatus*. In fact the inflorescences of *M. arcuatus* are strikingly like those of *M. fasciculatus*. In its less woody habit, obscurely lobed leaves, and more loosely pubescent stems and calyx, *M. arcuatus* differs, however, from all forms of *M. fasciculatus*. What appears to be a form of *M. arcuatus*, with smaller and more rounded leaves, was collected on Loma Prieta, Santa Cruz Co. (*Bond*, in 1928) at the unusual elevation of 3500 ft.

17. *Malacothamnus mendocinensis* (Eastw.), comb. nov. *Malvastrum mendocinense* Eastw., *Leafl. West. Bot.* 2: 188 (1939).

Plant woody below, up to 2 m. high; stems erect, rather stout, striate-angulate, very closely short-pubescent (sublepidote); leaves short-petioled, the blades up to 5 cm. long and wide, ovate to suborbicular, shallowly to rather deeply and somewhat angulately 3-5-lobed, shallowly crenate, rounded at apex, cordate (often deeply so) at base, thickish, copiously and minutely stellate-pubescent on both surfaces; inflorescences elongate, leafy at least below, narrowly paniculate, the short, loosely flowered branchlets stiffly ascending, the flowers mostly short-pedicelled; bractlets barely $\frac{1}{4}$ as long as the calyx, subulate, thickish; calyx 5-6 mm. long, somewhat angulate in bud, densely sublepidote with extremely short, many-armed hairs, the broadly deltoid, acutish lobes equaling or somewhat shorter than the tube; petals 10-12 mm. long; carpels about 2.2 mm. high and very nearly as wide, not stalked, barely incised.

Types from 5 miles southwest of Ukiah, Mendocino Co., about 700 ft., "on a bank alongside the road" (*Eastwood & Howell 4582, 6092, CA*).—Known only from the type-locality or very near it.

An extremely rare and local species, apparently the only representative of the genus in Mendocino Co. It is the smallest-flowered of all *Malacothamni*. It seems to belong to the *M.*

fasciculatus group and is probably most nearly related to *M. Hallii*, from which it differs in its less woody habit, conspicuously striate-angulate stems, shorter bractlets, and smaller corollas.

18. *Malacothamnus Hallii* (Eastw.), comb. nov. *Malvastrum Hallii* Eastw., Leaflet West. Bot. 1: 216 (1936). *Sphaeralcea fasciculata* var. *Elmeri* Jeps., Fl. Calif. 1: 501 (1936).

A very woody shrub with stout, straggling to suberect stems up to 3 m. long; herbage densely and closely pubescent (sublepidote); leaves rather long-petioled, the blades up to 7 cm. long and 8 cm. wide, broadly ovate to suborbicular, shallowly 3-5-lobed with rounded (rarely somewhat angulate) lobes, coarsely to rather finely crenate, rounded (seldom acutish) at apex, deeply cordate to subcordate at base, thin and plane to thick and rugose with veins prominent beneath; inflorescences narrowly thyrsoid-glomerate with sessile glomerules, or more openly paniculate with the longest branchlets up to 10 cm. long, the flowers mostly pedicelled; bractlets about $\frac{1}{3}$ as long as the calyx, subulate or filiform; calyx 5-6 mm. long, not angulate in the bud, densely pubescent with very short, many-armed hairs, the lobes deltoid-ovate, acute or acutish, about as long as the tube; petals 15-17 mm. long; carpels 2-3 mm. high and about $\frac{3}{4}$ as wide, not to distinctly stalked, very shallowly (rarely somewhat deeply) incised, sparsely to densely stellulate apically and subapically; seeds papillate-stellulate and often somewhat rugose.

Type of *M. Hallii* from Mt. Diablo, Contra Costa Co. (*Hall & Essig 10131*, CA), type of *S. fasciculata* var. *Elmeri* also from Mt. Diablo (*Elmer 4395*, Jepson Herbarium?). — Mt. Diablo, Contra Costa Co., and Mt. Hamilton Range, Santa Clara and Merced counties, mostly on the western slopes of this range but extending 2 miles east of the summit of Pacheco Pass, 250 to 1200 ft. It usually grows in association with *Adenostoma*, *Artemisia californica*, and *Salvia mellifera*.

Malacothamnus Hallii is related to *M. fasciculatus*. It was treated as a variety of the latter by Jepson (ibid., as *Sphaeralcea*) and was reduced to synonymy under *Malvastrum fasciculatum* var. *laxiflorum* by McMinn (11, p. 348), although the inflorescences are sometimes as narrowly thyrsoid-glomerate as in typical *M. fasciculatus*. The great variability of *M. Hallii* makes it impossible to draw a sharp line between it and *M. fasciculatus*, but in general it has more shallowly lobed leaves and smaller calyces. In view of the wide geographical separation of the two species, no form of *M. fasciculatus* being known from farther

north than Santa Barbara Co., the writer considers it expedient to maintain *M. Hallii* as a species.

Specimens from the Mt. Hamilton Range tend to have more contracted inflorescences and more distinctly stalked carpels than those from Mt. Diablo. An unusual specimen, apparently a shade form, with large, thin, coarsely dentate, more or less cuneate leaves, a very open inflorescence, and a deeply cleft calyx with acuminate lobes, was collected at the base of Mt. Diablo (*Rattan*, in 1903).

19. *Malacothamnus Jonesii* (Munz), comb. nov. *Malvastrum Jonesii* Munz, Bull. S. Calif. Acad. Sci. 24: 88 (1925). *Sphaeralcea fasciculata* var. *Jonesii* (Munz) Jeps., Fl. Calif. 2: 501 (1936). *Malvastrum Dudleyi* Eastw., Leaflet West. Bot. 1: 218 (1936).

An (apparently) small shrub with nearly erect branches; herbage densely and closely whitish-tomentose (sublepidote) with very short, many-armed hairs; leaves slender-petioled, the blades up to 4.5 cm. long and nearly as wide, suborbicular to rhombic-ovate, obscurely 3-5-lobed, coarsely and irregularly crenate or crenate-dentate, rounded to acutish at apex, truncate, cuneate, or very slightly subcordate at base, thickish, slender-veined; inflorescences racemiform or very narrowly paniculate, few-flowered, the flowers 1-3 (rarely more) at each node, mostly distinctly pedicelled; bractlets $\frac{1}{3}$ - $\frac{1}{2}$ (exceptionally $\frac{2}{3}$) as long as the calyx, subulate; calyx 6-8 mm. long, sublepidote to copiously but not very densely tomentose with short many-armed hairs, the lobes deltoid or oblong-lanceolate, acute or acutish, slightly to considerably longer than the tube, 2-3 mm. wide at base; carpels about 3 mm. high and nearly as wide, not to conspicuously stalked, usually deeply and acutely incised, sparsely stellulate apically-ventrally; seeds papillate-stellulate.

Type of *M. Jonesii* from Paso Robles, San Luis Obispo Co. (*M. E. Jones* 223, Po), type of *M. Dudleyi* from Fern Canyon 2 miles west of Paso Robles (*C. Dudley*, in 1929, CA).—Known only from San Luis Obispo Co. (and southern Monterey Co.?) where it has been collected also in the Santa Lucia Mountains and near Atascadero.

This insufficiently known species shows some affinity to *M. fasciculatus* although, in the occasionally somewhat woolly calyx, it resembles members of the *M. Fremontii* group, especially *M. niveus*, which has much the same geographical distribution. It is unique in its greatly reduced inflorescences. The type of *M. Dudleyi* differs from the type of *M. Jonesii* in its cuneate-flabelliform leaves and more deeply cleft calyx, but the two seem to be conspecific.

20. *Malacothamnus Parishii* (Eastw.), comb. nov. *Malvastrum Parishii* Eastw., Leaflet West. Bot. 1: 216 (1936).

Apparently a shrub, with erect branches, the younger stems very densely lepidote with minute, many-armed hairs, the pubescence apparently yellowish; leaves slender-petioled, the blades rhombic-ovate, up to 6.5 x 5.5 cm., very shallowly and obtusely 3-lobed, coarsely crenate, obtuse to acutish at apex, cuneate at base, thickish, green and glabrescent above, densely whitish-lepidote beneath, the veins prominent beneath; inflorescence a very open and rather few-flowered panicle with ascending branchlets (the lower ones elongate), nearly naked (the floral leaves much reduced), the flowers racemously disposed on the branchlets, short-pedicelled; bractlets $\frac{1}{4}$ – $\frac{1}{3}$ as long as the calyx, subulate; calyx 8–9 mm. long, angulate and pointed in bud, densely sublepidote with many-armed hairs, the lobes about twice as long as the tube, deltoid-lanceolate, very acute; petals about 15 mm. long; carpels (immature) about 3 mm. long and $\frac{2}{3}$ as wide, conspicuously stalked, shallowly incised, stellulate at apex; seeds papillate-stellulate.

Type from near San Bernardino, San Bernardino Co., 1000 to 1500 ft. (*S. B. Parish 3804*, in 1895, CA).—Known only from the type-collection.

The material available is too scanty to permit a final conclusion as to the status of this plant. It is very similar to *M. fasciculatus* var. *laxiflorus* in characters of the inflorescence, flowers, and fruit but differs markedly in leaf-shape from any specimen of the *M. fasciculatus* complex that the writer has seen. Also the flower-buds are more angulate and pointed than is usual in *M. fasciculatus* and its varieties.

21. *MALACOTHAMNUS FASCICULATUS* (Nutt.) Greene, Leaflet Bot. Obs. 1: 208 (1906). *Malva fasciculata* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 225 (1838). *Malvastrum Thurberi* A. Gray, Mem. Amer. Acad. ser. 2, 5: 307 (1855). *Malvastrum fasciculatum* (Nutt.) Greene, Fl. Francisc. 108 (1891). *Sphaeralcea fasciculata* (Nutt.) Arthur, Torreya 21: 11 (1921). *Malvastrum fasciculatum* var. *typicum* Estes, Bull. S. Calif. Acad. Sci. 24: 83 (1925).

Plant shrubby, up to 5 m. high, with long, relatively slender, ascending branches, these when young densely and usually closely sublepidote with many-armed hairs; leaves slender-petioled, the blades up to about 4 cm. long and wide, broadly ovate or suborbicular, usually distinctly and somewhat angulately but not deeply 3–5-lobed, crenate or dentate, rounded to acutish at apex, truncate or shallowly cordate at base, thin or thickish, copiously stellulate or sublepidote on both surfaces with many-armed hairs or glabrescent above, paler beneath; inflorescences elongate, leafy or nearly naked, interrupted-thyrsoid-glomerate, the glomerules often dense, subsessile, and many-flowered but sometimes rather loose, short-stalked, and fewer-flowered, the flowers sessile or short-pedicelled; bractlets $\frac{1}{5}$ – $\frac{1}{2}$ as long as the calyx, subulate; calyx 6–8 mm. long, not or but slightly angulate

in bud, densely to rather loosely subtomentose or sublepidote with short, many-armed hairs, the lobes broadly deltoid, acute or acutish, shorter than to about equaling the tube, 2–3 mm. wide at base; petals up to about 20 mm. long; carpels 2.5–3.2 mm. high and averaging about $\frac{2}{3}$ as wide, mostly conspicuously stalked and deeply incised; seeds papillate-stellulate and often rugose.

Type of *Malva fasciculata* labelled as from Santa Barbara but probably collected at San Diego (*Nuttall*, isotype?, G), type of *Malvastrum Thurberi* labelled, as from Santa Cruz, Sonora (*Thurber*, G) but this surely is an error as to locality.—Los Angeles Co. and southwestern San Bernardino Co. to northern Baja California, common and locally abundant, mostly near the coast at low elevations but reported to range eastward as far as the San Bernardino and Santa Rosa mountains. The occurrence of typical *M. fasciculatus* as far north as Santa Barbara is doubtful.

In *M. fasciculatus* and its varieties some of the calyx-lobes occasionally cohere, giving the appearance of a bilabiate calyx.

21a. *Malacothamnus fasciculatus* var. *laxiflorus* (A. Gray), comb. nov. *Malvastrum splendidum* Kellogg, Proc. Calif. Acad. Sci. 1: 65 (67) (1855). *Malvastrum Thurberi* var. *laxiflorum* A. Gray, Proc. Amer. Acad. 22: 291 (1887). *Malacothamnus fasciculatus splendidus* (Kellogg) Abrams, Bull. N. Y. Bot. Gard. 6: 417 (1910). *Malvastrum laxiflorum* Davids. & Mox., Fl. S. Calif. 233 (1923), wrongly attributed to Gray; (A. Gray) Eastw., Leafl. West. Bot. 1: 219 (1936). *Malvastrum fasciculatum* var. *laxiflorum* (A. Gray) Munz & Johnst., Bull. Torr. Bot. Club 51: 296 (1924). *Sphaeralcea fasciculata* (Nutt.) Jepson var. *laxiflora* (A. Gray) Jepson, Man. Fl. Pl. Calif. 634 (1925).

Malvastrum splendidum, upon which Gray based his *M. Thurberi* var. *laxiflorum*, cannot be identified with certainty from Kellogg's vague description, and the type, collected by Wm. A. Wallace, presumably near Los Angeles, seems not to have been preserved. Since, however, *M. splendidum* was described as "15 to 20 feet high," there is little doubt that it was a form of *Malacothamnus fasciculatus*, and probably var. *laxiflorus*.—Ventura, Los Angeles, San Bernardino, Riverside, and Orange (probably also San Diego) counties, and in northern Baja California, usually at low elevations but up to 5500 feet in the Santa Rosa Mountains, chiefly on the coastal side of the mountains but occasionally on the desert side as at Victorville, San Bernardino Co.

In its extreme form, characterized by a very openly paniculate inflorescence with slender ascending branchlets up to 25 cm. long and with rather long-pedicelled, racemosely disposed flowers, var. *laxiflorus* seems quite distinct from typical *M. fasciculatus*, but the intergradation is complete, as was pointed out by Estes (4, p. 84). There is, perhaps, a tendency for var. *laxiflorus* to have more deeply cordate leaves, relatively longer bractlets, a larger and more deeply cleft calyx with more acuminate lobes, and less deeply incised carpels, but there is no consistent difference in these characters.

21b. *Malacothamnus fasciculatus* var. *catalinensis* (Eastw.), comb. nov. *Malvastrum catalinense* Eastw., Leaflet West. Bot. 1: 215 (1936). *Malvastrum fasciculatum* var. *catalinense* (Eastw.) McMinn, Man. Calif. Shrubs 348 (1939).

Types from near Avalon, Santa Catalina Island (*John Carlson*, in 1915, *Eastwood 6442*, CA).—Commonly supposed to be endemic on Santa Catalina Island, near sea level, but specimens collected at Point Mugu, Ventura Co., near Laguna Beach, Orange Co., and between Oceanside and San Juan Capistrano, San Diego or Orange Co., are not distinguishable from this variety.

Most of the specimens resemble typical *M. fasciculatus* in the contracted inflorescences, but some of them, including the *Carlson* type, have the more open inflorescences of var. *laxiflorus*. Var. *catalinensis* is characterized by large (up to 8 x 8 cm.), thin, often deeply lobed and deeply cordate leaf-blades, these sparsely stellulate or glabrescent above and usually conspicuously paler beneath. The carpels are relatively large, (3.2–3.8 mm. high) and narrow, conspicuously stalked, and deeply incised.

21c. *Malacothamnus fasciculatus* var. *Nuttallii* (Abrams), comb. nov. *Malacothamnus Nuttallii* Abrams, Bull. N. Y. Bot. Gard. 6: 417 (1910). *Malvastrum Nuttallii* Davids. & Mox., Fl. S. Calif. 233 (1923), attributed to Abrams. *Sphaeralcea fasciculata* (Nutt.) Jeps. var. *Nuttallii* (Abrams) Jeps., Fl. Calif. 2: 501 (1936). *Malvastrum fasciculatum* var. *Nuttallii* (Abrams) McMinn, Man. Calif. Shrubs 348 (1939).

Type from Casitas Pass, Ventura Co. (*Abrams*, in 1908, St).—Santa Barbara and Ventura counties, from near sea level to 1500 ft., common and sometimes abundant.

In its typical form this variety is distinguished by having very nearly concolored leaves, scarcely paler and more pubescent be-

neath than above; but a series of fine specimens collected in Ventura Co. by Henry M. Pollard shows every gradation from this state to the distinctly bicolored leaves typical of var. *laxiflorus*. The inflorescences are usually open and long-branched as in var. *laxiflorus*, but are sometimes narrow and contracted, although never so much so as in typical *M. fasciculatus*. Var. *Nuttallii* is a luxuriant form, the stems reaching a height of 6 m. and a diameter of 10 cm. at base. The petioles are long and slender, the blades up to 10 cm. long, deeply lobed, truncate to deeply cordate at base, the inflorescences long and many-flowered, the calyx up to 10 mm. long, the petals up to 25 mm. long, the carpels 3–5 mm. high, about $\frac{2}{3}$ as wide, distinctly to very conspicuously stalked, and deeply incised.

21d. *Malacothamnus fasciculatus* var. *nesioticus* (Robins.), comb. nov. *Malvastrum nesioticum* Robins. in A. Gray, Syn. Fl. N. Amer. 11: 312 (1897). *Malacothamnus nesioticus* (Robins.) Abrams, Bull. N. Y. Bot. Gard. 6: 419 (1910). *Sphaeralcea nesiota* (Robins.) Jeps., Man. Fl. Pl. Calif. 634 (1925). *Sphaeralcea fasciculata* var. *nesiota* (Robins.) Jeps., Fl. Calif. 2: 501 (1936). *Malvastrum fasciculatum* var. *nesioticum* (Robins.) McMinn, Man. Calif. Shrubs 348 (1939).

Type from Santa Cruz Island (*Greene*, in 1886, G).—Known only from Santa Cruz Island.

This extremely local variety differs from all other forms of *M. fasciculatus* in the fastigiate character of the loosely many-flowered panicle, the numerous rather rigid branches mostly erect or strictly ascending, and the flowers cymosely disposed on the branchlets. In all other characters it resembles var. *catalinensis*, the leaves being large (up to 7 x 8 cm.), thin, rather deeply lobed, and deeply cordate at base, and the carpels being about 4 mm. high, distinctly but shortly stalked, and deeply incised.

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INDEX BY SPECIES NUMBER

(with partial reference to synonymy, in italics)

- | | |
|---|---|
| Abbottii 12 | <i>gabrielense</i> 15 |
| aboriginum 2 | gracilis 13 |
| arcuatus 16 | Hallii 18 |
| <i>catalinense</i> 21b | Helleri 6 |
| clementinus 10 | Howellii 9 |
| Davidsonii 14 | var. <i>cordatum</i> 9 |
| <i>densiflora</i> var. <i>gabrielensis</i> 15 | <i>involucratum</i> 1a |
| <i>densiflorum</i> var. <i>typicum</i> 11 | Jonesii 19 |
| densiflorus 11 | <i>laxiflorum</i> 21a |
| var. <i>viscidus</i> 11a | marrubioides 15 |
| <i>Dudleyi</i> 19 | var. <i>paniculatum</i> 4 |
| <i>fasciculata</i> var. <i>Elmeri</i> 18 | var. <i>viscidum</i> 11a |
| var. <i>Jonesii</i> 19 | mendocinensis 17 |
| <i>fasciculatum</i> var. <i>typicum</i> 21 | <i>nesioticum</i> 21d |
| fasciculatus 21 | niveus 5 |
| var. <i>catalinensis</i> 21b | <i>Nuttallii</i> 21c |
| var. <i>laxiflorus</i> 21a | <i>orbiculata</i> var. <i>clementina</i> 10 |
| var. <i>nesioticus</i> 21d | orbiculatus 7 |
| var. <i>Nuttallii</i> 21c | Palmeri 1 |
| <i>splendidus</i> 21a | var. <i>involucratum</i> 1a |
| foliosus 3 | paniculatus 4 |
| <i>fragrans</i> 5 | Parishii 20 |
| Fremontii 8 | <i>splendidum</i> 21a |
| var. <i>cercophorum</i> 9 | <i>Thurberi</i> 21 |
| var. <i>exfibulosa</i> 6 | var. <i>laxiflorum</i> 21a |
| var. <i>Helleri</i> 6 | <i>viscidum</i> 11a |
| var. <i>niveum</i> 5 | |
| var. <i>orbiculatum</i> 7 | |

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[Begin Page: Text]

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Vol. VI No. 6 G

LEAFLETS

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WESTERN BOTANY

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PAGE

The Genus *Malacothamnus*, Greene (Malvaceae) . 113

Thomas H. Kearney

San Francisco, California

April 20, 1951

[Begin Page: Text]

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[Begin Page: Page 113]

APRIL, 1951] MALACOTHAMNUS 113

THE GENUS MALACOTHAMNUS, GREENE

(MALVACEAE)

BY THOMAS H. KEARNEY

It has been proposed to restrict the genus *Malvastrum* to species having indehiscent or merely apically dehiscent carpels,

typified by *M. coromandelianum* (L.) Garcke (9). If this proposal is accepted, species having the carpels completely dehiscent, splitting into two valves when dry, belong to other genera, such as the South American *Nototriche* Turcz. and *Tarasa* Phil., and the North American *Malacothamnus* Greene and *Sidopsis* Rydb. Possibly additional segregates will need recognition when some of the South American species previously included in *Malvastrum* are better known.

The genus *Malacothamnus* was established by Edward L. Greene in 1906 (6) to comprise the more or less shrubby Californian plants which Gray and Robinson (5, pp. 310-313) had treated as species of *Malvastrum*, they having recognized 11 species of this group. Greene published a brief description of the genus and included in it the following species: *M. arcuatus* (Greene), *M. Fremontii* (Torr.), *M. orbiculatus* (Greene), *M. Davidsonii* (Robins.), *M. Palmeri* (Wats.), *M. aboriginum* (Robins.), *M. densiflorus* (Wats.), *M. marrubioides* (Dur. & Hilg.), and *M. fasciculatus* (Nutt.). These 9 species represent nearly the whole range of variation in the genus.[^]

Malacothamnus as a genus has not been recognized by later authors except Abrams (1) who published *M. Nuttallii* as a new species and *M. fasciculatus splendidus* (Kell.) and *M. nesioticus* (Robins.) as new combinations. The species of southern California were treated (as *Malvastrum*) by Estes (4). Eastwood (2,3) in her treatment of the Californian species (likewise as *Malvastrum*) recognized 27 species, whereas Jepson (7, pp. 497-501), who mistakenly transferred them to *Sphaeralcea*, reduced the

number to 8, relegating to varietal status or to synonymy several entities which previously had been regarded as species. McMinn (11) recognized 12 species and numerous varieties of shrubby Californian "Malvastrum." Two species that, so far as is defi-

^ Greene did not indicate a type-species but *M. fasciculatus*, having been the first species described (as *Malva foiciculata* Nutt.), may be designated as the lectotype.

Leaflets of Western Bot*ny, Vol. VI, pp. 113-140, April 20, 1951.

[Begin Page: Page 114]

114 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

nitely known, are confined to Baja California, have been discussed recently by Wiggins (13).

The present writer distinguishes 21 species and 6 varieties. It should be noted, however, that several of these entities are known only from a single or very few collections. With more abundant material, reduction in the status of some of them may become advisable.

The genus is wholly North American unless, as has been suggested by A. Krapovickas (personal communication), the Chilean *Malva obtusifolia* Walp. is a species of *Malacothamnus*.

Description of the Genus

Plants perennial, usually shrubby but sometimes herbaceous above the woody caudex, with numerous ascending-spreading or nearly erect branches; herbage more or less densely pubescent with mostly stellate hairs, these with arms often very unequal; leaves short- or rather long-petioled, the blades mostly shallowly to somewhat deeply 3- to 5-lobed, crenate or dentate, rounded to acutish at apex, cuneate, truncate, or cordate at base, the veins (at least the five principal veins) usually prominent beneath; flowers in axillary (or sometimes terminal) glomerules, these dense and sessile or loose (more or less racemiform) and stalked, the flowers sessile to rather long-pedicelled; involucre of 3 subulate or filiform (in a few species broader) bractlets, these much shorter than to somewhat surpassing the calyx; calyx more or less deeply 5-lobed, sparsely to very densely pubescent with stellate (rarely simple) hairs, the lobes deltoid-ovate to lanceolate, acutish to attenuate-acuminate; petals pale to deep mauve, asymmetrically obovate, villous and often somewhat united at base; column much shorter than the corolla, the stamens numerous, crowded; style-branches of the same number as the carpels, the stigmas terminal, capitate; ovary and fruit depressed-hemispheric, usually about 10-merous; ovules solitary, ascending, the radicle inferior; carpels in fruit thin-walled, compressed, asymmetrically suborbicular or broadly ovate or obovate, mucous, very shallowly and broadly to rather deeply and acutely incised ventrally toward base, often with a stalk-like base below the sinus, sparsely to copiously stellulate apically and usually on the ventral edge, mostly glabrous dorsally and on the faces, otherwise smooth and unappendaged, completely dehiscent (splitting into two valves even before full maturity); seeds reniform, papillate-stellulate and often somewhat rugose.

The haploid chromosome number, as determined by J. M. Webber (12,

p. 320) for 6 species is 17.

Habitat and Time of Flowering

These plants occur mostly, if not exclusively, on well-drained slopes and along washes and gullies, in areas now or formerly occupied by chaparral vegetation. Therefore, "Chaparral Mai-

[Begin Page: Page 115]

APRIL, 1951] MALACOTHAMNUS 115

low" would be a good choice for the common name of the genus.

Since the genus, as a whole, ranges from Mendocino and Tehama counties in northern California to northern Baja California and from the coast and coastal islands to the desert-facing slopes of the Sierra Nevada, San Gabriel, San Bernardino, and San Jacinto mountains, the associated chaparral plants differ considerably as to species, but ecologically the environment is remarkably uniform. Most of the species begin flowering in late spring and early summer and, except at the higher elevations, produce few flowers, and these smaller than the early ones, after the advent of the dry season. The flowers, and often the herbage, are usually more or less fragrant.

Probable Age and Relationship of the Genus

Several of the species are very rare and local, three of them being known only from a single collection. San Luis Obispo County ranks first in the number of endemic or very nearly en-

demically species and not one of the widely distributed species is found in that county. Two species, *M. foliosus* and *M. paniculatus*, are known certainly only from northern Baja California.

Miss Eastwood (3, p. 188) summed up her conclusions as follows: "The different species of *Malvastrum* [*Malacothamnus*] are widely scattered in California and so often isolated that to me it seems to be an old genus once much more abundant here but now declining," This conclusion seems justified when applied to the rare and very local species and to *M. Fremontii*, which has an extensive range but with widely separated stations and very few individuals at each station. On the other hand, *M. fasciculatus*, in its several forms, is common and sometimes abundant in mainland and insular southern California, from Santa Barbara County to northern Baja California, and has developed several more or less intergrading varieties. These are scarcely characteristics of a waning species. Furthermore, the relative homogeneity of the genus might be considered as an indication that it is not a very old one.

The phylogeny of the genus is obscure. In the writer's classification (10), *Malacothamnus* belongs to the uniovulate group of *Suhir'ihit* *Abutilinae* of Tribe *Maheae*, a group which may be conjectured to have descended from some pluriovulate ancestor, such as are most species of *Sphaeralcea*. The other uniovulate

genera of subtribe Ahutilinae are *Malvastrum* (sensu stricto), *Nototriche*, *Tarasa*, and *Sidopsis*. The first has indehiscent or but slightly dehiscent carpels, whereas in the other three genera the carpels split into two separate valves as in *Malacothamnus*. It is improbable that any of these four genera as they now exist could have been a direct ancestor of *Malacothamnus* and it would seem more likely that it derives from some more generalized form, now extinct and not likely to have been preserved in the geological record.

Classification of the Species

There are two principal groups of closely allied species of *Malacothamnus*, one typified by *M. Fremontii* and the other by *M. fasciculatus*. The first, which includes also *M. Howellii*, *M. Helleri*, *M. marruhioides*, *M. orhiculatus*, and *M. niveus*, is characterized by suborbicular, shallowly incised carpels and usually by a densely lanate calyx, although in *M. marruhioides*, and commonly in *M. orhiculatus*, the calyx is more loosely and less densely pubescent.

The group which comprises *M. fasciculatus* and its varieties and with which may be associated, in various degrees of affinity, *M. mendocinensis*, *M. Hallii*, *M. arcuatus*, and *M. Parishii*, is characterized by having the calyx closely pubescent or sublepidote with very short, many-rayed hairs and often by relatively

narrow, usually deeply incised carpels, although *M. mendocinensis* and *M. Hallii* are exceptions as regards the characters of the carpels.

The remaining species show no very close relationship to either of the principal groups, or to one another. Delimitation of several of the species is difficult and numerous specimens are intermediate in their characters. It is suspected that in this, as well as in *Sphaeralcea* and other genera of *Malvaceae*, interspecific hybridization is not infrequent, but experimental evidence is lacking.

Key to the Species and Varieties

The key is an artificial one and the position of a species in the key does not necessarily indicate its closest relationship. Unlike the condition in many genera of *Malvaceae*, the characters

[Begin Page: Page 117]

APRIL, 1951] MALACOTHAMNUS 117

of the fruit have proved to be of little value in distinguishing the species, most of which are represented in herbaria by very few specimens with mature fruit. In some cases it has been necessary to base the description of the carpels upon a single fruiting specimen. As often happens in the *Malvaceae* (8, p. 19), the fruits are much parasitized by insects. Furthermore, there is

often as much variation within the species in the characters of the carpels as in the vegetative and floral characters. The characters that have been found to be of greatest diagnostic value are: nature of the pubescence of the herbage and calyx; shape and texture of the leaves; character of the inflorescence; shape and relative length of the bractlets of the involucre; and shape and relative length of the calyx-lobes.

1. Flowers in dense, subcapitate, terminal clusters, these conspicuously involucre with membranous or foliaceous bracts equaling or somewhat shorter than the calyces, or a few of the flowers axillary and subterminal (2).

1. Flowers not in dense heads or, if so, then the clusters distributed along the stems and not conspicuously involucre (3).

2. Bracts oblong-lanceolate; bractlets linear; calyx commonly about 15 mm.

long; petals mostly 20-30 mm. long; leaves truncate, subcuneate, or

subcordate at base, persistently pubescent or puberulent above

1 . M. Palmeri

2. Bracts oblong to broadly ovate; bractlets oblong-lanceolate; calyx com-

monly 10-12 mm. long; petals mostly 15-20 mm. long; leaves usually

distinctly cordate at base, glabrous or glabrescent above

la. Af. Palmeri var. involuocratus

3. Calyx-lobes 4-8 mm. wide at base (exceptionally only 3 mm. in *M. pani-*

culatus) and mostly subcordate, more or less abruptly caudate-acuminate, much longer than the turbinate calyx-tube (4).

3. Calyx-lobes seldom more than 3 mm. wide at base, mostly acute or

gradually acuminate but more abruptly acuminate in *M. Abbottii* and often in *M. densiflorus* and *M. marrubioides* (6).

4. Bractlets of the involucl broadly lanceolate to deltoid-ovate, often con-

nate at base, somewhat shorter than the calyx; leaves subcordate to deeply cordate at base 2. *M. aboriginum*

4. Bractlets subulate or filiform, distinct, $\frac{1}{4}$ - $\frac{1}{2}$ as long as the calyx; leaves

truncate or cuneate at base (5).

5. Leaves rather coarsely dentate; inflorescence narrowly thyrsoid, elongate,

very leafy, the glomerules dense, the flowers sessile or subsessile

3. *M. foliosus*

5. Leaves crenate or crenulate; inflorescence open-paniculate, the lower branches elongate and racemiform, the flowers mostly long-pedicelled

4. *M. paniculatus*

[Begin Page: Page 118]

118 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

6. Calyx conspicuously and densely white-lanate, the hairs, at least in the bud, more or less concealing the calyx-lobes. Leaves mostly suborbicular, not or very shallowly lobed; calyx not, or very inconspicuously angulate in the bud, the buds nearly globose (7).

6. Calyx not conspicuously and densely lanate, the pubescence sparser, or looser, or the hairs very short (pubescence sublepidote), not concealing the calyx-lobes, or, if the calyx rather densely lanate (sometimes so in *Af. Jonesii*) then the inflorescence very narrow (subracemose) and few-flowered (11).

7. Stems closely white-tomentose with very short hairs; leaves mostly truncate or subcuneate at base, rather finely crenate or crenate-dentate (8).

7. Stems more loosely pubescent with longer hairs; leaves mostly cordate at base, coarsely crenate (9).

8. Inflorescence open-paniculate, the lower branches usually elongate and loosely few-flowered, many of the flowers relatively long-pedicelled; carpels conspicuously and broadly stalked, deeply incised; seeds copiously papillate-stellulate 5. *M. niveus*

8. Inflorescence thyrsoid-glomerate or, if the lower branches somewhat elongate, then these many-flowered and the flowers short-pedicelled or subsessile; carpels rounded at base, very shallowly incised; seeds obscurely stellulate 6. *M. Helleri*

9. Leaves relatively thin, sparsely to copiously but seldom densely pubescent; glomerules usually rather loosely flowered and more or less stalked 7. *M. orbiculatus*

9. Leaves thick, velvety-tomentose; glomerules usually dense and subsessile except sometimes in *M. Howellii* (10).

10. Calyx (6) 7-8 (10) mm. long, the lobes about as long as the tube, deltoid, acute or short-acuminate; inflorescences interrupted-spicate, the glomerules and individual flowers sessile or subsessile. 8. *Af. Fremontii*

10. Calyx (8) 9-12 (13) mm. long, the lobes somewhat longer to more than twice as long as the tube, usually deltoid-lanceolate, acuminate (often

sharply attenuate-acuminate); inflorescences more open, the glomerules often distinctly stalked and more or less racemiform, the flowers mostly pedicelled 9. *M. Howellii*

11. Calyx and bractlets conspicuously hirsute or villous with long, few-armed (occasionally simple) hairs, the longest arm often 2 mm. or more long (12).

11. Calyx not conspicuously hirsute or villous, the hairs shorter (usually not much more than 1 mm. long) and many-armed (14).

12. Stems conspicuously shaggy-tomentose, the pubescence grayish; leaves angulately 3-5-lobed, deeply cordate at base, bicolored, soft-tomentose beneath; inflorescences not conspicuously interrupted; carpels conspicuously stellate at apex with relatively long hairs

10. *M. clementinus*

12. Stems more closely pubescent, the pubescence yellowish; leaves not lobed or very shallowly so with rounded lobes, truncate, subcuneate, or cordate at base, not noticeably bicolored, not tomentose (usually

rather sparsely pubescent) beneath; inflorescences conspicuously interrupted; carpels minutely or obscurely stellulate (13).

13. Bractlets mostly as long as or longer than the calyx; calyx 10-14 mm.

long, the lobes attenuate-acuminate (exceptionally more abruptly

acuminate), 2-3 times as long as the tube 11. *M. densiflorus*

18. Bractlets 1/2-3/4 as long as the calyx; calyx 7-10 mm. long, the lobes more or less abruptly acuminate from a deltoid-ovate base, somewhat

longer than to at least twice as long as the tube

1 la. *M. densiflorus* var. *viscidus*

14. Inflorescences very open-paniculate, relatively few-flowered, the branches

elongate, slender, somewhat flexuous, ascending-spreading to somewhat recurved (15).

14. Inflorescences contracted and short-branched or if open-paniculate and

long-branched, then the branches ascending (16).

15. Bractlets broadly subulate, thick, whitish; calyx whitish-lepidote, angu-

late and pointed in the bud, 9-11 mm. long, the lobes 2-3 times as long as the tube, rather abruptly acuminate 12. *M. Abbottii*

15. Bractlets narrowly subulate, thin, dark-colored; calyx dark-colored, not angulate in bud, opening before anthesis, 6-7 mm. long, the lobes less than twice as long as the tube, gradually acuminate. 13. *M. gracilis*

16. Leaves usually distinctly and often somewhat angulately 3-5-lobed (17).

16. Leaves not lobed, or, if shallowly so, then the lobes rounded, exceptionally angulate (23).

17. Petioles and principal leaf -veins very stout; young branches shaggy-tomentose 14. *M. Davidsonii*

17. Petioles and veins relatively slender; young branches closely short-pubescent to sublepidote (18).

18. Stems conspicuously angulate and striate; calyx 5-6 mm. long; petals 10-12 mm. long 17. *M. mendocinensis*

18. Stems terete or nearly so, not conspicuously striate; calyx (5) 6-9 mm.

long: petals commonly 15-20 mm. long (19).

19. Inflorescences narrowly thyrsoid-glomerate, the glomerules dense, short-stalked or sessile or (in *M. fasciculatus* var. *catalinensis*) the lower branches sometimes up to 6 cm. long and more loosely flowered; calyx often rather loosely pubescent (subtomentose) with relatively long hairs (20).

19. Inflorescences open-paniculate (at least below), the lower branches often very long and very loosely flowered; calyx closely pubescent (sublepide) with very short hairs (21).

20. Leaves relatively small, the largest blades seldom more than 4 cm. long, usually shallowly lobed and truncate or subcordate at base, seldom conspicuously bicolored; carpels 2.5-3.2 mm. high. .21. *M. fasciculatus*

20. Leaves relatively large, the blades up to 8 cm. long and wide, commonly deeply lobed and deeply cordate at base, often conspicuously bicolored; carpels 3.2-3.8 mm. high. .21b. *M. fasciculatus* var. *catalinensis*

21. Flowers in a many-branched, fastigiate panicle, the ultimate divisions rather rigid, not obviously racemose; calyx 6-7 mm. long

21d. *M. fasciculatus* var. *nesioticus*

[Begin Page: Page 120]

120 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

21. Flowers in a fewer-branched, more elongate panicle, the ultimate divisions commonly racemose; calyx 5-9 mm. long (22).

22. Leaves more or less bicolored, usually distinctly paler and more pubescent beneath, subcordate to deeply cordate at base; carpels 2-3 mm.

high, nearly as wide, shallowly incised

21a. *M. fasciculatus* var. *laxiflorus*

22. Leaves essentially concolored, both surfaces about equally pale and

pubescent, subcuneate to cordate at base; carpels 3-5 mm. high and

about $\frac{1}{2}$ as wide, more or less deeply and often acutely incised

21c. *M. fasciculatus* var. *Nuttallii*

23. Inflorescences few-flowered, subracemose, the flowers 1-3 (rarely more)

at each node. Herbage whitish-pubescent; leaves suborbicular to

rhombic-cuneate; carpels usually deeply and acutely incised

19. *M. Jonesii*

23. Inflorescences usually many-flowered, thyrsoïd-glomerate to openly pan-

iculate (24).

24. Calyx and young branches closely pubescent or sublepidote (25).

24. Calyx and young branches loosely pubescent to shaggy-tomentose (26).

25. Leaves broadly ovate to suborbicular, not noticeably bicolored; calyx

5-6 mm. long 18. *M. Hallii*

25. Leaves rhombic-ovate, conspicuously bicolored (whitish beneath); calyx

8-9 mm. long 20. *M. Parishii*

26. Calyx 5-7 (9) mm. long; leaves usually longer than wide. . 16. *Af. arcuatus*

26. Calyx usually more than 7 mm. long; leaves as wide as long or wider (27).

27. Calyx-lobes abruptly short-acuminate; inflorescences conspicuously in-

terrupted, the internodes very long. . . 11a. *M. densiflorus* var. *viscidus*

27. Calyx-lobes acute to gradually acuminate or (in *M. marrubioides*) some-

what abruptly long-acuminate; inflorescences not very conspicuously interrupted, the internodes of moderate length (28).

28. Leaves cordate at base, mostly crenate; calyx not angulate in the bud,

the buds subglobose 7. *Af. orbiculatus*

28. Leaves truncate, cuneate, or subcordate at base, dentate or crenate-dentate; calyx usually conspicuously angulate and pointed in the bud. . .

15. *Af. marrubioides*

Descriptions of the Species and Varieties[^]

1. *Malacothamnus Palmeri* (S. Wats.) Greene, *Leafl. Bot. Obs.* 1: 208

(1906). *Malvastrum Palmeri* S. Wats., *Proc. Amer. Acad.* 12: 250 (1877).

Sphaeralcea Palmeri (S. Wats.) Jeps., *Man. Fl. Pi. Calif.* 633 (1925).

2 The names of herbaria in which the type-specimens are deposited are abbreviated as follows: CA, California Academy of Sciences; G, Gray Herbarium of Harvard University; ND, University of Notre Dame; NY, New York Botanical Garden; Po, Pomona College; St, Stanford University; UC, University of California; US, U. S. National Herbarium. The writer is indebted to the curators of these herbaria for the loan of specimens, and to Mr. John Thomas Howell of the California Academy of Sciences for many helpful suggestions and for aid in field work. . .

The writer has examined the type, or one or more isotypes. of all species and varieties

recognized in this paper, excepting the type of *M. orbiculatus* (Greene) Greene. An excellent photograph of the latter, obli^gly supplied by Prof. Albert L. Delisle of Notre Dame University, shows clearly that this species has been interpreted correctly by California botanists.

[Begin Page: Page 121]

APRIL, 1951] MALACOTHAMNUS 121

Stems up to nearly 2.5 m. high and 6 cm. in diameter, woody below, very leafy, densely rough-pubescent; leaves long-petioled, the blades large, broadly ovate to suborbicular, usually shallowly lobed with rounded lobes, coarsely crenate, truncate, subcuneate, or subcordate at base, obtuse or rounded at apex, thin and plane to thick and rugose, permanently short-pubescent above, the larger veins prominent beneath; flowers in dense, subcapitate, terminal clusters, these conspicuously involucrate with membranous or foliaceous, oblong-lanceolate bracts equaling or somewhat shorter than the calyces; bractlets linear or narrowly lanceolate, shorter than to about equaling the calyx, these and the calyx villous or hirsute with relatively few-armed or sometimes simple hairs, the longest arm up to 3 mm. long; calyx commonly 15-20 mm. long, more or less angulate in the bud, the lobes longer than the short tube, deltoid-lanceolate from a broader base, acuminate; petals mostly 20-30 mm. long; carpels up to 4 mm. long and about ¹/₂ as wide, distinctly stalked, deeply and rather narrowly incised; seeds 2.5-3 mm. long, rugose-papillate and rather copiously stellulate.

Type from Cambria, San Luis Obispo Co. (Palmer 50, in 1876, G).— San Luis Obispo Co., chiefly in the foothills of the Santa

Lucia Mountains, reported also from southern Monterey Co., ranging from near sea level to 2000 ft.

Malacothamnus Palmeri is very different from all other species of the genus but is probably related distantly to *M. aboriginum*. It is, apparently, more shade-tolerant than any other *Malacothamnus*.

1a. *Malacothamnus Palmeri* var. *involucratus* (Robins.), comb. nov. *Malvastrum involucratum* Robins, in A. Gray, Syn. Fl. N. Amer. U: 310 (1897).

Malvastrum Palmeri var. *involucratum* (Robins.) McMinn, Man. Calif. Shrubs 339 (1939).

Type from Jolon, Monterey Co. (T. S. Brandegee, G), cotype from between Jolon and King City, Monterey Co. (Eastwood, in 1893, CA).— Known from several localities in Monterey Co. and from Cuesta Pass, San Luis Obispo Co.

This variety, although intergrading rather freely with typical *M. Palmeri*, may be distinguished usually by having distinctly cordate leaves, these glabrous or glabrescent above, broader bracts and bractlets, and smaller flowers. The carpels, in the 2 fruiting specimens examined, are not stalked or shortly and broadly stalked.

2. *Malacothamnus aboriginum* (Robins.) Greene, Leaf. Bot. Obs. 1: 208 (1906). *Malvastrum aboriginum* Robins, in A. Gray, Syn. Fl. N. Amer. U: 311 (1897). *Sphaeralcea aboriginum* (Robins.) Jeps., Fl. Calif. 2: 498 (1936).

[Begin Page: Page 122]

122 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

Stems up to at least 0.75 m. high, woody below, densely shaggy- tomentose with many-armed hairs; petioles rather stout; blades up to 8 x 12 cm. but mostly much smaller, deltoid-ovate or suborbicular, shallowly to rather deeply 3-lobed, crenate or crenate-dentate, obtuse at apex, shallowly to deeply cordate at base, tomentose on both surfaces, in age thick and rugose; inflorescences spike-like, leafy or nearly naked, the glomerules dense but rather few-flowered, the flowers sessile or subsessile; bractlets broadly lanceolate to deltoid-ovate, subcordate and often somewhat connate at base, shorter than the calyx; calyx 7-9 mm. long, pointed and strongly plicate-angled in the bud, rather sparsely pubescent with very short, many-armed hairs, the lobes much longer than the tube, 5-7 mm. wide at base, abruptly acuminate; carpels 2.5-3 mm. high and about Va as wide, suborbicular or reniform, barely to conspicuously stalked, very shallowly to rather deeply incised; seeds minutely (often sparsely) papillate-stellulate.

Type from Indian Valley, Monterey (?) Co. (M. K. Curran, in 1885, CA).— Known otherwise from several localities in San Benito Co. and from Los Gatos Creek and Alcalde Canyon, western Fresno Co., at altitudes of 700 to 1400 ft.

This species, peculiar in the character of the involucre, has a very limited geographical distribution.

3. *Malacothamnus foliosus* (S. Wats.), comb. nov. *Malvastrum foliosum*
S. Wats., Proc. Amer. Acad. 20: 356 (1885).

Stems apparently rather stout (height of plant unknown), shaggy-tomentose with short, many-armed hairs; petioles short, rather slender; blades suborbicular or broadly ovate, very shallowly angulate-lobed, rather coarsely dentate, acute at apex, strongly cuneate at base, thin, not rugose, copiously but not densely pubescent on both surfaces; inflorescence interrupted-thyrsoid-glomerate, very leafy to the apex, the lower glomerules more open (subracemose), the flowers sessile or short-pedicelled; bractlets filiform, about 1/2 as long as the calyx; calyx 12-16 mm. long, pointed and distinctly angulate in the bud, copiously but not densely pubescent with short, many-armed hairs, the lobes about twice as long as the tube, abruptly long-acuminate, 4-5 mm. wide at base; carpels 2.5-3 mm. high, about 1/2 as wide, not stalked or shortly and broadly so, very shallowly incised; seeds papillate, minutely stellulate.

Type from Santo Tomas, coast of northern Baja California
(Orcutt, in 1884, G).— Known definitely only from the type-collection.

This species was reduced by Gray (5, p. 311) to synonymy under *Malvastrum marruhioides* Dur. & Hilg. and there is some resemblance in the shape and dentation of the leaves, but *M. marruhioides* has a less leafy inflorescence and narrower, more

[Begin Page: Page 123]

gradually acuminate calyx-lobes. Wiggins (13), considered it to be more nearly related to *Malvastrum densiflorum* S. Wats., as did Watson himself, but from the latter, *M. foliosus* differs in its very leafy inflorescence and broader calyx-lobes, these with shorter hairs.

4. *Malacothamnus paniculatus* (A. Gray), comb. nov. *Malvastrum marruboides* var. *paniculatum* A. Gray, Proc. Amer. Acad. 22: 290 (1887). *Malvastrum paniculatum* (A. Gray) Wiggins, Madrono 10: 184 (1950).

Plant shrubby, 1-2.5 m. high, the stems densely shaggy-tomentose with yellowish hairs; leaves short-petioled, the blades up to 8 cm. long and nearly as wide, broadly deltoid-ovate, scarcely to shallowly 3-lobed, obtuse or acutish at apex, more or less cuneate at base, coarsely to finely crenate, rather thin, not rugose, copiously pubescent on both surfaces with short, many-armed hairs; inflorescences open-paniculate, the branches up to 30 cm. long, loosely cymose, the flowers mostly on long slender pedicels; bractlets filiform, about i/\wedge as long as the calyx; calyx 11-15 mm. long, pointed and plicate-angled in the bud, copiously but not densely pubescent with short, many-armed hairs, the lobes about twice as long as the tube, (3) 5-8 mm. wide at the subcordate base, abruptly and sharply long-acuminate; carpels about 2.5 mm. high and nearly as wide, suborbicular, not stalked, moderately incised; seeds papillate-stellulate.

Type from Ensenada de Todos Santos, Baja California (Orcutt, in 1886, G).— Known definitely only from northwestern

Baja California, presumably near sea level, although reported by McMinn (1 1, p. 345) "from the hills bordering Lake Elsinore, Riverside County."

This differs from the other species with wide calyx-lobes in the open-paniculate inflorescence and the mostly long-pedicelled flowers.

5. *Malacothamnus niveus* (Eastw.), comb. nov. *Malvastrum fragrans* Eastw., Leaflet West. Bot. 1 : 218 (1936), non Gray & Harv. *Malvastrum niwum* Eastw., ibid. p. 232. *Malvastrum Fremontii* var. *niveum* (Eastw.) McMinn, Man. Calif. Shrubs 343 (1939).

A rather small shrub, the stems densely and closely white-tomentose (sublepidote) with very short hairs; leaves relatively small, the blades up to 4x4 cm., broadly deltoid-ovate or suborbicular, very shallowly 3-lobed, shallowly crenate or crenate-dentate, rounded at apex, truncate, subcuneate. or subcordate at base, rather thick, soft-tomentose on both surfaces; inflorescences paniculate, usually open and relatively few-flowered, the longest branchlets usually 4-5 cm. long, the flowers 1-4 on the branchlets, short- to rather long-pedicelled; bractlets subulate (exceptionally filiform), Vi-VA as long as the calyx, dark-colored; calyx (6) 7-8 (12) mm. long, densely white-lanate (the longest hairs mostly about 1 mm. long), the lobes as long as to

[Begin Page: Page 124]

nearly twice as long as the tube, mostly deltoid-ovate or deltoid-lanceolate, acutish to short-acuminate, 2-3 mm. wide at base; petals up to 2 cm. long; carpels 2.5-3 mm. high and nearly as wide, conspicuously and broadly stalked, deeply incised; seeds copiously papillate-stellulate.

Type from El Dorado School near Santa Margarita, San Luis Obispo Co. (M. E. Wall, in 1933, CA).-Known from several localities in San Luis Obispo Co., where apparently not infrequent, and from Tepusquet Canyon, Santa Barbara (?) Co., in washes, at elevations of 1300 to 1500 ft.

One of the handsomest species of the genus, with large, fragrant flowers. Although relationship to *M. Fremontii* is indicated by the white-woolly calyx, *M. niveus* is very different in the character of the leaves and inflorescences. The dark-colored bractlets contrast conspicuously with the calyx.

6. *Malacothamnus Helli* (Eastw.), comb. nov. *Malvastrum Helli* Eastw., Leafl. West. Bot. 1: 217 (1936). *Sphaeralcea Fremontii* var. *exfibulosa* Jeps., Fl. Calif. 1: 500 (1936). *Malvastrum Fremontii* var. *Helli* (Eastw.) McMinn, Man. Calif. Shrubs 341 (1939).

A much-branched shrub 1 m. high or higher, the younger branches densely and closely pubescent with very short, many-armed hairs; leaves mostly small, suborbicular-deltoid, not lobed or obscurely so, finely to rather coarsely crenate-dentate, very obtuse to acutish at apex, truncate, subcordate, or subcuneate at base, thickish, the veins prominent beneath; inflorescences many-flowered, narrow, with dense sessile glomerules, or more openly paniculate with racemiform branchlets up to 6 cm. long; bractlets

subulate or filiform, $\frac{1}{2}$ - $\frac{3}{4}$ as long as the calyx; calyx (5) 6-8 mm. long, densely white-woolly, (the longest hairs up to 1.3 mm. long), the lobes about as long (exceptionally nearly twice as long) as the tube, deltoid, acute, 2-3 mm. wide at base; carpels 2.5 mm. high and nearly as wide, suborbicular, rounded at base, very shallowly incised; seeds obscurely stellulate.

Type of *M. Helleri* from Ladoga, Colusa Co., but labelled as from "near Ladoga, Lake County" (Heller 13242, CA), type of *S. Fremontii* var. *exfibulosa* from "Putah Creek, in gravel bed, near Winters," Yolo Co., (Jepson 16741).— Known also from near Lower Lake, Lake Co., and Capay Valley, Yolo Co. The type grew in the *Quercus Douglasii* belt with "*Ceanothus*, *Adenostoma*, and *Toxicodendron*." In the herbarium of the California Academy there are specimens of *M. Helleri* purporting to have been collected in Sespe Gorge, Ventura Co., but it is highly improbable that they were collected so far to the south.

The white-woolly calyx indicates relationship to *M. Fre-*

[Begin Page: Page 125]

APRIL, 1951] MALACOTHAMNUS 125

montii, but the close pubescence of the herbage and the shape of the leaves sufficiently distinguish *M. Helleri*. From *M. niveus* the characters given in the key afford ample distinction.

(1906). *Malvastrum orbiculatum* Greene, Fl. Francisc. 109 (1891). *Malvastrum Fremontii* var. *orbiculatum* (Greene) Johnst., Pl. World 22: 109 (1919).
Sphaeralcea orbiculata (Greene) Jeps., Fl. Calif. 2: 499 (1936).

Plant shrubby or the stems often herbaceous or nearly so above the caudex, up to about 2 m. high, the rather stout branches densely but rather loosely pubescent (more or less shaggy); leaves rather large, the petioles mostly short and stout, the blades up to 8 cm. long and wide, suborbicular or reniform (wider than long), nearly entire to shallowly 3-5-lobed, mostly crenate (often coarsely so), rounded or truncate at apex, subcordate to deeply cordate at base, thin, more or less copiously but not densely stellate on both surfaces, only the larger veins prominent beneath; inflorescences narrow, elongate, leafy only at base, the longest branchlets up to 10 cm. long but usually much shorter, the glomerules often rather loosely flowered or shortly racemose, the flowers subsessile or short-pedicelled; bractlets subulate or filiform, $\frac{1}{2}$ as long as the calyx; calyx 7-10 (14) mm. long, woolly or (commonly) more loosely and sparsely pubescent (the longest hairs up to 2 mm. long, but usually shorter), the lobes about as long as to 2.5 (commonly at least 1.5) times as long as the tube, deltoid or deltoid-lanceolate, acute to sharply attenuate-acuminate, 1.5-3 (rarely 4) mm. wide at base; carpels 2.2-3.2 mm. high and nearly as wide, ovate to suborbicular, not or shortly stalked, very slightly to rather deeply incised; seeds sparsely to copiously stellulate and often papillate.

Type from "mountains south of Tehachapi," Kern (?) Co.,
(Greene, in 1889, ND).— Mountains of northern Ventura, Kern,
Los Angeles, San Bernardino, and Inyo counties, especially
abundant on the northern slopes of the San Gabriel and San

Bernardino mountains and the eastern slopes of the Sierra Nevada, at elevations of (2770) 4000 to 9000 ft., attaining higher altitudes than any other species of *Malacothamnus*. The plant ascends to the pine belt (ponderosa and Jeffrey pines). West of Independence, Inyo County, it occurs as widely scattered individuals in very open chaparral of *Arctostaphylos*, *Castanopsis*, *Ceanothus*, etc., at elevations of 7000 to 8500 ft. These plants were small, less than 1 m. high, with stems entirely herbaceous above the woody caudex.

Malacothamnus orhiculatus is the most difficult species of the genus to define satisfactorily. It is related on the one hand to *M. Fremontii* and on the other to *M. maruhoioides*. It differs

[Begin Page: Page 126]

126 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

from the former chiefly in the relatively thin and rather sparsely pubescent leaves. The calyx also is usually more sparsely pubescent than in *M. Fremontii* and the geographical distributions apparently do not overlap, *M. Fremontii* not being known from farther south than Tulare Co. and being a plant of usually much lower altitudes. As compared with *M. maruhoioides*, *M. orhiculatus* is distinguished by its larger, cordate, crenate leaves.

8. *Malacothamnus Fremontii* (Torr.) Greene, Leaflet Bot. Obs. 1: 208 (1906). *Malvastrum Fremontii* Torr. ex A. Gray, Mem. Amer. Acad. ser. 2,

4: 21 (1849). *Sphaeralcea Fremontii* (Torr.) Jeps., Man. Fl. Pl. Calif. 633 (1925).

A straggling shrub up to about 3 m. high, herbaceous above, the stout young stems densely shaggy-tomentose with rather long, many-armed hairs; petioles short and stout; blades suborbicular or reniform (wider than long), up to 6 X 7 cm., not lobed or very shallowly lobed with rounded lobes, coarsely crenate, mostly rounded at apex, more or less cordate (or the upper ones truncate) at base, thick, velvety-tomentose on both surfaces, the principal veins usually stout, prominent beneath; inflorescences narrow, interrupted, leafy only toward base, the glomerules dense, sessile or nearly so, the flowers sessile or subsessile; bractlets subulate or filiform, mostly $1\frac{3}{4}$ as long as the calyx; calyx (6) 7-8 (10) mm. long, conspicuously and densely white-lanate, the pubescence almost concealing the lobes at least in the (nearly globose) buds, the hairs many-armed, seldom more than 1.5 mm. long, the lobes in anthesis about as long as the tube, deltoid, acute or (exceptionally) short-acuminate, 2-3 (4) mm. wide at base; petals up to 18 mm. long; carpels 2.5 to nearly 4 mm. long, averaging $\frac{1}{2}$ - $\frac{2}{3}$ as wide, suborbicular or obovate, rounded at base to distinctly stalked, shallowly (seldom deeply) incised; seeds papillate-stellulate.

Type from "interior of California" (Fremont, in 1846, NY).*

—Western foothills of the Sierra Nevada from (Placer?) Amador Co. to Tulare Co., with outlying stations in the Yollo Bolly foothills, Tehama Co., and at North Butte, Sutter Co., ranging from (200?) 500 to 2500 ft. Although having a rather extensive geographical distribution, *M. Fremontii* apparently is nowhere common, the plants occurring singly or in very small colonies at each station. Near Springville, Tulare Co., it grew in associa-

tion with *Quercus Wislizeni*, *Rhus diversiloba*, *Eriodictyon* sp.,
Lupinus albifrons, *Diplacus* sp., etc.

9. *Malacothamnus Howellii* (Eastw.), comb. nov. *Malvastrum Fremontii*
var. *cercophorum* Robins, in A. Gray, Syn. Fl. N. Amer. U: 311 (1897).

"Fremont probably collected the type specimens on the western slope of the Sierra Nevada, along the American Fork of the Sacramento River" (F. V. Coville, Contrib. U. S. Nat. Herb. 4: 73).

[Begin Page: Page 127]

APRIL, 1951] MALACOTHAMNUS 127

Sphaeralcea Fremontii var. *cercophora* Jeps., Man. Fl. Pl. Calif. 634 (1925).
Malvastrum Howellii Eastw., Leafl. West. Bot. 1: 220 (1936). *Malvastrum*
Howellii var. *cordatum* Eastw., *ibid.*

Inflorescences more or less expanded, the longest branchlets up to 10 cm. long, the glomerules usually distinctly stalked and often racemiform, the flowers mostly short-pedicelled; bractlets % as long as to about equaling the calyx, subulate or filiform; calyx (8) 9-12 (16) mm. long, densely lanate, the hairs up to 2 mm. long, the lobes somewhat longer than to more than twice as long as the tube, usually deltoid-lanceolate, acuminate, often sharply attenuate-acuminate. Similar in other characters to *M. Fremontii*.

Type from Nortonville, Contra Costa Co. (J. T. Howell 6470, CA), type of var. *cordatum* from Junto del Puerto Canyon, west-

ern Stanislaus Co. (C. Dudley, in 1935, CA), type of *M. Fremontii* var. *cercophorum* from Arroyo del Valle, Alameda Co. (Greene, in 1895, UC).— Contra Costa, Alameda, eastern Santa Clara, and western Stanislaus counties, also Swiss Ranch, Calaveras Co., and Bissett's Ranch, Madera Co., centered principally on and near Mount Diablo and on the east side of the Mount Hamilton Range, ranging from 500 to 3500 (4300?) ft. At Nortonville, the type-locality of *M. Howellii*, the plants were associated with *A. denostoma*, *Artemisia californica*, *Salvia mellifera*, *Dendromecon*, etc.

Although there is some intergradation with *M. Fremontii*, the more open inflorescences and the larger, much more deeply cleft calyx together with the mainly different geographical distribution, seem to warrant recognition of *M. Howellii* as a species. The herbage and flowers are fragrant, as is also the case in *M. Fremontii*.

10. *Malacothamnus clementinus* (Munz & Johnst.), comb. nov. *Malvastrum clementinum* Munz & Johnst., Bull. Torr. Bot. Club 51: 296 (1924). *Sphaeralcea orbiculata* (Greene) Jeps. var. *Clementina* (Munz & Johnst.) Jeps., Fl. Calif. 2: 499 (1936).

A rounded shrub up to 1 m. high with numerous ascending branches, these shaggy-tomentose when young with rather long, many-armed hairs; petioles short and rather stout; blades up to 5 cm. long, somewhat wider than long, rather deeply and somewhat angulately 5-lobed, rather deeply crenate with numerous teeth, acutish at apex, cordate at base with a broad

or rather narrow sinus, thin, bright green above, pale beneath, sparsely pubescent or glabrescent above, copiously but not very densely pubescent beneath with both very short and longer hairs, not prominently reticulate beneath; inflorescences thyrsoid-glomerate, not conspicuously interrupted, leafy only at base, the glomerules dense, sessile or nearly so, the flowers

[Begin Page: Page 128]

128 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

sessile or subsessile; bractlets filiform, about $\frac{1}{4}$ as long as the calyx, villous; calyx 7-9 mm. long, not angulate in the bud, densely villous (especially the tube) with relatively few-armed hairs up to 2 mm. long, the lobes about as long as to twice as long as the tube, deltoid-lanceolate, gradually and sharply acuminate, 2-2.5 mm. wide at base; petals about 15 mm. long, the claws conspicuously ciliate; mature fruit not seen but the carpels described as 2.5-3 mm. high and stellate-tomentose at apex (Munz & Johnst., *ibid.*).

Type from Lemon Tank, San Clemente Island (P. A. Munz 6684, Po).— Known only from the type-locality, where it is apparently very rare, growing at the "base of rocky walls in a deep canyon on the northeast side of the island" (Estes, p. 85).

This strikingly handsome and very distinct species is not closely related to any other, although, as the authors of the species suggested, it may have some affinity with *M. fasciculatus*. It differs from all forms of that species in the long-hairy calyx and other characters. To *M. densiflorus*, with which it is asso-

ciated in the key on account of the long calyx-hairs, it has no near affinity.

11. *Malacothamnus densiflorus* (S. Wats.) Greene, Leafl. Bot. Obs. 1: 208 (1906). *Malvastrum densiflorum* S. Wats., Proc. Amer. Acad. 17: 368 (1882). *Malvastrum densiflorum* var. *typicum* Estes, Bull. S. Calif. Acad. Sci. 24: 85 (1925). *Sphaeralcea densiflora* (S. Wats.) Jeps., Man. Fl. Pl. Calif. 633 (1925).

Stems erect, woody below, up to 2 (3?) m. high; herbage yellowish-pubescent with stellate hairs and obscurely granular-puberulent; leaves rather small, seldom more than 4 cm. long, sometimes shallowly 3-lobed, broadly ovate, rounded to acutish at apex, subcuneate, truncate, or subcordate at base, shallowly crenate or dentate, thin or thickish, not conspicuously reticulate beneath; inflorescences spike-like, conspicuously interrupted (the internodes elongate), naked or nearly so, the glomerules dense, sessile or subsessile, the flowers sessile or short-pedicelled; bractlets filiform, equaling or longer than the calyx, hirsute-ciliate; calyx 10-14 mm. long, hirsute with few-armed or simple hairs, these 2-3 mm. long, the calyx-lobes 2-3 times as long as the strongly ribbed tube, lanceolate, attenuate-acuminate, 2-3 mm. wide at base; carpels 2.2-2.8 mm. high, about $\frac{1}{2}$ as wide, suborbicular, oval, or ovate, not stalked or very slightly so, shallowly incised; seeds minutely papillate-stellulate.

Types from the San Jacinto Mountains, Riverside Co. (Parish Bros. 738, W. G. Wright, in 1881, G).-Santa Ana and San Jacinto mountains, Riverside Co., to northern Baja California, 1000 to 3000 (4000?) ft.

[Begin Page: Page 129]

APRIL, 1951] MAUVCOTHAMNUS 129

McMinn (11, p. 345) considered *M. densiflorus* "identical to *M. marrubioides* D. & H.," but although these species superficially resemble each other, *M. densiflorus* differs from *M. marrubioides* in the longer, more interrupted inflorescence, denser glomerules, and much longer calyx-hairs, as well as in geographical distribution.

Malacothamnus densiflorus var. *viscidus* (Abrams), comb. nov. *Malvastrum viscidum* Abrams, Bull. Torr. Bot. Club 34: 264 (1907). *Malvastrum detisiflorum* var. *viscidum* (Abrams) Estes, Bull. S. Calif. Acad. Sci. 24: 85 (1925). *Sphaeralcea densiflora* var. *viscida* (Abrams) Jeps., Fl. Calif. 2: 498 (1936). *Malvastrum marrubioides* var. *viscidum* (Abrams) McMinn, Man. Calif. Shrubs 345 (1939).

Type from El Nido, San Diego Co. (L. Abrams 3528, St).— San Diego Co. and northern Baja California, from near sea level to 3000 ft., apparently commoner than typical *M. densiflorus*.

This variety differs usually from the species in its more deeply cordate leaves, relatively short bractlets (not more than 2/3 as long as the calyx), and smaller calyx (7-10 nun. long) with deltoid-ovate, more abruptly acuminate lobes and often shorter hairs. Intergradation with typical *M. densiflorus* is complete, however, and specimens of more or less intermediate character

are about as numerous as specimens of the typical phase and of var. *viscidus*. Occasional specimens of var. *viscidus*, as was noted by Fosberg, have the calyx-lobes glabrous except toward the margin. According to Estes (4, p. 86) the plant is similar in habit and habitat to typical *M. densiflorus*, being "a slender open shrub 6-8 feet high."

12. *Malacothamnus Abbottii* (Eastw.), comb. nov. *Malvastrum Abbottii* Eastw., Leaflet West. Bot. 1: 215 (1936).

"An erect shrub 3 to 6 feet high, with white-tomentose herbage" (11, p. 349); stems densely and closely stellate (sublepidote) with very short hairs; leaves up to 6 cm. long and very nearly as wide, scarcely lobed, rounded at apex, truncate or subcordate at base, coarsely crenate with broad rounded teeth, thickish, prominently reticulate beneath; inflorescence very open, with slender, more or less flexuous branchlets often 15 cm. long or longer, the flowers cymosely or racemosely disposed, mostly distinctly pedicelled; bractlets $\frac{1}{2}$ as long as the calyx, broadly subulate, thick, whitish; calyx 9-11 mm. long, angulate and pointed in the bud, whitish-lepidote, the lobes 2-3 times as long as the tube, sharply and somewhat abruptly acuminate, about 3 mm. wide at base; petals 15-20 mm. long; mature fruit unknown.

[Begin Page: Page 130]

130 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

Type from "among willows on the Salinas River, Monterey

Co." (E. K. Abbott, in 1889, CA).— An exceptionally handsome, large-flowered species, apparently known only from the type-collection.

13. *Malacothamnus gracilis* (Eastw.), comb. nov. *Malvastrum gracile* Eastw., Leafl. West. Bot. 1: 219 (1936).

An erect, rather slender-branched shrub 1-2 m. high; young stems densely and closely whitish-stellate (sublepidote); leaves slender-petioled, the blades small (less than 3 cm. long and wide, so far as known), broadly deltoid-ovate, very shallowly lobed, crenate, very obtuse at apex, truncate or sub-cuneate at base, thickish, rather prominently reticulate beneath; inflorescence a very open, relatively few-flowered panicle with slender, more or less flexuous branchlets up to 8 cm. long, the flowers cymosely or racemosely disposed, mostly distinctly pedicelled; bractlets about 1/2 the calyx, narrowly subulate, thin, dark-colored; calyx 6-7 mm. long, not angulate in the bud, opening before anthesis, dark-colored, the lobes less than twice as long as the tube, gradually acuminate, not more than 2.5 mm, wide at base; petals 15-20 mm. long; carpels 3 mm. high and about 1/2 as wide, broadly short-stalked, shallowly incised; seeds stellulate in patches.

Type from between Arroyo Grande and Huasna, San Luis Obispo Co. (Eastwood 14996, C A). —Apparently known only from the type-collection and one from Arroyo Grande (R. F. Hoover 7905).

This beautiful and rare plant is evidently related to *M. A. bottii* but is readily distinguishable by the characters given in

the key. It seems to be unique in the dark color and early opening of the calyx.

14. *Malacothamnus Davidsonii* (Robins.) Greene, Leafl. Bot. Obs. 1: 208 (1906). *Malvastrum Davidsonii* Robins, in Gray, Syn. Fl. N. Amer. U: 312 (1897). *Sphaeralcea Davidsonii* (Robins.) Jeps., Man. Fl. Pl. Calif. 634 (1925).

A large shrub up to 5 m. high, with stout, shaggy-tomentose branches; petioles very stout; blades very large, up to 9 x 11 cm., mostly wider than long, usually deeply and often angulately 3-5-lobed, crenate or crenulate, rounded to acutish at apex, deeply cordate at base, thick, velvety-tomentose on both surfaces, the principal veins very stout and prominent beneath; inflorescences paniculate, mostly narrowly so, commonly leafy, the ultimate branchlets short and stout, several- to many-flowered, the flowers more or less racemously disposed, mostly short-f>edicelled; bractlets less than 14 as long as the calyx, subulate; calyx 6-9 mm. long, copiously but rather loosely pubescent with many-armed hairs, slightly angulate in the bud, the lobes about equaling to twice as long as the tube, deltoid, acute or short-acuminate, 2-3 mm. wide at base, the margins white-lanate; carpels 2.5-3.5 mm. high and 74-% as wide, asymmetrically ovate, distinctly stalked, moderately to rather deeply incised.

[Begin Page: Page 131]

APRIL, 1951] MALACOTHAMNUS 131

Type from San Fernando Valley, Los Angeles Co. (A . David-
son, in 1895, G).— Los Angeles Co., especially in and near the

San Fernando Valley, where apparently rather common, reported by Estes (4) also from Ojai Valley, Ventura Co., up to 1000 (1500?) ft., along washes and on dry slopes.

An apparently very local species, *M. Davidsonii* is notable in having thick, velvety-tomentose leaves (as in *M. Fremontii*) that are also rather deeply and angulately lobed (as is often the case in *M. fasciculatus*). Hybridization with the latter (var. *laxiflorus*) may occur, a collection in Pacoima Wash, Los Angeles Co. (J. T. Howell 5169, in part) being nearly intermediate in its characters.

15. MALACOTHAMNUS MARRUBIODES (DuRoi & Hilg.) Gtence, Leafl. Bot. Obs. 1: 208 (1906). *Malvastrum marrubioides* Dur. & Hilg., Jour. Acad. Phila. ser. 2, 3: 38 (1855). *Malvastrum gabrielense* Munz & Johnst., Bull. Torr. Bot. Club 52: 223 (1925). *Sphaeralcea densiflora* var. *gabrielensis* (Munz & Johnst.) Jeps., Fl. Calif. 2: 498 (1936).

Plant shrubby, up to about 2 m. high, the branches rather slender, densely but not closely stellate-tomentose when young; leaves (so far as known) slender-petioled, the blades rather small, usually not more than 4 cm. long and wide, suborbicular-deltoid, not or obscurely lobed, dentate or crenate-dentate, mostly acute at apex, truncate or subcordate at base, thickish, somewhat prominently reticulate beneath, copiously but not densely pubescent on both surfaces with short, many-armed hairs; inflorescences interrupted-thyrsoid-glomerate, usually short, leafy nearly to the apex or naked except at base, the glomerules few-flowered, sessile or short-stalked, the flowers sessile or short-pedicelled; bractlets $y^{\wedge} \wedge^{\wedge} 8 \wedge^{\wedge} \wedge^{\circ}$ nearly equaling the calyx, subulate or filiform; calyx 9-12 mm. long, more or less pointed and

angulate in the bud, loosely short-pubescent with many-armed hairs (the longest arm scarcely more than 1 mm. long), the lobes 1.5-3 times as long as the tube, lanceolate or lance-ovate, somewhat abruptly and sharply long-acuminate, 2-3 (4) mm. wide at base; carpels 2.5-3.5 mm. high and usually nearly as wide, obovate to nearly orbicular, truncate or rounded (exceptionally distinctly stalked) at base, shallowly (seldom rather deeply) incised; seeds copiously papillate-stellulate.

Type of *M. marrubioides* from Fort Miller (Millerton), Mariposa or Fresno Co. (Heermann, in 1853, isotypes G, US), type of *M. gabrielense* from "Arraster" (Arrastre Creek?) north slope of the San Gabriel Mountains, Los Angeles Co. (F. W. Peirson 774, Po).— The site of Fort Miller or Millerton is now within the Friant Reservoir and the species has not been collected since so far to the north. It is known from the mountains of Kern, Ven-

[Begin Page: Page 132]

132 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

tura, and Los Angeles counties, 1500 to 7000 ft., but apparently is quite rare. A specimen in the herbarium of the University of California (K. Curran, in 1885), labelled as from Livermore, Alameda Co., was almost certainly collected much farther south. Jepson (7, p. 500) reduced *M. marrubioides* to synonymy under *Sphaeralcea* [*Malacothamnus*] *Fremontii*, but it is readily distinguished from that species by its smaller, dentate rather than crenate, less tomentose leaves and less densely pubescent

calyx. Also, according to J. T. Howell, who collected the plant in the Tehachapi Mountains, it lacks the characteristic fragrance of *M. Fremontii*. Although superficially resembling *M. densiflorus*, the nearest relative of *M. marrubioides* seems to be *M. orbiculatus*, which differs in its larger, thinner, cordate, crenate leaves and looser inflorescences. Specimens from Mt. Pinos, Alamo Peak, and Sespe Gorge, Ventura Co., however, approach *M. orbiculatus* in their looser, longer-stalked inflorescences. They tend also to have a smaller and less deeply cleft calyx with more gradually acuminate lobes than in typical *M. marrubioides*.

16. *Malacothamnus arcuatus* (Greene) Greene, Leaf. Bot. Obs. 1: 208 (1906). *Malveopsis arcuata* Greene, Man. Reg. S. F. Bay 66 (1894). *Malvistrum arcuatum* (Greene) Robins, in A. Gray, Syn. Fl. N. Amer. U: 311 (1897). *Sphaeralcea arcuata* (Greene) Arthur, Torrey 21: 11 (1921).

Stems up to 2 m. high, woody below, stout, copiously and loosely stellate-tomentose (more or less shaggy) with many-armed hairs; leaves suborbicular to rhombic-ovate, up to 6 cm. long, usually longer than wide, very shallowly 3-5-lobed (the lobes rounded to somewhat angulate), rounded to acutish at apex, subcuneate, truncate, or subcordate at base, coarsely crenate to rather finely crenate-dentate, sparsely to copiously but not densely pubescent on both surfaces, usually thin and plane but sometimes thickish and prominently rugose-reticulate beneath; inflorescences elongate, narrow, interrupted-thyrsoid-glomerate, usually naked except at base, the glomerules dense, few- to many-flowered, sessile or nearly so, the flowers sessile or subsessile; bractlets Vi-Vi as long as the calyx, subulate; calyx 5-7

(9) mm. long, not angulate in bud, rather sparsely to copiously but not densely pubescent with short, many-armed hairs, the lobes deltoid, acute, about as long as the tube; carpels about 3 mm. high and nearly % as wide, obovate, more or less stalked, very shallowly to rather deeply incised, copiously stellulate apically and for a short distance ventrally and dorsally; seeds (always?) papillate-stellulate and somewhat rugose.

Type from the "Coast Range back of Belmont," San Mateo Co. (E. L. Greene, in 1886, UC?)-San Mateo, Santa Clara, and

[Begin Page: Page 133]

APRIL, 1951] MALACOTHAMNUS 133

Santa Cruz counties, apparently rather common on the eastern side of the Outer Coast Range, up to about 800 ft., slopes, canyons and bottom lands. A specimen in the herbarium of the California Academy of Sciences (Eastwood 4925), labelled as from Duarte, Los Angeles Co., seems to be typical *M. arcuatus*, but it is highly improbable that the species extends so far to the south.

This species is quite variable in its vegetative characters, the variation probably due largely to differences in habitat. Although it is placed next to *M. marrubioides* in the key, its nearest relative is probably *M. Hallii*, which, in turn, seems to be allied to *M. fasciculatiis*. In fact the inflorescences of *M. arcuatus* are strikingly like those of *M. fasciculatus*. In its less woody

habit, obscurely lobed leaves, and more loosely pubescent stems and calyx, *M. arcuatus* differs, however, from all forms of *M. fasciculatus*. What appears to be a form of *M. arcuatus*, with smaller and more rounded leaves, was collected on Loma Prieta, Santa Cruz Co. (Bond, in 1928) at the unusual elevation of 3500 ft.

17. *Malacothainnus mendocinensis* (Eastw.), comb. nov. *Malvastrum mendocinense* Eastw., Leafl. West. Bot. 2: 188 (1939).

Plant woody below, up to 2 m. high; stems erect, rather stout, striate-angulate, very closely short-pubescent (sublepidote); leaves short-petioled, the blades up to 5 cm. long and wide, ovate to suborbicular, shallowly to rather deeply and somewhat angulately 3-5-lobed, shallowly crenate, rounded at apex, cordate (often deeply so) at base, thickish, copiously and minutely stellate-pubescent on both surfaces; inflorescences elongate, leafy at least below, narrowly paniculate, the short, loosely flowered branchlets stiffly ascending, the flowers mostly short-pedicelled; bractlets barely as long as the calyx, subulate, thickish; calyx 5-6 mm. long, somewhat angulate in bud, densely sublepidote with extremely short, many-armed hairs, the broadly deltoid, acutish lobes equaling or somewhat shorter than the tube; petals 10-12 mm. long; carpels about 2.2 mm. high and very nearly as wide, not stalked, barely incised.

Types from 5 miles southwest of Ukiah, Mendocino Co., about 700 ft., "on a bank alongside the road" (Eastwood in Howell 4582, 6092, CA).— Known only from the type-locality or very near it.

An extremely rare and local species, apparently the only representative of the genus in Mendocino Co. It is the smallest-flowered of all Malacothamni. It seems to belong to the M.

[Begin Page: Page 134]

134 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

fasciculatus group and is probably most nearly related to M. Hallii, from which it differs in its less woody habit, conspicuously striate-angulate stems, shorter bractlets, and smaller corollas.

18. *Malacothamnus Hallii* (Eastw.), comb. nov. *Malvastrum Hallii* Eastw., Leaflet. West. Bot. 1: 216 (1936). *Sphaeralcea fasciculata* var. *Elmeri* Jeps., Fl. Calif. 1: 501 (1936).

A very woody shrub with stout, straggling to suberect stems up to 3 m. long; herbage densely and closely pubescent (sublepidote); leaves rather long-petioled, the blades up to 7 cm. long and 8 cm. wide, broadly ovate to suborbicular, shallowly 3-5-lobed with rounded (rarely somewhat angulate) lobes, coarsely to rather finely crenate, rounded (seldom acutish) at apex, deeply cordate to subcordate at base, thin and plane to thick and rugose with veins prominent beneath; inflorescences narrowly thyrsoid-glomerate with sessile glomerules, or more openly paniculate with the longest branchlets up to 10 cm. long, the flowers mostly pedicelled; bractlets about 1/2 as long as the calyx, subulate or filiform; calyx 5-6 mm. long, not angulate in the bud, densely pubescent with very short, many-armed hairs, the

lobes deltoid-ovate, acute or acutish, about as long as the tube; petals 15-17 mm. long; carpels 2-3 mm. high and about $\frac{1}{2}$ as wide, not to distinctly stalked, very shallowly (rarely somewhat deeply) incised, sparsely to densely stellulate apically and subapically; seeds papillate-stellulate and often somewhat rugose.

Type of *M. Hallii* from Mt. Diablo, Contra Costa Co. (Hall & Essig 10131, CA), type of *S. fasciculata* var. *Elmeri* also from Mt. Diablo (Elmer 4395, Jepson Herbarium?). — Mt. Diablo, Contra Costa Co., and Mt. Hamilton Range, Santa Clara and Merced counties, mostly on the western slopes of this range but extending 2 miles east of the summit of Pacheco Pass, 250 to 1200 ft. It usually grows in association with *Adenostoma*, *Artemisia californica*, and *Salvia mellifera*.

Malacothamnus Hallii is related to *M. fasciculatus*. It was treated as a variety of the latter by Jepson (*ibid.*, as *Sphaeralcea*) and was reduced to synonymy under *Malvastrum fasciculatum* var. *laxiflorum* by McMinn (11, p. 348), although the inflorescences are sometimes as narrowly thyrsoid-glomerate as in typical *M. fasciculatus*. The great variability of *M. Hallii* makes it impossible to draw a sharp line between it and *M. fasciculatus*, but in general it has more shallowly lobed leaves and smaller calyces. In view of the wide geographical separation of the two species, no form of *M. fasciculatus* being known from farther

north than Santa Barbara Co., the writer considers it expedient to maintain *M. Hallii* as a species.

Specimens from the Mt. Hamilton Range tend to have more contracted inflorescences and more distinctly stalked carpels than those from Mt. Diablo. An unusual specimen, apparently a shade form, with large, thin, coarsely dentate, more or less cuneate leaves, a very open inflorescence, and a deeply cleft calyx with acuminate lobes, was collected at the base of Mt. Diablo (Rattan, in 1903).

19. *Malacothamnus Jonesii* (Munz), comb. nov. *Malvastrum Jonesii* Munz, Bull. S. Calif. Acad. Sci. 24: 88 (1925). *Sphaeralcea fasciculata* var. *Jonesii* (Munz) Jeps., Fl. Calif. 2: 501 (1936). *Malvastrum Dudleyi* Eastw., Leaf! West. Bot. 1: 218 (1936).

An (apparently) small shrub with nearly erect branches; herbage densely and closely whitish-tomentose (sublepidote) with very short, many-armed hairs; leaves slender-petioled, the blades up to 4.5 cm. long and nearly as wide, suborbicular to rhombic-ovate, obscurely 3-5-lobed, coarsely and irregularly crenate or crenate-dentate, rounded to acutish at apex, truncate, cuneate, or very slightly subcordate at base, thickish, slender-veined; inflorescences racemiform or very narrowly paniculate, few-flowered, the flowers 1-3 (rarely more) at each node, mostly distinctly pedicelled; bractlets $V3-1/2$ (exceptionally \wedge) as long as the calyx, subulate; calyx 6-8 mm. long, sublepidote to copiously but not very densely tomentose with short many-

armed hairs, the lobes deltoid or oblong-lanceolate, acute or acutish, slightly to considerably longer than the tube, 2-3 mm. wide at base; carpels about 3 mm. high and nearly as wide, not to conspicuously stalked, usually deeply and acutely incised, sparsely stellulate apically-ventrally; seeds papillate-tellulate.

Type of *M. Jonesii* from Paso Robles, San Luis Obispo Co.

(M. E. Jones 223, Po), type of *M. Dudleyi* from Fern Canyon 2 miles west of Paso Robles (C. Dudley, in 1929, CA).— Known only from San Luis Obispo Co, (and southern Monterey Co.?) where it has been collected also in the Santa Lucia Mountains and near Atascadero.

This insufficiently known species shows some affinity to *M. fasciculatus* although, in the occasionally somewhat woolly calyx, it resembles members of the *M. Fremontii* group, especially *M. niveus*, which has much the same geographical distribution. It is unique in its greatly reduced inflorescences. The type of *M. Dudleyi* differs from the type of *M. Jonesii* in its cuneate-flabelliform leaves and more deeply cleft calyx, but the two seem to be conspecific.

[Begin Page: Page 136]

136 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

20. *Malacothamnus Parishii* (Eastw.), comb. nov. *Malvastrum Parishii* Eastw., Leafl. West. Bot. 1: 216 (1936).

Apparently a shrub, with erect branches, the younger stems very densely lepidote with minute, many-armed hairs, the pubescence apparently yellowish; leaves slender-petioled, the blades rhombic-ovate, up to 6.5 x 5.5 cm., very shallowly and obtusely 3-lobed, coarsely crenate, obtuse to acutish at apex, cuneate at base, thickish, green and glabrescent above, densely whitish-lepidote beneath, the veins prominent beneath; inflorescence a very open and rather few-flowered panicle with ascending branchlets (the lower ones elongate), nearly naked (the floral leaves much reduced), the flowers racemosely disposed on the branchlets, short-pedicelled; bractlets Vt-Vs as long as the calyx, subulate; calyx 8-9 mm. long, angulate and pointed in bud, densely sublepidote with many-armed hairs, the lobes about twice as long as the tube, deltoid-lanceolate, very acute; petals about 15 mm. long; carpels (immature) about 3 mm. long and $\frac{1}{2}$ as wide, conspicuously stalked, shallowly incised, stellulate at apex; seeds papillate-stellulate.

Type from near San Bernardino, San Bernardino Co., 1000 to 1500 ft. (S. B. Parish 3804, in 1895, CA).-Known only from the type-collection.

The material available is too scanty to permit a final conclusion as to the status of this plant. It is very similar to *M. fasciculatus* var. *laxiflorus* in characters of the inflorescence, flowers, and fruit but differs markedly in leaf-shape from any specimen of the *M. fasciculatus* complex that the writer has seen. Also the flower-buds are more angulate and pointed than is usual in *M. fasciculatus* and its varieties.

21. *Malacothamnus fasciculatus* (Nutt.) Greene, Leafl. Bot. Obs. 1: 208 (1906). *Malva fasciculata* Nutt. in Torr. & Gray, Fl. N. Amer. 1: 225 (1838). *Malvastrum Thurberi* A. Gray, Mem. Amer. Acad. ser. 2, 5: 307 (1855). *Malvastrum fasciculatum* (Nutt.) Greene, Fl. Francisc. 108 (1891). *Sphaeralcea fasciculata* (Nutt.) Arthur, Torreya 21: 11 (1921). *Malvastrum fasciculatum* var. *typicum* Estes, Bull. S. Calif. Acad. Sci. 24: 83 (1925).

Plant shrubby, up to 5 m. high, with long, relatively slender, ascending branches, these when young densely and usually closely sublepidote with many-armed hairs; leaves slender-petioled, the blades up to about 4 cm. long and wide, broadly ovate or suborbicular, usually distinctly and somewhat angulately but not deeply 3-5-lobed, crenate or dentate, rounded to acutish at apex, truncate or shallowly cordate at base, thin or thickish, copiously stellulate or sublepidote on both surfaces with many-armed hairs or glabrescent above, paler beneath; inflorescences elongate, leafy or nearly naked, interrupted-thyrsoid-glomerate, the glomerules often dense, subsessile, and many-flowered but sometimes rather loose, short-stalked, and fewer-flowered, the flowers sessile or short-pedicelled; bractlets $\frac{1}{2}$ - $\frac{1}{3}$ as long as the calyx, subulate; calyx 6-8 mm. long, not or but slightly angulate

[Begin Page: Page 137]

APRIL, 1951] MALACOTHAMNUS 137

in bud, densely to rather loosely subtomentose or sublepidote with short, many-armed hairs, the lobes broadly deltoid, acute or acutish, shorter than to about equaling the tube, 2-3 mm. wide at base; petals up to about 20 mm. long; carpels 2.5-3.2 mm. high and averaging about $\frac{1}{2}$ as wide, mostly

conspicuously stalked and deeply incised; seeds papillate-stellulate and often rugose.

Type of *Malva fasciculata* labelled as from Santa Barbara but probably collected at San Diego (Nuttall, isotype?, G), type of *Malvastrum Thurberi* labelled, as from Santa Cruz, Sonora (Thurber, G) but this surely is an error as to locality.— Los Angeles Co. and southwestern San Bernardino Co. to northern Baja California, common and locally abundant, mostly near the coast at low elevations but reported to range eastward as far as the San Bernardino and Santa Rosa mountains. The occurrence of typical *M. fasciculatus* as far north as Santa Barbara is doubtful.

In *M. fasciculatus* and its varieties some of the calyx-lobes occasionally cohere, giving the appearance of a bilabiate calyx.

21a. *Malacothamnus fasciculatus* var. *laxiflorus* (A. Gray), comb. nov.
Malvastrum splendidum Kellogg, Proc. Calif. Acad. Sci. 1: 65 (67) (1855).
Malvastrum Thurberi var. *laxiflorum* A. Gray, Proc. Amer. Acad. 22: 291 (1887). *Malacothamnus fasciculatus splendidus* (Kellogg) Abrams, Bull. N. Y. Bot. Gard. 6: 417 (1910). *Malvastrum laxiflorum* Davids. & Mox., Fl. S. Calif. 233 (1923), wrongly attributed to Gray; (A. Gray) Eastw., Leafl. West. Bot. 1: 219 (1936). *Malvastrum fasciculatum* var. *laxiflorum* (A. Gray) Munz & Johnst., Bull. Torr. Bot. Club 51: 296 (1924). *Sphaeralcea fasciculata* (Nutt.) Jepson var. *laxiflora* (A. Gray) Jepson, Man. Fl. Pl. Calif. 634 (1925).

Malvastrum splendidum, upon which Gray based his *M. Thurberi* var. *laxiflorum*, cannot be identified with certainty

from Kellogg's vague description, and the type, collected by Wm. A. Wallace, presumably near Los Angeles, seems not to have been preserved. Since, however, *M. splendidum* was described as "15 to 20 feet high," there is little doubt that it was a form of *Malacothamnus fasciculatus*, and probably var. *laxiflorus*.— Ventura, Los Angeles, San Bernardino, Riverside, and Orange (probably also San Diego) counties, and in northern Baja California, usually at low elevations but up to 5500 feet in the Santa Rosa Mountains, chiefly on the coastal side of the mountains but occasionally on the desert side as at Victorville, San Bernardino Co.

[Begin Page: Page 138]

138 LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

In its extreme form, characterized by a very openly paniculate inflorescence with slender ascending branchlets up to 25 cm. long and with rather long-pedicelled, racemosely disposed flowers, var. *laxiflorus* seems quite distinct from typical *M. fasciculatus*, but the intergradation is complete, as was pointed out by Estes (4, p. 84). There is, perhaps, a tendency for var. *laxiflorus* to have more deeply cordate leaves, relatively longer bractlets, a larger and more deeply cleft calyx with more acuminate lobes, and less deeply incised carpels, but there is no consistent difference in these characters.

21b. *Malacothamnus fasciculatus* var. *catalinensis* (Eastw.), comb. nov.

Malvastrum catalinense Eastw., Leafl. West. Bot. 1: 215 (1936). *Malvastrum fasciculatum* var. *catalinense* (Eastw.) McMinn, Man. Calif. Shrubs 348 (1939).

Types from near Avalon, Santa Catalina Island (John Carlson, in 1915, Eastwood 6442, CA).— Commonly supposed to be endemic on Santa Catalina Island, near sea level, but specimens collected at Point Mugu, Ventura Co., near Laguna Beach, Orange Co., and between Oceanside and San Juan Capistrano, San Diego or Orange Co., are not distinguishable from this variety.

Most of the specimens resemble typical *M. fasciculatus* in the contracted inflorescences, but some of them, including the Carlson type, have the more open inflorescences of var. *laxiflorus*.

Var. *catalinensis* is characterized by large (up to 8 x 8 cm.), thin, often deeply lobed and deeply cordate leaf-blades, these sparsely stellulate or glabrescent above and usually conspicuously paler beneath. The carpels are relatively large, (3.2-3.8 mm. high) and narrow, conspicuously stalked, and deeply incised.

21c. *Malacothamnus fasciculatus* var. *Nuttallii* (Abrams), comb. nov.

Malacothamnus Nuttallii Abrams, Bull. N. Y. Bot. Card. 6: 417 (1910). *Malvastrum Nuttallii* Davids. & Mox., Fl. S. Calif. 233 (1923), attributed to Abrams. *Sphaeralcea fasciculata* (Nutt.) Jeps. var. *Nuttallii* (Abrams) Jeps., Fl. Calif. 2: 501 (1936). *Malvastrum fasciculatum* var. *Nuttallii* (Abrams) McMinn, Man. Calif. Shrubs 348 (1939).

Type from Casitas Pass, Ventura Co. (Abrams, in 1908, St).—

Santa Barbara and Ventura counties, from near sea level to 1500 ft., common and sometimes abundant.

In its typical form this variety is distinguished by having very nearly concolored leaves, scarcely paler and more pubescent be-

[Begin Page: Page 139]

APRIL, 1951] MALACOTHAMNUS 139

neath than above; but a series of fine specimens collected in Ventura Co. by Henry M. Pollard shows every gradation from this state to the distinctly bicolored leaves typical of var. *laxiflorus*. The inflorescences are usually open and long-branched as in var. *laxiflorus*, but are sometimes narrow and contracted, although never so much so as in typical *M. fasciculatus*. Var. *Nuttallii* is a luxuriant form, the stems reaching a height of 6 m. and a diameter of 10 cm. at base. The petioles are long and slender, the blades up to 10 cm. long, deeply lobed, truncate to deeply cordate at base, the inflorescences long and many-flowered, the calyx up to 10 mm. long, the petals up to 25 mm. long, the carpels 3-5 mm. high, about 2/3 as wide, distinctly to very conspicuously stalked, and deeply incised.

2 Id. *Malacothamnus fasciculatus* var. *nesioticus* (Robins.), comb. nov.

Malvastrum nesioticum Robins, in A. Gray, Syn. Fl. N. Amer. U: 312 (1897).

Malacothamnus nesioticus (Robins.) Abrams, Bull. N. Y. Bot. Gard. 6: 419

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Sphaeralcea fasciculata var. *nesiotica* (Robins.) Jeps., Fl. Calif. 2: 501 (1936).
Malvastrum fasciculatum var. *nesioticum* (Robins.) McMinn, Man. Calif.
Shrubs 348 (1939).

Type from Santa Cruz Island (Greene, in 1886, G).— Known
only from Santa Cruz Island,

This extremely local variety differs from all other forms of
M. fasciculatus in the fastigate character of the loosely many-
flowered panicle, the numerous rather rigid branches mostly
erect or strictly ascending, and the flowers cyraosely disposed on
the branchlets. In all other characters it resembles var. *catalin-*
sis, the leaves being large (up to 7 x 8 cm.), thin, rather deeply
lobed, and deeply cordate at base, and the carpels being about
4 mm. high, distinctly but shortly stalked, and deeply incised.

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[Begin Page: Page 140]

140

LEAFLETS OF WESTERN BOTANY [VOL. VI, NO. 6

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Index by Species Number

(with partial reference to synonymy, in italics)

Abbotii 12

aboriginum 2

arcuatus 16

catalinense 21b

clementinus 10

Davidsonii 14

densiflora var. gabrielensis 15

densiflorum var. typicum 11

densiflorus 11

var. viscidus 11a

Dudleyi 19

fasciculata var. Elmeri 18

var. Jonesii 19

fasciculatum var. typicum 21

fasciculatus 21

var. catalinensis 21b

var. laxiflorus 21a

var. nesioticus 21d

var. Nuttallii 21c

splendidus 21a

foliosus 3

fragrans 5

Fremontii 8

var. cercophorum 9

var. exfibulosa 6

var. Helleri 6

var. niveum 5

var. orbiculatum 7

gabrielense 15

gracilis 13

Hallii 18

Helleri 6

Howellii 9

var. cordatum 9

involucratum la

Jonesii 19

laxiflorum 21a

marrubioides 15

var. paniculatum 4

var. viscidum 11a

mendocinensis 17

nesioticum 21d

niveus 5

Nuttallii 21c

orbiculata var. Clementina 10

orbiculatus 7

Palmeri 1

var. involucratus la

paniculatus 4

Parishii 20

splendidum, 21a

Thurberi 21

var. laxiflorum 21a

viscidum 11a