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SAN FRANCISCO, CALIFORNIA
JANUARY 16, 1932

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...Leaflets of western botany
NEW YORK BOTANICAL GARDEN

THE PITTOSPORUMS IN CALIFORNIAN GARDENS AND PARKS

BY ALICE EASTWOOD

This genus of plants consists of trees and shrubs with alternate or whorled leaves without stipules. The flowers are in the axils of the leaves or in terminal clusters generally surrounded by the leaves; the sepals, petals, and stamens are five, inserted on the receptacle. The pod is woody, splitting into two, three or, rarely, four valves with the seeds attached to the sides and immersed in a viscid fluid. The genus is widely distributed, being found in the Cape region, South Africa, islands of the Pacific, New Zealand and Australia, Japan, China, India, and Canary Islands. The name is derived from the Greek and means pitch seed; it is pronounced Pittósporum.

Key to the Species

1a. Corolla salverform, claws of petals conniving to form a tube, blades spreading to reflexed 2

1b. Corolla open-bell-shaped, claws of petals conniving only near base 11

1c. Corolla star-shaped, petals spreading; flowers numerous 12

2a (1a). Corolla dark crimson or purple 3

2b. Corolla cream-white or yellow 6

3a (2a). Leaves densely white-downy beneath, green above 4

3b. Leaves green on both sides 5

4a (3a). Leaves broadest at top, tapering to the stalk ..... 1. *P. crassifolium*

4b. Leaves equal at top and bottom ..... 2. *P. Ralphii*

5a (3b). Leaves whorled at end of branches; flowers dull purple ..... 3. *P. cornifolium*

5b. Leaves not whorled; flowers generally axillary, dark purple ..... 4. *P. tenuifolium*

6a (2b). Flowers in small heads on bare branches ..... 5. *P. cauliflorum*

6b. Flowers axillary 7

6c. Flowers at end of leafy branches 8

7a (6b). Shrub or tree with drooping branches; flowers yellow ..... 6. *P. phillyræoides*

7b. Erect shrub or tree; flowers yellow and purple ..... 7. *P. bicolor*

JAN 25 1932

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8a (6c). Flowers in umbels..... 9
8b. Flowers not in umbels, yellow..... 10
9a (8a). Flowers many; petals white, turning yellow.....
.....8. *P. Tobira*
9b. Flowers few, petals cream-color with red claws.....
.....9. *P. erioloma*
9c. Flowers few, on thread-like stalks, petals yellow.....
.....10. *P. heterophyllum*
10a (8b). Flowers many, in pyramidal panicles.....
.....11. *P. eriocarpum*
10b. Flowers few, in nodding racemes.....12. *P. revolutum*
11a (1b). Flowers greenish-yellow, in many-flowered clusters
..... 13. *P. daphniphylloides*
11b. Flowers cream-white, clusters loosely flowered.....
.....14. *P. undulatum*
11c. Flowers pale yellow, on thread-like stalks at end of branches..... 15. *P. truncatum*
12a (1c). Flower-clusters flat-topped 13
12b. Flower-clusters not flat-topped..... 14
13a (12a). Flowers white; leaves dentate.....16. *P. rhombifolium*
13b. Flowers pale yellow, generally unisexual; leaves undulate.....17. *P. eugenioides*
14a (12b). Flowers greenish, in roundish clusters.....
.....18. *P. viridiflorum*
14b. Flowers greenish-yellow, in pyramidal clusters.....
.....19. *P. floribundum*

P. bicolor, 7.
P. caulifiorum, 5.
P. cornifolium, 3.
P. crassifolium, 1.
P. daphniphylloides, 13
P. eriocarpum, 11.
P. erioloma, 9.
P. eugenioides, 17.
P. floribundum, 19.
P. heterophyllum, 10.
P. phillyræoides, 6.
P. Ralphii, 2.
P. revolutum, 12.
P. rhombifolium, 16.
P. tenuifolium, 4.
P. Tobira, 8.
P. truncatum, 15.
P. undulatum, 14.
P. viridiflorum, 18.

1. Pittosporum crassifolium A. Cunn. Figured in Kirk's Forest Fl. New Zeal., V, pl. 14. Tree or shrub with white-downy branches, becoming black when old. Leaves obovate, 5-8 cm. long, tapering to a short petiole; upper surface green; lower densely white-downy; margin entire. Flowers dark red-crimson, three to ten on drooping pedicels in terminal clusters; sepals white-downy, pointed, 6-7 mm. long; petals 12 mm. long, the spreading or recurving blades as long as the claws; anthers yellow, in the throat of the corolla. Pod roundish, about 2 cm. long, white-downy, valves three or four, yellow within; *seeds black*. Native of New Zealand. Common in cultivation.

2. Pittosporum Ralphii T. Kirk. This is similar to the preceding, but can be readily distinguished by the shape of the leaves. In *P. Ralphii* they are elliptic-oblong, obtuse at base and apex and about the same width throughout, while in *P. crassifolium* the leaves are broadest at the obtuse apex, gradually narrowing to the short petiole.

The pods are smaller in *P. Ralphii.* This was introduced by the New Zealand exhibition at the Exposition in 1915 in San Francisco. Golden Gate Park. Native of New Zealand.

3. PITTOSPORUM CORNIFOLIUM R. Cunn. Shrub with spreading branches and leaves whorled at the ends and junction of the branchlets. Leaves brownish-green, oblong-lanceolate, tapering at both ends and almost sessile, 3-4 cm. long, 1-2 cm. wide, margin entire, smooth. Flowers unisexual, dull purple, 1-3 on slender stems about 5 mm. long; petals linear-lanceolate, nearly 1 cm. long, recurving at the pointed tips; sepals linear and spreading. Pods small, dark brown, with inner surface of valves bright orange; *seeds blackish-purple.* Native of New Zealand. It is rarely cultivated in California.

4. PITTOSPORUM TENUIFOLIUM Banks and Solander. Figured in Kirk's Forest Fl. of New Zeal., pl. 46. Tree or shrub with almost black bark. Leaves oblong, obovate or elliptical, variable in shape and size, somewhat pubescent when young, becoming smooth in age, apex and base obtuse or acute, margin entire or wavy, petiole short. Flowers dark purple, fragrant, generally axillary, but in some bushes in small clusters at the ends of the branchlets, peduncles and sepals smooth or downy, the latter sometimes spreading but more often reflexed, pointed, margin ciliate, generally half as long as the corolla-tube; claws of petals forming a tube much lighter in color than the black-purple blades, these spreading or strongly reflexed; anthers yellow, in the throat of the corolla. Pod either smooth or downy, splitting into three valves with *black seeds.* This is grown as a tree or a hedge plant. It is very common in Golden Gate Park, and is variable. In the trade this is listed as *P. nigrum* because of the dark stems and the darker green leaves. A native of New Zealand.

5. PITTOSPORUM CAULIFLORUM Mann. Tree or shrub with large veiny leaves clustered at the ends of bare branches; these and lower surface of leaves brown-downy. Flowers cream-color, about 8 mm. long in small heads on short stems growing on the old wood. Pod flattened, 3-4 cm. across, roundish and 4-ridged, woody, exterior dark brown, interior of valves orange; *seeds black.* Native of Hawaii. Golden Gate Park.

6. PITTOSPORUM PHILLYRÆOIDES DC. Small tree or climbing shrub with slender drooping branches. Leaves oblong to lanceolate, sharply hook-pointed at apex, narrowed at base to a short petiole, hairy when young, becoming smooth when old. Flowers yellow, often unisexual, single or several, in the leaf axils on thread-like pedicels about as long as the flowers; sepals very small, soon deciduous; claws of petals conniving to form a tube 6-8 mm. long, 3-veined, blades reflexed, 3 mm. long, darker than the tube. Pod about 1 cm. in diameter, splitting into two valves with few *orange-red seeds.* Native of Australia. It is not uncommon in gardens in southern California.

7. PITTOSPORUM BICOLOR Hook. Figured in Gartenflora, pl. 15, as *P. discolor* Regel. Small tree or shrub with brown-downy branches. Leaves oblong-lanceolate to linear, 2-6 cm. long, 1-2 cm. wide, almost sessile, margin revolute, smooth above, white-downy beneath. Flowers unisexual, axillary or few and clustered at ends of leafy branches; flower-stems long, thread-like, and drooping; petals purple and yellow, about 1 cm. long, spreading from about the middle; sepals reflexed 5 mm. long. Pods rounded, compressed, 1 cm. broad, splitting into two valves; *seeds black.* Native of Australia. Mosswood Park, Oakland, and Golden Gate Park.

8. PITTOSPORUM TOBIRA Dryand. Figured in Bot. Mag., pl. 396. Shrub with spreading branches. Leaves obovate, entire, strongly revolute, smooth, upper surface darker than the lower, midrib prominent, apex obtuse or retuse, base tapering to a short petiole 1 cm. long, blade 7 cm. long. Flowers white, turning yellow, very fragrant, in almost sessile umbels at ends of branches, much shorter than the clustered subtending leaves, pedicels simple or sometimes with one or two branches, puberulent, 15 mm. long; sepals united at base, deciduous, about as long as the connivent claws of the petals, ovate, unequal; corolla almost 2 cm. across, the blades oblong, obtuse, spreading, flat, a little longer than the claws. Pods becoming dark brown and rough externally, valves 3, the inner surface straw color; *seeds red.* Native of China and Japan. This and the variegated variety were introduced into Californian gardens over seventy-five years ago and are common in cultivation.

9. PITTOSPORUM ERIOLOMA Moore and Mueller. Shrub with spreading branches. Leaves spatulate to obovate, densely clustered, tapering at base and almost sessile, strongly revolute, smooth, upper surface dark green, lower paler. Flowers large, more than 1 cm. long, terminal and few in sessile umbels, the pedicels recurved in fruit; sepals reflexed; corolla cream-white about 1 cm. across, with reddish claws almost 1 cm. long. Pod warty-wrinkled, dark brown or black, roundish, 2 cm. in diameter, valves 3; *seeds black.* Native of Lord Howe Island. It is used as a hedge shrub in Golden Gate Park.

10. PITTOSPORUM HETEROPHYLLUM Franch. Figured Pl. Delavayi pl. 18, not seen. Shrub with smooth, spreading, slender branches. Leaves from lanceolate to rhomboid, smooth, paler on lower surface, tapering at both ends, petiole short. Flowers yellowish, few at ends of branches on erect thread-like stems, becoming 1-2 cm. long, closely surrounded by the leaves; sepals half as long as the claws of the petals; petals linear-oblong, 5 mm. long, blades erect, rounded, 1 mm. wide. Pod small, orbicular, 6 mm. in diameter, valves 2 or 3, black; seeds unknown. Native of western Sechuan, China. Specimens from several gardens compared with E. H. Wilson, No. 1146, distributed from the Arnold Arboretum.

11. PITTOSPORUM ERIOCARPUM Royle. Figured in Bot. Mag., pl. 7423. A small tree or shrub with spreading branches and all parts clothed with a yellow down. Leaves oblong-lanceolate, pointed at both ends, 10-15 cm. long, 3-5 cm. wide, petiole 3-4 cm. long, margin entire, above almost smooth, beneath very veiny and brown-downy. Flowers numerous, yellow, fragrant, in a large pyramidal panicle, 6 dm. high and almost sessile; sepals spreading, half the length of the claws of the petals, these 7 mm. long, blades spreading, 6 mm. across. Pods compressed, roundish, downy, valves brown on outside, yellow within, almost 15 mm. across. *Seeds many, red.* Native of western Himalaya Mountains. It is in several gardens in Santa Barbara as *P. ferrugineum.*

12. PITTOSPORUM REVOLUTUM Ait. Figured in Bot. Reg., pl. 186. Shrub. Leaves ovate-elliptical or elliptical-oblong, tapering at base to a short petiole, apex acute, 5-10 cm. long, upper surface smooth, lower clothed with a brown down when young, becoming smoother with age, margin entire or slightly wavy. Flowers sometimes solitary or in nodding corymbose racemes subtended by the closely clustered leaves, stems and bracts brown-downy; sepals lanceolate 5 mm. long, reflexed, lower surface downy, upper smooth, 3-veined; petals with claws conniving to form an urn-shaped tube about 1 cm. long, yellowish, smooth, veiny, blades reflexed, oblong, 5 mm. long and wide. Pod dark brown and rough on the outside, 1-2 cm. in diameter; *seeds numerous, red, contrasting beautifully with the bright yellow interior of the valves.* Native of Australia. Not common in cultivation, but more frequent in southern than in northern California.

13. PITTOSPORUM DAPHNIPHYLLOIDES Hayata. Figured in Icon. Pl. Formosa, vol. 7, pl. 2. Shrub. Leaves oblong to elliptical, 10 cm. or more long, pointed at both ends on a petiole 2-3 cm. long, smooth, veiny, margin entire or slightly wavy. Flowers greenish-yellow, less than 7 mm. long, in large clusters 7-8 cm. across surrounded by the leaves; petals with spreading blades as long as the claws. Pods small, less than 1 cm. across, valves dark brown on the outside, yellow within, roundish; *seeds red, two or three.* Native of western Sechuan, China, where it was collected by E. H. Wilson. Western Nursery (Charles Abraham), San Francisco. Nursery of E. O. Orpet, Santa Barbara. Golden Gate Park.

14. PITTOSPORUM UNDULATUM Vent. Figured in Bot. Reg., pl. 16. Tree or shrub and used for hedges. Leaves oblong, elliptic or lanceolate, 8-15 cm. long, apex acute, tapering at base to a petiole about 2 cm. long, glossy and smooth except for a slight downiness near the petiole when young, margin entire to undulate. Flowers fragrant, cream-white, in loosely flowered umbellate clusters surrounded and surpassed by the leaves, bracts very small, surrounding the pedicels; sepals lanceolate-acuminate, tips spreading in bud, soon falling; petals with spreading blades about as long as the claws, about 1.5 cm.; stamens and style exserted from the throat of the

corolla. Pod orbicular, as large as a small cherry, *bright orange,* splitting into two or three valves with *red seeds.* This seems to bloom continuously in Golden Gate Park; it is in flower and fruit at the same time. Native of Australia and introduced into Californian gardens over seventy-five years ago. Common in cultivation.

15. PITTOSPORUM TRUNCATUM E. Pritz. Figured in Hook. Icon., pl. 1579. Shrub. Leaves rhombic with acute apex and base, tapering to a short downy petiole, margin entire, smooth on both sides and veiny. Flowers small in few-flowered, cymosely umbellate clusters, sessile at the ends of the branchlets; sepals oblong, acute, small, spreading but not reflexed; petals with claws forming a bell-shaped corolla, blades orbicular, veiny, reflexed; stamens and pistil exserted from the throat of the corolla. Pods two-valved, dark brown, truncate; *seeds yellow.* Native of China. This is cultivated at the Huntington Botanic Garden at San Marino, Pasadena, where it is known as *P. coriaceum.* It agrees exactly with specimens of *P. truncatum* in the herbarium of the California Academy of Sciences, collected by E. H. Wilson, No. 650, western Hupeh, Expedition to China, 1907-09, distributed by the Arnold Arboretum.

16. PITTOSPORUM RHOMBIFOLIUM A. Cunn. Figured in Hook. Icon., pl. 621. Tree. Leaves rhombic, tapering at base and apex, bright green, smooth on both surfaces, margin toothed above the middle, 8-10 cm. long, petiole about 2-5 cm. long. Flowers small, white, in terminal, flat-topped, dense, compound corymbs, smooth, without bracts; sepals ovate, obtuse, very small, erect; petals white, spreading, about 8 mm. long, with very short claws, blades oblong to obovate, veiny; stamens and pistil exserted; ovary tomentose at base, tapering to a style as long as the ovary and persistent on the *bright yellow fruit.* Pod pear-shaped or globular, about 5 mm. long; *seeds black.* Native of Australia. There is one tree in Golden Gate Park, near the Haight Street entrance. It is extensively cultivated in southern California.

17. PITTOSPORUM EUGENIOIDES A. Cunn. Figured in Kirk's Forest Fl., N. Zeal., pl. 49. Tree or shrub, often used as a hedge shrub. Leaves elliptic-oblong, 4-8 cm. long, 2-3 cm. wide, light green and glossy above, paler beneath, margin strongly wavy, petiole about 1 cm. long. Flowers small, pale yellow, usually unisexual, fragrant, in many-flowered, roundish or flat-topped clusters closely surrounded by the leaves; petals linear and spreading, 5 mm. long, 1 mm. wide, sepals half as long. Pod ovoid, acute, small, black, valves 2-5; *seeds black.* Native of New Zealand; native name, Taratoo. Common in cultivation.

18. PITTOSPORUM VIRIDIFLORUM Sims. Figured in Bot. Mag., pl. 1684. Shrub, with spreading branches. Leaves obovate to oblanceolate, 5-10 cm. long, 3-8 cm. wide, apex retuse, obtuse or acute, tapering at base to a finely downy petiole, smooth on both sides, veiny. Flowers small, yellowish-green, fragrant, in roundish, densely flowered

clusters surrounded and surpassed by the leaves; sepals ovate, 1 mm. long, soon falling; petals spreading, linear-oblong, 5 mm. long, margins ciliate near the base. Pod about as large as a small pea, splitting into two or three *rough brown valves with red seeds.* Native of the Cape region, Africa, and introduced by Mrs. Ellwood Cooper, at Ellwood, Santa Barbara County. It is rather common in Santa Barbara gardens.

19. PITTOSPORUM FLORIBUNDUM Wright and Arn. Small tree or shrub with spreading, slightly pubescent branches. Leaves lanceolate, pointed at both ends, about 20 cm. long, 3-5 cm. wide, upper surface darker than the lower, very veiny, margin crisp-wavy, petiole 1-2 cm. long. Flowers greenish-yellow, numerous in a large, pyramidal cluster 10 cm. or more long, surrounded by the leaves; sepals small; petals spreading, linear, 5 mm. long, 1 mm. wide; ovary downy, half as long as the style. Pods not seen but described as smooth, about 8 mm. in diameter with few seeds; color not given. Native of India. It is known in California only from plants in the nursery of E. O. Orpet, Santa Barbara, determined by Dr. Alfred Rehder at the Arnold Arboretum.

A NEW CALIFORNIAN BAERIA

BY JOHN THOMAS HOWELL

Baeria Bakeri J. T. Howell, spec. nov. Herba perennis; radicibus fasciculatis tenuiter fusiformibus; caulibus solitariis vel raro pluribus, stricte erectis, simplicibus vel paucis ramis, 2.5-4 dm. altis, leviter pubescentibus; foliis inferioribus multis, linearibus, 10-12 cm. longis, 0.1-0.2 cm. latis, basi tenuibus ciliatis; foliis caulinis oppositis, linearibus, ciliatis, basi connatis; capitulis solitariis in pedunculis elongatis, 1.5 cm. latis; squamis involucri 2-serialibus, ovatis vel ovato-ellipticis, pubescentibus, 5 mm. longis, 2-3 mm. latis; receptaculis conoideis, papilloso-muricatis, 3 mm. altis; floribus radii 9-12, luteis, rubescentibus, 8 mm. longis; floribus disci multis, 2.5 mm. longis; acheniis tenuiter turbinatis, 2.5 mm. longis, scabro-pubescentibus; paleis 1, 2, vel nullis.

Plant perennial; roots fascicled, slender-fusiform; stems solitary or rarely several from the root-crown, strictly erect, simple or sparingly branched, 2.5-4 dm. tall, slightly pubescent; lower leaves numerous and congested at the ground, linear, 10-12 cm. long, 0.1-0.2 cm. wide, the slender, petiole-like base bristly-ciliate; cauline leaves opposite, linear, ciliate, connate at base; heads solitary on elongated peduncles, 1.5 cm. broad; involucral bracts in two series, ovatish to elliptic, pubescent, 5 mm. long, 2-3 mm. broad; receptacle conical, papillate-roughened, 3 mm. high; ray-flowers 9-12, yellow, becoming

maroon in age, 8 mm. long; disk-flowers many, 2.5 mm. long; achenes slender-turbinate, somewhat compressed, 2.5 mm. long, scabrous-pubescent with upwardly appressed hairs; pappus present as one or two bristles 2 mm. long, or lacking.

Meadowy open in the forest on the coastal plain of Mendocino County, California, six miles south of Point Arena: *M. S. Baker No. 5283* (in flower, June 26, 1931; type, Herb. Calif. Acad. Sci., No. 189,087); *J. T. Howell No. 8099* (in fruit, September 27, 1931; Herb. Calif. Acad. Sci., No. 189,086).

It is a pleasure to associate with this Baeria the name of its discoverer, Mr. Milo S. Baker, professor of botany at the Santa Rosa Junior College, one who is finding much of botanical interest in the diversified regions adjacent to Santa Rosa. The plant is clearly related to *B. macrantha* Gray, but differs from that species in its fascicled roots, strictly erect habit, numerous narrow basal leaves, smaller heads, and small pubescent achenes (the achenes in *B. macrantha* being generally glabrous). The plants are common at the locality cited above, but have not been found elsewhere. They grow in a low swale or bordering it with such perennial herbs as *Eryngium armatum* and *Solidago spathulata,* and with such trees and shrubs as *Pinus muricata, Salix lasiolepis, Myrica californica, Rhamnus californica, Ceanothus thyrsiflorus, Gaultheria Shallon,* and *Arctostaphylos columbiana.*

ZYGOPHYLLUM FABAGO L. Mrs. Margaret P. Bellue, Seed Analyst, California Department of Agriculture, Sacramento, has recently sent for identification specimens of the above species from Hamlin, Stanislaus County. It is a native of Syria and adjacent regions and belongs to the same family as the Puncture Weed, *Tribulus terrestris* L., but lacks the obnoxious character of the latter.—A. E.

OXALIS CERNUA THUNB. This yellow oxalis from the Cape region, Africa, has become very common near Colma, San Mateo County. Some cabbage fields are golden when it is in flower, suggesting the inaccurate common name, Bermuda Buttercup.—A. E.

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BOTTLE-BRUSHES IN CALIFORNIAN GARDENS AND PARKS

BY ALICE EASTWOOD

Bottle-brushes are trees or shrubs belonging to the Myrtle Family and to the division with woody seed-pods. These seed-pods have several partitions or cells and discharge the seeds through openings at the top. To the numerous and conspicuous stamens the beauty of the flowers is due, the calyx and corolla being inconspicuous. An aromatic fragrance pervades the foliage from oil glands which are usually visible. This branch of the family is almost restricted to Australia and is represented there by numerous genera and species, Eucalyptus the best known.

Bottle-brush is a most appropriate name derived from the peculiar manner of flowering. The flowers are thickly clustered and sessile. With the exception of one genus they surround the stem and are followed by woody seed-pods that persist long after the stamens have fallen. New leaves appear either with the flowers or after flowering, growing out of the spike. In many species they are as decorative as the flowers. Five genera are cultivated in California, but at present only two, Callistemon and Melaleuca, are common. They should be more generally grown both for their beauty and their slight cultural requirements. They come from a country of little rain and when once established will take care of themselves.

Key to the Genera

1a. Flowers on one side of stem only.....1. *Calothamnus*
1b. Flowers surrounding the stem..... 2
2a (1b). Seeds 1 or 2 in each division of the pod; rare..... 3
2b. Seeds many in each division; common..... 4
3a (2a). Stamens with anther-cells divaricately spreading.....
2. *Beaufortia*
3b. Stamens with anther-cells erect, back to back.....3. *Regelia*
4a (2b). Stamens all separate; leaves alternate.....4. *Callistemon*
4b. Stamens united in 4 or 5 bundles on long or short claws; leaves opposite or alternate.....5. *Melaleuca*

1. Calothamnus

Calothamnus is distinguished from the other bottle-brushes by the flowers on only one side of the stem. In our species the leaves

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are very narrowly linear or thread-like. The stamens are bright red in four bundles with the claws as long as or longer than the filaments. The chief differences in the three species in cultivation are found in pubescence, the size of the ovary, and the pods. The name comes from the Greek and means beautiful bush.

CALOTHAMNUS QUADRIFIDUS R. Br. Figured in Bot. Mag., pl. 1506. Smooth except a few scattered white hairs on the youngest leaves. Leaves 15-30 mm. long dense and generally erect. Stamens 30 mm. long on a flowering axis 4-10 cm. long. Ovary 5 mm. long, 2 mm. wide. The most commonly cultivated.

CALOTHAMNUS ASPER Turcz. Clothed throughout with fine white spreading hairs. Leaves dense, 20-30 mm. long. Ovary 7 mm. long, 6 mm. wide. Cultivated in nursery of Golden Gate Park and in Hugh Evans' place, Santa Monica.

CALOTHAMNUS TORULOSUS Schau. Smooth throughout. Leaves dense, spreading, 5 cm. long. Stamens about 25 mm. long with two of the claws sometimes united. Pod almost globular 15 mm. long and wide, surmounted by four erect woody calyx divisions. Collected in fruit at the Bard place, Hueneme, Ventura County. Hugh Evans has it also on his place at Santa Monica.

2. BEAUFORTIA

BEAUFORTIA PURPUREA Lindl. Figured in Lindl. App. Swan Riv. Bot. Reg., pl. 3a. Smooth shrub with erect branches. Leaves opposite, erect, sessile, lanceolate, 10-12 mm. long, 3 mm. wide, 5-nerved. Flowers bluish-purple in globose heads 2 cm. in diameter, terminating slender branchlets, the new shoots developing from the head after flowering. Stamens in five bundles 8-10 mm. long, the claws about as long as the filaments, white downy; anthers small, the cells divaricately spreading. The genus is named in honor of the Duchess of Beaufort, a patron of Botany. In cultivation in California it is known only in the nursery of Golden Gate Park.

3. REGELIA

REGELIA CILIATA Schau. Figured in Bot. Mag., pl. 6100. A straggly, twiggy shrub, becoming dense and roundish, somewhat white hairy. Leaves overlapping in four ranks, densely clothing the stem, orbicular, sessile, 4 mm. wide, recurving, 5-nerved, with evident oil glands. Flowers rose-purple in globose heads about 2 cm. in diameter, the new shoots developing from the heads of flowers, the axis white-woolly. Stamens in five bundles, 8 mm. long, the claws a little longer than the filaments; anthers with cells erect and back to back. It is named in honor of E. Regel, a noted German botanist. In California is is cultivated only in Golden Gate Park and in Hugh Evans' place, Santa Monica.

(To be continued)

A NEW CALIFORNIAN MONTIA

BY ALICE EASTWOOD

Montia alpina Eastwood, spec. nov. Perennis glabra: radicibus et caulibus subterraneis fasciculatis: foliis ovatis ovalisve 20-35 mm. longis, 15-25 mm. latis, obtusis, basi cuneatis; petiolis 8-12 cm. longis, saepe rubescentibus: floribus in umbellis simplicibus compositisve; pedunculis et pedicellis 2-6 cm. longis; bracteis 2, inequalibus, separatis, oblongis vel orbicularibus, 5-10 cm. latis: sepalis ovalis vel orbiculatis, rubescentibus, 6 mm. longis, 4-5 mm. latis: corollis albis, basi rosaceis: petalis oblongis, obtusis, 8 mm. longis, unguisibus 1 mm. longis et latis: antheris sagittatis: ovario orbiculato, sepalis circumdato.

This Montia is about 10-12 cm. above ground with the lower stems and roots in a tangled mass below ground. The petioles and flowering stems are long and lax, reddish and smooth, the blades of the leaves are from broadly oval to ovate, tapering cuneately to the petiole. The flowers are in simple or partially compound umbels, with two variable separate involucral bracts. The corolla is about 1 cm. across, white with pink center. It belongs to the group of which *Montia perfoliata* is the best known; but differs from other members of the group in the habit of growth and large size of the flowers.

Type: Herb. Calif. Acad. Sci., No. 189,088, collected and donated by Mrs. H. P. Bracelin, No. 526. The plant was found in a cold spring on the northwest slope of Mount Dana at 11,000-11,500 feet on August 5, 1931. It grew "in a solid mass, roots closely entangled. Plants about six inches high. Flower white with a pink center."

NEW CALIFORNIAN PLANTS

BY JOHN THOMAS HOWELL

Calochortus superbus Purdy (in herb.), spec. nov. Bulbis parvis, non vel leviter fibrosis; caulibus 3-6 dm. altis, basi bulbulo uno; foliis basi fere 2-4, circa 2 dm. longis; floribus campanulatis, erectis; sepalis apicibus attenuatis; petalis obovato-cuneatis, 4-6 mm. longis, eburneis vel caesientibus, macula purpureo-fusca circumdata luteo; glandibus non depressis, inverse v-formatis, velatis simplicibus pilis; antheris oblongis, 7-10 mm. longis; capsulis non alatis, lanceolato-linearibus, attenuatis in tenuem stylum.

Bulb small, the outer coat chartaceous or only slightly fibrous; stem 3-6 dm. tall, erect, unbranched and bearing a single flower or branched above to form a loose, several-flowered panicle, producing

1 bulblet just below the ground; basal leaves 2-4, about 2 dm. long; flower campanulate, erect; sepals lanceolate, the slender-attenuate tips far exceeding the petals in bud, nearly equalling the petals in anthesis, creamy-white shaded with purplish pencilling, with a central purple-brown spot circumbanded by yellow; petals obovate-cuneate, 4-6 cm. long, 2.5-4 cm. broad, creamy-white, strongly shaded with greyish-lavender, with a central triangular or arched purple-brown spot surrounded by yellow, below this and to the gland flecked and dashed with purple-brown, glabrous except for a few scattered hairs near the gland, the outer edge undulate-denticulate, sometimes shortly apiculate; gland not depressed, inverted v-shaped, the sharp acute angle pointing to upper edge of petal, closely covered with simple, yellowish hairs; anthers cream-color, oblongish, obtuse at both ends, 7-10 mm. long; capsule immature, not winged, 5 cm. long, lanceolate-linear, gradually attenuate from near the base into a beak-like style.

Hell Hollow near Bagby, Merced River Canyon, Mariposa County, *Branson in 1929* (type, Herb. Calif. Acad. Sci., No. 163,519 and 163,518).

Calochortus superbus var. **pratensis** Purdy (in herb.), var. nov. *C. luteus* var. *robustus* Purdy, Proc. Calif. Acad. Sci., ser. 3, 2:139 (1901). *C. venustus* var. *robustus* Hort., *loc. cit.* Caulis basi 3-5 bulbulis; petalis late obovato-cuneatis vel subflabelliformibus, 2.5-3.5 cm. longis.

Stem producing 3-5 bulblets at base; petals broadly obovate-cuneate to subflabelliform, 2.5-3.5 cm. long.

Grassy open in pine-oak forest, five miles from Mariposa on road to Briceburg, Mariposa County, *J. T. Howell No. 6675* (type, Herb. Calif. Acad. Sci., No. 188,423). Other collections of the variety are: Wawona Valley, Mariposa County, *J. T. Howell No. 130;* Berkeley Recreation Camp, Tuolumne County, *Duckles in 1930.*

Calochortus superbus seems most closely related to *C. luteus* Dougl. The present species, however, is never yellow-flowered and can be distinguished from that and other related species by the peculiar inverted v-shaped gland. It is not uncommon in the higher Sierra Nevada foothills of the Yosemite region and northward to Placer County along the lower edge of the Transition Zone. In this region it is characterized by the two variations published here. The species with a large fine flower is characteristic of the mineralized country of the foothill belt according to Mr. Purdy, while the variety with the notably smaller flower is found only in moist meadows at slightly

higher elevations. The species has been known to the writer since the summer of his first botanical collecting, when, in 1923, the Wawona specimens were found in a grassy meadow near the South Fork of the Merced River. At the time the distinctive character of the gland was noted in his field record. Mr. Carl Purdy of Ukiah, California, has kindly granted permission to publish these names, which he has had in manuscript for several years.

Eriogonum argillosum J. T. Howell, spec. nov. Herba annua, 1-3 dm. alta; caulibus rotundis levibus glabratis vel arachnoideo-tomentellis; foliis oblongis, 1-3 cm. longis, 3-12 mm. latis, petiolis 1-3.5 cm. longis, tomentellis supra, pallidis arachnoideisque subter, foliis superis nodis minoribus vel ad bracteas deminuitis; pedicellis glabris, 5-40 mm. longis; involucris turbinatis, glabris, 3 mm. longis, leviter angulatis basi, scariosis sub sinibus, 5-dentatis, dentibus brevissimis vel circa 1 mm. longis; bracteolis intra involucrum filiformibus, plumosis; segmentis perianthii oblongis vel oblongo-oblanceolatis, 1.5 mm. longis, circa æqualibus, segmentis externis leviter latioribus, obtusis, integris crenulatisve, albis roseisve, cum fusca costa; staminibus æqualibus perianthio; acheniis circa 2.5 mm. longis.

Annual, 1-3 dm. tall; stems round, smooth, glabrous or arachnoid-tomentellous; leaves oblong, 1-3 cm. long, 3-12 mm. wide, on petioles 1-3.5 cm. long, tomentellous above, paler and arachnoid beneath, the leaves at the upper nodes smaller or reduced to bracts; pedicels glabrous, 5-40 mm. long; involucres turbinate, glabrous, 3 mm. high, somewhat 5-angled at base, scarious below the sinuses, 5-toothed, the teeth very short or nearly 1 mm. long; bractlets within the involucre filiform, plumose; perianth-segments oblong to oblong-oblanceolate, 1.5 mm. long, nearly equal, the outer a little broader than the inner, obtuse, entire or crenulate, white or rose with a dark midrib; stamens equalling the perianth; fruit about 2.5 mm. long.

Arid slope of shallow clay from disintegrating shale, Poncho Rico Canyon, 6.6 miles east of San Bernardo, Monterey County, California, *J. T. Howell No. 5999* (type, Herb. Calif. Acad. Sci., No. 190,672). Other collections: canyon of the San Benito River, fourteen miles south of Hollister, San Benito County, *H. L. Mason in 1930;* clay soil of open hillside, eleven miles from Hernandez at head of Bitterwater Valley, San Benito County, *J. T. Howell No. 6020.*

In the subgenus Ganysma, this Eriogonum differs in a marked way from all known species. It is related to those species which have leaves at the upper nodes, perhaps most nearly to *E. gracillimum* Wats. From that species *E. argillosum* differs

in its non-angled stems, its long-petioled leaves, its green-ribbed, turbinate involucres, and its glabrous perianth. From *E. angulosum* Benth. and its relatives, both *E. gracillimum* and *E. argillosum* differ in the similarity of their outer and inner segments of the perianth. While the other species related to it generally grow in loose and sandy soils, *E. argillosum* grows on clay slopes, and it is from this fact that the specific name has been derived.

PLANTS WORTHY OF NOTE—I

BY JOHN THOMAS HOWELL

PILULARIA AMERICANA A. BR. As the water recedes and dries from shallow depressions on the floor of the interior valley of California, beds of low, colorful annuals arise for a short season of beauty. In this society, especially where it occupies or borders the edge of an extra deep rain-pool, a frequent, unsuspected associate is the American Pillwort, that ally of the ferns which produces its spores in small hairy spheroids at the surface of the ground. This plant sometimes forms a dense green turf which simulates one composed of a diminutive grass or sedge in an alpine meadow. Because of their grass-like appearance such patches are rarely investigated and as a result that which is perhaps a rather common plant in the rain-pool flora of California, has been but little collected. In the last few seasons the following collections of Pilularia from central California have been added to the Herbarium of the California Academy of Sciences: Willows, Glenn County, *Eastwood No. 10,198;* Morgan Hill, Santa Clara County, *J. T. Howell No. 5195;* Valley Springs, Calaveras County, *J. T. Howell No. 4709;* near Escalon, San Joaquin County, *J. T. Howell No. 4683;* near Merced, Merced County, *J. T. Howell No. 4176;* Los Banos Bird Reserve, Merced County, *Eastwood No. 17,966.*

DENTARIA CUNEATA GREENE, Pitt. 3:123, 1896. (*Cardamine cuneata* Greene, Bull. Cal. Acad. Sci. 1:74, 1885.) Visitors to the Vancouver Pinnacles in San Benito County, California, in the early spring will find this dainty toothwort on shaded slopes of the main canyon. Those who might notice it more closely will discover that, while it bears a generic resem-

blance to the toothworts so abundant in the region farther to the north, the flowers are somewhat smaller and the basal and cauline leaves are cleft and broken into numerous small segments. In fact these finely divided leaf-blades are the most distinctive character of this species. While sometimes the basal leaves are only simply pinnate, more frequently they are twice divided and form a fern-like base for the flowers.

This Dentaria is not uncommon in moist canyons of hills and mountains on either side of the northern Salinas Valley. It was first described from the collection made in the Santa Lucia Mountains near Jolon, Monterey County, by Dr. E. L. Greene, the type being in the Herbarium of the California Academy of Sciences. Other collections in the Academy herbarium are: Mansfield's Ranch near King City, Monterey County, *Eastwood No. 4019;* Stone Canyon, thirteen miles east of the Salinas Valley, Monterey County, *J. T. Howell No. 5968;* Vancouver Pinnacles, San Benito County, *J. T. Howell No. 4618;* San Benito River Canyon, eight miles north of Hernandez, San Benito County, *J. T. Howell No. 6033.*

ARCTOSTAPHYLOS MEDIA GREENE, Pitt. 2: 171, 1891. In the Pacific Northwest where *Arctostaphylos columbiana* Piper and *A. Uva-ursi* L. grow together, *A. media* Greene is frequently a third member of the society. These three species were found by the writer during the past summer on Vancouver Island, some distance north of Nanaimo in an open of the Douglas Fir forest. *Arctostaphylos media,* combining as it does certain of the characters from each of its associates, is to be regarded a natural hybrid (cf. Greene, *loc. cit.*). The erect shrub of *A. columbiana* crossed with the prostrate mat of *A. Uva-ursi* effects in *A. media* a loosely spreading growth with strongly assurgent tips. The stems of *A. media* are hirsutulous, the leaves are lightly pubescent, the fruits are puberulent, none of these so hairy as in *A. columbiana* but yet quite different from the minutely pubescent stems and leaves and glabrous fruits of *A. Uva-ursi.*

Last September *A. media* was discovered in California. On the narrow coastal plain of Mendocino County south of Point Arena, *A. Uva-ursi* occurs on the open, wind-swept flat just back of the ocean bluff, and *A. columbiana* is common farther inland as a wind-controlled shrub or as a well developed growth

in thickets. There, growing on the windy coastal plain, are plants of *A. media,* low springy bushes 1.5-3 dm. tall and about a meter across. One plant carried a few ripened fruits. These were small, about half the size of the fruits of either *A. Uva-ursi* or *A. columbiana,* and light brown. The Californian specimens of this interesting form were collected by the writer (*No. 8103 and 8104*) in the company of Mr. Milo S. Baker and are in the Herbarium of the California Academy of Sciences.

GENTIANA TENELLA IN CALIFORNIA

BY ALICE EASTWOOD

From the high summits on either side of the Owens Valley trough, a low annual gentian, heretofore unreported in California, has been found. In the Sierra Nevada it has been collected by Mr. Frank W. Peirson in the Rock Creek Lake Basin, Inyo County, at 10,500 feet (*No. 9482*), and by Mrs. Keir A. Campbell (*in 1931*) at the east end of Mirror Lake, Mount Whitney Trail, at 10,650 feet. On the east side of Owens Valley it has been collected by Mr. Victor Duran in the White Mountains. The plant is probably best referred to *G. tenella* Rottb., an arctic species, although southern representatives of this species in North America have been separated by Dr. Aven Nelson under the name *G. monantha* (Bull. Torr. Bot. Club, 31:244). The Californian specimens compare favorably with those collections of *G. tenella* made in the arctic parts of Europe, which are in the Herbarium of the California Academy of Sciences.

ANOTHER STATION FOR ZYGOPHYLLUM FABAGO L. From Mrs. Susan W. Hutchinson of Los Angeles comes word that *Zygophyllum Fabago,* which was noted as an adventive in the first issue of LEAFLETS OF WESTERN BOTANY, page 8, has also been found in southern California. She writes: "*Zygophyllum Fabago* has for some time been growing just outside of a ranch near the dry lake in the Muroc region on the Mojave Desert."—A. E.

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LEAFLETS
of
WESTERN BOTANY

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ALICE EASTWOOD and JOHN THOMAS HOWELL

BOTANICAL
GARDEN

BOTTLE-BRUSHES IN CALIFORNIAN GARDENS AND PARKS

BY ALICE EASTWOOD

(Continued from Page 10)

4. CALLISTEMON

Callistemon, which means "beautiful stamen," includes the most gorgeous of the bottle-brushes. It is distinguished from the closely related Melaleuca by the filaments of the stamens being separate to the base. However, two species, *C. speciosus* and *C. viminalis,* have the filaments united at the base, forming a link, which a few botanists have thought sufficient reason to merge the two genera. The best authorities, though, prefer to keep them distinct. The showy flowers with their conspicuous stamens surround the stems, to be followed by the persistent, woody, sessile and often crowded pods opening by three slits at the top.

KEY TO THE SPECIES

1a.	Stamens with red or rosy filaments	2
1b.	Stamens with green or cream-white filaments	7
2a. (1a)	Young anthers yellow	3
2b.	Young anthers dark	4
3a. (2a)	Filaments 1 cm. long; leaves needle-shaped	*C. brachyandrus*
3b.	Filaments 2 cm. long or more; leaves lance-shaped	*C. rugulosus*
4a. (2b)	Tree or shrub with drooping branches	*C. viminalis*
4b.	Shrubs with erect or spreading branches	5
5a. (4b)	Leaves lance-shaped	*C. citrinus*
5b.	Leaves linear	6
6a. (5b)	Leaves flat, 4 to 5 mm. wide	*G. rigidus*
6b.	Leaves grooved, 1 to 2 mm. wide	*C. linearis*
7a. (1b)	Leaves needle-shaped; filaments green	*C. pinifolius*
7b.	Leaves lance-shaped; filaments cream-white or greenish-yellow	*C. salignus*

CALLISTEMON BRACHYANDRUS Lindl. The juvenile form figured in Fl. de Serres, pl. 450. Tree or shrub with slender drooping branches, young leaves and stems white-hairy; leaves on old plants needle-like, 2-3 cm. long, 1 mm. wide, spiny-pointed, glands inconspicuous; spike 5-8 cm. long, about 2 cm. wide, surpassed by the young leafy stem; sepals and petals densely white-downy, rounded and involute, the former much shorter than the latter; filaments red, about 1 cm. long, anthers yellow; pods globular, often scattered, 5 mm. in diameter. Golden Gate Park, Huntington Botanic Garden and other places in Southern California though not common in cultivation. The juvenile

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form has the leaves narrowly linear-oblanceolate, somewhat involute. The mature bushes are very lovely when in bloom as the slender flower-laden branches fall over like a beautiful flowery cascade.

CALLISTEMON RUGULOSUS DC. Spreading shrub with linear-lanceolate leaves 3-7 cm. long, 3-5 mm. wide, spiny-pointed, silky-hairy when young, becoming smooth when old, sometimes tinged with red, glands conspicuous often giving the leaf a warty appearance; flowering spike with leaves terminating and mingling with the upper flowers, 5-7 cm. long, 5 cm. wide, hairy; sepals rounded, less than half as long as the hairy, involute, papery petals; filaments generally rose-red, 10-12 cm. long, anthers yellow; pods rounded, depressed at the broadly margined apex, wrinkled, 5 mm. in diameter. This is one of the loveliest of the bottle-brushes with its numerous spikes of rosy filaments tipped with bright yellow anthers. It is rather generally cultivated and is sometimes confused with *C. rigidus* but that has dark anthers and generally longer, narrower leaves.

CALLISTEMON VIMINALIS Cheel. Tree or shrub with drooping branches, stems and young leaves clothed with soft, white, spreading hairs; leaves linear-lanceolate, 5-10 cm. long, 5-10 mm. wide, tapering to a short hairy stem, pointed at top, with midrib, marginal veins and glands conspicuous; flowering spikes with leaves terminating and intermingling with the flowers, 7-12 cm. long, 4 cm. wide; sepals and petals rounded, hairy, the latter twice the former; filaments united at base and falling together, 2 cm. long, anthers dark; pods globular, 5 mm. in diameter, often hairy, neither constricted nor depressed at top. This is not uncommon in Southern California. A beautiful tree which formerly grew along a Santa Barbara street was photographed and illustrated in Dr. H. M. Hall's "Studies in Ornamental Shrubs" (Univ. Calif. Publ. Bot.). He described it as *C. speciosus,* a species which so far is not known in cultivation in California. The two species are alike in the basal union of the filaments.

CALLISTEMON CITRINUS Stapf. Bot. Mag., pl. 9050 (figuring *C. citrinus* var. *splendens*). This was first described by Curtis as *Metrosideros citrina* Bot. Mag., plate 260, later changed to *M. lanceolata* by Smith in 1797 and restored by Dr. Stapf as the earliest name. *C. citrinus* should displace *Callistemon lanceolatus,* its long-used name. The Callistemons were all included under Metrosideros until removed by Robert Brown in 1814, when he established Callistemon. This species has been figured more than any other and the following plates have been seen by the author:

M. citrina Curtis, Bot. Mag., pl. 260 (1794)
M. marginata Cavanilles, Icon., pl. 332 (1797)
M. lophantha Ventenat Gard., Celsius., pl. 63 (1800)
M. semperflorens Loddiges, Bot. Cab., pl. 523 (1821)
C. lophanthum Sweet, Austral. Flora, pl. 29 (1828)

The first illustration showed leaves acuminate at top; all the other illustrations have leaves merely acute. In our gardens, shrubs

with leaves of both kinds are seen. The degree of hairiness also varies. *C. semperflorens* (Lodd.) Hooker and Jackson differs as Loddiges pointed out in its continuous blooming and might be considered distinct. *Callistemon citrinus* is one of the commonest and loveliest species in cultivation.

CALLISTEMON RIGIDUS R. Br. Figured in Bot. Reg., pl. 393. Stiff shrub with young leaves and stems silky-hairy, becoming smooth with age. Leaves stiff, linear, 4-13 cm. long, 2-5 mm. wide, spiny-pointed, marginal veins and glands prominent; spikes 7-15 cm. long, 6 cm. wide, surpassed by young leafy branches; sepals and petals smooth or slightly hairy, rounded, the former less than half the latter; filaments bright red, 2 cm. long, anthers almost black; pods 8 mm. in diameter densely clustered on the old stems, smooth, the opening slighty depressed. This is one of the commonest species in cultivation and readily recognized by the long linear leaves, red spikes and densely clustered pods.

CALLISTEMON LINEARIS DC. Figured in plate 20, Maiden's Ill. N. S. Wales Plants. Smooth except the white-hairy young leaves; leaves rigid, linear, 5-8 cm. long, 1-2 mm. wide, grooved on upper side, glands warty; spikes 5-9 cm. long, 3-4 cm. wide; sepals reddish, surpassed by the greenish petals; filaments red, 2 cm. long; anthers dark; pods densely crowded, globular, about 8 mm. in diameter, the opening depressed, 3 mm. across. The specimens agree with one from the Botanical Garden, Sydney, Australia, in Herb. Calif. Acad. Sciences. It may be common but is known only from Golden Gate Park and Huntington Botanic Garden.

CALLISTEMON PINIFOLIUS DC. Figured in Bot. Mag., pl. 3987, with yellowish-green filaments, also pl. 27, Maiden's Ill. N. S. Wales Plants. Shrub smooth except the white-hairy young leaves which spread like a plume above the spikes of green flowers; leaves needle-like, 5-8 cm. long, 1 mm. wide, stiff and with warty glands; filaments green, 10-12 mm. long; petals and sepals green; pods globular, 4 mm. in diameter, not contracted at the opening. Golden Gate Park. Fruiting plants from Hillside Park, Santa Barbara, seem to be the same. This peculiar bottle-bush owes whatever beauty it may have to the plume-like young leaves emerging from the reddish bud-scales.

CALLISTEMON SALIGNUS DC. Figured in Bot. Mag., pl. 1821. Tree or shrub with papery, flaky bark, generally smooth; leaves rather thin, lanceolate, 5-12 cm. long, 5-20 mm. wide, tapering at base to a short petiole, pointed at apex, feather-veined, glands inconspicuous; spikes surpassed by beautiful young leaves, 5-7 cm. long, 2.5-3 cm. wide; sepals and petals rounded, the latter almost thrice the former, both hairy; stamens with greenish-yellow filaments and anthers; pod urn-shaped, smooth, 6 mm. in diameter, the opening depressed. In Golden Gate Park there is a tree of this species 20-30 feet high. In other parts of California the plants have narrower leaves and spikes. Many varieties of this are listed in Flora Australiensis.

(To be continued)

NEW SPECIES OF LEWISIA

BY CARL PURDY

Lewisias are among the loveliest plants belonging to the Portulaca Family, and are especially adapted to beautify rock gardens. The genus was named in honor of Captain Merriwether Lewis, the leader of the first expedition across the continent. He brought back *Lewisia rediviva,* the bitter-root. This plant gives the name to the Bitter Root Mountains of Idaho and is widely distributed on the western slope of the continent.

These three new species are alike in having a rosulate cluster of fleshy leaves and leafless flowering stems arising from a thick fleshy root which is generally unbranched. The bracts and sepals are similar, being truncate at apex and serrulately margined with stiff hairs, each tipped with a red club-shaped gland. The differences lie chiefly in the shape and size of the leaves, color and size of the flowers. However, the living plants from which these descriptions are drawn stand out as distinct and differ from other described species. All come from Josephine County, southern Oregon, in the region around Waldo and Kirby.

Lewisia Whiteæ sp. nov. Folia spatulata 6-7 cm. longa, ad apicem 1 cm. lata, ad petiolum attenuata, glabra. Scapus solitarius paniculate ramosus, 25-30 cm. altus, 30-40 floribus. Petala 7-8 ovata, 12-13 mm. longa, carnea roseis venis.

Type: No. 193196, Herb. Calif. Acad. Sci., discovered by Mrs. Mary L. White, Waldo, Oregon, in whose honor it is named. The leaves are deep green, the flowers are light salmon-rose with darker veins, and the petals spread so that the open flower is flat. It is a lovely plant.

Lewisia Eastwoodiana sp. nov. Folia spatulata, 7-8 cm. longa, ad apicem 8 mm. lata, ad petiolum attenuata, glabra. Scapus solitarius, 15-20 cm. altus, paniculate ramosus 25-36 floribus. Flores parvi, petalis 6-8 mm. longis, albis; antheris roseis.

Type: No. 193198, Herb. Calif. Acad. Sci., discovered by Mrs. Mary L. White. It is distinguished by the small white flowers and bright green leaves. It is named in honor of Miss Alice Eastwood.

Lewisia Finchæ sp. nov. Folia spatulata, 6-10 cm. longa, ad apicem 2-4 cm. lata, glabra. Scapi multi 12-18 dm. alti, paniculate

ramosi 5-7 floribus. Corolla 3 cm. diametro, petalis 10, 2-3 dentatis, armeniacis roseis venis; antheris aurantiacis.

Type: No. 193194, Herb. Calif. Acad. Sci., discovered by Mrs. J. M. Finch, Kirby, Oregon, in whose honor it is named. The leaves are light green and spread so as to make a flat rosette, the petals are apricot color with many lilac-rose veins. It is one of the most beautiful species.

A COLLECTION OF EMEX FROM CALIFORNIA

BY GEORGE J. GOODMAN

The genus *Emex,* which is closely related to *Rumex,* consists of two species, *E. spinosa* Campd. and *E. australis* Steinh. The general distribution of the former species is from Persia westward through southern Europe and northern Africa, whereas the range of *E. australis* is in the southern hemisphere, chiefly South Africa.

While recently examining some polygonaceous material from the Pomona College Herbarium, an unnamed specimen was found which proves to be *Emex australis* Steinh. The plant was collected by Marcus E. Jones at San Francisco, July 16, 1881 (*No. 2393*).

The other member of the genus, *E. spinosa,* apparently has never been found in this country. The only other North American collection of *Emex* known to the writer is one of *E. australis* made by A. H. Curtiss at Pensacola, Florida, August 8, 1901 (*No. 6868*). This collection might be found in herbaria under the name of *Emex spinosa* Campd.

Missouri Botanical Garden, St. Louis.

VERBENA BONARIENSIS L. This verbena from Argentina has appeared in several localities in California. It was first noted by Mr. J. W. Stacey between Alto and Mill Valley, in Marin County, where the clustered spikes overtop the high, dense vegetation along the railroad track. It has been collected also at Collinsville, Solano County, by Miss C. E. Smith, and along the Merced River between Snelling and the bridge, Merced County, by J. T. Howell.—A. E.

CYPRIPEDIUM FASCICULATUM IN CALIFORNIA

BY ALICE EASTWOOD

On April 23, 1923, Miss Louise A. Boyd and Miss Barbara Donahoe collected this rare Lady's Slipper on Kings Mountain, San Mateo County. It had been collected in 1881 by Mrs. R. M. Austin near Prattville, Plumas County, and about the same time by Mr. Bradley in Del Norte County. Mr. Horace Davis found it on his place near Glenwood, Santa Cruz County, in 1907. The plant was originally named by Dr. Albert Kellogg from Mrs. Austin's collection, but was described by Sereno Watson (Proc. Amer. Acad. 17:380, 1882) from specimens collected by W. M. Suksdorf in 1880 on the White Salmon River above the falls, Washington.

It differs from the other Californian species in the two-leaved stem terminated by two or three unattractive closely clustered flowers.

PLANTS WORTHY OF NOTE—II

BY JOHN THOMAS HOWELL

OREOBROMA HECKNERI MORTON. One of the more attractive plants of California that has recently been described as new is *Oreobroma Heckneri* Morton (Proc. Biol. Soc. Wash., 44:9, 1931). This plant is nearly related to the Oregonian *Lewisia Howellii* (Wats.) Robinson, which has long been a favorite in rock-gardens, but is distinguished from the latter by its dentate leaves. The type locality of the new species is near Canyon Creek, four miles north of Junction City, Trinity County, collected by John Heckner. The specimen collected by G. R. Kleeberger on Mount Bally, Trinity County, in 1880, in the California Academy of Sciences Herbarium is probably the earliest collection of this species which has been considered a variant of *L. Howellii* by those who knew it.

CARDUUS NEGLECTUS TEN. (Not *Cirsium neglectum* Fisch.) This Italian thistle has appeared at several points in California as an obnoxious weed. It was first found in 1912 at Fort Bragg, Mendocino County, by Miss Eastwood and later, on the Marina, San Francisco, by Dr. E. Goodman in 1920 and by Miss East-

wood in 1922. In 1930 collections were made from a flourishing stand in the Berkeley Hills by Mr. J. T. Howell. This thistle differs from all other thistles in California in the non-plumose pappus-bristles, and at a glance it can be recognized by the spiny-winged stems which carry clusters of slender, oblong heads of perfect flowers. Some variation is found in the collections noted above, but the name assumed for them is the determination of the Mendocino plant by Dr. F. Petrak, the noted German student of thistles. The Berkeley Hills plant with its clusters of more numerous heads resembles *C. tenuiflorus* Curtis, the species to which DeCandolle closely relates *C. neglectus* (Prodromus 6:627), but differs from *C. tenuiflorus* in the relative length of the corolla-lobes and corolla-tube (Fl. Mitt. Eur. 6, pt. 2:862).

A NEW SPECIES OF ERIOGONUM

BY S. G. STOKES

Eriogonum Hoffmanni Stokes, spec. nov. Herba erecta 1-8 dm. alta; caulibus gracilibus levibus glabratis vel in axillis arachnoideis: foliis rotundis ovatis, 1-3 cm. latis, petiolis variabilis, pube levibus subtus villoso-tomentosis, super glabratis; foliis minoribus ad nodis, bracteis linearis, minutis; pedicellis capillaribus glabris brevis vel involucris subsessilibus; involucris minutis 1 mm. turbinatis; segmentis perianthii 1.5 mm. longis, lanceolatis glabris, pallidis; acheniis circa 2 mm. longis exsertis.

Annual, erect, 1-8 dm. tall, stems slender, round, smooth or lightly tomentose, graceful; leaves broad, ovate to round, glabrate above, slightly villous-tomentose beneath; bracts foliaceous, upper linear and minute; pedicels capillary, short, spreading or refracted; involucres minute, toothed, glabrous; floral segments lanceolate, glabrous, pale; akenes pointed, exserted. Collected in Wild Rose Canyon, Panamint Mountains, Inyo County, California, by Mr. Ralph Hoffmann, No. 627, September 30, 1931. Type in Santa Barbara Museum of Natural History.

While this is related to *E. Ordii* Wats., it differs in the reduction of involucral peduncles and the glabrous flowers. The pubescence of the two species is tomentose but not entirely floccose, just a trifle silky. In habit it is more delicate than *E. deflexum* Torr. and a little stouter than *E. subreniforme* Wats. Both long and round-leaved forms occur in several annual species, and where localities are somewhat continuous, intergradations are numerous, but, in this case, isolation would seem to promise purity of strain.

THE FETID ADDER'S TONGUE

BY ALICE EASTWOOD

One of the earliest spring flowers in northern California is the Fetid Adder's Tongue, *Scoliopus Bigelovii* Torr. The species was originally described from plants collected at "Tamul Pass" or Mount Tamalpais, Marin County, where it is still abundant at different localities in shady places at the foot of the mountain. It is a plant with a decided personality. When the flowers first appear they are enfolded in two erect purple-spotted leaves out of which they seem to be peeping. These leaves begin to grow, become large and soon lie flat on the ground. At the same time the flower-stems are elongating and curving downwards as if to hide their seed-pods beneath the protecting leaves. The little spidery lilies have the dark purple color and the odor of carrion that characterizes some arums. This nasty smell is supposed to attract flies to insure pollination.

A most notable variation from the type occurs in San Mateo County and so far has been collected in no other region. Instead of two leaves, these plants when older have three leaves and a second crop of flowers, thus lengthening the blooming season. Specimens of this variation are in the Herbarium of the California Academy of Sciences from Kings Mountain and Lake Pilarcitos.

CONCERNING PITTOSPORUM DAPHNIPHYLLOIDES. Mr. E. O. Orpet, well known plant-grower of Santa Barbara, writes that in specimens of *Pittosporum daphniphylloides* in his garden the seeds are orange instead of red; and also, that they number four or five instead of two or three, as was given in the description of that species in the first issue of the LEAFLETS OF WESTERN BOTANY.—A. E.

DESCURAINIA SOPHIA (L.) WEBB. (*Sisymbrium Sophia* L.) On the sandy open of the Mojave Desert, eleven miles south of Mojave, Kern County, this European weed has been found (*J. T. Howell No. 4902*). In California it has been known from the northern counties and it has been collected as far south as Globe, Arizona (*Eastwood No. 8645*), but this seems to be the first record of the plant in Southern California.—J. T. H.

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SAN FRANCISCO, CALIFORNIA

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ALICE EASTWOOD and JOHN THOMAS HOWELL

BOTTLE-BRUSHES IN CALIFORNIAN GARDENS AND PARKS

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GARDEN

BY ALICE EASTWOOD

(Continued from Page 19)

5. Melaleuca

The species of Melaleuca are more numerous both in cultivation and in their native home than the Callistemons and more diverse in color, size of spikes, and length of staminal claws. In general the five claws are conspicuous but species occur where a line cannot be definitely drawn between the two genera. Owing to the number of species cultivated in California it is not possible to include them in a single paper so they will be divided according to the color of the flowers. The red-flowered species will be described in this issue, to be followed by those with colors to-day perhaps classed as orchid shades. The species with white or cream-white flowers will be the last.

Key to the Red-Flowered Melaleucas

1a.	Claws of stamens scarcely evident	*M. lateritia*
1b.	Claws of stamens conspicuous	2
2a. (1b)	Leaves alternate	*M. longicoma*
2b.	Leaves opposite	3
3a. (2b)	Leaves pale green, obtuse	*M. elliptica*
3b.	Leaves bright green, pointed	4
4a. (3b)	Leaves linear-lanceolate, 2 mm. wide	*M. fulgens*
4b.	Leaves oblong-lanceolate, 5-10 mm. wide	*M. hypericifolia*

Melaleuca lateritia Otto. Branches erect. Leaves bright green, narrowly linear, 1-2 cm. long, about 1 mm. wide, erect. Spikes bright red, at base of leafy branches, 5-6 cm. long, 3-4 cm. broad. Staminal claws scarcely evident, filaments 2 cm. long; calyx without glands, divisions rounded; petals white-membranous, orbicular, 2 mm. long; style shorter than the stamens, stigma club-shaped. Pods densely crowded in a woody spike encasing the stem. This species might be considered a Callistemon and is one of the links uniting the two genera. Specimens are in the Herbarium of the California Academy of Sciences from Pasadena, Santa Barbara, and Golden Gate Park.

Melaleuca longicoma Benth. Branches erect-spreading. Leaves lanceolate, pointed, generally erect, with small dark glands on both sides, often red-tinged, 2-3 cm. long, 5 mm. wide. Spikes bright red at base of leafy branches, 3-5 cm. long, 4.5 cm. wide. Staminal claws slender, 1 cm. long, terminated by many bright red filaments; calyx smooth, without glands, divisions deltoid-lanceolate, 1 mm. long;

Leafl. West. Bot., Vol. I, No. 4, pp. 25-32, Nov. 18, 1932.

petals white, membranous, oblong, obtuse, 2-3 mm. long; style shorter than stamens, with small stigma. Fruit not known. This lovely shrub was introduced by the United States Department of Agriculture and is known from Hugh Evans' place at Santa Monica and Golden Gate Park.

MELALEUCA ELLIPTICA Labill. Branches horizontally spreading. Leaves pale green, oval to elliptical, obtuse at both ends, 10-14 mm. long, 5-8 mm. wide, spreading. Spikes bright red, terminating lateral branches, about 5 cm. broad, said to be "2-3 inches" long, but specimens at hand only about 3 cm. long. Staminal claws slender, 1 cm. long, filaments at end of claw; calyx-tube pubescent, divisions deltoid, obtuse, glandular-dotted; petals elliptical, 5 cm. long, rosy. Pods densely packed, calyx-divisions persistent. This species is in the nursery of the Golden Gate Park but has not yet flowered. The description of the flowers is from a specimen in the Herbarium of the California Academy of Sciences from the Botanic Garden, Sydney, Australia. The description of the flowering and fruiting spike is from Bentham's Flora Australiensis.

MELALEUCA FULGENS R. Br. Illustrations seen in Bot. Reg., pl. 103, Lodd. Bot. Cab., pl. 378, and, the best, Rev. Hort. 1895, page 232. Branches slender, erect-spreading, reddish. Leaves linear to lanceolate, about 2 cm. long, 1-2 mm. wide, pointed, lower surface densely glandular, upper glandless. Spikes on short side branches, the leafy shoots growing out while flowering, 3-5 cm. long, 2 cm. broad, flowers often 2-ranked. Staminal claws about 3 mm. long, 1 mm. broad, the filaments pinnately arranged on upper part, spreading; calyx broadest at base, 5 mm. long, glandular-dotted, divisions deltoid, white or rosy-margined; petals rosy, gland-dotted, oblong, about 3 mm. long; style about as long as the stamens, stigma capitate. Pods broad, not crowded. This lovely species is known in California only from Golden Gate Park.

MELALEUCA HYPERICIFOLIA Smith. Illustrations seen in Andr. Bot. Rep., pl. 200; Lodd. Bot. Cab., pl. 199; Ventenat Jard. Cels., pl. 10. Branches widely spreading. Leaves oblong-lanceolate, acute, 2-3.5 cm. long, 5-10 mm. wide, lower surface closely gland-dotted, upper surface glandless. Spikes densely flowered, bright red, on short side branches, the leafy shoots growing out while flowering, 5-7 cm. long, and almost as broad. Staminal claws slender, 15 mm. long, terminated by many shorter filaments; calyx densely glandular-dotted, with rounded divisions; petals orbicular, gland-dotted, 6 mm. long; style shorter than the stamens, the stigma small. Pods densely crowded, sepals persistent, turned inward when old. This is the species most common in cultivation and is sometimes used as a hedge shrub. The leaves often become red. This species flowers almost continuously, but the spikes are often concealed under the dense cover of branches. It is the most aromatic species in cultivation.

COTYLEDON, ECHEVERIA, OR DUDLEYA?

BY ERIC WALTHER

Several explanations might be adduced for the confusion that for so long has attended an understanding of Cotyledon, Echeveria, and Dudleya. Personal opinion will probably always continue as sufficient excuse for some to take a position different from the rest of the world, even where it leads to such an absurd treatment as that of Otto Kuntze who reduced the whole large family Crassulaceæ to the single genus Sedum. Limited information, based on insufficient dried material, so notoriously unsatisfactory in the case of succulent plants, might account for the failure of Bentham and Hooker in their "Genera Plantarum" to accord to these genera the status so justly theirs. Increased knowledge of the groups here considered, supplemented by intimate acquaintance both in the field and in cultivation, leaves little doubt that all three are generically distinct.

It is a far cry, indeed, from South Africa's Cotyledon to California's Dudleya and Mexico's Echeveria, and not merely as measured in miles. The present confusion is another instance where attaching too much weight to a single character, the relative amount of coherence of the petals, leads to false conclusions of affinity. Even if of undoubted importance in most other families, in the Crassulaceæ this character taken alone is of minor value. It is much more logical and probably much nearer the actual facts to consider Cotyledon proper as much more closely allied to the subfamily Kalanchoideæ, also of the Old World, than to the Echeverioideæ of the New World.

So much for Cotyledon; the case of Echeveria and Dudleya is rather different. Evidences of close relationship are abundant and clear, and both genera are probably descended, fairly recently, from a common ancestral type, perhaps to be found in some form we would class today as belonging to the subfamily Sedoideæ. The most striking difference between Dudleya and Echeveria is, of course, that of distribution, Dudleya never having been found in Mexico (outside of Lower California) and no Echeveria in California, Upper or Lower. This difference in range might be correlated with climatic influences, such as different seasons of precipitation, *i. e.*, summer rains or winter

rains. Or it might be explained by postulating the presence or absence of some other factor, such as a special kind of pollenizing agent. Unquestionably the flower of Echeveria represents structurally a more highly specialized type, developed for the purpose of attracting a particular type of insect or bird. The usually nodding flowers of Echeveria, their commonly brighter coloration, the abundance of honey secreted by the much more prominently developed hypogynous glands, the correspondingly greater storage space provided for this honey in the enlarged basal cavity of the petals, the thick texture of the latter that is perhaps adapted to keep out robbers, their rigid erect posture that compels visitors to pass the anthers and stigmas, all seem to be adaptations of the flower of Echeveria as contrasted to that of Dudleya, developed to attract certain visitors. Here there seem to be indications of specialization for attracting one particular type of visitor that will assure cross-fertilization, so all-important for both the maintenance of racial vigor and the variability necessary if the organism shall remain plastic and responsive to changing environment. The attention of ornithologists is called to the problem here presented, as we are inclined to attribute this differentiation of Echeveria to the influence of a particular type of humming-bird.

The three genera may be differentiated as follows:

A. Inflorescence terminal, the vegetative axis determinate; plants of South Africa.....*Cotyledon*

A. Inflorescence always axillary and lateral, the vegetative axis indeterminate; plants of the New World.

B. Plants with basal leaves stem-clasping; flowers mostly pale, less often bright red or yellow; petals thinnish, neither prominently keeled nor conspicuously hollowed within at base, honey-glands small; sepals never spreading; bracts of scape often cordate or stem-clasping at base, not readily detached. Native to California, Lower California, and Arizona. Rarely cultivated.....*Dudleya*

B. Basal leaves not stem-clasping, often readily detached; flowers mostly bright-colored; petals commonly thick, prominently keeled on back and with conspicuous basal honey-cavity, hypogynous honey-glands large, mostly thick and truncate; sepals often widely spreading at anthesis; bracts of scape never stem-clasping, only very rarely subcordate at base, usually readily detached.

Native to Mexico, Central America, and northern South America, a single species reaching Texas. Commonly cultivated ..... *Echeveria*

Believing that these three groups are best understood as distinct genera, we feel it proper to publish the following new combination: **Dudleya lagunensis** (Munz) Eric Walther (*Echeveria lagunensis* Munz, Bull. S. Calif. Acad. Sci., 31:64,—1932).

NEW WESTERN ERIOGONUMS

BY S. G. STOKES

Eriogonum Rixfordii Stokes, spec. nov. Annuum, basi ramosum et supra intricate et dense ramosum; foliis omnibus radicalibus, orbiculatis, tomentosis; pedunculis glabris vel glaucis, divaricate ramosissimis; involucris axillaribus, sessilibus vel breve pedicellatis, 1.5-2 mm. longis; floribus basi obtusis, pallidis; perigonii segmentis cordatis, 1.5 mm. longis; acheniis triquetris, rostratis.

Annual, developing bushy crowns; leaves basal, round or nearly so, tomentose; lower peduncles glabrous or glaucous, branching repeatedly at a wide angle (90°), the final divisions not quite delicate; involucres chiefly axillary, but slightly racemose at ends of branches, sessile or shortly pedicellate, 1.5-2 mm. long; flowers rounded at base, pale, segments cordate, sometimes a little puffy, 1.5 mm. long; achene triquetrous, beaked.

Type: No. 348, Herb. Calif. Acad. Sci., collected by Mr. G. P. Rixford, in Inyo County, California. Also collected in Inyo County by J. T. Howell, near Burro Mine, Panamint Mountains, *Nos. 4063* and *4063A*, and by Ralph Hoffman (Panamint Mountains) who noted the stiffish, divaricate habit. This lies on the border line between the virgate annuals and the *E. deflexum* group.

Eriogonum ovalifolium var. **bellum** Stokes, var. nov. Flores in cymis latis et compositis; calycis segmentis ellipticis, roseis.

White-tomentose perennial; base stubby, branching and forming flattened mats; leaves roundish, petioles 2-3 cm. long; peduncles 2-3 dm. tall, cymosely branched, angle of branching wide; involucres narrow, sessile, 3-5 mm. long; flowers pale with deep-colored vein, glabrous; segments 3.5-4 mm. long, elliptical.

Type: No. 191105, Herb. Calif. Acad. Sci., collected fourteen miles south of Helena, Jefferson County, Montana (*J. T. Howell No. 7900*), August 22, 1931. The flowers of the type collection are of a beautiful pink color. Other collections not so rich in

color have been made in Montana by Lewis S. Rose (*No. 32480*), near Butte, Silver Bow County, and by Tweedy (*No. 1179*), in Madison County. This variety is characterized by the cyme, once or twice divided, the angle of branching quite broad, and by the calyx-segments elliptical. While approaching *E. proliferum,* the inflorescence of that species is somewhat virgate and the calyx-segments are broadly obovate.

Eriogonum Heermanni var. **occidentale** Stokes, var. nov. Frutex ad 2 m. altus; foliis lanceolatis, 1.5-3 cm. longis, 5-8 mm. latis, supra glabratis, infra tomentosis, petiolatis, foliis præcocibus fasciculatis; inflorescentia late ramosa, involucris sessilibus axillaribus vel virgatis et secundis circa terminos ramorum, 2.5-3 mm. longis; floribus albis roseisve, turbinatis, glabris, segmentis externis obovatis, 3-4 mm. longis.

Shrubby perennial to 2 m. tall; base woody, much-branched, erect, the stems lightly tomentose or completely glabrate; leaves lanceolate, blade 1.5-3 cm. long, 5-8 mm. wide, glabrate above, tomentose beneath, petiolate, fasciculate when young, alternate by flowering time; inflorescence widely branched, angle 90°, glabrate, lower internodes several centimeters in length, much shorter near tips; involucres sessile in the axils or virgate and secund near the ends of the branches, divaricate, turbinate-campanulate, five-toothed, 2.5-3 mm. long; flowers white or pinkish, turbinate, glabrous, outer segments obovate, limb spreading, 3-4 mm. long, brown when old.

Type: No. 190155, Herb. Calif. Acad. Sci., collected by J. T. Howell, ten miles from San Benito on the road to Hernandez, San Benito County, California, September 7, 1931, (*No. 8062*); also from the same bushes are *Lewis S. Rose No. 678,* and *S. G. Stokes No. 15.* Other collections are: Mt. Pinos, Ventura County (*Hall No. 7637*); Frazier Borax Mine, Ventura County (*Abrams & McGregor No. 207*); Griffin's near Sespe River, Ventura County (*Elmer No. 3947*); San Benito River Canyon, eight miles northwest of Hernandez, San Benito County (*J. T. Howell No. 6035* and *8072*); floodbed of San Benito River at Erie School, San Benito County (*J. T. Howell No. 8086*). The flowers of the last collection are a delicate pink.

This, the western variant of *E. Heermanni,* differs from the typical form in the more generally tomentose leaves and in the more virgate character of the outer inflorescence. The thin and linear leaves of the younger stems are fasciculate and strongly suggest those of *E. fasciculatum* Benth.

A NEW SPECIES OF ARCTOSTAPHYLOS

BY MILO S. BAKER

Arctostaphylos densiflora M. S. Baker, spec. nov. Frutex humilis, ramosus; ramis patentibus et radicantibus, præcocibus puberulentibus eglandulosis, cortice fuliginosis, opacis, subsquamosis; foliis præcocibus subpubescentibus, maturis nitentibus, fere glabrescentibus, ellipticis ad oblongo-ellipticis, raro oblanceolatis ovatisve, acutis obtusisve, semper mucronulatis, basi anguste vel late cuneatis, 10-30 mm. longis, 7-17 mm. latis, petiolis pubescentibus, 2-4 mm. longis; panicula ampla, subcorymbosa; bracteis parvis, squamosis; pedicellis glabris, gracilissimis, 5-7 mm. longis; sepalis appressis ad corollam, late ovatis, obtusis, ciliatis, exteriore glabris, interiore basi pubescentibus; corollis pallide roseis, 5 mm. longis, abrupte constrictis ad foramina 1 mm. lata, lobis rotundis, patentibus, 0.5 mm. longis; ovario glabro; fructo subdepresso glabro, 5-6 mm. diametro.

Low shrub with numerous branches, spreading and rooting freely; young stems puberulent with adpressed nonglandular hairs; bark dark brown, dull, somewhat scaly; young leaves sparingly soft pubescent, mature leaves shining, glabrous except for a minute pubescence along the margin and veins, elliptic to oblong-elliptic, rarely oblanceolate or ovate, acute or obtuse, but invariably mucronulate, the base narrowly or broadly cuneate, 10-30 mm. long, 7-17 mm. wide, petioles pubescent, 2-4 mm. long; panicle ample, somewhat corymbose; bracts inconspicuous, scaly; pedicels glabrous, very slender, 5-7 mm. long; sepals closely appressed to corolla, broadly ovate, obtuse, ciliate, glabrous without, pubescent at base within; corolla pink-tinted, 5 mm. long and 4 mm. wide, abruptly constricted to an orifice 1 mm. wide, the rounded lobes spreading, 0.5 mm. long; ovary glabrous; fruit slightly flattened, glabrous, 5-6 mm. in diameter.

Type: No. 198261, Herb. Calif. Acad. Sci., collected from roadside just west of Vine Hill Schoolhouse, about ten miles westerly from Santa Rosa, Sonoma County, California (*M. S. Baker No. 5045*), (ex Herb. M. S. Baker), flowers collected February 23, 1929, fruit collected April 18, 1928.

The nearest relatives of *A. densiflora* seem to be *A. Stanfordiana* Parry, *A. Hookeri* Don, and *A. franciscana* Eastw. From *A. Stanfordiana* it differs in its depressed and rooting habit, in its smaller leaves, in a greater puberulence, and in the dull scaly bark of its branches, as well as in its more compact and somewhat corymbose panicle. *Arctostaphylos Stanfordiana* is somewhat rare in the hills of the Mt. Hood Range but abundant in Napa and Lake counties. In the former region it is rather

depressed, but never creeping or rooting. In the latter region it is a strictly erect and glabrous shrub with only the faintest puberulence on the extreme tips of the branchlets. At stations nearer the Vine Hill region there appear to be intergrades of these two species, as on Rincon Ridge just east of Santa Rosa.

Arctostaphylos densiflora is probably a relict in a region where the natural vegetation is fast disappearing through an intensive system of agriculture. The known plants of this rare species will scarcely number one hundred and all but a half dozen of these are confined to the banks of a single road for a distance of scarcely 500 feet. Here it prospers and spreads by numerous seedlings, as well as by creeping and rooting, up and down the steep clay banks. Since these road banks are apparently not very old, one wonders where this species maintained itself before the present banks were graded. I have searched diligently back from the road on both sides of this colony, through an undisturbed growth of shrubs common to this locality without finding a single representative of this manzanita. However, at the extreme eastern limit of this colony in a cultivated field to the north, along a fence line, I did find a single bush.

For a number of years I have been watching for this dwarf manzanita at other points in this general region. About a mile south of the colony just described, I found a few sickly plants in rather heavy shade. At another spot nearly a mile farther south in a patch of brush on the Frei Brothers ranch, Mr. J. T. Howell and I found one small plant. At the present time, *A. densiflora* seems unable to compete with the more erect, rapidly growing shrubs and trees of this region and this, coupled with the agricultural activity, is fast crowding it to extinction.

I should add, however, that it seems to have hybridized with *A. manzanita* of this locality and to have produced a most vigorous but variable descendant that is already the dominant manzanita of a section many miles in extent.

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SAN FRANCISCO, CALIFORNIA

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BOTTLE-BRUSHES IN CALIFORNIAN GARDENS AND PARKS

BY ALICE EASTWOOD

(Continued from Page 26)

KEY TO THE SPECIES OF MELALEUCA WITH FLOWERS PINK, LILAC, LAVENDER, OR VIOLET, COLORS GENERALLY CLASSIFIED AS ORCHID SHADES

1a. Flowers on side-shoots in spikes at base of leafy branches; leaves opposite 2
1b. Flowers in roundish clusters terminating the branches; leaves alternate ..... *M. nesophila*
2a. (1a) Leaves needle-shaped or narrowly linear 3
2b. Leaves narrowly lanceolate 4
3a. (2a) Leaves scattered, about 2 cm. long ..... *M. radula*
3b. Leaves dense, 1 cm. or less long ..... *M. glaberrima*
4a. (2b) Branches drooping; leaves four-ranked ..... *M. decussata*
4b. Branches erect; leaves scattered ..... *M. thymifolia*

MELALEUCA NESOPHILA F. v. M. Shrub or small tree with erect branches. Leaves pale green, alternate, rather thick, smooth, three-veined from a tapering base, about 2 cm. long, 5-8 mm. wide, broadest at the obtuse apex, sometimes ending in a short point. Flowers pink-lilac in roundish clusters 2-3 cm. in diameter, terminating the leafy branches; calyx smooth, with small, round, papery divisions; petals much larger, pink-tinged; staminal claws slightly surpassing the petals and style, each ending in nine or ten filaments about 1 cm. long. Pods woody, conglomerated in a roundish bunch about 15 mm. in diameter. This is rather common in cultivation, sometimes planted as a hedge. A small tree with distinct slender trunk grows in the Presidio, San Francisco.

MELALEUCA RADULA Lindl. Illustration seen in Curtis' Bot. Mag., pl. 8866. Smooth shrub with erect-spreading branches. Leaves opposite, very narrow, appearing needle-shaped because of the inturned margins, one-nerved, glands evident on outer surface, wanting on inner surface, 2-4 cm. long, less than 1 mm. wide, pointed at the apex, often reddish. Spikes at the base of leafy branches; flowers pink-lilac in opposite separated pairs; calyx glandular, broad at base, with very narrow divisions; petals round, pink, about 5 mm. across; staminal claws broad, shorter than the petals, with many filaments along the margins and on the inner surface; stigma capitate surpassing the stamens. Pods not seen. This is a lovely neat little shrub grown in Hugh Evans' place at Santa Monica and in the nursery of Golden Gate Park.

MELALEUCA GLABERRIMA F. v. M. Small smooth shrub with slender erect branches. Leaves dense, opposite, needle-shaped, 5-8 mm. long,

Leafl. West. Bot., Vol. I, pp. 33-44, Jan. 19, 1933.

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less than 1 mm. wide, glands evident. Spikes pink-purple, about 2 cm. long on distinct stems at the base of leafy branchlets; calyx small, with tooth-like divisions; petals pinkish, membranous, folding inwards, about 2 mm. long; staminal claws slender, almost 5 mm. long, surpassing the petals, the filaments shorter and clustered near the top of the claws. Pods closely aggregated on the old wood in spikes 6 mm. in diameter and 2 cm. long. Rare in cultivation in Southern California.

MELALEUCA DECUSSATA R. Br. Illustrations seen in Curtis' Bot. Mag., pl. 2268; Lodd. Bot. Cab., pl. 1208. Smooth shrub with slender, drooping branches. Leaves distinctly four-ranked (decussate), pale green, oblong-lanceolate, 5-8 mm. long, 1 mm. wide, lower surface convex, glandular. Spikes pink-lilac, dense, 2-3 cm. long, about 1 cm. in diameter, generally at the base of leafy branchlets; calyx broad at base, divisions very short, membranous; petals roundish, about 2-3 mm. long, membranous; staminal claws very short, concealed by the petals, with filaments from the top of the claws, 3-4 mm. long. Pods small, four-ranked, embedded in the stem. It is not uncommon in cultivation.

MELALEUCA THYMIFOLIA Smith. Illustrations seen in Andrews' Bot. Rep., pl. 278; Curtis' Bot. Mag., pl. 1868; Lodd. Bot. Cab., pl. 439. Low, smooth shrub with many erect, slender branches. Leaves bright green, opposite, linear-lanceolate, 5-15 mm. long, 1-2 mm. wide, lower surface with black glands, upper surface glandless. Spikes pink-purple, short, almost hugging the stems and often close together; calyx glandular, with short, rounded divisions; petals obovate, about 4 mm. long, pinkish, membranous; staminal claws surpassing the petals, spreading, with filaments along the margin and on the inner surface. Pods not seen. This lovely little shrub is known only in the nursery of Golden Gate Park, where it has flowered since 1930.

(To be continued)

NEW WESTERN ERIOGONUMS—II

BY S. G. STOKES

Eriogonum cupulatum Stokes, spec. nov. Perenne, 3-4 dm. altum, laxe ramosum modo *E. umbellati*; foliis ovatis, 1-3 cm. longis, petiolatis, subtus albo-tomentosis, supra glabratis; pedunculis gracilibus, nudis, floccosis; bracteis foliaceis, sublinearibus; umbellis 5-7 ramis, involucro centrali sessili; involucris campanulatis, 4-5 mm. longis, 5-7 mm. latis, 5-8—dentatis, hirsuto-villosis; perigoniis stipitatis, glabris, aureis, 3-5 mm. longis, segmentis ovalibus.

Perennial, 3-4 dm. tall, loosely branched, in manner of *E. umbellatum* or *E. ursinum*; leaves ovate, 1-3 cm. long, white-tomentose below, glabrate above, petiolate; peduncles tall, slender, leafless, floccose; bracts foliaceous, nearly linear; umbel with five to seven

branches, central involucre sessile; involucres campanulate, 4-5 mm. high, 5-7 mm. broad, with five to eight teeth, hirsutely villous; perigonia stipitate, glabrous, yellow, 3-5 mm. long, segments oval.

Type: No. 131313, Herb. Calif. Acad. Sci., collected by Mr. L. E. Smith, No. 517, August 12, 1913, at McCloud, Siskiyou County, California. The shrubby base and brown twigs suggest *E. pendulum* Wats. and the mode of branching of the umbel *E. ursinum* Wats. It is most distinct in the flat or low involucres with shallow teeth.

Eriogonum fruticulosum Stokes, spec. nov. Perenne, basi fruticulosum; caulibus numerosis, fuscis, ligneis, cortice lamelliformi, ramis erectis, ramulis terminatis foliis rosulatis; foliis oblanceolatis, angustis, flavovirentibus, revolutis, supra glabratis, subtus tomentosis; pedunculis brevibus, 1-5 cm. longis, pubescentibus, bracteis foliaceis; involucris pedunculatis, tubo 2-3 mm. longo, dentibus reflexis, 1-2 mm. longis; floribus magnis, 6-8 mm. longis, stipitatis, ochroleucis, fumescentibus, segmentis late ovalibus, pubescentibus.

Base shrubby, the numerous brown woody stems with flaky bark, branches erect, twigs terminating in rosettes of leaves, leaves oblanceolate, narrow, yellow-green, revolute, glabrate above, tomentose below; peduncles short, 1-5 cm. long, pubescent, bracts foliaceous; involucres pedunculate, tube 2-3 mm. long, teeth reflexed, 1-2 mm. long; flowers very large, 6-8 mm. long when mature, stipitate, ochroleucous, discolored or smoky in drying, the segments wide, broadly oval, hairy.

Type: No. 192302, Herb. Calif. Acad. Sci., collected by Mr. E. C. Johnston in the Seven Devils Mountains, Black Lake to Bear P. O., elevation 4500 to 8000 feet, Adams County, Idaho, July 20, 1931. While the leaves suggest the *sphærocephalum* group, the flowers are not very distinct from those of *E. compositum* Dougl.

Eriogonum Johnstoni Stokes, spec. nov. Basi perenne, ramis terminatis foliis densis erectis; foliis 2-4 cm. longis, ovatis, tomentosis fulvescentibus, supra glabratis; pedunculis circa 1 dm. altis, pubescentibus, ramis pluribus, 2-3 cm. longis, abrupte divaricatis, crassiusculis, hirsutis, subtentis bracteis foliaceis; involucris turbinatis, dentibus erectis, bracteis solis subtentibus involucra præcocia; floribus turbinatis, fere stipitatis, 5-6 mm. longis, flavis, glabris, segmentis perianthii anguste ovalibus.

Base perennial, the branches terminating in a close, heavy rosette of erect leaves; leaves 2-4 cm. long, ovate, tomentum buffish, glabrate above; peduncles about 1 dm. tall, pubescent, rays several, 2-3 cm. long, abruptly divaricate, stoutish, hirsute, subtended by foliaceous bracts; involucres turbinate, teeth erect, subtended when young by

a single bract; flowers turbinate, somewhat stipitate, 5-6 mm. long, pale yellow, glabrous, the segments narrowly oval.

Type: No. 192058, Herb. Calif. Acad. Sci., collected by Mr. E. C. Johnston at La Grande, Union County, Oregon. This differs from *E. compositum* Dougl. in its abruptly spreading, simple inflorescence and glabrous flowers.

NEW PLANTS FROM OLD FIELDS

BY JOHN THOMAS HOWELL

From time to time, one hears from those who fail to appreciate the nature of botanical studies conducted in the field, the remark that a locality has been so thoroughly collected botanically that effort and time spent in such a place are wasted, since nothing of further interest can be obtained or learned. Such a statement displays a lack of appreciation of the dynamic character of all living matter, a character met both in the study of the individual and of the interrelationships between associated individuals. In systematic botany, where an attempt is made to organize and present all available knowledge of a plant so that it might be better understood, how can any area be visited too frequently to see growing plants, to observe their changes in time and space, to note the constancy or variation in their communities, to study the effect of the ever-changing habitat on the individual and the community? The exploration of regions unknown to botanical science is in itself an enviable occupation but acute observation on the weeds around one's doorstep might reveal matters of even greater significance.

Not long ago a day was spent in the middle reaches of the Sonoma Valley, California. From the time of Theodore Hartweg, who, as collector for the Royal Horticultural Society of London, visited those parts in September, 1846, the territory about Sonoma and Santa Rosa has been frequently visited by botanists and collectors, and many species have been first described from the oak-shaded glades or chaparrel-covered ridges of the region. In this area, where some might say all has been done, two weedy Polygonums, new or rare in the flora of California, were detected and studied during the day afield. They are *P. pennsylvanicum L.* (*J. T. Howell No. 10778*) and *P. Hydropiper* var. *projectum* Stanford (*J. T. Howell No. 10779*).

They occurred along the low ground draining the Kenwood Marsh, just west of Kenwood, Sonoma County. Associated with these two species was a third, *P. lapathifolium L.*, and nearby, in the shaded bottom of the slough, was *P. punctatum* Ell.* The following key will serve to distinguish these and related forms which occur in central California:

1. Calyx glandular-punctate 2
1. Calyx not glandular-punctate 5
2. Achenes shining 3
2. Achenes dull; plant annual 4
3. Plant annual ..... *P. punctatum* var. *leptostachyum*
3. Plant perennial ..... *P. punctatum*
4. Pedicels not strongly exserted from the sheaths in the inflorescence; achenes mostly 3-3.5 mm. long ..... *P. Hydropiper*
4. Pedicels strongly exserted from the sheaths in the inflorescence; achenes 2-2.5 mm. long ..... *P. Hydropiper* var. *projectum*
5. Plant perennial ..... *P. hydropiperoides*
5. Plant annual 6
6. Branches of inflorescence conspicuously glandular; calyx 3-4 mm. long ..... *P. pennsylvanicum*
6. Branches of inflorescence glabrous (or sometimes slightly glandular in *P. lapathifolium*); calyx 1.5-2.5 mm. long 7
7. Stipular sheaths bristly-ciliate; inflorescence of rather few erect spikes ..... *P. Persicaria*
7. Stipular sheaths not ciliate; inflorescence usually of very many drooping spikes ..... *P. lapathifolium*

Stanford in his study of *P. Hydropiper* (Rhodora 29: 77) cites the only collection of the species seen by him from California: "moist places in fields in the blue oak belt, five miles south of Redding, plentiful (*Heller No. 12445*)." This collection is referred to var. *projectum* "as a somewhat exaggerated type, unique in the collections at hand, not resembling material from Oregon and Washington, which is referable to typical *P. Hydropiper.*" The Sonoma Valley plant resembles the specimen of the Heller collection in the Herbarium of the California Academy of Sciences in the scarcely exserted pedicels but can be referred to var. *projectum* on the small size of the achenes.

Studies in the Academy Herbarium on the variety of *P. Hydropiper* from Kenwood, discovered under *P. punctatum* a second Californian collection of the former species made in September, 1931, on the gravelly flood-bed of the Garcia River

* Bibliographical studies would indicate that P. punctatum Ell. is an older name than P. acre H. B. K., species which are usually considered synonymous. See Stanford in Rhodora 29: 77.

in the coastal region of Mendocino County, 3.5 miles north of Point Arena (*J. T. Howell No. 8118*). This specimen with its dull, lenticular achene a bit over 3 mm. long is definitely referable to typical *P. Hydropiper* and is perhaps the first record of its occurrence in California. A notable character of the Mendocino plant is the unusually high development of stipular-enveloped, cleistogamous-flowered panicles which occur at each node from the base of the stems upward toward the normal inflorescence. Because of the smaller fruits in the variety, the effect of these congested flower clusters is not so noticeable in var. *projectum,* but their occurrence in both the species and the variety offers an additional differentia between *P. Hydropiper* and *P. punctatum.*

Yet another species of Polygonum is to be added to the Californian flora as a result of field studies in areas just north of San Francisco Bay. This is *P. exsertum* Small and was first noted by Mr. Milo S. Baker. The plants have a resemblance to the widespread and common wire-weed, *P. aviculare,* but differ in the erect loosely branched habit, the rather showy perianth-segments, and the shining achene which at maturity exceeds the perianth by 1/3 to 2/3 of its length. The Californian specimens of *P. exsertum* were collected from dried clay flats of the salt marsh at Cuttings Wharf on the Napa River, Napa County (*J. T. Howell No. 10799*), where it was associated with *Polygonum littorale, Atriplex hastata, Salicornia pacifica, Chenopodium rubrum, Spergularia salina* var. *sordida,* and *Spergularia macrotheca.*

TAXUS BREVIFOLIA IN MARIN COUNTY, CALIFORNIA

Today I made an interesting discovery, one that will add, if I am not mistaken, a new genus to our Marin County Coniferæ. On the summit of the ridge between the Olema Valley and Bear Valley, growing under a dense stand of Douglas spruce, a thrifty tree some seven feet high of *Taxus brevifolia* was found. As you might imagine, it was not easy to detect forty feet from the trail, growing among young Douglas spruce, but it just happened my eye caught it and the difference in habit and foliage struck me at once. I had no time today, but I plan to return and

search the neighborhood to see if there can possibly be a small colony of these trees.—Robert H. Menzies, July 26, 1932.

The western yew, which ranges southward from Alaska, has been collected in the Santa Cruz mountains, but Mr. Menzies' find seems to be the first record of this species between the southern station and Lake and Mendocino counties on the north, where its more abundant occurrence begins.—Alice Eastwood.

PLANTS WORTHY OF NOTE—III

BY JOHN THOMAS HOWELL

On the Distribution of Mollugo Cerviana. A plant having a distribution of a most unusual character is *Mollugo Cerviana* (L.) Seringe. Collections of it have come from such widely separated regions as the East Indies, South Africa, the Mediterranean region, and Mexico, and for many years it has been known in the western United States from Texas, New Mexico, and Arizona. In September, 1929, this interesting species was collected by Ralph Hoffmann in Thomas Valley, Riverside County, apparently the first record of its occurrence in California. And, more recently, the plant has been detected on three islands of the Galápagos Archipelago, a new plant record for those islands made by the Templeton Crocker Expedition of the California Academy of Sciences. The delicate habit, the glaucescent herbage, the several-flowered peduncles, and the minute angled seeds distinguish the species from other Mollugos.

Two Weedy Martynias. Our attention was directed to two weedy Martynias of California when specimens of the species were received for determination from Miss Vesta Holt, Chico, California. In "A Preliminary Study of the Unicorn Plants" by G. P. Van Eseltine, the two species are treated, the study being published in the Technical Bulletin No. 10 of the New York State Agricultural Experiment Station. Although the two plants are there referred to two genera, it seems best to return them both to the distinctive and well-founded genus Martynia.

Martynia lutea Lindl., Bot. Reg. No. 934. (*Ibicella lutea* Van Es., *loc. cit.*, p. 34.) Inflorescence racemose-capitate; calyx of five sepals; corolla bright yellow with orange spots. The yellow unicorn plant was first collected in the hills eight miles

north of Oroville, in 1914 (*Heller No. 11685*); Miss Holt's specimen came from Chico in the same region and she reports that it is very common. Van Eseltine cites the Heller collection as "cultivated," but field notes accompanying a specimen of this collection in the Herbarium of the California Academy of Sciences show that it grew in a wild state. Its persistence and spread in the region since 1914 establish the plant as a naturalized weed of California.

MARTYNIA JUSSIEUI (Keller) J. T. Howell, n. comb. (*Proboscidea Jussieui* Keller, in Schmidel, Icon. ed. Keller 49, 1762. *M. louisiana* Mill. Gard. Dict. No. 3, 1768. *M. Proboscidea* Glox. Obs. 14, 1785.) Inflorescence generally loosely racemose, the pedicels long; calyx 5-lobed, split to base on the lower side of flower; corolla-color varying from dull white or yellowish to reddish-purple, generally mottled or blotched. The common unicorn plant or devil's claw is of wide distribution in the United States, and in the West it is reported by Van Eseltine (*loc cit.*, p. 30) from Texas, New Mexico, and California. The flowers from the Chico plant have pale rosy-lavender corollas, purplish-dotted on the limb and with three yellow lines on the palate.

MARTYNIA FRAGRANS Lindl., a Mexican annual with large angular-dentate leaves, has not been seen in collections from the United States. The plant doubtfully referred to this species from the Colorado Desert of California (Jepson, Man. Fl. Pl. Calif., 950) might be *M. althæfolia* Benth., a perennial with small leaves.

A NEW YERBA SANTA

BY ALICE EASTWOOD

Eriodictyon capitatum Eastwood, spec. nov. Frutex glutinosus; foliis linearibus circa 5 cm. longis, 2-4 mm. latis, obutsis, margine revolutis, supra glabris et glutinosis, infra trinervatis albo-tomentosis; floribus sessilibus in capitatis 2 cm. diametro; calycis segmentis anguste linearibus, 8 mm. longis, villosis; corollis purpurascentibus, infundibuliformibus, 1 cm. longis, exteriore villosis, interiore glabris, segmentis orbiculatis; staminibus inclusis, filamentis 6 mm. longis, medio connatis et villosis; stylibus basi villosis.

This odd Eriodictyon derives its name from the distinctive capitate inflorescence. The leaves are as narrow as the nar-

rowest in *E. angustifolium* but it does not belong to that group. The pubescence is different and the free part of the filaments is equal in length to the hairy part attached to the corolla-tube. Its affinities are with *E. californicum* (H. & A.) Greene which it resembles in the glabrous and glutinous upper leaf-surface but differs conspicuously in the extremely narrow leaves and the capitate inflorescence. The three nerves so marked on the lower leaf-surface are caused by the strong midrib and the narrow revolute leaf-margins. There is no lateral or other venation visible.

Type: No. 194986, Herb. Calif. Acad. Sci., collected May 18, 1932, by Ralph Hoffman, five miles north of Lompoc on the road to Casmailia, Santa Barbara County, California, growing under *Pinus muricata.*

AN UNDESCRIBED LILY FROM THE SIERRA NEVADA OF CALIFORNIA

BY ALICE EASTWOOD

Lilium nevadense Eastwood, spec. nov. Caulis strictus, scabro-puberulens, solitarius ex bulbo squamoso, rhizomato; squamis numerosis, basi articulatis; foliis inferioribus paucis, alternis, superioribus 4-7—verticillatis alternisve, oblongo-lanceolatis, 5-15 cm. longis, 2-4 cm. latis, glabris, trinervatis; pedunculis longis, rectis, apice, recurvatis; floribus nutantibus, alabastris lanceolatis, 4-5 cm. longis, perianthi segmentis lanceolatis, recurvatissimis, rubris, aurantiacis vel flavis, maculatis; pistillo et staminibus exsertis, antheris rubiginosis, 5 mm. longis, 2 mm. latis; capsulis strictis, oblongis, basi et apice truncatis, 2.5 cm. longis, 2 cm. latis, breve stipitatis; seminibus obliquo-cuneatis, papillosis, 5 mm. latis.

Type: No. 169002, Herb. Calif. Acad. Sci., collected by the author, July, 1912, *No. 799,* on the George Dillman ranch, Goose Valley, Shasta County, California.

This has been included under *Lilium pardalinum* Kellogg, the large-flowered tiger lily, from which it differs in the smaller and generally fewer flowers, the short anthers, the broad lanceolate leaves, and the single stem arising from the bulb. The following collections also represent this species in the Herbarium of the California Academy of Sciences: Gold Lake region, Plumas County, and Salmon Lake, Sierra County, *Mrs. E. C. Sutliffe;* Lake Almanor and Greenville, Plumas County, *Mary Strong Clemens;* Kelly Camp, Mount Lassen National Park,

Mrs. E. C. Van Dyke; Lake Center Camp, Feather River region, *Miss Anna Head;* near Shasta Springs, Siskiyou County, *A. A. Heller;* Castella, Shasta County, *L. E. Smith;* Jonesville, Butte County, *Dr. E. B. Copeland;* Prospect Peak, Mount Lassen National Park, *A. H. Kramer;* Castle Lake and Shasta Springs, Siskiyou County, and Forest Lodge near Greenville, Plumas County, *Alice Eastwood.*

Lilium nevadense var. **monense** Eastwood, var. nov. Perianthi basis obtusior quam basis typi et campanulatus.

Type: No. 179135, Herb. Calif. Acad. Sci., collected by Miss Enid Larson, June 21, 1925, along the highway at Rock Creek, Mono County, California. Another specimen from Mono County was collected by Mrs. C. H. Silva, with no definite locality recorded.

Lilium nevadense var. **fresnense** Eastwood, var. nov. Alabastrum 3.5 cm. longum; perianthi segmentis 5 mm. latis, pedunculis gracilioribus et longioribus quam pedunculis typi.

Type: No. 168984, Herb. Calif. Acad. Sci., collected by Miss Julia McDonald, July, 1915, in the Big Creek region, Fresno County, California. Miss McDonald also collected the variety at Huntington Lake, July, 1926.

Lilium nevadense var. **shastense** Eastwood, var. nov. Folia stricta, linearia vel angusto lanceolata in verticillis propinquis; alabastris 4-5 cm. longis.

Type: No. 108996, Herb. Calif. Acad. Sci., collected by the author, *No. 799A,* on the George Dillman ranch, Goose Valley, Shasta County, California. Other specimens in the Herbarium of the California Academy of Sciences are: Prattville, Plumas County, *Mrs. A. L. Coombs;* Gold Lake, Plumas County, *Mrs. E. C. Sutliffe;* Gray Eagle Meadow and Green Lake, Plumas County, *Miss Anna Head;* Montgomery Creek, Shasta County, *Ellsworth Bethel;* northeast base of Mount Eddy, Siskiyou County, *A. A. Heller.*

Lilium nevadense and its varieties include the small-flowered tiger lilies of the Sierra Nevada. In the typical *L. nevadense* the single stems with generally one to few flowers arise from the bulb, the leaves are broadly lance-shaped, the flowers half the size of true *L. pardalinum,* and the anthers are about half as long. The variety from Mono County has the flowers more open-spreading owing to the shorter ovary. The variety from

Fresno County has flowers about the size of *L. parvum* but with the petals much-reflexed and with the flowers drooping at the end of the long, slender, erect peduncles. The variety from Plumas, Shasta, and Siskiyou counties has the leaves much narrower than in the type, and more numerous.

The small-flowered *L. pardalinum* of the southern Sierra Nevada is *L. pardalinum* var. *parviflorum* Eastwood. It has smaller flowers than the typical *L. paradalinum* but has the long anthers and the many stems from the bulb that are characteristic of that species. In Shasta, Siskiyou, and Trinity counties another small-flowered *L. pardalinum* grows. It has the narrow leaves of *L. nevadense* var. *shastense,* but has the long anthers and robust habit of true *L. pardalinum* and is perhaps *L. pardalinum* var. *angustifolium* Kellogg.

LEDUM AS A POISONOUS PLANT

BY ALICE EASTWOOD

Mr. C. S. Myszka, Mendocino County agent of the United States Department of Agriculture, has recently sent to the California Academy of Sciences several plants from areas on the Mendocino coast, where the ground is wet in the spring and dry in the fall. The cattle are poisoned by one of these plants, the effects being vomiting and acting crazy. The plants sent are *Gentiana oregana,* a species of Lotus and of Carex, and *Ledum columbianum* Piper. The last is locally known as swamp laurel and is probably the injurious plant. The following note by Pallas from Lindley's Flora Medica, under *Ledum latifolium* Ait. (*L. groenlandicum* Retz), seems to indicate this: "The leaves infused in beer render it unusually heavy, producing headache, nausea, and even delirium."

LUNARIA ANNUA L. On moist, shaded slopes of the Point Reyes Peninsula near Inverness, Marin County, California, the European Moonwort has established itself as a garden-escape (*J. T. Howell*). The rose-purple blossoms of early spring resemble those of the Wild Radish and are followed later by the broad flat fruits, the white translucent partitions of which gleam like oblong moons after the valves have fallen.—J. T. H.

TWO INTRODUCED SPECIES OF ATRIPLEX IN THE SAN FRANCISCO BAY REGION

BY L. R. ABRAMS

The opening of the Bayshore Road on the San Francisco Peninsula has made the salt marshes skirting the shore of the Bay readily accessible for field work. While motoring along this road in August, 1932, a strange looking dock-like plant struck my eye, which proved to be *Atriplex hortensis* L. Although this plant, which is known as French spinach, is sometimes cultivated in this country as well as in Europe, I am not aware that it has been reported growing spontaneously in California. It was scattered along the road for a mile or more between Redwood City and San Mateo, but it was most abundant about the old tannery back of the former place. Another species of this genus, *Atriplex rosea* L., has become well established all along the bay shore of the Peninsula and is now quite as common there as it is in the Great Valley and Southern California.

A NEW MIMULUS

BY ALICE EASTWOOD

Mimulus Wolfi spec. nov. Annuus, glandulare puberulens, pallidus, ramosus, 5-10 cm. altus; foliis lanceolatis, 1-2 cm. longis, sessilibis, basi 3-nervatis, apice obtusis; floribus ex axillis infimis floribus supremis dense fasciculatis, pedicellis 3 mm. longis; calycis segmentis inequalibus, 3 superioribus 5 mm. longis, 2 inferioribus 4 mm. longis, angusto-subulatis, apicis obtusis; corollis exteriore glandularo-puberulentibus, roseis, faucibus luteis et villosis, segmentis corollæ fere equalibus, 3 mm. latis, apice truncatis vel obtusis, tubis exsertis et in parte inferiore nigrescente maculatis; stylo glandularo-puberulenti; partibus stigmati latis, equalis; capsulis oblongis, obtusis, calycem superantibus.

Type: No. 174917, Herb. Calif. Acad. Sci., collected by Carl B. Wolf in whose honor it is named. It is his No. 3266, collected August 12, 1928, twenty-one miles south of Mono Lake, Mono County, California. It was distributed as *Mimulus Bigelovii* to which it is most closely allied. The pale glandular herbage, the longer, narrower lance-shaped leaves, the smaller flowers, and the hairy-throated corolla readily distinguish it. It is a lovely little plant with its pale green leaves and red-purple or crimson corollas which have a yellow hairy throat and dark-spotted tube.

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LEAFLETS
of
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BOTTLE-BRUSHES IN CALIFORNIAN GARDENS AND PARKS

BY ALICE EASTWOOD

(Continued from Page 34)

BOTANICAL GARDEN

KEY TO THE SPECIES OF MELALEUCA WITH FLOWERS WHITE, CREAM, OR YELLOWISH

1a. Spikes roundish or cylindrical, terminating leafy branches 2
1b. Spikes with leafy branches developing at the end when in flower 6
2a. (1a) Spikes short, roundish 3
2b. Spikes long, cylindrical 4
3a. (2a) Leaves very small, scale-like, dense, in threes ..... *M. micromera*
3b. Leaves narrowly linear, 2 cm. long ..... *M. nodosa*
4a. (2b) Leaves large, 4-5 cm. long, 1-2 cm. wide ..... *M. Leucadendron*
4b. Leaves narrow, linear or lanceolate 5
5a. (4b) Leaves opposite, 2-3.5 cm. long, 2-3 mm. wide ..... *M. linariifolia*
5b. Leaves scattered, very narrowly linear, 5-9 mm. long, 0.5 mm. wide ..... *M. tenella*
6a. (1b) Stamens with filaments along sides of claws 7
6b. Stamens at or near ends of claws 8
7a. (6a) Leaves opposite ..... *M. linariifolia*
7b. Leaves alternate but crowded ..... *M. armillaris*
8a. (6b) Leaves broadest at base 9
8b. Leaves not broadest at base 11
9a. (8a) Leaves very small, 1-2 mm. long, dense and scale-like ..... *M. Huegelii*
9b. Leaves 1 cm. or more long, stiff-pointed 10
10a. (9b) Leaves lanceolate ..... *M. genistifolia*
10b. Leaves ovate ..... *M. styphelioides*
11a. (8b) Leaves pale green 12
11b. Leaves bright green 13
12a. (11a) Leaves and stems white-downy ..... *M. incana*
12b. Leaves and stems smooth ..... *M. tenella*
13a. (11b) Spikes short, roundish ..... *M. ericifolia*
13b. Spikes elongated; bracts persistent 14
14a. (13b) Spikes smooth ..... *M. parviflora*
14b. Spikes hairy ..... *M. Preissiana*

MELALEUCA MICROMERA Schau. Shrub with many short slender branches, generally spreading, densely white-downy except on the old stems. Leaves minute, ovate, closely appressed, in threes, thick, 2-3 mm. long, pointed. Flowers yellowish-white, in small heads 8-10 mm. across, terminating numerous short branchlets; calyx with short, rounded divisions; petals white, membranous, 1 mm. broad, rounded

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at apex, auricled at base, surpassing the sepals and staminal claws; stamens with few filaments at ends of claws; style when present bent, stigma large. Pods densely aggregated on old wood in spikes 5-10 mm. long, 8 mm. in diameter. The same shrub on my place in Mill Valley bore pistillate flowers one year and only staminate the next. It is very pretty, dotted all over when in flower with small yellowish-white heads of flowers. It may no longer be in California as the one plant of which I knew was destroyed by the fire on my place.

MELALEUCA NODOSA Sm. Shrub or small tree with many widely spreading branches, smooth except some hairs on the young growth. Leaves narrow-linear, pointed, 1-3 cm. long, 1 mm. wide. Flowers cream-yellow, in globular heads, the leafy shoots coming after flowering; calyx with very short, broad, rounded divisions; petals white, membranous, orbicular, 1.5 mm. broad; stamens with short claws about as long as the petals, the filaments few at the end. Pods densely aggregated in woody globes less than 1 cm. in diameter. Golden Gate Park and Pasadena.

MELALEUCA LEUCADENDRON L. Tree with parchment-like bark, the bark flaking off in layers on old plants. Leaves narrowly elliptical or oblong-lanceolate, stiff, 3-7-nerved from the base, the veins joining above, 4-5 cm. long, 1-2 cm. wide, smooth but young leaves often silky-hairy. Spikes at first terminal, 3-6 cm. long; flowers yellowish or white; calyx with broad, rounded, membranous-edged divisions; petals larger, orbicular, 2-3 mm. across; stamens with short claws, filaments 1-1.5 cm. long at the end. Pods crowded in woody spikes, in ours 5 cm. long. It does not seem to be common in cultivation in California: Session's Nursery, San Diego; Gould's place, Santa Barbara; Buena Vista Park, San Francisco. It is said to be very variable and often has bracts among the flowers in the spike.

MELALEUCA LINARIIFOLIA Sm. Becoming a tall tree but usually shrubby in California, with slender and numerous branches, the bark parchment-like and flaking off when old. Leaves linear or linear-lanceolate, pointed, 2-3.5 cm. long, 2-3 mm. wide, the midrib usually prominent. Spikes often forming panicles at the ends of the branches, the leafy shoots growing out while flowering, the bracts in bud prominently spreading; flowers cream-white, in opposite pairs in the spike; calyx with triangular, obtuse, membranously margined divisions shorter than the white, orbicular petals, 2 mm. across, both dotted with glands; stamens with narrow claws about 9 mm. long, the slender filaments along the sides like a feather, almost the entire length. Pods not densely aggregated, small, 2 mm. in diameter, the calyx-divisions persistent. A beautiful species which should be more commonly cultivated. Session's Nursery, San Diego, and Golden Gate Park.

MELALEUCA TENELLA Benth. Shrub with slender, upwardly spreading branches, smooth throughout, pale gray when young. Leaves very narrowly linear, 5-9 mm. long, less than 0.5 mm. broad, recurv-

ing, pale green. Spikes globular or cylindrical, 1-2 cm. long, about 6 mm. wide, with or without leafy shoots at the end; flowers yellowish-white, the calyx open bell-shaped, crenate; corolla white or rose-tinted, the petals orbicular, membranous, about 1 mm. broad; stamens with claws about as long as the petals or shorter, the filaments unequal, 3-4 mm. long. Pods densely aggregated in woody spikes, 1-2 cm. long, 5 mm. in diameter. A dainty species first seen in the nursery of Howard and Smith near Los Angeles; also at the Bard place, Hueneme, Ventura County, and Balboa Park, San Diego.

MELALEUCA ARMILLARIS Sm. Illustration seen in Andr. Bot. Rep., pl. 175. Tall shrub or small tree. Leaves recurved at end or erect, narrow-linear, 1 mm. wide, 2-3 cm. long. Spikes at the base of leafy branchlets; flowers with smooth green triangular calyx-divisions; petals twice as large, white, membranous, orbicular, about 2 mm. in diameter; stamens white with claws 3-4 mm. long and the numerous filaments arranged feather-like along the sides of the upper part. Bud-scales ovate, with long, often reddish points. Pods generally densely clustered in woody spikes, 4-6 cm. long, about 1 cm. in diameter, the calyx-divisions generally persistent. A showy shrub when in bloom; the ultimate branchlets generally drooping. It is not uncommon in both Northern and Southern California: Golden Gate Park; Bard's place, Hueneme; Hart's place, Sierra Madre; Los Angeles.

MELALEUCA HUEGELII Endl. Erect shrub with numerous slender erect branches, smooth throughout except some hairs on the flowering spikes. Leaves pale green, ovate, pointed, very small, 2-3 mm. long, densely clothing the stems and overlapping, nerved. Spikes at the base of leafy branches, densely flowered, 3-10 cm. long, about 1 cm. in diameter; flowers yellowish-white, the spikes sometimes tinged with rose; calyx with greenish or reddish divisions, rounded, infolded, nerved, half as long as the petals; petals white or rose, membranous; stamens with slender claws surpassing the petals, and terminated by 7-11 unequal filaments. Pods densely aggregated in a woody spike 5-8 cm. long, about 6 mm. in diameter. This was introduced by Miss Kate O. Sessions, San Diego, and is not uncommon in Southern California.

MELALEUCA GENISTIFOLIA Sm. Shrub or tree with many erect or spreading slender branches, bark parchment-like, flaking off in layers. Leaves stiff, lanceolate, flat, sharp-pointed, 1-2 cm. long, 2 mm. wide, nerved, hairy when young. Spikes at base of leafy branchlets, generally loosely flowered and with persistent bracts; flowers yellowish-white, calyx with hairy tube, and triangular, nerved teeth; petals white, membranous, soon falling, 1.5 mm. broad; stamens with claws 2 mm. long and numerous filaments clustered near the top. Pods pale, small, globular, somewhat scattered. Most common in Southern California.

MELALEUCA STYPHELIOIDES Sm. This is closely related to the preceding, differing in shorter, ovate leaves, more pungent and generally more rigid. The former seems to be most common in Southern California; the latter is known only from Golden Gate Park.

MELALEUCA INCANA R. Br. Illustration seen in Bot. Reg., pl. 410. Shrub with spreading branches, pale with a fine, white close down. Leaves pale, narrowly linear-lanceolate, 10-15 mm. long, 1 mm. wide, obtuse, rather thick. Spikes short, with or without short terminal branchlets; flowers white; calyx with triangular obtuse divisions, shorter than the membranous, orbicular petals which are 2 mm. broad; stamens with claws longer than the petals, the filaments 5-8 mm. long at the end. Pods not seen. This is known only from the grounds of the Del Monte Hotel, Monterey.

MELALEUCA ERICIFOLIA Sm. Shrub or small tree, generally sending up numerous suckers and often forming thickets, the bark on older trees smooth like parchment. Leaves smooth, narrow-linear, 0.5 mm. wide, 8-15 mm. long, spreading or recurved. Spikes often unisexual, the male spikes nearly globular, the others generally longer, terminated by short leafy branchlets; calyx smooth with very short obtuse divisions; petals orbicular, membranous, twice as large as calyx-divisions; stamens yellowish-white, claws about as long as the petals, the filaments at the end. Pods densely clustered in short spikes, 1-2 cm. long. Male trees are common in Golden Gate Park, where a picturesque example can be seen at the upper end of the lawn of the Children's Playground. It is also cultivated in Southern California.

MELALEUCA PARVIFLORA Lindl. Shrub or small tree, smooth throughout, with numerous spreading branches inclined to droop at the ends. Leaves linear to lanceolate, about 1 cm. long, 1-3 mm. wide, acute. Spikes slender, 2-5 cm. long, about 15 mm. in diameter, surmounted by leafy branchlets and generally with persistent bracts; flowers white; calyx smooth, the divisions tooth-like; petals much larger than the calyx-divisions, white, membranous, orbicular on short claws, surpassing the claws of the stamens; filaments many, unequal, at the top of the short claws. Pods pale, orbicular, 2 mm. in diameter, with persistent calyx-divisions, closely or more densely clustered. Golden Gate Park near the Lodge, and Bard's place, Hueneme.

MELALEUCA PREISSIANA Schau. This is similar to the preceding except that the spike is somewhat white-woolly. The species is cultivated in Southern California.

The next number will conclude the bottle-brushes. Several have been discovered since the paper was begun and there is the possibility of new ones in the nursery of Golden Gate Park coming into bloom.

WESTERN SPECIES OF OXALIS—I

BY LEWIS S. ROSE

There is an ever increasing population among the plant immigrants of the Pacific Coast. Five exotic species of the genus Oxalis have become permanent inhabitants of our region, having entered either by the weed method, mixed with imported crop seeds, or as garden escapes. It is, therefore, of interest to list all the species of this genus which have been observed growing spontaneously in California, Oregon, and Washington. The recent monograph by Knuth in Das Pflanzenreich (IV. 130: 43-389, — 1930) and Small's revision of the North American species (N. Am. Fl. 25: 25-56, — 1907) have been taken as the basis for the key and descriptions. In this number, the species without leafy stems above the ground will be described and in the next number the species with leafy stems above the ground will be considered.

KEY TO THE WESTERN SPECIES OF OXALIS WITHOUT STEMS ABOVE THE GROUND

1a. Flowers solitary; capsule globose-ovoid 2
1b. Flowers in umbels; capsule elongated 3
2a. Petals rose-color, large, 23-30 mm. long ..... *O. Smallii*
2b. Petals white, smaller, 9-18 mm. long ..... *O. oregana*
3a. Plants without bulbs: petals white ..... *O. trilliifolia*
3b. Plants with bulbs; petals generally not white 4
4a. Petals yellow ..... *O. cernua*
4b. Petals rose or white ..... *O. rubra*

OXALIS SMALLII R. Knuth. (*O. macra* Small, not Schlechter.) Plant 9-28 cm. high with thick rhizome. Leaflets 3-5 cm. wide, lower surface copiously hairy, upper sparsely so or glabrous. Sepals 8-10 mm. long. Petals 23-30 mm. long, pale lilac to rose-color.

Distribution: coastal California from Del Norte County to Monterey County.

Type locality: Santa Lucia Mountains, Monterey County, *Plaskett in 1898.*

Perhaps this should be considered a large-flowered subspecies of *O. oregana* Nutt. *Oxalis Smallii* is the beautiful species found so abundantly in the redwood groves of the Californian Coast Ranges.

OXALIS OREGANA Nutt. Acaulescent, perennial with horizontal rhizomes. Leaflets widely obcordate, 35 mm. wide, 27 mm. long, lobes rounded, upper surface glabrous, lower surface and margins long-hairy, the petioles 6-15 cm. long, villous. Peduncles 10-17 cm. long, one-flowered. Sepals oblong, 6-8 mm. long, densely pubescent. Petals

white, 9-18 mm. long. Styles copiously pubescent. Capsule globose-ovoid, 7-8 mm. long.

Distribution: Washington to California.

Type locality: "shady woods of the Oregon (Columbia River) in moist places."

This species, a form with small white flowers, seems to be the predominant form in the Pacific Northwest. The form with large, pale rose flowers, *O. Smallii,* does not seem to occur north of the Californian boundary line. *Oxalis oregana* occurs with *O. Smallii* in California as far south as the Santa Cruz Mountains. *Oxalis oregana* var. *Tracyi* Jepson, collected at Tamba Ranch, Chetco River, Oregon, seems to be typical *O. oregana* Nutt. The species with large, rosy flowers is generally thought of as *O. oregana* but is *O. Smallii* Knuth.

Oxalis trilliifolia Hook. Acaulescent with vertical rhizomes. Leaves numerous, upper surface of leaflets glabrous, lower surface and margins sparsely hairy, obcordate. Peduncles glabrous, 15-30 cm. long, the umbel 2-6-flowered, the pedicels 1-2.5 cm. long. Sepals lanceolate or oblong-lanceolate, 4-5 mm. long, sparsely ciliate. Petals white or pale violet, 8-14 mm. long, deeply notched. Stamens and styles glabrous. Capsule erect, 2.5-3 cm. long, the beak often half as long as the body.

Distribution: Washington and Oregon.

Type locality: "near the Grand Rapids of the Oregon (Columbia River), *Douglas.*"

Oxalis cernua Thunb. Acaulescent. Leaflets cuneate, obcordate, 20 mm. long, 32 mm. wide, margins and under surface somewhat hairy, the petiole 13 cm. long. Peduncles 10-30 cm. long, more or less covered with soft pubescence, 3-8-flowered, the pedicels 1-2 cm. long. Sepals oblong-lanceolate, 5-7 mm. long. Corolla about 22 mm. long, campanulate, yellow, petals narrowly cuneate. Lesser stamens equaling sepals.

Distribution: widely cultivated and naturalized.

Type locality: Cape of Good Hope.

Specimens. California: in orange grove, Highland, San Bernardino County, *Feudge No. 1610* (Herb. Univ. Calif.); near Colma in cabbage fields, San Mateo County, *Loomis in 1915.*

The occurrence of this species as a naturalized plant in California was reported by Alice Eastwood in Leaflets of Western Botany, page 8, and by I. L. Wiggins in Torreya, volume 32, page 3.

Oxalis rubra St. Hil. Perennial with tuberous, obovate or cylindrical root. Leaves long-petioled, the leaflets 18 mm. long, 15 mm. wide, obcordate, upper surface glabrous or glabrescent, under surface slightly pilose, margin ciliate, sprinkled with dark spots. Peduncles 10-15 cm. long, many, becoming glabrous, the umbels shortly involucrate, simple or compound, 6-12-flowered, the pedicels 13-18 mm. long. Sepals about 4.5 mm. long, slightly pubescent, obtuse, the apices with irregular orange spots. Petals about 11 mm. long, entire, glabrous,

rose with darker lines. All stamens shorter than pistil, the shorter filaments glabrous, the longer pubescent towards the edge. Style and top of ovary pubescent. Capsule oblong.

Distribution: southern Brazil and Argentine.

Type locality: São Paulo, Brazil. Occasionally naturalized; a white-flowered variety is cultivated and may also become naturalized.

(To be concluded)

SOME WESTERN EUPHORBIAS OF THE SECTION ANISOPHYLLUM

BY JOHN THOMAS HOWELL

On both my visits with Mr. Templeton Crocker to Guadalupe Island, off the west coast of northern Lower California, a species of Euphorbia was collected from arid slopes at Melpomone Cove, the first member of Euphorbiaceæ to be found on the island. In working out the relationship of this Euphorbia, my attention has again been directed to certain species of the genus in the western United States. Shortly after the publication of my note in 1931 on a Californian Euphorbia referred to *E. pseudoserpyllifolia,* I made two collections on the western borders of the Colorado Desert which more nearly corresponded to Millspaugh's original description of that species than did the plant which I had considered earlier. Dr. Paul C. Standley compared one of these later collections with the type of *E. pseudoserpyllifolia* in the Herbarium of the Field Museum and Dr. P. A. Munz sent a fragment of M. E. Jones's collection which was cited in the original description. The Californian plant erroneously referred to *E. pseudoserpyllifolia* and the plant from Guadalupe Island are here described as new. Following the descriptions and notes of the several species, a key is given to indicate differences between related forms. All collections cited are in the Herbarium of the California Academy of Sciences.

Euphorbia guadalupensis J. T. Howell, spec. nov. Annua; caulibus prostratis, 1-5 cm. longis, glabris, teretibus, purpurascentibus; foliis oppositis, subovatis, ad 5 mm. longis, integerrimis, obtusis, basi inæqualibus subcordatisque, laminis glabris, petiolis ciliatis, stipulis elongato-triangularibus, integerrimis, copioso-villosis; involucris campanulatis, circa 1 mm. longis, glabris, lobis angusto-triangularibus, ciliatis; glandulis oblongis, purpureis, appendicibus albis roseisve, crenulatis; stylis circa 0.3 mm. longis, bifidis ad medium; capsulis

glabris; seminibus ovato-ellipticis, angulis non prominentibus, lateribus planis vel sæpe convexis, minute tuberculato-rugosis.

Root annual; stems prostrate, 1-5 cm. long, glabrous, terete, reddish; leaves opposite, subovate, to 5 mm. long, entire, obtuse, asymmetrical and subcordate at base, the blades glabrous, the petioles ciliate, the stipules elongate-triangular, entire, copiously villous; involucres campanulate, about 1 mm. long, glabrous, the lobes slender-triangular, ciliate; glands oblong, purple, with narrow, crenulate white or rosy appendages; styles about 0.3 mm. long, cleft to about the middle; capsules glabrous; seeds ovate-elliptical, the angles not prominent, the sides plane or generally convex, minutely tuberculate-rugose.

Collections. Melpomone Cove, Guadalupe Island, Lower California, March 18, 1932, *J. T. Howell No. 8331* (type, Herb. Calif. Acad. Sci., No. 200324); November 16, 1931, *J. T. Howell No. 8195.*

Closely related to *E. serpyllifolia,* this new Euphorbia from Guadalupe Island is readily distinguished by the compact habit, the entire obtuse leaves, and the entire hairy stipules. The plants grow in coarse sandy soil on dry wind-swept slopes at the south end of the island.

EUPHORBIA PSEUDOSERPYLLIFOLIA Millsp., Pitt. 2: 87 (1890). Root annual; stems prostrate, 5-20 cm. long, glabrous or villous, terete; leaves opposite, entire, obtuse, asymmetrical at base, glabrous or villous, ovate to broadly lanceolate, to 5 mm. long, the stipules elongate-triangular, entire, hairy-ciliate; involucres solitary, glabrous or villous, about 0.5 mm. long, the lobes elongate-triangular, ciliate; glands red or dark purple, round, without appendages; styles cleft to about the middle, very short; capsules glabrous; seeds oblong or elliptical, quadrangular, more or less transversely rugulose between the angles, ashy-white.

KEY TO THE FORMS OF E. PSEUDOSERPYLLIFOLIA

Stems and leaves glabrous or subglabrous; involucres glabrous .....a. *typica*

Stems, leaves, and involucres villous.....b. *villosa*

EUPHORBIA PSEUDOSERPYLLIFOLIA forma TYPICA J. T. Howell, nom. nov. *E. pseudoserpyllifolia* Millsp., *loc. cit.* Stems and leaves glabrous, rarely with a few scattered villi; involucres glabrous except the ciliate lobes.

Collections. Arizona: Gila River Valley, *Mohr in 1873* (from type in Herb. Field Mus.); Bowie, *Jones No. 4223* (from Herb. Pomona College); Quartzite, *Jones No. 24,974.* California: San Felipe Wash, *J. T. Howell No. 3253;* Cabazon, *J. T. Howell No. 6657.*

Euphorbia pseudoserpyllifolia forma **villosa** J. T. Howell, f. nov. Caulibus et foliis sparse villosis; involucris villosis.

Stems and leaves sparsely villous; involucres villous.

Collection: south of Palm Springs near Cathedral City, California, *J. T. Howell No. 6651* (type, Herb. Calif. Acad. Sci., No. 188849).

Euphorbia patellifera J. T. Howell, spec. nov. *E. pseudoserpyllifolia* J. T. Howell, not Millspaugh, Madroño 2: 19 (1931). Biennis ?; caulibus prostratis, 1-2 dm. longis, glabris, teretibus; foliis oppositis, ovato-lanceolatis ovatisve, ad 4 mm. longis, integerrimis, obtusis, basi inæqualibus subcordatisque, glabris, stipulis triangularo-lanceolatis et inæqualibus paucis lobis vel filiformibus et pluribus, glabris vel fere supra ciliatis; involucris campanulato-turbinatis, circa 1 mm. longis, glabris, lobis late triangularibus, comoso-ciliatis; glandulis rotundis vel fere oblongis et longioribus quam latis, substipitatis, fulvescentibus vel purpurascentibus, patelliformibus, appendice obsoleta; stylis circa 0.25 mm. longis, bifidis ad medium, ramis subcrassis; capsulis glabris; seminibus ellipticis, angulis fere prominentibus, lateribus vix concavis, minute reticulato-rugosis.

Probably biennial; stems prostrate, 1-1.5 dm. long, glabrous, terete; leaves opposite, ovate-lanceolate or ovate, to 4 mm. long, entire, obtuse, asymmetrical and subcordate at the base or the base subcuneate, glabrous, the stipules triangular-lanceolate and irregularly few-lobed or the stipules filiform and several, glabrous or somewhat hairy above; involucres campanulate-turbinate, about 1 mm. long, glabrous, the lobes broadly triangular, comose-ciliate; glands round or a little longer than broad, substipitate, patelliform, yellowish or purplish, appendage none; styles about 0.25 mm. long, cleft to about the middle, the branches stout; capsule glabrous; seeds elliptical, the angles rather prominent, the sides scarcely concave, minutely reticulate-rugose.

Collections. Near Palm Wash, western Colorado Desert, San Diego County, California, *J. T. Howell No. 3488* (type, Herb. Calif. Acad. Sci., No. 179830); north of Furnace Creek, Death Valley, Inyo County, California, *J. T. Howell No. 3684.*

Euphorbia patellifera does not appear to be closely related to *E. ocellata* D. and H., *E. arenicola* Parish, or *E. eremica* Jepson, the other Californian species which have similar curious discoid glands. From these species, *E. patellifera* can be distinguished by the elongate, angled seeds. The species seems more closely allied to the *E. polycarpa* group, although it appears very distinct in the peculiar glands, the involucral lobes, the thickened style-branches, and the somewhat different seeds.

EUPHORBIA FENDLERI T. and G., Pacific Railroad Surveys, 2, pt. 2:175 (1855). This species heretofore unrecorded from California, has been recently found in Inyo County, an extension of range westward from Arizona and Nevada, where its occurrence is not uncommon. The Californian specimen was collected in Westgard Pass of the White Mountains by Mr. Victor Duran and was distributed from the University of California Herbarium (No. 547) as *E. polycarpa* Benth.

KEY

A. Seeds ovatish, the sides reticulate-rugulose, plane or somewhat convex, the outer seed-coat scarcely becoming gelatinous when wetted; annuals ..... B

A. Seeds oblong or ovate-oblong, about twice as long as broad, the sides smooth or finely rugulose, the outer seed-coat becoming more or less gelatinous when wetted; leaves entire.... C

B. Leaves generally toothed; stipules irregularly cleft into few subulate divisions, glabrous ..... *E. serpyllifolia*

B. Leaves entire; stipules entire, densely ciliate..... *E. guadalupensis*

C. Stipules entire, elongate-triangular, hairy; glands generally red or purple; lobes of involucre elongate-triangular; seeds elongate-oblong, the sides markedly concave between prominent angles, smooth or very slightly transverse-rugulose, the outer seed-coat developing a very thick gelatinous mass when wetted ..... D

C. Stipules generally subulate-divided, often to the base, mostly glabrous, rarely entire or hairy; glands generally yellowish or brownish; lobes of involucre broadly triangular; seeds oblong-ovate, the sides plane or slightly concave, rather irregularly and subreticulately rugulose..... E

D. Perennials; involucre generally 0.75-1.2 mm. long, turbinate-campanulate; glands oblong, nearly always with appendages; styles conspicuous, at least 0.25 mm. long..... *E. polycarpa*

D. Annuals; involucres about 0.5 mm. long, bowl-shaped; glands round, very small, always without appendages; styles very short, less than 0.25 mm. long..... *E. pseudoserpyllifolia*

E. Probably biennial; stems prostrate from the summit of a taproot; glands round or slightly elongated longitudinally, always without appendages; outer seed-coat developing a very thick gelatinous mass when wetted..... *E. patellifera*

E. Perennials with numerous slender suberect or spreading stems from a rather deep-seated caudex; glands transversely oblong, generally with appendages; outer seed-coat developing only a thin gelatinous mass when wetted..... *E. Fendleri*

A NEW CALIFORNIAN FRITILLARIA

BY ALICE EASTWOOD

Fritillaria phæanthera Eastwood, spec. nov. Caulis 3-10 dm. altus, sæpe purpureo-maculatus et glaucus; foliis 3-5 verticillatis, angusto-lanceolatis, acuminatis, 8-10 cm. longis, 5-8 mm. latis, glaucis; floribus racemosis, pedicellis recurvatis, bracteis brevioribus; perianthi segmentis virido-fulvus vel purpurascentibus, rubiginoso-marginatis, 5 mm. longis, 3 mm. latis, apice recurvatis, basi carinatis; filamentis acuminatis, 6 mm. longis, antheris rubiginosis, 2 mm. longis; ovario angulato, 5 mm. longo, stylis medio conjunctis, apice recurvatis.

Type: No. 194148, Herb. Calif. Acad. Sci., collected by Mrs. J. H. Morrison near Durham, Butte County, California, April 17, 1932.

This interesting Fritillaria belongs to the group which includes *Fritillaria multiflora* Kell. and others of that aggregate. The rusty anthers projecting from the small, dull greenish-yellow or purplish bells give the species its name and its distinctive beauty. The filaments surround the ovary but the anthers spread. The bulb consists of a few thick scales surrounded by numerous little rice-grain bulblets. The blue-green stems are often mottled with purple and some become over 3 dm. high before the first whorl of leaves appears.

TWO NEW SPECIES OF WESTERN GALIUM

BY ALICE EASTWOOD

Galium utahense Eastwood, sp. nov. Perenne, stricto-ramosum, 1 dm. altum, scabro-puberulum; caulibus quadrangulatis, striatis; foliis quaterno-verticillatis, linearibus, obtusis, uninervatis, 1-2 cm. longis, 1-2 mm. latis, scabro-puberulis, valde revolutis; cymis paucifloribus, congestis, floribus fere sessilibus in axillis supremis, bracteis ovatis, obtusis, pedicellis æquilongis ovario; floribus bisexualibus; corollis albis 4 mm. latis, segmentis obtusis; filamentis longioribus; ovario glabro, stigmatibus 2, globosis nigris.

Type: No. 18691, Herb. Calif. Acad. Sci., collected by the author, *No. 7668,* at Soldier Summit, Utah, June 24, 1918. This is related to *Galium boreale* L., differing in the one-nerved scabrous strongly revolute leaves, glabrous ovaries, and inconspicuous inflorescence. Some of the oldest leaves are almost imperceptibly three-nerved at base, while the upper ones have the margins folded back to the midrib. The small white flowers in the

terminal clusters are few, crowded, and almost sessile among the uppermost leaves.

Galium Clementis Eastwood, sp. nov. Perenne, cæspitosum, 3-7 cm. altum, canescente hirsutulum, villis densis divaricatis; foliis quaterno-verticillatis, 3-10 mm. longis, 0.5-2 mm. latis, valde revolutis, strictis vel divaricatis; fructibus globosis, nigris vel brunneis, pubescentibus, 1-2 mm. diametro.

Type: No. 190668, Herb. Calif. Acad. Sci., collected October 3, 1921, on Santa Lucia Peak by Mrs. Mary Strong Clemens in whose honor it is named. The species is related to *G. californicum* H. and A., differing in the hoary appearance due to the dense white hairs covering all parts of the plant even to the fruits. It was not in flower; but in this genus the flowers have but little diagnostic value. The plants grow in low dense mats with few flowers concentrated in the upper leaf-axils.

ADVENTIVE SENECIOS

BY JOHN THOMAS HOWELL

In Mendocino County, California, *Senecio Jacobæa* L. has become an abundant and showy plant on coastal flats. What is perhaps the earliest record of this European species in California was collected by Alice Eastwood at Fort Bragg, Mendocino County, in 1912 (*No. 1648*).

Locally common on the coastal bluffs at Santa Cruz, California, *Senecio Cineraria* DC., a native of the Mediterranean region, has recently been collected (*J. T. Howell No. 10858*). In California this attractive garden plant is commonly known as Dusty Miller.

Yet a third Senecio which is established along the Californian coast is *S. elegans* L., the Purple Ragwort of South Africa. The occurrence of this species at San Francisco is reported in Jepson, Manual of Flowering Plants in California, page 1153. The plant was first collected as a garden escape by Alice Eastwood in October, 1912, at Lands End, San Francisco (*No. 2386A*), and at that locality now it is one of the most attractive and abundant plants blooming in the early autumn.

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JOHN THOMAS HOWELL

SAN FRANCISCO, CALIFORNIA
AUGUST 2, 1933

LEAFLETS
of
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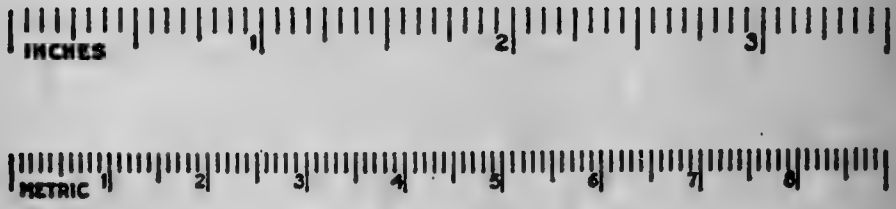

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ALICE EASTWOOD and JOHN THOMAS HOWELL

GARDEN

BOTTLE-BRUSHES RECENTLY INTRODUCED INTO CALIFORNIA

BY ALICE EASTWOOD

CALOTHAMNUS LONGISSIMUS F. v. M. The name suggests its most conspicuous character, the long needle-shaped leaves, a foot or more in length. It was discovered by Mr. Eric Walther in the now deserted California Botanic Garden, Los Angeles.

CALOTHAMNUS ASPER Turcz. The young branches of this species are most lovely. They wave in the slightest breeze like downy grey plumes.

The following species of Melaleuca are cultivated from seed but have not yet flowered, so that the names are uncertain. The first is in the Huntington Botanic Garden, San Marino, and the others are in the nursery of Golden Gate Park. The color of the flowers is taken from Bentham's Flora Australiensis.

M. squarrosa Don. Flowers yellowish-white.
M. acuminata F. v. M. Flowers white.
M. rhaphiophylla Schau. Flowers yellowish-white.
M. teretifolia Benth. Flowers yellowish-white.

THE IDENTITY OF LYCIUM BREVIPES BENTH.

BY C. LEO HITCHCOCK
University of Montana, Missoula, Montana

In the Annals of the Missouri Botanical Garden 19: 256 (1932), the writer pointed out that if I. M. Johnston was correct in his conclusion that *Lycium cedrosense* Greene was conspecific with *L. brevipes* Benth., then the name *L. Richii* Gray would have to be replaced by that of *L. brevipes*. However, it was not thought that there was sufficient evidence to warrant this change.

Very recently, however, Dr. Johnston has had opportunity to study the type of *L. brevipes,* which is at the British Museum, and reports that the type of Bentham's species is identical with the material known as *L. Richii*. It therefore seems wise to

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clear up the status of this specific complex by making the following reductions:

LYCIUM BREVIPES Bentham, Bot. Voy. Sulph. 40 (1844). *L. Richii* Gray, Proc. Amer. Acad. 6:46 (1862). *L. Berlandieri β Miersii* var. *Palmeri* subvar. *Richii* (Gray) Terrac., Malpighia 4:521 (1891). *L. Palmeri* Gray, Proc. Amer. Acad. 8:292 (1870). *L. Berlandieri β Miersii* var. *Palmeri* (Gray) Terrac., l. c. *L. cedrosense* Greene, Pittonia 1:268 (1889). *L. carolinianum β sandwicense* var. *cedrosense* Terrac., l. c. 518.

Lycium brevipes Benth. var. **Hassei** (Greene) comb. nov. *L. Richii* var. *Hassei* (Greene) I. M. Johnston, Proc. Calif. Acad. Sci. IV, 12:1154 (1924). *L. Hassei* Greene, Pittonia 1:222 (1888). *L. carolinianum γ californicum* forma *Hassei* (Greene) Terrac., l. c.

WESTERN SPECIES OF OXALIS—II

BY LEWIS S. ROSE

(Concluded from Page 51)

KEY TO THE WESTERN SPECIES OF OXALIS WITH STEMS ABOVE THE GROUND

1a. Leaves sessile, the leaflets not obcordate ..... *O. hirta*
1b. Leaves petioled, the leaflets obcordate 2
2a. Annual ..... *O. laxa*
2b. Perennial 3
3a. Pedicels appressed-pubescent 4
3b. Pedicels laxly pubescent ..... *O. pilosa*
4a. Underground stems with thread-like rootlets or with slender vertical root 5
4b. Underground stem from woody, elongated rootstock or tuberous fusiform root 6
5a. Longer filaments glabrous; leaflets 5-12 mm. broad; petals 7-10 mm. long ..... *O. corniculata*
5b. Longer filaments pubescent; leaflets 13-26 mm. broad; petals 12-18 mm. long ..... *O. Suksdorfii*
6a. Capsules longer than pedicels; peduncles as long as petioles or a bit longer ..... *O. albicans*
6b. Capsules shorter than pedicels; peduncles much longer than petioles ..... *O. californica*

OXALIS HIRTA L. Perennial with bulbs. Stems leafy, 3-30 cm. high, erect or procumbent, slightly hairy. Leaves alternate, sessile, pubescent, 5-15 mm. long, 1.5-3 mm. wide, the leaflets linear to oblong, almost cuneate. Peduncles axillary, 2-6 times as long as leaves, hairy. Sepals 4-5 mm. long, lanceolate, acute, hairy. Corolla 15-23 mm. long, cup-shaped, claws yellow, blade violet.

Distribution: southwestern Cape Province.

Type locality: South Africa.

Specimens. California: Montebello, Los Angeles County, *Cecil Hart.* It was reported by Wallace A. Brown near Salinas, with drawings of the plant and flowers.

OXALIS LAXA H. & A. Annual. Stems to 7 cm. high, densely but not rosulately leaved. Leaflets wide, obcordate, both surfaces hairy, 20 mm. long, 15 mm. wide, the petioles lax, subhirsute, 4-20 cm. long. Peduncles 8-20 cm. long, slender, frequently two-forked, the branches with three to six flowers. Flowers 12-13 mm. long. Sepals ovate to lanceolate, acute, more or less hairy. Corolla yellow, petals oblong. Stamens somewhat hairy. Styles pubescent.

Distribution: central and southern Chile.

Type locality: Chile.

The only collection of this interesting species known from North America was made in California, 7.5 miles from San Andreas on road to Valley Springs, Calaveras County, *J. T. Howell No. 4706.*

OXALIS PILOSA Nutt. Perennial, with straight woody root. Stems many, 10-40 cm. high. Leaflets densely pubescent, about as wide as long, obcordate, the petioles about 4 cm. long. Peduncles axillary, 1-1.5 times the petioles, 1-3-flowered, densely soft-hirsute, the pedicels hirsute, 1.5-3 cm. long. Sepals 4.5-6 mm. long. Petals yellow, 8-12 mm. long. Longer filaments glabrous. Capsule cylindrical, 13-18 mm. long, densely short-subhirsute, apex abruptly attenuate.

Distribution: California to Arizona and Sonora.

Type locality: "woods around St. Barbara, California."

Specimens. California: Ellwood, Santa Barbara County, *Eastwood No. 180;* Santa Barbara, *Elmer No. 2925;* Santa Cruz, Santa Cruz County, *Elmer No. 4516;* Cambria, San Luis Obispo County, *Eastwood No. 13581;* near Pigeon Point, San Mateo County, *J. T. Howell No. 10972;* Lake Merced, San Francisco, *J. T. Howell No. 11423, L. S. Rose No. 33281.*

OXALIS CORNICULATA L. Many stems arising from a running rootstock, branched, frequently rooting, slender, leafy. Leaflets wide, cuneate-obcordate, the petioles one to seven times as long as leaflets, sparsely pilose. Peduncles axillary, one to two times as long as the leaves, 1-6-flowered. Sepals lanceolate or ovate-lanceolate, acute, about 5 mm. long. Corolla 8-10 mm. long, crateriform, pale yellowish, the petals narrow-cuneate. Capsule 12-15 mm. long, covered with adpressed hairs.

Distribution: world-wide, the type locality European.

Of common occurrence as a garden weed on the Pacific Coast. *Oxalis corniculata* var. *atropurpurea* Planch. is the form with red-purple leaves, a rather common weed, especially conspicuous when it occurs in lawns.

Oxalis Suksdorfii Trel. Rhizomes sparsely branched. Stems decumbent or scarcely ascending, 10-30 cm. high, more or less villous. Leaflets bright green, 13-26 mm. wide, both surfaces with sparse hairs. Peduncles equalling petioles or slightly longer, the pedicels hispid. Sepals 4.5-6 mm. long. Petals bright yellow, 12-18 mm. long. Longer filaments pubescent. Capsule oblong, quite robust, densely and minutely pubescent, apex abruptly contracted.

Distribution: British Columbia to California.

Type locality: Oregon.

Specimens. California: Carlotta, Humboldt County, *Eastwood No. 12335;* Smith River, Del Norte County, *Eastwood No. 12277A.* Oregon: Marshfield, Coos County, *Haydon No. 73;* Portland, Multnomah County, *Eastwood No. 13428.*

Oxalis albicans HBK. (*O. Wrightii* Gray.) Perennial with tuberous or turnip-shaped roots. Stems many, erect or subprocumbent, much-branched, leafy. Leaves pubescent, the leaflets as long as wide, 7-8 mm. long, obcordate, the petioles 8-30 mm. long. Peduncles axillary, more or less subhirsute. Sepals 4-5 mm. long, more or less purplish-tinged. Petals pale yellow or purplish. Longer filaments glabrous. Capsule cylindrical, 16-20 mm. long, densely tomentose, apex gradually attenuate.

Distribution: Texas to Arizona and California, south to Ecuador.

Type locality: near Moran, Texas.

Specimens. California: Santa Monica Mountains, *Epling in 1931;* Fall Brook, San Diego County, *Jones No. 2652;* Santa Ana Canyon, Orange County, *J. T. Howell No. 2543;* Prisoner's Harbor, Santa Cruz Island, *J. T. Howell No. 6184.*

Oxalis californica (Abrams) R. Knuth. Knuth writes: "Related to *O. albicans,* from which it is distinguished by the size of the leaves and length of pedicels and capsules." Leaflets 7-16 mm. wide. Sepals 5-6.5 mm. long. Petals 9-13 mm. long. Capsule 11-16 mm. long.

Distribution: Southern and Lower California.

Type locality: Onofre Mountains, California.

This is scarcely and not naturally separable from the Californian material of *O. albicans* HBK. as that species is treated by Knuth. I am inclined to agree with Jepson, who in his Manual of the Flowering Plants of California includes *Xanthoxalis californica* Abrams in *Oxalis Wrightii* Gray, the latter being a synonym of *O. albicans* HBK. according to Knuth.

NEW MANZANITAS FROM SANTA CRUZ ISLAND, CALIFORNIA

BY ALICE EASTWOOD

Arctostaphylos subcordata Eastwood, spec. nov. Frutex erecto-patens, circa 1-2 m. altus; ramis senioribus glabris, rubro-brunneis, junioribus cinereo-tomentosis et plerumque vestitis villis divaricatis, glandulosis; foliis senioribus viridibus ovato-ellipticis vel sublanceolatis, 2-5 cm. longis, 1.5-3 cm. latis, basi subcordatis, plerumque truncatis, obtusis acutisve, margine integris, glandulare ciliatis, apice cuspidatis mucronatisve; petiolis 2-5 mm. longis, hispidis; foliis junioribus dense cano-pubescentibus margine rubescentibus; paniculis sessilibus, floribus dense congestis; bracteis foliaceis, ovato-lanceolatis, acutis, 4-10 mm. longis, viscidis et glandulare ciliatis; pedicellis 2-5 mm. longis, bracteis brevioribus; sepalis orbiculatis incurvis, 2 mm. latis; corolla 4 mm. longa lataque; filamentis basi latis et ciliatis; ovario dense cano-villoso; drupa globoso-depressa, rubescenti, parce villosa.

This shrub has the old stems smooth and chocolate-brown, the young being clothed with a fine white pubescence and generally with spreading glandular hairs. The leaves are bright green, variable in shape, but generally somewhat cordate at base; the upper surface is generally glossy and the lower dull and somewhat pubescent; the petioles, as well as the young leaves, are more densely pubescent and the latter are often rosy on the margins. The flowers are in densely flowered sessile panicles with leafy bracts which are edged with glandular hairs and which exceed the glandular pedicels. The sepals are white, rounded and incurved. The filaments expand to a broad ciliate base and carry dark red, tailed anthers. The ovary is densely white-hairy and the berry is slightly hairy, reddish, and depressed-globular. When ripe, the berries are ridged by the separable seeds.

Type: No. 188732, Herb. Calif. Acad. Sci., collected by John Thomas Howell, *No. 6335,* April 13, 1931, near the west end of Santa Cruz Island. Other collections from Santa Cruz Island are: near the west end, *Howell Nos. 6327, 6334, 6336, 6337,* and *Hoffmann No. 357;* stony ridge above Fry's Harbor, *Hoffmann;* China Harbor, *Howell Nos. 6369* and *6370;* Ravenswood, *Howell Nos. 6229* and *6230;* Pelican Bay, *Howell No. 6401,*

Abrams & Wiggins Nos. 164 and *165*. The leaves of the last two are noted as dull green on the upper surface, but in the dried specimens the leaves are glossy.

This species is related to *A. glandulosa* Eastwood. It is most readily distinguished by the generally subcordate leaves, bright green when old but clothed when young with a white close pubescence. The white flowers are dense in the sessile glandular panicles and in bud the bracts are densely aggregated and the branches have a heavy aspect.

Arctostaphylos pechoensis Dudley var. **viridissima** Eastwood, var. nov. Frutex 1-2 m. altus; ramis senioribus badiis, junioribus dense et minute tomentosis et villosis, villis canis et divaricatis; foliis viridissimis, basi auriculatis, subsessilibus.

This differs from typical *A. pechoensis* in the hairy stems and the bright green subsessile leaves. There is some variation in the leaves on any shrub, a few leaves being truncate or obtuse at base, but in general the leaves are rounded at apex and auriculate at base and are often overlapping.

Type: No. 188755, Herb. Calif. Acad. Sci., collected at China Harbor, Santa Cruz Island, April 14, 1931, by John Thomas Howell, *No. 6368*. Other specimens from the same locality are: *Howell Nos. 6365, 6366, 6367,* and *Hoffmann No. 359*. These are all in fruit. The following specimens are from the mainland: Point Sal, Santa Barbara County, May 31, 1931, *Hoffmann;* amid *Pinus muricata,* five miles north of Lompoc on road to Casmailia, April 16, 1932, *Hoffmann;* on road from Lompoc to Harris, Santa Barbara County, *Eastwood No. 16840;* near Morro Bay, May 1, 1931, *Gertrude Sinsheimer,* in flower.

Arctostaphylos insularis Greene var. **pubescens** Eastwood, var. nov. Panicula in alabastro pubescens; ovario villoso et drupa pubescente.

This variety differs from the type only in pubescence. Dr. Greene collected both forms, the pubescent one in the Herbarium of the California Academy of Sciences (type, No. 261B, Herb. Calif. Acad. Sci.), the glabrous one in Parry's Herbarium at the State College of Iowa. This was described by Parry as smooth throughout with the exception of the glandular pedicels.

I am indebted to Jess Fultz for the report on the type in the Parry Herbarium and fragments from the specimens deposited there.

Key to the Species of Arctostaphylos on Santa Cruz Island, California

1. Leaves bright green on upper surface, white with dense tomentum on lower ..... *A. tomentosa*
1. Leaves bright green on both surfaces 2
2. Pubescence glandular; panicles in bud with thick branches ..... *A. subcordata*
2. Pubescence not glandular 3
3. Leaves subsessile, mainly rounded at top and auriculate at base ..... *A. pechoensis* var. *viridissima*
3. Leaves petiolate, not auriculate; panicles in bud with slender branches 4
4. Bracts and ovary glabrous ..... *A. insularis*
4. Bracts and ovary pubescent ..... *A. insularis* var. *pubescens*

FIELD NOTES ON THE MANZANITAS OF SANTA CRUZ ISLAND

BY JOHN THOMAS HOWELL

Arctostaphylos insularis Greene. From the Main Ranch, with its picturesque buildings, well-tilled vineyards, and Old World atmosphere, the trail to Cochie Bay climbs to the summit of the ridge on the south side of the central valley, Valle del Medio, and descends Cochie Canyon to the bay on the southern shore of the island. One of the notable elements in the chaparral on the higher ridges along this route is *Arctostaphylos insularis* Greene, a distinctive manzanita with bark gray-glaucous over reddish-brown. This manzanita is perhaps the most abundant and widespread species of the genus on Santa Cruz Island. It grows in the pine groves at Pelican Bay and at the west end, and it is the dominant element in the chaparral at various places along the ridge on the south side of Valle del Medio. It was not seen in the pine forest at China Harbor. *Arctostaphylos insularis* is also the largest manzanita on the island. While generally it is a shrub 1.5 to 2.5 m. tall, occasionally it becomes arborescent and up to 5 m. tall with a single

trunk and a broad rounded crown. One individual at Pelican Bay was nearly 4 m. tall with a spread of about 5 m. and with a trunk 0.52 m. in diameter. The stems do not form a platform at the ground and are killed by fire, as was observed in a small burn at Pelican Bay. Although the typical and pubescent varieties were found growing together, it was generally noted that the pubescent variety was more abundant near the coast and that the typical glabrous variety was more abundant in the interior. The glaucescent bark, which, among Californian manzanitas, is known otherwise only in *A. myrtifolia* Parry, is very thin and soft and can be easily scraped by a finger-nail.

ARCTOSTAPHYLOS SUBCORDATA Eastwood. As one goes west from the grassland of Puerta Zuela Ranch to the pine forest near the west end of Santa Cruz Island, a borderland of brush or chaparral is traversed before reaching the forest itself. One of the typical shrubs in this association is *Arctostaphylos subcordata* Eastwood, which reaches its fullest development at the edge of the pines. There erect chocolate-colored stems arise from woody platforms to a height of 2 to 3 m. and form dense, almost impenetrable thickets. On rocky slopes at Pelican Bay and China Harbor subprostrate variants occur together with plants of erect habit.

ARCTOSTAPHYLOS PECHOENSIS var. VIRIDISSIMA Eastwood. Great pale cream cliffs of chert rise from the blue ocean at China Harbor, a small cove on the north side of Santa Cruz Island at its narrowest part. A steep narrow canyon extends in from the place of landing, and on the slopes and ridges at the head of the several forks of the canyon is one of the three pine forests of the island. As in the forests at the west end and at Pelican Bay, an interesting group of shrubs is found associated with the pines, and among the shrubs manzanitas are the most abundant. The only record of *Arctostaphylos pechoensis* var. *viridissima* Eastwood on the island is in this association. The plants do not form a dense chaparral, but are usually disposed in an open manner on the border of the pine forest. The plants are erect with a single trunk from the base and are usually 1-2.5 m. tall. None of the plants was observed to form a woody platform at the ground.

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BOTANICAL GARDEN

ESCALLONIAS IN GOLDEN GATE PARK

BY ALICE EASTWOOD

These beautiful shrubs that are so much at home in Golden Gate Park and other parts of California are natives of South America. The name was given by Mutis, a Spanish botanist, in honor of Escallon, his pupil and companion while traveling in South America. Besides the true species that are cultivated, there are many notable hybrids, some of which surpass in beauty and vigor the parents from which they were derived. The genus belongs to the diverse Saxifrage Family which includes also gooseberries, currants, hydrangeas, saxifrages, Philadelphus (mock orange), Parnassia, and many more less well known groups.

The Escallonias bloom profusely, some in panicles or racemes terminating erect stems, some in short lateral branchlets, or solitary, often forming lovely wreath-like festoons. The colors range from deep crimson to rose-pink, white, and in one, pale straw-color.

They may be conveniently divided into two main groups, one with salverform flowers, the claws of the petals erect forming a tube and the blades a flat limb, the other with the petals spreading from the base and the claws not forming a tube. The first group will be described in the present article and the second in the next issue of this publication.

With few exceptions the foliage and stems are dotted with glands, the glands present only on the lower side of the leaves except in *E. franciscana* where they are conspicuous on both sides. The aromatic fragrance emanating from some of the species is due to these glands.

Other species and hybrids may be cultivated in other parts of California, but none has been seen or reported that is not here included. The more recent hybrids are not yet in general cultivation, but because they are so readily propagated by cuttings the most desirable may soon be. A hybrid is indicated by *x* preceding the name. The names of the new hybrids came from the nurseries in England and New Zealand from which the plants were received. The only descriptions known are brief

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ones in the nursery catalogues. Those named by the author were described in the Proc. Calif. Acad. Sci., ser. 4, 18: 385-391 (1929).

Key to the Species of Escallonia With Claws of Petals Forming a Tube

1. Petals white 2
1. Petals pink or rose 5
2. Calyx inconspicuously red-tinged 3
2. Calyx green; panicles pyramidal 4
3. Leaves clothed with white downy hairs, revolute; panicles pyramidal, densely flowered; tall, coarse shrub with downy stem ..... 1. *E. revoluta*
3. Leaves and stems not as in preceding; panicles small; erect-spreading bushy shrub ..... 2. *E. rubricalyx*
4. Leaves wavy and serrate, glandular; claws of petals longer than the narrow, revolute blades; panicle as if varnished; tall, erect shrub, strongly aromatic ..... 3. *E. illinita*
4. Leaves serrate but not wavy, glandular beneath only; claws of petals about as long as the broad, flat blades; tall erect shrub, sometimes trimmed as a tree ..... 4. *E. Grahamiana*
5. Petals pink or pink-tinged 6
5. Petals rose or crimson 10
6. Leaves large, gland-dotted on both sides; corolla pink, with claws of petals longer than breadth of limb; tall, vigorous shrub, aromatic ..... 5. *E. franciscana*
6. Leaves gland-dotted beneath only; flowers pink-tinged 7
7. Flowers in large pyramidal panicles 8
7. Flowers in one-sided panicles 9
8. Corolla with flat limb; calyx glandular ..... 6. *E. Fretheyi*
8. Corolla limb not flat; calyx not glandular ..... 7. *E. Rockii*
9. Corolla rose-tinged; leaves glandular beneath ..... 8. *E. exoniensis*
9. Corolla almost white; leaves without glands ..... 9. *E. pterocladon*
10. Panicles broad, many-flowered 11
10. Panicles longer than wide 13
11. Leaves broader than, or as broad as long, gland-dotted beneath, glossy above; flowers large ..... 10. *E. macrantha*
11. Leaves longer than broad 12
12. Stems glandular and clothed with short white hairs; flowers large, with claws longer than blades ..... 11. *E. Ingrami*
12. Stems and leaves smooth; flowers with claws as long as width of limb; young weak stems surpassing the round panicles ..... 12. *E. organensis*
13. Panicles generally one-sided, many-flowered 14
13. Panicles few-flowered, flowers sometimes solitary 16
14. Flowers bright rose, claws of petals longer than width of limb ..... 13. *E. rubra*

14. Similar to *E. rubra* but flowers pale rose, claws of petals darker than limb.....15
15. Erect shrub.....14. *E. Balfourii*
15. Drooping shrub.....15. *E. demissa*
16. Loosely branching shrub; calyx rounded at base....16. *E. glutinosa*
16. Drooping shrub; calyx pointed at base.....17. *E. punctata*
16. Low shrub; leaves pointed at both ends; flowers small, generally solitary at ends of branchlets.....18. *E. rubra uniflora*

1. Escallonia revoluta Pers. Figured in Bot. Mag., pl. 6949, also Ruiz & Pvon, Fl. Peru and Chile, pl. 236a. A tall, coarse, erect shrub said to become thirty feet high. Stems and lower leaf surfaces are gray-downy with close white pubescence. The white flowers are densely clustered in large terminal pyramidal panicles terminating the branches.

2. x Escallonia rubricalyx Eastwood. Erect, spreading bushy shrub, with small panicles of white flowers, the claw and blade of about equal length; calyx red-tinged, becoming redder in fruit. It is related to *E. rubra* which may be one parent.

3. Escallonia illinita Presl. Figured in Bot. Reg., pl. 1900. Tall erect shrub, glandular as if varnished; leaves longer than wide; panicles many-flowered; strongly aromatic. Recently introduced in Golden Gate Park.

4. Escallonia Grahamiana H. & A. Figured in Sweet's British Fl. Garden IV, pl. 81, as *E. glandulosa* Lodd. Tall spreading shrub with large pyramidal panicles of white flowers terminating the branches; leaves bright green, obovate, obtuse but not notched at apex. It has gone under several names. The correct identification was ascertained by specimens sent to Kew for comparison. It is one of the commonest in cultivation. At the Marine Hospital, San Francisco, bushes are trimmed to form trees.

5. x Escallonia franciscana Eastwood. Tall erect shrubs with large thick leaves, conspicuously gland-dotted on both sides; panicles longer than wide, many-flowered with pink flowers having the tube longer than the width of the limb. Very glandular and exhaling an aromatic odor.

6. x Escallonia Fretheyi Hort. Tall vigorous erect shrubs with large pyramidal panicles of pink-tinged flowers terminating the branches; calyx glandular and corolla with an open flat limb. Recently introduced from a New Zealand nursery.

7. x Escallonia Rockii Eastwood. Similar to the preceding with calyx not glandular and the limb of the corolla not flat, some petals having erect blades and some flat. This was originated in Golden Gate Park by Mr. Peter Rock, Superintendent of the Nursery. He pollinated *E. montevidensis* with pollen from *E. macrantha*. Several plants of the second generation have been raised in the nursery but none is equal to the type nor do they agree with it.

8. x Escallonia exoniensis Veitch. Erect spreading shrub with

angled stems; leaves thin, paler beneath and sparingly gland-dotted; flowers many in numerous one-sided panicles longer than wide, the pink-tinged flowers generally pendent; calyx glandular.

9. Escallonia pterocladon Hook. Figured in Bot. Mag., pl. 4827. In the plate the flowers are in racemes; in the shrubs grown here they are in panicles similar to the preceding, but corollas smaller and almost white and lower leaf surface not glandular. In this and preceding, the young growth surpasses flowering branches.

10. Escallonia macrantha H. & A. Figured in Bot. Mag., pl. 4473. This is the most extensively cultivated species and together with other Escallonias is often used as a hedge plant. The shrub is erect, bushy and spreading; leaves thick, large, broader than long, glossy above, densely gland-dotted beneath. The panicles of bright rosy flowers terminate the branches; the limb of corolla is broad and almost equals the length of the claw. It is frequently sold as *E. rubra* to which it is related, but it has much larger flowers and leaves.

11. x Escallonia Ingrami Hort. Erect shrub, the stems and branches clothed with glands and pubescent with fine short white hairs; leaves not gland-dotted beneath; corolla rose-color, large, with the claws of the petals almost twice as long as width of limb. Recently introduced. It was described in the Gardeners' Chronicle in June, 1883.

12. Escallonia organensis Gardner. Figured in Bot. Mag., pl. 4274. Erect bushy shrub, with narrowly obovate leaves, longer than broad with red margins, stems red, no glands or pubescence; flowers rose often lighter at the throat, in a rounded panicle, surpassed by the rather weak young branches.

13. Escallonia rubra Pers. Figured in Bot. Mag., pl. 2890, also Ruiz & Pavon, Fl. Peru and Chile, vol. 3, pl. 236b. Typical *E. rubra* Pers. does not seem to be in cultivation, but in Chile the species has several varieties and the differences are not conspicuous. It is an erect bushy shrub with some pubescence and is but little glandular. The leaves are rather thin, paler on the lower surface, pointed at each end; flowers bright rose with corolla-tube longer than breadth of limb; panicles longer than wide, generally one-sided. The young slender erect young stems surpass the flowering branches. The name is often incorrectly applied to *E. macrantha* and it is also called *E. rosea* which belongs to an entirely different species.

14. x Escallonia Balfourii Hort. This is similar to the preceding but with flowers paler rose and the claws of the petals darker and longer than the width of the limb. Recently introduced.

15. x Escallonia demissa Eastwood, nom. nov. *E. pendula* Hort., not *E. pendula* R. & P. A very drooping shrub with loosely flowered panicles longer than wide; flowers with tube of corolla twice as long as breadth of limb; very glandular except upper surface of obovate leaves. Recently introduced.

15. x Escallonia glutinosa Hort. *E. rubra glutinosa* Phil. Shrub

with slender, spreading branches, very glandular throughout except the glossy upper surface of the leaves and the small dark crimson corollas. Petals with claws scarcely surpassing the bell-shaped calyx and about as long as the breadth of the limb. Recently introduced.

17. ESCALLONIA PUNCTATA DC. This resembles the preceding in the dark crimson color of the flowers and the glandular pubescence. The habit is drooping and the leaves and flowers larger. The flowers are often solitary at the ends of branchlets but also in few-flowered clusters. Recently introduced.

18. ESCALLONIA RUBRA UNIFLORA Poepp. *E. montana* Hort., not *E. montana* Phil. Leaves small, sharply pointed at both ends, glossy above; flowers generally solitary at ends of branches, small but with tube longer than breadth of limb. According to the original description, *E. montana* Phil. has white flowers in a panicle.

NOTES ON SOME PLANT INTRODUCTIONS, MOSTLY CALIFORNIAN

BY J. W. STACEY

On April 20, 1930, while passing over a grassy meadow about two miles from Stanford University, a number of very tiny plants was noticed, which at first were thought to be *Tillæa erecta,* but on closer inspection with a pocket lens, for the plants were so small that the parts could not be made out with the naked eye, they were seen to be some species of Galium, totally unknown to the writer. Specimens were sent to Miss Alice Eastwood, and they were determined as *Galium murale* DC. Within a few rods there were literally thousands of these plants, but so small that they would usually be passed over. It is not improbable that this plant will be found in other places. This introduction probably came from Spain.

On page 21 of LEAFLETS OF WESTERN BOTANY, George J. Goodman writes of the fact that *Emex australis* Steinh. was found in some material from San Francisco. This species is probably not so rare as is supposed, as Professor E. L. Greene in Flora Franciscana, page 141, cites it as adventive on our sea-beaches, and cites a collection by himself in South Vallejo in 1874. About fifteen years ago it was collected by the writer at Benicia, Solano County, but unfortunately, as it was not supposed at that time to be rare, the specimen was not preserved.

While looking over some grasses and sedges from the herbarium of Milo S. Baker, one sheet labeled tentatively *Briza*

minor L. was found to be *Briza media* L., which is perhaps a new addition to the weed flora of California. The collection was presumably made in Sonoma County.

Atriplex hortensis L. was found last fall along the sides of the streets in Klamath Falls, Oregon. As it has been found by Professor L. R. Abrams in California near San Mateo recently, it is evidently beginning to spread.

Sisymbrium Irio L. is becoming very plentiful in fields and orchards in Southern California, notably around Redlands and Riverside. In some fields it has become the predominant weed. It will without doubt spread northward, and should be detected in Northern California.

Another weed which seems to be working northward is *Alhagi camelorum* Fisch., the justly dreaded Camel Thorn. It was first found on the Colorado Desert, in Riverside County, but it has spread as far north as Fresno County, as the writer has seen it in both Kern and Fresno counties.

Paspalum dilatatum Poir. is also spreading rapidly. It has been found by the writer in such widely separated localities as Phoenix, Arizona; Los Angeles, Redlands, Santa Cruz, and San Jose, California.

Oxalis cernua Thunb. is very plentiful on Santa Catalina Island. The slopes back of St. Catherine's Hotel are yellow with the color of this species. It has been noticed there for several years and it is spreading very rapidly away from the hotel, and is also found in other parts of the island.

Two Old World species of Linaria which have been found at several stations in California are *L. Elatine* (L.) Mill. and *L. spuria* (L.) Mill. Both were named as occurring in California and elsewhere by Dr. Munz in his work on the Antirrhinoideæ -Antirrhineæ of the New World (Proc. Calif. Acad. Sci., ser. 4, 15: 333), but no collections from California were cited. *Linaria Elatine* with its bicolored corolla, yellow above and purple below, was found by the writer at Colfax, Placer County, and Mr. J. T. Howell has collected it in the Napa Valley on the rocky bed of Conn Creek at the entrance to Sage Canyon, Napa County. It has also been found along Putah Creek and as an adventive at the University Farm, Davis, Yolo County. *Linaria spuria,* which also has a bicolored corolla but

with purple above and yellow below, was found by the writer at Menlo Park, San Mateo County, by Mr. J. T. Howell near Coulterville, Mariposa County, and by Miss Sophie Fauntleroy at Ojai, Ventura County.

Among plants which have been found as waifs in California and should not yet be dignified as introductions are the following: *Hibiscus Trionum* L. at Stockton, and *Conringia perfoliata* Link at Santa Rosa. Yet the waifs of to-day may become the weeds of to-morrow.

WANTED: SPECIMENS OF CAREX. A critical study of western American species of Carex has been undertaken by Mr. J. W. Stacey, publisher of scientific and medical books in San Francisco. To aid him in his work on Carex, Mr. Stacey wishes to obtain as much material as possible during the next few years, and he will be grateful to botanical collectors for all that they may send to him. According to Mr. Stacey, western Carices have been almost entirely overlooked by collectors in recent years, and, as a result, the representative material in the herbaria is markedly deficient, considering the wide and abundant distribution of the genus in the western states. Specimens may be sent to Mr. Stacey at 236 Flood Building, San Francisco.—John Thomas Howell.

SIMULISM* AND CEANOTHUS FRESNENSIS

BY JOHN THOMAS HOWELL

An interesting line of investigation in botanical field work is the study of plants which assume a striking similarity in aspect and habit although they belong to unrelated natural orders of plants. Two such plants growing amid the middle and higher pine forests of the Sierra Nevada of California are *Ceanothus fresnensis* Dudley and *Arctostaphylos nevadensis* Gray. Each of these species is marked by a nearly prostrate habit and spreads a loosely branched mat-like growth on gentle slopes or develops rough curtains and pendent sprays on bluffs. A further resemblance is that each species bears a comparable relationship to a shrubby and variable specific complex in its genus, the Ceanothus to *C. cuneatus* (Hook.) Nutt. and the

* The term used by Dr. Jepson to designate "habital similarity, a similarity in branching, in hue or in foliage" among unrelated species (Man. Fl. Pl. Calif. 19).

Arctostaphylos to *A. pungens* of Californian authors, both of these species being widespread in California. The two species appear to be montane developments in genera whose more numerous species are characteristic of the chaparral of the lower mountains and foothills throughout California. In distribution and abundance the two are not similar: the Arctostaphylos is not uncommon from the southern Sierra Nevada and higher North Coast Ranges northward into the mountains of west central Oregon; the Ceanothus is only an occasional plant of the central Sierra Nevada for about a hundred miles from Tuolumne County south to Fresno County.

Ceanothus fresnensis has not been clearly understood and perhaps deserves further notice. It appears as distinct as any species found in the subgenus Cerastes and yet it is treated by Jepson as a variety of *C. rigidus* Nutt. (Man. Fl. Pl. Calif. 623) and by McMinn as a variation of *C. cuneatus* (Hook.) Nutt. (Contrib. Dudley Herb. 1:144). Surely if *Arctostaphylos nevadensis* is to be retained as a species, *C. fresnensis* is deserving of like consideration. From both *C. cuneatus* and *C. rigidus* it differs entirely in habit, and its commonly spreading slender horns on the nearly mature fruits are very distinctive. Although the leaves of *C. fresnensis* tend to be finely denticulate about the rounded apex, a character nearly absent in *C. cuneatus,* the leaves are never so coarsely dentate as are those of *C. rigidus.*

The following excellent field notes have been received recently from Mrs. Enid Michaels of Yosemite Valley: "This creeping Ceanothus has interested me for fourteen years. It appears on the sides of the roads at about 5500 feet and continues a thousand feet higher. It hangs rope-like branches down the very steep banks or clings to the slopes in mat-like, bossy masses. Year by year the mats of this plant increase until an individual may measure twenty feet across. I call it the creeping form of *C. cuneatus,* but it must be distinct from that species, however, as its prostrate habit is so definite."

Besides specimens of *C. fresnensis* which have been received from Mrs. Michaels, the plant is in the Herbarium of the California Academy of Sciences from the summit of Chowchilla Mountain, *J. T. Howell No. 6685,* and from midway between Wawona and Inspiration Point, *M. S. Baker No. 5759.*

TWO NEW PLANT MIGRANTS IN MONTANA

BY C. LEO HITCHCOCK

University of Montana, Missoula, Montana

That some of the plants popularly known as weeds, which are common to the central and eastern United States, are becoming established in Montana seems evident from the detection of two frequenters of roadsides and waste-places that have been brought to the attention of the writer.

Recently, a plant, collected by C. Jensen and W. Wetzel, and reported to be "plentiful in hayfields in the Gallatin Valley, near Bozeman," was submitted for determination; it was found to be *Knautia Scabiosa* (L.) Coulter,* commonly known as the Field Scabiosa.

The second such migrant, *Centaurea maculosa* Lam., was pointed out by Dr. J. W. Severy. This attractive relative of the cultivated Bachelor's Button is now well established along dry roadsides in the Bitterroot Valley, near Missoula. Collections of both of these plants, which are adventive from Europe, are now incorporated in the herbarium of the University of Montana.

NEW SPECIES OF CALIFORNIAN ARCTOSTAPHYLOS

BY ALICE EASTWOOD

The genus Arctostaphylos reaches its greatest development in variety and number of species in California. In order to know them, observation in the field is absolutely essential. The character of the urn-shaped corolla, except for size and in some cases color, seems of slight taxonomic value. The anthers are all furnished with slender, horn-like appendages, the filaments broad at base and more or less hairy even in the same apparent species. The ovary is generally variable, more often flattened-globular than ovoid or perfectly globular. In some species the fruit is distinctive.

The new species described and named here are marked amid

* The validity of this determination was checked by G. J. Goodman at the Missouri Botanical Garden.

the chaparral where they grow by the color characteristics of the foliage, the shape of the leaves, the appearance of the flower-cluster (whether foliaceous-bracted or not, whether markedly glandular or not), the size and color of the flowers, and the character of the fruit. In the next number of this publication, a key to the species in northern California will be given with brief diagnostic descriptions of each species.

Arctostaphylos Campbellæ Eastwood, spec. nov. Frutex divaricato-ramosus, circa 1 m. altus; ramis senioribus nigro-purpureis, glabris, ramis junioribus cinereo-tomentosis et divaricato-villosis, villis albis, non glandulosis; foliis pallido-viridibus, senioribus glabratis, junioribus subtomentosis, oblongis, ellipticis ovatisve, 3-4 cm. longis, 1-2 cm. latis, apice cuspidatis, basi obtusis, margine integris vel minute spinuloso-serrulatis, petiolis villosis et tomentosis, circa 5 mm. longis; paniculis subsessilibus, divaricato-ramosis, tomentosis et villosis; bracteis inferioribus foliaceis, superioribus ovatis, acuminatis, apice brunneis pedicellis brevioribus; sepalis orbiculatis, margine revolutis et minute ciliatis; corolla alba, 5 mm. longa et lata; filamentorum basi glabra; ovario tomentoso, non glanduloso; drupa sparse cano-villosa.

Type: No. 202212, Herb. Calif. Acad. Sci., collected on Mount Hamilton, May 5, 1922, by Mrs. W. W. Campbell in whose honor it is a pleasure to name this species. There are other specimens in the Herbarium of the California Academy of Sciences collected by J. T. Howell and the author. The pale green color of the foliage and the tomentose character of the pubescence ally it with *A. canescens* Eastwood. It differs in smaller flowers white instead of rose color, and in the spreading white hairs on the stems. The bracts, too, with the exception of the very lowest, are not leaf-like. The fruiting specimen was collected by the author, June 29, 1924, *No. 12401.*

Arctostaphylos crustacea Eastwood, spec. nov. Frutex ramosus, 1-2 m. altus; ramis senioribus nigro-purpureis, glabris, ramis junioribus albo-setosis et dense pubescentibus, non glandulosis; foliis viridissimis, crustaceis, oblongis, suborbiculatis vel aliquando lanceolatis, 2-4 cm. longis, 1.5-3 cm. latis, apice apiculatis acutisve, basi obtusis, truncatis vel subcordatis, margine integris vel serratis, foliis junioribus infra pubescentibus, senioribus glabris, petiolis circa 5 mm. longis, pubescentibus et villosis; paniculis breve-pedunculatis, ramosis saepe nutantibus, pubescentibus, non glandulosis; bracteis infimis foliaceis, superioribus deltoideis, acuminatis, hirsuto-ciliatis; pedicellis circa

5 mm. longis, pubescentibus; corolla 5 mm. longa, rosacea vel alba; filamentorum basi plerumque villosa; drupa globoso-depressa, paulo pubescenti vel glabra.

Type: No. 162221, Herb. Calif. Acad. Sci., collected by Mr. and Mrs. Alvin Seale on Kings Mountain, San Mateo County, California, April 2, 1922. Specimens in the Herbarium of the California Academy of Sciences are from Lake Merced, San Francisco; Moraga Ridge, Contra Costa County, and Grizzly Peak, Alameda County; various places in the Santa Cruz Mountains and in the hills near Watsonville. It has been identified as *A. Andersoni* Gray from which it differs in pubescence, petioled leaves, and non-auricled leaf-base; as *A. glandulosa* Eastwood from which it differs in thinner leaves, entire absence of glandular pubescence, and difference in bracts; as *A. tomentosa* (Pursh) Dougl. from which it differs in the old leaves, almost smooth and bright green on both surfaces.

Arctostaphylos Cushingiana Eastwood, spec. nov. Frutex dense-ramosus; ramis senioribus nigro-purpureis, ramis junioribus et petiolis cano-pubescentibus; foliis subglaucis, pulverulentibus, lanceolatis, ovatis vel ellipticis, 2-4 cm. longis, 1.5-2.5 cm. latis, apice acutis, basi obtusis vel truncatis, margine integris; paniculis subsessilibus, bracteis inferioribus foliaceis, lineari-lanceolatis, circa 2 cm. longis, superioribus ovatis, pedicellos superantibus; floribus albis, congestis; pedicellis glandulosis; sepalis orbiculatis, ciliatis, revolutis; basi filamentorum villosa; drupa glabra, depresso-globosa.

Type: No. 179646, Herb. Calif. Acad. Sci., collected by the author, No. 11075A, on the south side of Mount Tamalpais, Marin County, California, March 12, 1922. In C. F. Baker's distribution, No. 3997, it was sent out with this name, but the publication was prevented by the destruction of the specimens in the disaster of 1906 when the Herbarium of the California Academy of Sciences was destroyed. It is the most abundant species on the lower slopes of Mount Tamalpais, distinguished amid the chaparral by the pale foliage due to a sort of bloom that can be rubbed off. Owing to its almost smooth leaves and the small upper bracts of the panicle, it has been identified with *A. manzanita* Parry. That, however, is destroyed by fire, reproducing by seeds while this is a stump-sprouter and is never killed. Dr. Jepson, in Madroño (1:86) and also in the Manual (p. 749), has confused *A. Cushingiana* with *A. canescens* Eastwood, which is not a stump-sprouter and is tomentose. It is

named in honor of the late Mr. Sidney Cushing, who was, during his life, identified with Mount Tamalpais and Marin County.

Arctostaphylos lævigata Eastwood, spec. nov. Frutex intricato-ramosus, circa 1 m. altus; ramis senioribus nigro-porphyreis, ramis junioribus et petiolis minute et dense puberulentibus; foliis ovatis, oblongis vel lanceolatis, nitidis, viridissimis, 2-3 cm. longis, 1-2 cm. latis, apice acutis, basi acutis vel obtusis, margine integris, minute pubescentibus, petiolis circa 5 mm. longis; paniculis nutanibus, breve-pedunculatis, ramis divaricatis, nigrescentibus, puberulentibus; bracteis ovatis vel lanceolatis, pedicellis glabris brevioribus; sepalis orbiculatis; corolla alba, parva, 4 mm. longa; filamentorum basi villosa.

Type: No. 179651, Herb. Calif. Acad. Sci., collected by the author, *No. 11082,* on Mount Diablo, Contra Costa County, California, March 17, 1922. The bushes grew along the side of the old road about halfway up the mountain. A specimen was also collected at the same locality by J. T. Howell, March 7, 1926, *No. 1665.* This manzanita is a low intricately branching shrub with old stems dark red-brown, and with young stems and petioles minutely puberulent. The leaves are glossy green, smooth, from oblong to lanceolate, 2-3 cm. long, 1-2 cm. wide, with apex and base generally acute. The flowers are small, white, in drooping, branched panicles with dark stems and small bracts that are shorter than the smooth pedicels. It is related to *A. Stanfordiana* Parry, differing in habit, white flowers, and more sessile and coarser branches of the panicle.

Arctostaphylos pallida Eastwood, spec. nov. Frutex divaricato-ramosus; caulibus senioribus nigro-purpureis, junioribus tomentosis et setosis; foliis glabris, pallidis, sessilibus, imbricatis, basi auriculatis, apice obtusis vel acutis, 3-5 cm. longis, 1-2.5 cm. latis; paniculis sessilibus; bracteis foliaceis, viridibus, glabratis; pedicellis glandulosis, bracteis longioribus vel brevioribus; corolla alba; ovario glanduloso, drupa depresso-globosa, glandulosa.

Type: No. 38785, Herb. Calif. Acad. Sci., collected on the summit of East Oakland hills, California, January, 1902, by W. W. Carruth, who presented his herbarium to the California Academy of Sciences after the disaster of 1906. It is found also on the hills back of Piedmont, Alameda County, California, and was distributed by the Herbarium of the University of California as *A. Andersoni* Gray, collected by Carlotta C. Hall,

No. 10999, flowers, February 3, 1920; fruits, April 8, 1920. This species resembles *A. Andersoni* Gray in the glabrous, sessile, auriculate leaves, usually longer than broad, but differs in the pale hue of the foliage, more imbricated leaves, and the panicle so surrounded by the upper leaves as to appear involucrate. It is like *A. regismontana* Eastwood in the pale foliage, but lacks the viscidity so characteristic of that species and has more condensed panicles.

Arctostaphylos regismontana Eastwood, spec. nov. Frutex erectus, ramosus, circa 1-2 m. altus, glanduloso-setosus et viscido-pubescens; foliis pallidis, oblongis, erectis, 2-6 cm. longis, 2-3 cm. latis, basi sessilibus, auriculatis, apice acutis, margine integris, ciliatis, supra subglabris, infra breve-villosis; paniculis subsessilibus, late ramosis; bracteis faliaceis, linearibus, viscidis et glanduloso-villosis, nervatis, circa 1 cm. longis, 2 mm. latis; pedicellis glanduloso-villosis; sepalis orbiculatis, reflexis; corolla 5 mm. longa, rosea vel alba; filamentorum basi villosissima; ovario glanduloso-villoso.

Type: No. 202231, Herb. Calif. Acad. Sci., collected by Mrs. E. C. Sutliffe on Kings Mountain, San Mateo County, California, March 15, 1933. It has pink flowers. Other specimens from the same locality are *C. F. Baker No. 271* and *Elmer 4537,* both distributed as *A. Andersoni* Gray. Also there is a specimen from Woodside collected by Eric Walther, August, 1919. Specimens from Big Basin in the Santa Cruz Mountains also belong here. This beautiful manzanita is related to *A. Andersoni* Gray, differing conspicuously in the pallid and more glandular foliage. The flowers are pink or white, the leaves erect, much longer than broad, somewhat overlapping, sessile and auriculate at base. All specimens examined are in flower except those collected by Eric Walther at Woodside.

Arctostaphylos Rosei Eastwood, spec. nov. Frutex erectus, ramosus, circa 1 m. altus; ramis nigro-purpureis, junioribus parce lanuginosis, non setosis; foliis lineari-oblongis vel ovato-oblongis, coriaceis, viridissimis, 4-6 cm. longis, 1-2.5 cm. latis, dorso parce pubescentibus, apice pungentibus, basi obtusis, margine integris, petiolis 2-5 mm. longis; paniculis ramosis, nutantibus, in fructu erectis, breve pedunculatis, parce lanuginosis; bracteis rubescentibus, deltoideo-subulatis, carinatis, glabris vel parce lanuginosis et ciliatis; pedicellis breve villosis, bracteis brevioribus vel longioribus; sepalis suborbiculatis, membranaceis, albis roseisve, revolutis, ciliatis, basi subauriculatis; corolla roseo-alba, 5 mm. longa, basi 4 mm. diametro; filamentis

2 mm. longis, basi crassis et villosis; ovario villoso; drupa depresso-globosa, parce pubescenti.

Type: No. 205821, Herb. Calif. Acad Sci., collected March 26, 1933, on the hills bordering Lake Merced, San Francisco, California, by Lewis S. Rose in whose honor it is named. Other specimens in the Herbarium of the California Academy of Sciences are two specimens collected by the author, in flower, April, 1907, and in fruit, July, 1907, at Lake Merced. It is the narrower-leaved, almost smooth species found there with *A. crustacea* Eastwood.

Arctostaphylos setosissima Eastwood, spec. nov. Frutex erectus, 1-2 m. altus, ramosus; caulibus tomentosis et dense setosis, villis longis, albis, glandulosis; foliis ovatis, junioribus albo-tomentosis et glandulosis, senioribus pallido-viridibus, apice acutis vel apiculatis, basi obtusis vel truncatis, 4-6 cm. longis, 2-3 cm. latis, petiolis 3-7 mm. longis; paniculis sessilibus, congestis, in fructu nutantibus; bracteis lineari-lanceolatis, multo superantibus brevissimos pedicellos, tomentosis, margine setosis; corolla alba; drupa depressa, parce pubescenti.

Type: No. 179716, Herb. Calif. Acad. Sci., collected in fruit by the author, *No. 11457*, at Mendocino City, Mendocino County, California, June 28, 1922. This is the species that has been identified as *A. columbiana* Piper. It differs from that species in the glandular inflorescence, the generally larger leaves, the youngest glandular as well as tomentose. Its affinities are with *A. virgata* Eastwood, which it resembles in the setose stems and the leafy-bracteate, glandular inflorescence, differing in the tomentose pubescence and paler foliage. It is found also at Fort Bragg, Point Arena, and Albion along the coast of Mendocino County.

Arctostaphylos sonomensis Eastwood, spec. nov. Frutex erectus et divaricato-ramosus, circa 1 m. altus; caulibus senioribus fere nigris, junioribus viscido-tomentosis; foliis oblongis ad ovato-lanceolatis, tenuiter tomentosis, 2-3 cm. longis, 1-2 cm. latis, apice acuminatis vel acutis, basi obtusis vel acutis; paniculis brevissimis, subsessilibus, congestis, nutantibus, viscido-tomentosis; bracteis foliaceis, multo superantibus pedicellos; pedicellis et oblongis sepalis viscido-pubescentibus; corolla alba, 6 mm. longa; drupa viscido-pubescenti.

Type: No. 189248, Herb. Calif. Acad. Sci., collected by Milo S. Baker, *No. 3877c*, on Rincon Ridge near Santa Rosa, Sonoma County, California, February 21, 1930. It is related to *A. canescens* Eastwood, differing in the more pointed, darker green, and less tomentose leaves, shorter and more congested

flower-clusters, and the viscid character of the pubescence on the young growth and inflorescence. The shrubs are from 1 to 2.5 m. high.

Arctostaphylos Tracyi Eastwood, spec. nov. Frutex erecto-patens, circa 2 m. altus; ramis senioribus purpureo-rubris, junioribus puberulentibus; foliis ovato-ovalis vel angusto-ellipticis, 3-6 cm. longis, 2-3 cm. latis, viridibus, coriaceis, reticulatis, glabris, apice apiculatis, basi obtusis, margine integris vel subundulatis, petiolis circa 5 mm. longis, puberulentibus; paniculis subsessilibus, aliquando nutantibus, puberulentibus, non glandulosis; bracteis viridibus, foliaceis, lanceolatis, 1-nervatis, ciliatis, pedicellos superantibus, inferioribus 1.5 cm. longis, 3 mm. latis; sepalis orbiculatis, involutis, minute ciliatis; corolla urceolata, 6 mm. longa, 2 mm. lata, segmentis brevibus latisque; filamentis glabris, 2 mm. longis; ovario dense cano-tomentoso.

Type: No. 167008, Herb. Calif. Acad. Sci., collected by Joseph P. Tracy, *No. 6141,* February 18, 1923, at Big Lagoon, Humboldt County, California, "a frequent shrub, 6 feet tall." Another specimen was collected the same day by Mr. Tracy at Patrick's Point, in fern-covered prairies on coastal terraces, *No. 6142.* Both were distributed by Mr. Tracy as *A. columbiana* Piper. The smooth character and entire absence of the spreading hairs on the stems differentiate it from that species. This tall manzanita is almost smooth with bright green leaves longer than broad. The white flowers are in broad panicles with conspicuous green bracts surpassing the pedicels. It is entirely without divaricately spreading hairs or the least sign of viscidity. A specimen collected by the author, *No. 41,* at Trinidad, Humboldt County, April 22, 1907, is probably this species. The bracts of the panicles are less leafy, more pubescent, and with marginal hairs more numerous. The leaves are shorter and broader in proportion.

Arctostaphylos zacaensis Eastwood, spec. nov. Frutex ramosus erectus, circa 1 m. altus; ramis senioribus nigro-rubris, ramis junioribus dense glandulosis et setosis, villis divaricatis et glandulosis; foliis, pallidis, oblongis, ovatis vel subrotundis, 1-4 cm. latis, 2-6 cm. longis, minute pubescentibus, apice obtusis vel apiculatis, basi obtusis, margine integris vel minute spinuloso-serratulis; petiolis glanduloso-villosis, 5-10 mm. longis; paniculis subsessilibus, brevibus, floribus congestis; bracteis foliaceis, inferioribus lanceolatis, 2 cm. longis, 2 mm. latis, superioribus deltoideis, acuminatis, glandulosis et villosis; pedicellis glandulosis, 3-5 mm. longis; sepalis reflexis, rotundis, ciliatis; drupa parce glandulosa et pubescenti.

Type: No. 38844, Herb. Calif. Acad. Sci., collected by the author, *No. 681,* on hills above Zaca Lake, Santa Barbara County, California, June 24, 1906. This pallid glandular-hairy manzanita is the common one in the vicinity of Zaca Lake. On account of its glandular pubescence it has been included under *A. glandulosa* Eastwood. That species is dark green and not pale green. The corollas had all fallen and the berries were not fully developed. In general appearance it resembles the common *A. glauca,* but differs in the smaller berries with separable seeds.

MARTYNIA LOUISIANICA MILLER—A CORRECTION

It is regrettable that the name offered on page 40, LEAFLETS OF WESTERN BOTANY, for the common Unicorn Plant is incorrect. The fact has been called to my attention by Mr. C. A. Weatherby of the Gray Herbarium that the specific name used was originally employed in the sense of a generic genitive, not specific genitive as I assumed. So the plant named there as *Martynia Jussieui* should be called *Martynia louisianica* Miller. Concerning this matter Mr. Weatherby writes: "Mr. K. K. Mackenzie in a letter to me recently remarked that he did not believe that *Proboscidea Jussieuii* was a binomial at all, but that the 'Jussieuii' was merely an author citation, and that what Schmidel was trying to convey was that he was taking up an unpublished generic name, 'Proboscidea of Jussieu.' The using of Latinized names of authors in the genitive was a common practice in Schmidel's time, and occurs in other parts of his work, and in the original, 'Jussieuii' is printed in capitals, something which he regularly did in the case of authors' names.

"After looking into the matter I am convinced that Mackenzie is entirely right,—that *Jussieuii* should not be taken up as a specific name, but that the commonly accepted name *louisianica* of Miller should be retained. Another catchy point is that in the text of Miller's Dictionary this name was misprinted *'Louisiana,'* but in the list of errata at the end of the volume (which is often overlooked but which was called to my attention by Dr. S. F. Blake of Washington) it was corrected to *'Louisianica.'* "—John Thomas Howell.

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of
WESTERN BOTANY

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SAN FRANCISCO, CALIFORNIA

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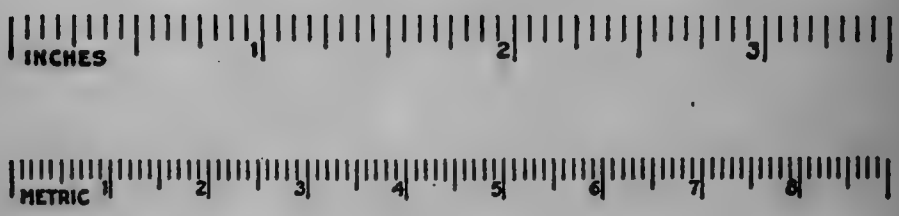

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ALICE EASTWOOD and JOHN THOMAS HOWELL

BOTANICAL
GARDEN

ESCALLONIAS IN GOLDEN GATE PARK—II

BY ALICE EASTWOOD

(Concluded from Page 69)

KEY TO THE SPECIES OF ESCALLONIA WITH PETALS SPREADING FROM THE BASE, CLAWS NOT FORMING A TUBE

1. Style with two spreading stigmas; flowers small, densely clustered in long, slender, tail-like racemes without bracts..... 1. *E. pulverulenta*
1. Style with capitate stigma, sometimes slightly lobed; flowers in bracteate panicles, racemes or solitary..... 2
2. Flowers with white petals..... 3
2. Flowers with pink, rose, or crimson petals..... 4
3. Flowers in leaf-axils of very short branchlets; leaves small, deciduous; intricately branched shrubs resembling some leptospermums..... 2. *E. Philippiana*
3. Flowers in large rounded panicles; tall shrub with bright green leaves notched at apex..... 3. *E. montevidensis*
4. Corolla rose or crimson..... 5
4. Corolla pink or pink-tinged..... 6
5. Branches arching and drooping; flowers dark crimson..... 4. *E. langleyensis*
5. Similar but less drooping; flowers light crimson..... 5. *C. F. Ball*
6. Buds pink, opening paler; calyx glandular..... 6. *Donard's Seedling*
6. Corolla rosy-pink; calyx not glandular..... 7. *E. edinensis*

1. ESCALLONIA PULVERULENTA Pers. (*Stereoxylon pulverulentum* R. & P.) Figured in Ruiz & Pavon, Flora of Peru and Chile, pl. 237. This is the most distinct species in cultivation. The tall vigorous shrub is downy and viscid throughout. It is unlike all other species of Escallonia in the tail-like inflorescence.

2. ESCALLONIA PHILIPPIANA Masters. (*E. virgata Philippiana* Engler.) Figured in the Gardeners' Chronicle 10:109 (1878). This low intricately branched shrub with its densely flowered branches resembles some leptospermums or bridal-wreath spiræas more than the commoner species of Escallonia.

3. ESCALLONIA MONTEVIDENSIS DC. Figured in Bot. Reg., pl. 1467. This is one of the most beautiful species. A tall vigorous shrub covered in the fall with great rounded clusters of white flowers around which the insects hover in countless numbers. In Golden Gate Park it is called the Butterfly Bush. Lindley gives the following beautiful description in the Botanical Register, under plate 1900: "The most showy plant of the kind is the *Escallonia montevidensis* which is also nearly hardy. That species is usually covered with hundreds of hemispherical heads of clear white flowers over which countless insects keep up a busy hum as they spring from blossom to

Leafl. West. Bot., Vol. I, pp. 81-96, January 30, 1934.

blossom in search of the rich store of honey concealed within the recesses of the calyx-cup. As one looks at these creatures enlivened by the warmth of a bright sunny day, one cannot but admire the exquisite beauty of the ball room that nature thus provides for an insect festival."

The following four are hybrids which, with the exception of *E. langleyensis,* have been recently introduced in California and may be represented only in Golden Gate Park. One parent is *E. Philippiana.*

4. x Escallonia langleyensis Vilm. & Bois. Figured in the Gardeners' Chronicle 22:15 (1897). This lovely hybrid was produced in the Veitch Nursery at Langley. It has long downwardly arching branches covered with rosy-crimson flowers forming wreaths of great beauty. It is recommended as a covering for unsightly objects, fences, etc.

5. x Escallonia, C. F. Ball. Similar to the preceding but less drooping, with large rosy-crimson flowers.

6. x Escallonia, Donard's Seedling. A vigorous growing shrub with flowers flesh-pink in bud, opening white.

7. x Escallonia edinensis Hort. This was produced in the Edinburgh Botanic Garden. It is a floriferous hybrid of neat habit attaining a height of four to six feet. Flowers bright rosy-pink.

The descriptions of the last three have been taken from the catalogue of Hillier & Sons, Winchester, England.

A NEW PENSTEMON FROM UTAH

BY DAVID D. KECK

Carnegie Institution of Washington, Stanford University, California

Miss Alice Eastwood and Mr. J. T. Howell made many collections of Penstemon in the Great Basin region during the summer of 1933 that were turned over to me for determination. One of these appears to be of an hitherto undescribed species that the collectors have graciously permitted me to publish.

Penstemon bracteatus Keck, spec. nov. Herba perennis, 6-18 cm. alta; rhizomatibus prostratis gracillimis ad 12 cm. longis facile fractis; radicibus fibrillatis; caulibus erectis herbaceis simplicibus strictis ad 2.5 mm. crassis glaberrimis cœruleo-glaucis; foliis coriaceis glaucis integerrimis 10-20 mm. longis 5-12 mm. latis, radicalibus plerisque rotundis flavo-viridibus, petiolis æquilongis, caulinis sessilibus spathulatis vel oblongis cœruleo-glaucis internodiis longitudine æqualibus, floralibus conspicuis cordato-ovatis amplexicaulibus plus minusve obtusis gradatim reductis; thyrso stricto contracto; cymis (4-7 geminis) subsessilibus multifloris; pedicellis gracilibus calyce haud longioribus; calyce 3.5-4.5 mm. longo, lobis ovato-lanceolatis obtusis vel acutis integris inferne scarioso-marginatis; corolla purpureo-cœrulea 12-15

mm. longa glabra, tubo angusto, fauce parum ampliata 4.5 mm. crassa, limbo 3-4 mm. longo fere æqualiter 5-lobo, lobis rotundatis patentibus; staminibus fertilibus inclusis glaberrimis, filamento sterili vix dilatato sub apice hinc moderato flavo-barbato; capsula ignota.

Spreading from the primary caudex by very slender rootstocks; stems few, terminating the rootstocks; herbage glabrous and glaucous throughout; leaves above the basal rosette equally spaced up the stem, the bracts of the inflorescence prominent, often quite concealing the pedicels; thyrsus about half the height of the stem; anther-sacs widely divaricate, 1.5 mm. long, oblong, distinct, dehiscent from end to end.

Known only from the type collection, taken on a talus of small rocks and soil in Red Canyon, west of Bryce National Park, Garfield County, Utah, by *Alice Eastwood and John Thomas Howell No. 783,* June 20, 1933. Type in the Herbarium of the California Academy of Sciences, No. 207933.

This member of the section Acuminati is most closely related to *P. acuminatus* Dougl. (including its probable synonym *P. nitidus* Dougl.) and *P. arenicola* A. Nels. These may be distinguished as follows:

Stems stout, 4-10 mm. thick, tufted from a simple or somewhat branching central caudex: leaves not dimorphous or with definite basal rosette at time of flowering; basal linear-oblanceolate to narrowly spatulate, 4-8 cm. long; cauline 2.5-8 cm. long.

Corolla 15-20 mm. long; bracts cordate-amplexicaul..... ..... *P. acuminatus* (and *P. nitidus*)

Corolla 10-15 mm. long; bracts broadly lanceolate..... ..... *P. arenicola*

Stems slender, not over 2.5 mm. thick, spreading from the primary caudex by very slender rootstocks up to 12 cm. long: leaves dimorphous, with a definite basal rosette at time of flowering; basal with oval or rotund blade and petiole as long, 2-3.5 cm. long; cauline 1-1.8 cm. long: corolla 12-15 mm. long: bracts cordate-amplexicaul..... *P. bracteatus*

Penstemon bracteatus is separated 250 miles from the nearest stations for *P. acuminatus* in northern Nevada, and somewhat farther from the Red Desert region in southwestern Wyoming inhabited by *P. arenicola.* The species of the Acuminati that are closer to *P. bracteatus* geographically, such as *P. pachyphyllus* Gray and *P. lentus* Pennell, are considerably further separated from it morphologically.

NOTES ON SOME TYPE SPECIMENS OF ARCTOSTAPHYLOS

BY LEROY ABRAMS
Dudley Herbarium, Stanford University

While studying types of our western plants deposited in various European herbaria the past year, I found that there has been some confusion or misunderstanding of certain species of Arctostaphylos belonging to that old aggregate *A. tomentosa* (Pursh) Lindl. This is still a difficult group to interpret, but thanks to the long and diligent studies of Miss Eastwood the various entities are being segregated and described.

Arctostaphylos bracteosa (DC.) Abrams, comb. nov. *Andromeda ? bracteosa* DC., Prodr. 7:607 (1839). *Andromeda bracteosa* α. *trichoclada* DC., l. c.

DeCandolle's original description reads as follows: "fruticosa erecta, ramis teretibus, foliis breviter petiolatis planis ovatis basi obtusis vel subcordatis apice mucronatis minutissime reticulato-venulosis, racemis solitariis aut congestis folio subbrevioribus, bracteis foliaceis oblongo-lanceolatis pedicello longioribus, ovario hispidissimo. In Nova California legit cl. Drummond! "α. *trichoclada,* ramulis petiolis bracteisque setis subglandulosis patulis hispidis, foliis junioribus dorso et margine subhispidis demum glabratis. (v. s. a. cl. inv.)
"β. *hebeclada,* ramulis petiolis rachibus bracteisque molliter velutino-pubescentibus. (v. s. a. cl. inv.)"

In DeCandolle's Herbarium at Geneva there are two specimens, one labeled *bracteosa* var. *trichoclada* and the other var. *hebeclada.* The handwriting, Dr. Hochreutiner assured me, is DeCandolle's. The specimen labeled var. α. *trichoclada* must be considered the type of the species, and it is without doubt the setose and glandular pubescent plant of the Santa Lucia Mountains. The second, var. β. *hebeclada,* is probably a form of the tomentose plant of the Monterey Peninsula, but it does not enter into the discussion of the type of DeCandolle's species.

DeCandolle states that the plants were collected by Drummond, but this is undoubtedly a slip. The collections were made by Douglas, and bear the printed label "Herb. Nova California Hort. Soc. Lond. Douglas 1833" with DeCandolle's annotation "received 1839."

Later, in examining the collections of Arctostaphylos at Kew, I came upon what seemed to me to be a duplicate of the type which Miss Eastwood had labeled as a new species, taking the Latinized form of the name of the Santa Lucia Mountains as the specific name. As her name has not been published I refrain from giving it here, but mention the fact to show that we are agreed that Douglas' plant, in all probability, came from the Santa Lucia Mountains, and that the identity of this long confused or buried species of DeCandolle is definitely placed.

ARCTOSTAPHYLOS CORDIFOLIA Lindl., Bot. Reg. 21: under pl. 1791 (1836). *Xerobotrys cordifolius* Nutt., Trans. Am. Phil. Soc., n. s., 8:268 (1843). *Arctostaphylos vestita* Eastw. in Sarg., Trees & Shrubs 1:205 (1905). *Uva-ursi vestita* Abrams, N. Am. Fl. 29:98 (1914).

The type of *Arctostaphylos cordifolia* in the Lindley Herbarium at Cambridge University is unquestionably the Monterey plant, which Miss Eastwood first adequately described under the name *A. vestita.* It was collected by Menzies and mislabeled "Northwest America." Isotypes are in the British Museum and at Kew. The one in the British Museum is one of the specimens on the type sheet of *A. tomentosa* (Pursh) Lindl. The one at Kew is one of the specimens included by Hooker in his variety *A. tomentosa nuda.*

ARCTOSTAPHYLOS TOMENTOSA (Pursh) Lindl., Bot. Reg. 21: pl. 1791 (1836). *Arbutus tomentosa* Pursh, Fl. Sept. 1:282 (1814). *Arbutus tomentosa hispida* Hook. Fl. Bor. Am. 2:36 (1834). *Arctostaphylos columbiana* Piper in Piper & Beattie, Fl. Northw. Coast, 279 (1915).

The type sheet of this species in the British Museum has three specimens, one of which is the non-setose Monterey plant, and without much doubt, an isotype of *Arctostaphylos cordifolia* Lindl. The others are the northwestern species, more recently known as *A. columbiana* Piper, and are very similar if not actual duplicates of specimens at Kew collected by Menzies. On the back of the sheet is the notation, "Menzies and Dav. Nelson, Northwestern America." Whether David Nelson, who was with the Cook expedition, collected one of the specimens is not clear, but whether he did or did not is of little importance in determining the type. For regardless of who collected the

material it is evident that the Monterey plant and at least one of the specimens from the Northwest were on the sheet when Pursh drew up his description. His *"ramis hispidis"* refers unquestionably to the northwestern plant, for the twigs of the Monterey specimen are not hispid; but his *"foliis ovalibus acutis basi subcordatis subtus albido-tomentosis"* applies to the Monterey plant, for it is the only one that has subcordate leaves.

If one were free to select the type on the basis of Pursh's description alone, he might choose either the Monterey or the northwestern plant, but where two or more species are included in the original description it is necessary in determining the type to take into account the subsequent history of the species as well as the original collections. Looking up the history in this case we find that:

Hooker (Bot. Beechey 1:144,—1832), under *Arbutus tomentosa,* wrote: "Of this we have several varieties, differing, however, almost solely in the pubescence. Var. α., the original plant from Mr. Menzies, and from which Mr. Pursh drew up his character, has the whole specimen, except the flowers very downy, especially on the underside of the upper leaves and young branches; and these latter, and the petioles, and the lower part of the costa beneath, have numerous long rigid hairs mixed with the pubescence, so as to give the plant a remarkable hispid appearance. This is from the Columbia.— Var. β. is destitute of long rigid hairs, but has the pubescence on the young stems and young leaves still copious, as is the case of some of Mr. Menzies' specimens, which have no more particular locality than Northwest Coast of America, and with some in Captain Beechey's Herbarium."

It is obvious that Hooker considered his variety α. as the typical species and intentionally or not clearly established the hirsute form as the type. Later (Fl. Bor. Am. 2:36, 37, pl. 130,—1834) he named, described, and figured both of these varieties: "α. *hispida;* ramis setosis, setis longis patentibus. Pursh, Fl. Sept. v. 1. p. 282. Hook. in Bot. Beech. Voy. v. 1. p. 144. . . . β. *nuda*; ramorum setis nullis."

If we were to follow the usual practice of systematists it is quite evident that Hooker's variety α. *hispida* fixes Menzies' specimens with the long hispid hairs as the type of the species.

Lindley, when he transferred the species from Arbutus to Arctostaphylos, had the same conception of the typical species as Hooker, for he described a duplicate of Menzies' Monterey plant as a new species, *Arctostaphylos cordifolia* Lindl. Whether the plant figured by Lindley as *Arctostaphylos tomentosa* (Pursh) Lindl. is the typical northwestern form or not, one cannot tell with certainty. The drawing was made from a cultivated plant, and resembles the typical form very closely. The source of the seed is not given, but he states that the "specimens were obligingly communicated from the very select collection of William Harrison, Esq., of Chestnut, where it has been kept in the open air for about four years, and where alone it has as yet flowered in England." This would seem to preclude the Menzies' collections as the source, for they were made nearly forty years earlier. In all probability the plants were grown from seeds in the Douglas collection. With this in mind I compared the plate with the herbarium specimens collected by Douglas, and found it most nearly matched those obtained by him in the Northwest.

Owing to this timely and elucidating article by Dr. Abrams, the key and descriptions of Arctostaphylos which were to have begun in this number have been postponed to future issues.—Alice Eastwood.

CHEIRANTHUS GRANDIFLORUS, A CORRECTION

BY ALICE EASTWOOD

On the sheet in Hooker's Herbarium at Kew on which are mounted the specimens collected by Menzies in California which were named and described by Hooker as *Hesperis Menziesii* (1830) are two other specimens collected much later by either Tolmie or Douglas and quite different from Menzies' specimens. These two specimens are each marked with a single asterisk and beside the lower is written "California, Douglas," while at the bottom of the sheet is written "Pine Creek, Snake Country, Tolmie." Without the slightest doubt these form the type of *Hesperis Menziesii* Hook. & Arn. (1840).

The type of the plant described by Hooker was collected by Menzies along the sandy shores of Monterey Bay near Point

Pinos. Menzies' specimens in Herb. Mus. Brit. are labelled "Pine Beach" on the back of the sheet. While they are poor specimens they are identical with Nuttall's *Erysimum grandiflorum* (1838, p. 96) collected on the sandy shores of Point Pinos near Monterey. Nuttall also collected and described the plant figured and described by Hooker and Arnott (1840), naming it as the type of a new genus, *Phœnicaulis cheiranthoides* (1838, p. 89). The type is in Nuttall's collection in Herb. Mus. Brit.

Menzies' specimens seem to have been quite overlooked in the changes that have since taken place in the names of these two plants. The first publication of the name *Cheiranthus Menziesii* appears in Sereno Watson's description in the Botany of King's Expedition (1871) but is applied only to the plant of the interior, the *Hesperis Menziesii* H. & A., Nuttall's *Phœnicaulis cheiranthoides* being given as a synonym. Watson, in this, follows Bentham and Hooker f. (1862), and, in the Botany of California (1876), repeats the error and adds the variety *lanuginosa* founded on collections of Douglas and others. E. L. Greene adds a new synonym, *Phœnicaulis Menziesii* (1886), unaware that the combination had been made earlier by Steudel (1841), and later identifies Phœnicaulis with the arctic genus Parrya (1891). In this he is followed by B. L. Robinson (1895), who adds the variety *lanuginosa* to the combination. To my mind, Phœnicaulis is as different from Parrya as it is from Erysimum or Cheiranthus and Nuttall's name should be restored to the plant which he so named. This is the view also taken by Prantl (1891).

Next arises the question whether the plant collected by Menzies at Point Pinos, and later by Nuttall at the same place, should be called Cheiranthus, Erysimum, or Cheirinia. The Californian plants that have been placed in these genera have been shifted back and forth and are at present in a state of chaos. Certainly the maritime species seem quite different from those of the interior and cannot well be confused by anyone who knows them in the field and seem best to be accepted as Cheiranthus. The maritime Cheiranthus has large light yellow flowers that become paler after pollination. The leaves are generally broader than those of Erysimum, with the broadened

bases of the petioles persistent on the lower part of the stem. The silique is compressed laterally and the seeds have accumbent cotyledons; the stigma-lobes are open and the style short and thick. Erysimum generally has orange flowers, leaves narrower, siliques either terete or quadrangular, stigma more capitate and cotyledons incumbent. Hence, the Monterey plant of Menzies and of Nuttall is here named **Cheiranthus grandiflorus** (Nutt.) Eastwood, comb. nov.

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FIELD DAYS IN SAN FRANCISCO—I

BY JOHN THOMAS HOWELL

San Francisco is, in certain parts, still decked with bright bits of primal vegetation, and to an extent but rarely met with in centers where humanity becomes as densely concentrated. Although, as the years pass, the fringe of natural wildness is shorn more closely—here a boulevard, there a golfing green, and yet again a vegetable garden or a building—there still remain wild areas of sufficient extent to gladden the heart and mind of the field botanist. The marine cliffs at Land's End, the sandy downs and green serpentine in the Presidio, the red chert and clay slopes of Twin Peaks, the swales, dunes, and strand about

Lake Merced, all of these carry still the same plant cover that was seen and studied by Chamisso and Eschscholtz, Bolander and Kellogg, Greene, Behr, and the Brandegees. At these places today, the student can still find plants first named from the vicinity, a number of which are narrow endemics, and most of which bear an endemic cast such as one meets in an insular flora. Although it is not possible to find in San Francisco all the plants first made known to the world from its hills and downs, it is probable that the majority can yet be located with a little search.

* * *

Two plants, long uncollected, led me afield last spring in the midst of the city. Can *Amsinckia Kelloggii* Suksdorf still be found on the slopes of Lone Mountain, and has *Allocarya diffusa* Greene been exterminated by the golf course in the Presidio—these were the particular questions to be answered. The quest led first to the mount which, until a few months ago, was a conical oasis of wild vegetation in a desert of streets and houses; but now on its truncated summit stands a school and its slopes have been so graded that scarcely aught remains of the native flora. It was with a doubt-filled mind that I trod the new-made ground and brushed past alien weeds crowding the freshly opened space with an alacrity which left the more tardy natives without a foothold. Passing on to a narrow border of the original undisturbed sand beside a fill of clay, a small colony of natives caught my eye. Here the sand phacelia, the trailing croton, and the dune œnothera grew and, to my great delight, a few plants of *Amsinckia Kelloggii.* To show that the plant still grew where over sixty years before it was first collected, specimens for the Herbarium of the California Academy of Sciences were prepared as a permanent record for reference. At no other place did I find the plant on the mount; and, as I left, I wondered if the next sweep of the grader would snuff out forever this plant in its classic home.

Heartened by my find, I started for the Presidio, cutting down across the cemetery which flanks the mountain on the west. Here was change too: yawning holes of exhumed graves betokened the encroachment of the living on the city of the dead. Once in the Presidio I sought those slopes above the Marine Hospital and Mountain Lake where, it appears, Greene,

and no one else, collected his Allocarya in 1886 and again in 1887 (cf. Johnston, Contrib. Arnold Arbor, 3:77). Again success was mine for I found this most local species growing with *Microseris Bigelovii* on a restricted clay flat near the summit of the ridge between the Marine Hospital and Fort Winfield Scott. A collection made, I took my way homeward down sandy slopes where low masses of *Chorizanthe cuspidata* and *Cryptantha leiocarpa* were beginning to bloom and where plants of the autumn-blooming *Lessingia germanorum* were becoming evident in opens between prostrate mats of the true *Baccharis pilularis* (cf. Greene Fl. Fran. 396) and bushes of *Ericameria ericoides*. It had been a day well filled.

* * *

The desire to have again in the Herbarium of the California Academy of Sciences specimens of *Cirsium amplifolium* (Greene) Petrak took me last July to Lake Merced where the plant had been collected by Miss Eastwood before the fire of 1906 and again by Suksdorf in 1913. A diligent search along the eastern shores of the lake disclosed no extraordinary thistle, only the widespread *C. edule* Nutt. in moist brushy places and *C. occidentale* (Nutt.) Jeps. on open sandy slopes. For the time I had given up and had started home when I lost my trail on the floor of the narrow swale east of the southern arm of the lake and became entangled in the dense growth of willows, Californian Sweet Gale, and rank herbs. In this annoying predicament while bending every effort to force my way into the open, the desired plant was found, a single robust specimen well covered with heads of light rosy-purple flowers.

There is to be expressed some doubt as to the status of *C. amplifolium:* although Petrak (Nordamer. Cirsium, 327) recognizes it as a distinct species, it is not readily separable from the plant that grows in canyons along the Marin County coast north of San Francisco Bay. The Marin plant has been referred by Jepson to *C. Andrewsii* (Gray) Jeps., but Petrak (l. c., 336) refers the same plant to *C. Hallii* (Gray) Jones, placing *C. Andrewsii* on his list of doubtful species (l. c., 538).

LEPIDIUM OREGANUM, A HYBRID-SUSPECT

BY JOHN THOMAS HOWELL

A western pepper-grass which appears to be known in botanical literature only from the original collection is *Lepidium oreganum* Howell,* first collected in 1887 from the valley of the Rogue River near Woodville in southwestern Oregon. In the last few years, at several stations in central California, plants have been collected by the writer which appear to be Howell's pepper-grass. The plants in question can be referred to no known species of Californian Lepidium, and in Thellung's monograph of the genus they agree in essential points with *L. oreganum.*

In California this plant was first collected by the writer in 1929 on the Merced plains of the San Joaquin Valley and from the first it proved a puzzle. The few-lobed leaves, the pubescent stem, and the acute lobes of the silicle resembled those parts found in plants of *L. dictyotum* Gray, which abounded on the plains, but the lobes of the silicle were too sharp and divergent and the texture of the valves as well as their acute outer margins did not agree. Without arriving at any satisfactory conclusion at that time, the plant was labelled "*L. nitidum* var." for the plant had the aspect of *L. nitidum* Nutt. and the silicles seemed nearer those of that species in spite of the fact that they were not so shining and the lobes were more prominent and acute.

In the spring of 1931, within a period of two weeks, three more collections of *L. oreganum* were made and at each time the probability of it being a hybrid was impressed. At each station this same plant grew in intimate society with *L. nitidum* and with a species belonging to Thellung's grex Oxycarpa.** Near Tracy, in a depressed area of a few square yards, our plant of special interest grew with *L. nitidum* and *L. latipes*

---

* *Lepidium oreganum* is given as a variety of *L. strictum* Rattan by Robinson (Syn. Fl. 1, pt. 1:129) and by some botanists the names are considered synonyms (cf. Henry, Fl. S. Brit. Colum., 143). According to Thellung (Die Gattung Lepidium, 247, 248), *L. strictum* is the same as *L. pubescens* Desv., a plant which in California has been known as *L. bipinnatifidum.* The plant named as *L. oreganum* by Greene in Flora Franciscana, page 274, and Manual of Bay Region Botany, page 24, is referred by Thellung to *L. acutidens* (Gray) Howell.

** "Grex" is a sectional appellation used by Thellung and applied to small well defined groups of species. Grex Oxycarpa (Gatt. Lep. p. 198) consists of *L. latipes* Hook., *L. oxycarpum* T. & G., *L. dictyotum* Gray, *L. acutidens* (Gray) Howell, and *L. oreganum* Howell.

Hook. and, in addition, it showed individual variants with its peculiar type of pod but with cauline leaves like those of *L. nitidum.* On the very next day on the plains of the old Tulare Lake bottom in Kings County, *L. oreganum* was again collected, this time in the company of *L. dictyotum* and *L. nitidum.* A couple of weeks later in a valley of the South Coast Ranges south of San Benito, there were found growing together three species of Lepidium, *L. nitidum, L. dictyotum,* and *L. latipes.* Experience had taught that there should be expected here a fourth member of this coterie of pepper-grasses, *L. oreganum,* so a special search was made to discover it. And, as it was anticipated, it was found, immediately recognizable by its own peculiar characters of fruit and vesture. Field observations demonstrated that where it is found, in the vicinity can be found parent-suspects, and that where two appropriate species grow together, there can be found *L. oreganum.* These field observations together with its definitely intermediate morphologic position between *L. nitidum* and the species of grex Oxycarpa are the reasons for regarding *L. oreganum* as a hybrid-suspect.

A comparison of the Californian material with a specimen of the type collection of *L. oreganum* in the Herbarium of the University of California has indicated the Californian plants to be this species or very near it. As has been pointed out by Thellung, the plants constituting the type collection of *L. oreganum* are most closely related to *L. acutidens* and have the lobes of the silicle acute and somewhat divergent. In the Californian plants that have been studied, the lobes vary in the length, shape, and angle of divergence, sometimes resembling those of *L. acutidens,* more frequently resembling those of *L. nitidum.* Besides the variability of the silicle, the plants vary greatly in habit and foliage, the habit being loosely spreading to substrictly erect, the leaves being pinnately parted to few-lobed or subentire. It might be argued that the more *nitidum*-like silicles of the Californian specimens are sufficiently different from the more *acutidens*-like silicles of typical *L. oreganum* to name the Californian plant as new, paying due attention to its probable hybrid origin. But since the Californian plant grows with either *L. latipes* or *L. dictyotum* as one of the likely parents and since there is displayed such variation in the Californian

plants, it seems desirable at present to designate as *L. oreganum* all plants that appear intermediate in fruit character between *L. nitidum* and species of grex Oxycarpa. Later, when more field data are accumulated and garden cultures conducted, separate names can be given if definite morphologic differences between the Oregonian and Californian plants appear to warrant them. Meanwhile the name *L. oreganum* will serve adequately, and we believe not incorrectly, to designate this probable hybrid in our population of Californian pepper-grasses.

The collections of *L. oreganum* in the Herbarium of the California Academy of Sciences, all from California, are as follows: Byron Springs, Contra Costa County, *Eastwood No. 3766A* and *3766B*; Corral Hollow, San Joaquin County, *J. T. Howell No. 10892*; low place in clay soil, three miles southeast of Tracy, San Joaquin County, *J. T. Howell No. 5784*; clay soil of subsaline valley bottom, one and one-half miles southeast of San Benito, San Benito County, *J. T. Howell No. 6018*; alkali flats, Chowchilla Ranch, fifteen miles southeast of Merced, Merced County, *J. T. Howell No. 4113*; Tulare Lake bottom, six miles southwest of Stratford, Kings County, *J. T. Howell No. 5792*.

SHORTER COMMUNICATIONS

It is of interest to hear of the variability of *Pittosporum tenuifolium* Banks & Solander, as it grows wild near Wellington, New Zealand, for in cultivation in California it presents diverse aspects. The following is communicated by Dr. Leonard Cockayne, dean of New Zealand botanists:

"The number of forms, some true breeding and some hybrids between such, is amazing. In one place, a few miles from here, a local botanist sent me dozens of specimens, no two of which were alike, but they fell into two categories, the one with flat leaves, and the other with waved margins: also, leaf-size was far from uniform, as also fruits and fruit-stalks. From this heterogeneous mixture could be selected plants, which had they come from the rather limited localities of *P. Colensoi* or *P. fasciculatum,* would have been considered these species, while others could easily be referred to that problematical species, *P. Buchanani.*" Dr. Cockayne prefers to term *P. tenuifolium* polymorphic rather than "variable."

From the eminent scientist, Dr. Gustavus A. Eisen, the following notes on Ledum have been received. Dr. Eisen, who at one time was associated with the California Academy of Sciences and in whose honor *Phacelia Eisenii* Brandg. of the Sierra Nevada was named, is honored as both zoölogist and archeologist. Dr. Eisen writes:

"You speak of the poisonous Ledum. Well, my ancestors in Scandinavia had no hops for their beer and brewed it from grain flavored with *Ledum palustre*. It was this Ledum which gave the 'berserks' (bare shirts) their furor, so often described by contemporaries. Yet, in some places in the country, they use Ledum leaves for beer, and a very good beer it makes, but a few mouthfuls affected my head, though not unpleasantly. The country people, especially the hard laboring farm, or mine, workers in Sweden often chew Ledum leaves, very much as the Peruvians do coca (Erythroxylon) and with the same effect. I tried it myself often when a boy and the intoxication was immediate. The hop in Sweden was introduced by the Christian missionaries, I think about 1000. I presume all the Ledum species are intoxicating more or less."

* * *

Centaurea iberica Trevir., the Iberian Star-thistle, was recently reported as an addition to the weed flora of California by Dr. I. L. Wiggins (Madroño 2:101). Concerning the history of this Mediterranean plant in California, Mrs. M. K. Bellue, Senior Seed Analyst, California Department of Agriculture, writes:

"*Centaurea iberica* was first noted in California in 1923 and was reported in 1924 by Mr. Ethelbert Johnson, who sent a specimen collected near Solvang, Santa Inez Canyon, Santa Barbara County, to Dr. P. B. Kennedy, University of California. In July, 1929, Mr. O. E. Bremner, Sonoma County Agricultural Commissioner, reported a considerable infestation in connection with his weed control work near Santa Rosa. Identification of this material was checked at the United States National Herbarium, Washington, D. C., by Mrs. Grace Cole Fleischman. Specimens were collected from the same locality in 1932. Two infestations near Ramona, San Diego County,

one approximately eighty acres in extent, were reported by Mr. W. S. Ball, Bureau of Weed Control, California State Department of Agriculture, in August, 1932." *

RICCIOCARPUS NATANS IN CALIFORNIA

BY DOROTHY SUTLIFFE

When Dr. M. A. Howe published his "Hepaticae and Anthocerotes of California" in 1899, neither *Riccia fluitans* L. nor *Ricciocarpus natans* (L.) Corda had been found in California. The former was reported by Dr. A. W. Evans (Proc. Calif. Acad. Sci., ser. 4, 13: 112,—1923) as having been found in California at Lily Lake, Marin County, in September, 1921, by the writer, *No. 45,* and it has since been found in several other localities.

The collection of *Ricciocarpus natans* can also be reported, having been found May 5, 1923, in a mud lake on a ridge between Montebello Ridge and Corte de Madera Creek near the San Mateo-Santa Clara county line by R. V. Bradshaw, *No. 3098.* In September of the same year, this plant was collected in a pond near Colma, California, by H. Walton Clark, *No. 63,* and it was again collected at Lake Merced near San Francisco in July, 1933, by John Thomas Howell, *No. 277.*

As the Ricciocarpus has been found in numerous localities in Oregon and Washington, it is to be expected in other parts of California. It should be looked for on stagnant water or on mud at the margins of ponds. The aquatic form resembles Lemna but bears long, pendent, serrated scales on the ventral surface of the thallus. The terrestrial form appears in crowded, imperfect rosettes.

GENTIANA COPELANDI Eastwood, Proc. Calif. Acad. Sci., ser. 4, 20:150 (1931). According to the International Rules, this name is untenable. Dr. Greene gave it as a synonym in his description of *Amarella Copelandi* (Leafl. Bot. Obs., 1:53), but without a previous description under Gentiana. The name **Gentiana eximia** Eastwood is substituted.—Alice Eastwood.

* These notes have been published in a somewhat fuller form in an account of "The Star Thistles" in California by Walter S. Ball, Wilfred W. Robbins, and Margaret K. Bellue (Month. Bull. Dept. Agric. Calif. 22:294-298, 3 pl. and 3 fig.,—1933).

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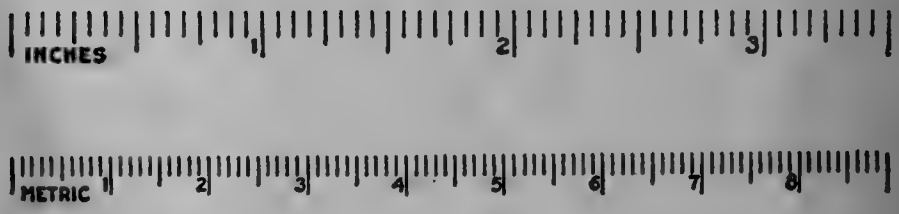

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GARDEN

A REVISION OF THE GENERA FORMERLY INCLUDED IN ARCTOSTAPHYLOS

BY ALICE EASTWOOD

The genera of the Heather Family which De Candolle included in Arbuteæ consisted of Arbutus, Arctostaphylos, and Pernettya. The first two are natives of the northern hemisphere, the last of the southern. Linnæus considered all that were known to him to be Arbutus. Since his time several divisions have been made. Arbutus, with globular fleshy fruits, externally granulose-papillose, and containing numerous small seeds, keeps its distinct place but from Arctostaphylos several genera have been removed by different authors.

KEY TO THE GENERA

1. Leaves deciduous (arctic or alpine) ..... ARCTOUS
1. Leaves evergreen 2
2. Fruit persisting, usually with more or less acid pulp surrounding the nutlets which are either separate or variously consolidated 3
2. Fruit small, soon falling and splitting into thin-shelled nutlets ..... SCHIZOCOCCUS
3. Fruit granulose-papillose on the surface ..... COMAROSTAPHYLIS
3. Fruit not as preceding 4
4. Fruit with a single hard round nut; leaves entire, longer than wide, smooth above, white-tomentose beneath ..... XYLOCOCCUS
4. Fruit with woody nutlets variously consolidated, sometimes into a single nut and then the leaves not longer than wide nor white-tomentose beneath ..... ARCTOSTAPHYLOS

ARCTOUS (Gray) Niedzu. This arctic-alpine genus was made a section of Arctostaphylos by Asa Gray in the Synoptical Flora of North America. It is distinguished by the deciduous leaves which follow the flowers. It is a low spreading untidy scraggly shrub when in flower and quite unlike any Arctostaphylos in appearance. Two varieties are recognized: *A. alpinus* (L.) Nied. with fruit black or dark purple when ripe, and *A. alpinus ruber* Rehder & Wilson with ripe fruit dark red. The former seems to be restricted to the regions adjacent to the Atlantic coast and the latter to those of the Pacific.

COMAROSTAPHYLIS Zucc. This genus was founded on *C. arguta,* a Mexican species and distinguished by the leaves, general appearance, and chiefly by the granulose-papillose sur-

Leafl. West. Bot., Vol. I, pp. 97-104, May 15, 1934.

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face of the fruit. *Comarostaphylis diversifolia* Greene is the only species in California. It was described from shrubs common on Santa Cruz Island and it certainly resembles Arbutus in foliage, fruits, and inflorescence more than any species of Arctostaphylos. The leaves are large, white-tomentose beneath, smooth above, with serrate margins. The flowers are in an open-flowering panicle with long spreading or curving pedicels.

Xylococcus Nutt. *Xylococcus bicolor* Nutt., on which the genus was founded, was published as coming from Monterey but this is considered to be a mistake as it has never since been found there while it is common around San Diego where Nuttall made extensive collections. In general appearance it might be taken for Comarostaphylis as it has the same type of inflorescence, leaves white-tomentose beneath and smooth above, longer than wide. The fruit, however, is externally smooth and contains a single round hard nut instead of the separable nutlets of Comarostaphylis. Several species have been described which have been distinguished by the width of the leaves; but as this is a variable character they are considered as varieties until more extended field study elucidates their status. Xylococcus might be considered to include those species of Arctostaphylos with nutlets consolidated into a single nut, such as *A. glauca,* but the distinction between the genera is evident to anyone who has seen them growing, and the shape of the leaves, inflorescence, and general habit of growth are so entirely different.

Schizococcus Eastwood, gen. nov. Calyx 4- vel 5-divisus. Corolla urceolata, ore 4-5-crenato, exteriore glabra, interiore pilosa. Stamina 8 vel 10, inclusa; filamentibus ovato-acuminatis, basi pilosis; antheris brevibus rubris, apice biporosis et bicornutis, cornibus reflexis, antheris longioribus. Ovarium ovatum pilosum, basi circumdatum nectariis crassis; stylo columnari, stigmate obtuso. Fructus viridis, sine carne, dehiscens in 2-5 nuculis, cuticula tenui.

Small shrubs from procumbent and rooting where the stems touch the ground to erect and variable in height according to situation. The stems are rather slender and when young are conspicuously clothed with white spreading hairs. The leaves are small and bright or glossy green, varying from orbicular to narrowly elliptical. The flowers are small, white or rose-tinted, on slender pedicels in many short terminal clusters all over the bushes with small bracts which are often red. The fruit is green when ripe and disarticulates in 2-5 thin-skinned seeds or nutlets which fall as soon as ripe and

can be found only under the bushes. The shrubs are destroyed by a fire, reproducing from the seeds in great numbers.

Parry considered this as a section under Arctostaphylos under the name Micrococcus. This name has been used for a genus of Bacteria, so Schizococcus has been substituted. It is derived from the Greek meaning split berry and emphasizes the chief generic character. *Arctostaphylos Nummularia* Gray is the type species.

Key to the Species of Schizococcus

1. Leaves pointed at apex; old stems with a glaucous bloom; parts of the flower on the plan of 5.....*S. myrtifolius*
1. Leaves rounded at apex but often mucronate; old stems reddish-black; parts of the flower on the plan of 4.....*S. Nummularia*

S. myrtifolius (Parry) Eastwood, comb. nov. Shrubs erect or procumbent and rooting, from less than a foot to several feet high; young stems pubescent and white-setose, sometimes glandular; old stems pale with a glaucous bloom; leaves pointed at apex generally oblong or elliptical with ciliate margins when young and rough with a scattered glandular scurf; calyx and corolla with 5 parts; stamens 10; fruit roundish, of 5 disarticulating nutlets. It is found on gravelly hills at and near Ione, Amador County, California.

S. Nummularia (Gray) Eastwood, comb. nov. This is similar in habit to the preceding, with the young stems pubescent and white-setose, old stems reddish-black; leaves elliptic to ovate and orbicular, rounded at apex and often mucronate, rounded or sometimes cordate at base, glossy and smooth with margins entire or serrate, often reddish; parts of the flower 4, stamens 8; fruit with from 2-4 disarticulating nutlets. The low plants growing with the erect shrubs have been taken as the type by Dr. W. L. Jepson, but on the Mendocino sands, the type locality where both are found, the erect shrub was evidently the one indicated by Gray as he describes it as erect. The variety on Mt. Tamalpais which was named *A. sensitiva* by Jepson is a more compact variety.

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OREGONIAN VARIANTS IN TWO SPECIES OF POTENTILLA

BY ETHEL CRUM

University of California

Potentilla Douglasii Greene var. **tenuisecta** (Rydb.) Crum, comb. nov. *Horkelia tenuisecta* Rydb., N. Am. Fl. 22:278 (1908).

Potentilla Douglasii Greene var. **filicoides** Crum, var. nov. A specie differt: foliolis oblongis basi cuneatis, pinnatipartitis, segmentibus 11-19, lineari-oblongis, itaque aspectu filicis pinnis similibus; cymis patente corymbosis.

Type: No. 208350 Herb. Calif. Acad. Sci., collected eight miles north of Diamond Lake, Douglas County, Oregon, June 22, 1931, by J. T. Howell, *No. 6901.* This rather striking variant of the *P. Douglasii* aggregate of the subgenus Horkelia is characterized by the deeply pinnatipartite leaflets. It represents in the section Capitatæ the extreme of the tendency toward pinnate incision of leaflets as *P. Douglasii* var. *tenuisecta* represents the extreme of the tendency toward palmate incision. The first named member of the section, *P. Douglasii* Greene (*Horkelia fusca* Lindl., Bot. Reg. 23: pl. 1997,—1837), was described as having leaflets *"pinnatifidis vel palmatis incisis,"* the illustration favoring the condition first mentioned. The leaflets of the specimens cited below are less deeply incised than are those of the type of var. *filicoides* and also are more or

less intermediate toward the palmatifid condition common in *P. Douglasii* var. *tenella* (Wats.) Greene: Diamond Lake, Douglas County, Oregon, June 21, 1931, *J. T. Howell No. 6877;* Prospect, Jackson County, Oregon, June 20, 1931, *J. T. Howell No. 6840.*

Potentilla caruifolia (Rydb.) Crum, comb. nov. *Horkelia caruifolia* Rydb. in Howell, Flora of Northwest America 181 (1898).

Potentilla caruifolia (Rydb.) Crum var. **divergens** Crum, var. nov. A specie differt: inflorescentia patula ramis paucifloris divergentibus, hic itaque *P. Howellii* simili.

Type: No. 208351 Herb. Calif. Acad. Sci., collected near Trail, Jackson County, Oregon, June 19, 1931, by J. T. Howell, *No. 6759.* Although this variant of *P. caruifolia* of the subgenus Horkelia (Section Hirsutæ) is very near the species in leaf and floral characters it differs markedly in the open inflorescence with widely divergent branches, in which respect it resembles *P. Howellii* Greene. *Potentilla caruifolia* in typical form has a rather densely congested inflorescence similar to that of *P. daucifolia* Greene. This is indicated by Rydberg's original description as well as by the illustration in his "Monograph of the North American Potentilleæ" (Mem. Dept. Bot. Columbia Univ. *2*: pl. 79, figs. 1-5,—1898). In addition to the type, two specimens are cited by Rydberg (op. cit., p. 141): *Thos. Howell No. 1129* and *R. M. Austin No. 256.* Duplicates of these specimens in the University of California Herbarium also show congested inflorescences. However, *P. caruifolia* is represented by so few collections that very little is known as to the range of variation within it. Since the variant here described combines certain characters of two well marked species, *P. Howellii* and *P. caruifolia,* it is worthy of recognition.

A NEW SPECIES OF LEPTOTÆNIA

BY MILDRED E. MATHIAS

Carnegie Museum, Pittsburgh, Pennsylvania

An incomplete description of the following new species was included in the many manuscript notes left unpublished by the late Dr. J. N. Rose.

Leptotænia Bradshawii Rose, spec. nov. Planta acaulis vel subacaulis, 3-6.5 dm. alta; radicibus angustis, elongatis, 1-2 dm. longis; foliis radicalibus oblongis, 8-15 cm. longis sine petiolis, 2-3 cm. latis,

glabris (raro hirtellis), ternatis deinde tripinnatisectis, ultimis segmentis linearibus, acutis, nonnumquam apiculatis, distinctis, 6-12 mm. longis, minus 1 mm. latis; petiolis vaginantibus, 8-28 cm. longis; pedunculis foliis longioribus, 1.5-6 dm. longis, ad basem umbellae hirtellis; umbellis 7-16-radiatis, radiis hirtellis; radiis fertilibus 1-4, 2.5-10 cm. longis, radiis sterilibus 1-2.5 cm. longis; involucro nullo; involucelli bracteis ad 10, 2-6 mm. longis, viridibus, floribus flavis longioribus, marginibus scariosis, ad medium ternatisectis, lobis integris vel ternatisectis, acutis vel subacuminatis; pedicellis 2-3 mm. longis, floribus sterilibus brevioribus; fructibus oblongis, 10-13 mm. longis, 5 mm. latis, alis lateralibus crassis, alis dorsalibus 3, filiformibus, vittis plerisque obsoletis, nunquam prominentibus.

Plants acaulescent or subacaulescent, 3-6.5 dm. high, from long slender tap-roots, 1-2 dm. long; basal leaves oblong in general outline, excluding the petiole, 8-15 cm. long, 2-3 cm. broad, glabrous (rarely hirtellous), ternate then tripinnatisect, ultimate segments linear, acute, sometimes minutely apiculate, distinct, 6-12 mm. long, less than 1 mm. broad, petiole sheathing, 8-28 cm. long; peduncles several, exceeding the leaves, 1.5-6 dm. long, minutely hirtellous at the base of the umbel, umbels 7-16-rayed, rays minutely hirtellous, fertile rays 1-4, 2.5-10 cm. long, sterile rays 1-2.5 cm. long, involucre absent, involucel-bracts about 10, 2-6 mm. long, longer than the yellow flowers, greenish with scarious margins, ternately cleft to the middle, the lobes entire to ternately cleft, acute to subacuminate; pedicels 2-3 mm. long, shorter than the sterile flowers; fruit oblong, 10-13 mm. long, 5 mm. broad, with thick lateral wings, and three or four filiform ribs on the dorsal surface, oil-tubes mostly obsolete, never prominent.

Type specimen: *R. V. Bradshaw No. 2047,* in low swales near the high school, Eugene, Oregon, May 14, 1921 (United States National Herbarium No. 1319980).

Distribution: known only from the type locality.

Specimens examined. OREGON: Eugene, May 24, 1920, *Bradshaw No. 1648* (U. S. Nat. Herb.); Eugene, May 14, 1921, *Bradshaw No. 2047* (U. S. Nat. Herb., type).

This species is distinguished by its conspicuous ternately divided free involucel-bracts, in which respect it differs from all other species of Leptotænia, and the obsolete nature of the oil-tubes, a character shared with *L. anomala.* It is most closely related to *L. anomala* known only from Amador County, California, and *L. filicina* from the mountains of Idaho. In addition to the characters of the involucel mentioned above, it differs from *L. anomala* in the larger fruits and frequently larger fruit-clusters and from *L. filicina* in the slightly shorter fruit and obsolete oil-tubes.

PITKIN MARSH, A FLORAL ISLAND AT VINE HILL, SONOMA COUNTY, CALIFORNIA

BY MILO S. BAKER

Santa Rosa Junior College

From memory I would estimate the area of this island to be approximately fifteen acres; it consists mainly of marsh land, and constitutes the headwaters of a small drainage system that flows south and west into Green Valley Creek. This area is a true plant island since it contains a considerable number of plants not otherwise known to Sonoma County.

It was near the last of April, 1928, when first I visited the Pitkin Ranch which includes this marshy piece of ground. Here I found *Helenium Bigelovii, Tofieldia occidentalis, Veronica scutellata, Lotus oblongifolius, Botrychium californicum, Gentiana Sceptrum, Drosera rotundifolia, Lagophylla ramosissima, Campanula linnæifolia,* and two apparently undescribed species, one of Castilleja, and one of Myosotis. Although the Pitkin Marsh is approximately fifteen miles inland and separated from the ocean by a fairly high mountain range, there grow here several maritime plants such as *Stellaria littoralis, Lilium maritimum, Plantago hirtella, Epilobium Watsonii,* and near by, *Ceanothus rigidus* var. *grandifolius.* In addition, there are to be found here a number of plants comparatively rare in Sonoma County, as *Pinus ponderosa, Mimulus moschatus* var. *sessilifolius, Lotus formosissimus, Potentilla tenuiloba, Lupinus rivularis, Athyrium Filix-femina, Zygadenus venenosus, Brodiæa peduncularis, Linaria canadensis, Ledum glandulosum, Pyrus rivularis,* and only a half mile away, the rare *Arctostaphylos densiflora.*

Since this marshy meadow, where this strange plant population is growing, has been pastured continuously for about seventy years, there were possibly, when first settled, still other unusual plants in this piece of ground. Fortunately, the members of the Pitkin family are ardent plant lovers, and Miss Alpha Pitkin in particular has watched over, studied, and painted these rare plants. To her I am indebted for calling attention to most of the plants listed in this article.

A NEW SPECIES OF SOLANUM

BY ALICE EASTWOOD

Solanum obispoense Eastwood, spec. nov. Suffrutescens, circa 3 dm. altum, glanduloso-pubescens; caulibus multis ex rhizomate gracili, ligneo; foliis lanceolatis oblongisve, 1-2 cm. longis, 3-10 mm. latis, acutis, petiolis brevibus, margine erose-crispis vel basi lobatis, lobis 2-4, linearibus divaricatis; floribus paucis, terminantibus in umbellis vel racemis vel propinque solitariis in foliorum axillis; calyce 5 mm. diametro, lobis suborbiculatis; corolla 2 cm. diametro, purpurea, centro viridi; antheris flavis, 4 mm. longis; stigmate antheras paulo superante.

Suffrutescent with many stems from running rootstocks, about 3 dm. high, glandular and with short glandular hairs; leaves deep green, lanceolate to oblong, acute, tapering to short slender petioles, margins erosely crisped, some with 2-4 short linear divaricate lobes at base; flowers few in terminal umbels or racemes, sometimes solitary in the leaf-axils; calyx about 5 mm. across, with five rounded lobes; corolla purple-blue, with two green spots at base of each lobe; stamens with short, broad filaments and bright yellow anthers, 4 mm. long; stigma barely surpassing the anthers.

Type: Herb. Calif. Acad. Sci., No. 204658 and 204657, collected by Mrs. Mary E. Wall near Eldorado School, Santa Margarita Post Office, San Luis Obispo County, California, April 20, 1933. This species is related to *Solanum Xanti* Gray, differing from the many plants aggregated under that species in the very glandular character of the pubescence and the small, deep green leaves with erosely crisped glandular margins, some with linear spreading lobes at base.

CYPERUS DIFFORMIS L. IN CALIFORNIA. One of the common weeds of the rice fields of the Sacramento Valley is *Cyperus difformis* L., a plant of Old World tropics. The first record of the occurrence of this plant in California is a collection in the Herbarium of the California Academy of Sciences made by F. T. McLean at Nelson, Butte County, November, 1921. In 1923 W. D. Gilbert reported that the plant had "become very prevalent in the rice fields" that season. Further inquiries of more recent date affirm the establishment of this plant in the Sacramento Valley. In September, 1932, the plant was collected in a wet roadside hollow, seven miles south of Napa, Napa County (*J. T. Howell No. 10798*).—John Thomas Howell.

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SAN FRANCISCO, CALIFORNIA
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BOTANICAL GARDEN

A REVISION OF ARCTOSTAPHYLOS WITH KEY AND DESCRIPTIONS

BY ALICE EASTWOOD

In the preceding number of LEAFLETS OF WESTERN BOTANY, the genera growing north of Mexico and included in Arbutus by Linnæus were discussed. Arctostaphylos was one of these and has been separated as Section Uva-ursi. This segregate is the subject of this revision. It deals only with the species north of Mexico and unless otherwise stated all are Californian.

Arctostaphylos proper (the Uva-ursi section of Gray and Parry) consists of the shrubs common throughout the Pacific Coast, forming a great part of the chaparral and commonly called manzanitas. The flowers are small, urn-shaped, white, rose-tinged, or clear rose-color, forming racemes or more generally panicles terminating branchlets. They bloom in winter or early spring in the coastal regions and soon after the snow melts at greater elevations. The stamens have purple anthers furnished with curving tails, and filaments are broad at base. The ovary is smooth, viscid or hairy, and the fruit is smooth, pubescent, or viscid, and with nutlets variously consolidated, sometimes into one, scarcely two fruits on the same bush separating equally. The young fruits resemble little apples and when fully ripe the juice turns to an acid granular powder. These fruits persist so that often dried fruits may be seen on the flowering shrubs. The berries of some are made into cider by the Indians. The flowers contain honey. Frequently the insects enter by boring a hole at the base of the flower instead of entering from the top where all the arrangements within are designed to aid cross-pollination.

In the key, obvious characters have been used. The reason is best explained by my experience over many years of study, during which I have walked over miles and miles of country looking at and collecting manzanitas. The species of Southern California are not well known, as my opportunities in the south have been few and short.

I first became interested in the manzanitas on Mt. Tamalpais and adjacent parts of Marin County. For years I travelled over the trails, scarcely missing a week throughout the year. When I first began to discriminate, two species were attributed to

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the region, one, the all-embracing aggregate and very doubtful *A. tomentosa,* and the other, *A. Nummularia.* Each kind that I eventually distinguished grew in definite areas and began to bloom at different times but overlapping. At all times of the year the different kinds gave a different color to the landscape where they occurred.

Arctostaphylos virgata is always in bloom about Christmas. The typical bushes are on the south side of the mountain, and fringe Muir Woods. They are tall, straight bushes with erect branches and bright green, rather thin leaves. The flowers are in ample panicles, white or rose-tinged, and the inflorescence and fruits are viscid. *Arctostaphylos canescens* loves bare gravelly slopes where the tiny plants often bloom when only a few inches high. It is a white-downy shrub with lovely pink flowers and is in bloom soon after the fall rains begin. I have seen it in bloom in October, but usually in December or January. When the bushes grow amid others that are tall, it becomes as high as its neighbors. Rarely, a white-flowered shrub is seen on the mountain. The species is destroyed by fire. *Arctostaphylos glandulosa* is a dark green intricately branching shrub with all parts glandular-viscid to the touch. *Arctostaphylos Cushingiana* is related to this and, like it, is not destroyed by a fire, but sprouts again from the large woody underground stem. It has a pale appearance and grows at the lower parts of the mountain. It is generally smooth and the leaves are covered with a glaucous bloom that can be rubbed off. *Arctostaphylos montana* belongs to a different group having the small bracts in the panicles instead of the leafy ones. It is the last to bloom and seems restricted to the serpentine areas. Generally it is a low spreading bush with bright green leaves and white flowers which are smaller than those of the preceding species. It is related to the southern *A. pungens,* from which it differs in the manner of flowering. It is destroyed by fire, but reproduces abundantly from the seeds. A seedling is rarely found until after a fire. This is true also of other species that do not sprout from the stumps.

Mount St. Helena is another peak of the coast mountains where several species occur. Near the base, the large arborescent *A. Manzanita* occurs. This is one of the most widely spread at lower elevations of northern California. It blooms

early, often at Christmas, and, with its large panicles of white or pink-tinged flowers, is one of the loveliest. As one ascends the mountain, *A. glandulosa* and *A. canescens* occur. Near the first summit the lovely delicate rosy-flowered *A. Stanfordiana* appears. Between the two summits *A. elegans* prevails. It is like a low *A. Manzanita,* but it differs chiefly in having large viscid fruits. In Lake County, it becomes taller. On serpentine areas near the base of the mountain, some *A. viscida* grows. It differs from the bushes in the Sierra Nevada in having fruits viscid instead of smooth.

Mount Diablo seems to be the northern limit of the pale *A. glauca* so common in Southern California. Two species have been described from this mountain by the author: *A. auriculata,* which in pubescence and habit is related to *A. canescens* but has leaves auriculate at base, and *A. lævigata,* which is related to *A. Stanfordiana* but with larger white flowers and less delicate in all its parts.

Mount Hamilton seems to have but two species, *A. glauca* along the road above Smith Creek and one prevailing at the top with yellowish-green foliage and white flowers. It is named *A. Campbellæ* in honor of Mrs. W. W. Campbell, who sent blooming specimens years ago. Since then the author has collected it in fruit.

The species growing at Monterey seem restricted to that region. This seems to be true also of the species on the islands off the coast of Southern California, though they show affinities with those on the neighboring mainland.

In the Sierra Nevada, the different species grow in overlapping zones. *Arctostaphylos Manzanita* is at the lowest elevation. *Arctostaphylos viscida* is higher and very lovely when in flower, the pink flowers set off by the pale smooth foliage. The viscidity is in the panicles, especially on the pedicels of the flowers. It covers great areas and its berries are the ones used by the Indians for cider. *Arctostaphylos Mariposa* is related to this, generally growing at a somewhat greater elevation. It is equally pale, but all parts are clothed with glandular hairs. *Arctostaphylos Mewukka* is found with *A. viscida,* but at its upper limit. The old stems have a glaucous bloom, the leaves are a pale green but not so pale as those of *A. viscida.* The fruit is smooth and large. Higher still *A. patula* is the prevailing species. Its open

habit, bright green glossy leaves amid panicles of rosy flowers distinguish it readily from the others. The globular fruits are smooth and often become black when fully ripe. There is much variation in the shape of the leaves, and the related species of Nevada and Utah, *A. platyphylla,* is chiefly distinguished by this variable character. Highest of all, *A. nevadensis* grows, a low procumbent shrub with bright green leaves generally broadest at the top and panicles of pearly-white flowers. Like all these low procumbent species, it roots where the stems touch the ground.

In the key, all the species so far described are included except *A. pulchella* and *A. parvifolia,* Thomas Howell's species of southern Oregon, and *A. Nissenana,* described by Dr. C. Hart Merriam without flowers or fruit. These are unknown to me. *Arctostaphylos drupacea* is considered to be a variety of *A. Pringlei.* It looks like the Arizona species, differing only in the nutlets consolidated into one. This is also true of *A. Parryana.* While I have not seen this growing, the description, which is reinforced by Parry's opinion, seems to place it as a variety of *A. Manzanita.* The great degree of variability in the union of the nutlets leads me to believe this to be an unessential character. The leaves, too, on individual bushes of the same species, or even of the same plant, are so lacking in uniformity and size that a better idea is given by measurements of the average largest and the average smallest leaf.

It is hoped that this revision and key will help in clearing some of the confusion that has prevailed in this genus. Many years will elapse and much more field observation will be necessary before a really clear understanding can be attained.

Key to the Species

1. Bracts small, deltoid, or subulate (the lowest sometimes foliaceous)

a. Prostrate shrubs, rooting along the branches, forming mats. (Northern Hemisphere).....1. *A. Uva-ursi*

b. Procumbent and generally rooting where branches touch the ground

Leaves broadest at top, tapering at base.

Lower leaf-surface paler than upper. (Monterey).....2. *A. pumila*

Both surfaces of leaves bright green.

Apex of leaf obtuse; a hybrid. (Calif. to Brit. Col.)..... 3. *A. media*

Apex of leaf mucronate or acute. (Upper altitudes in mountains, Calif. and northward).....4. *A. nevadensis*

Leaves broadest at base or middle.

Flowers few, inflorescence generally simple.

Fruit glossy, 4 mm. in diameter; mound-like shrub. (Monterey).....5. *A. Hookeri*

Fruit dull, 8 mm. in diameter; procumbent and rooting. (San Francisco) .....6. *A. franciscana*

Flowers many in branching panicles; fruit 8 mm. in diameter; procumbent and rooting. (Sonoma Co.).....7. *A. densiflora*

c. Erect, generally low bushes

Flowers small, 5 mm. or less long.

Flowers bright rose-color.

Smooth throughout; panicle with thread-like branches. (Napa, Lake, and Sonoma counties)..... 8. *A. Stanfordiana*

Glandular-hispidulous throughout; branches of panicle not thread-like. (Del Norte Co.).....9. *A. hispidula*

Flowers white; young branches and inflorescence white-downy. (Mt. Diablo).....10. *A. lævigata*

Flowers small, but a little more than 5 mm. long.

Young branches and inflorescence glandular-hispidulous; growing in serpentine areas. (Sonoma Co.).....11. *A. Bakeri*

Young branches and inflorescence white-downy.

Foliage bright green.

Flowers congested at top of club-shaped peduncle. (S. Calif., Ariz., etc.).....12. *A. pungens*

Inflorescence a branching panicle; growing in serpentine. (Marin Co.).....13. *A. montana*

Foliage, when young, pale green; panicle branching. (Del Norte Co. and s. Ore.).....14. *A. cinerea*

d. Erect shrubs, sometimes arborescent; corolla more than 5 mm. long

Leaves pallid-glaucous.

Young branches and leaves smooth; inflorescence viscid.

Fruit small, flattened-globular; some or all nutlets separate. (Sierran foothills northward).....15. *A. viscida*

Fruit large, globular or ovoid, viscid; all nutlets consolidated into one. (S. Calif. and South Coast Ranges) .....16. *A. glauca*

Young branches, petioles, parts of leaves, and inflorescence viscid-hairy; fruit as in *A. viscida*. (Sierran foothills) .....17. *A. Mariposa*

Leaves pale green.

Old stems with a glaucous bloom, young branches and inflorescence smooth; fruit large, globular; some or all nutlets separate. (Sierran foothills).....18. *A. Mewukka*

Old stems dark red-purple, young branches and inflorescence clothed with a dense white down; fruit small, flattened-globular; pedicels glandular. (S. Ore.)..... ..... 19. *A. oblongifolia*

Leaves bright green.

Old stems with a glaucous bloom, young branches and inflorescence glabrous or hairy; fruit almost smooth, large, somewhat flattened-globular. (Santa Cruz Island).....20. *A. insularis*

Old stems dark red-purple.

Young branches and inflorescence with a close, dark, somewhat glandular pubescence; pedicels and berries smooth. (Sierra Nevada northward and eastward, southward to Lower California)..... .....21. *A. patula*

Young branches and inflorescence smooth; berries large, almost globular, viscid. (Mt. St. Helena; Lake Co.) .....22. *A. elegans*

Young branches and inflorescence with a close, white-downy pubescence; shrubs often arborescent.

Some or all nutlets separate. (North Coast Ranges; Sierran foothills).....23. *A. Manzanita*

All nutlets united into one. (Tehachapi Mountains) .....24. *A. Parryana*

Young branches and inflorescence glandular.

Pedicels smooth. (Wash.).....25. *A. obtusifolia*

Pedicels glandular. (Sierra Nevada).....26. *A. Jepsoni*

2. Bracts foliaceous (sometimes the uppermost less so)

a. All bracts foliaceous

Foliage, or inflorescence, or both, glandular.

Leaves sessile or nearly so, auriculate or distinctly cordate at base.

Leaves bright green.

Leaves twice as long as broad. (Santa Cruz redwoods).....27. *A. Andersoni*

Leaves not much longer than broad.

Leaves densely imbricated; stems with dark glandular hairs. (San Bruno Hills)..... ..... 28. *A. imbricata*

Leaves not densely imbricated; stems with long bristly hairs. (Santa Cruz Island and San Luis Obispo Co.)..... .....44. *A. pechoensis* var. *viridissima*

Leaves pale green.

Leaves twice as long as broad. (Kings Mountain, San Mateo Co.) .....29. *A. regismontana*

Leaves not much longer than broad. (Contra Costa and Alameda counties).....30. *A. pallida*

Leaves with distinct petioles.

Leaves not cordate at base, longer than broad.

Leaves bright green.

Tall shrubs with erect branches.

Stems bristly with many long white, spreading hairs. (Mendocino and Humboldt counties, northward to Oregon).....31. *A. setosissima*

Stems glandular and with dark, glandular, shorter hairs (Marin Co., near redwoods).....33. *A. virgata*

Intricately branching shrubs.

Leaves, stems, inflorescence, and fruits viscid-glandular; flowers 8 mm. long. (Mt. Tamalpais and more widely spread) .....34. *A. glandulosa*

Leaves and fruit not glandular; stems and inflorescence glandular-hairy; flowers 5 mm. long. (Del Norte Co.)..... .....35. *A. intricata*

Leaves narrow and pointed; inflorescence very glandular; young stems white-tomentose, not glandular. (Sonoma Co.) .....37. *A. sonomensis*

Leaves pale green.

Leaves and inflorescence very glandular; bracts rose-color, deciduous. (S. Calif. and Ariz., etc.) .....40. *A. Pringlei*

Leaves scarcely glandular; bracts green, persistent. (Zaca Lake Mountains, Santa Barbara Co.).....41. *A. zacaensis*

Leaves when young somewhat downy; branches reddish under white down; inflorescence very glandular; fruit viscid. (Arroyo Seco, Monterey Co.).....42. *A. Howellii*

Leaves cordate or subcordate at base.

Old stems rough with shreddy bark.

Branches glandular-hairy without any tomentum; inflorescence very glandular. (Monterey Co.) .....36. *A. bracteosa*

Branches without glandular hairs. (Monterey Co.) .....36. *A. bracteosa* var. *hebeclada*

Old stems smooth, dark red-purple.

Stems and young leaves lightly tomentose and glandular-hairy. (Santa Cruz Island).....38. *A. subcordata*

Stems and young leaves glandular; flowers and bracts crowded in a short, spreading panicle; no tomentose pubescence. (Santa Rosa Island) .....39. *A. confertiflora*

Young branches white-tomentose; no glandular pubescence except sometimes on the pedicels.

Leaves auriculate at base, sessile or subsessile.

Leaves pale and white-tomentose on both sides; stems with some bristly hairs; pedicels hairy. (Mt. Diablo) .....43. *A. auriculata*

Leaves pale and somewhat tomentose; stems without bristly hairs; pedicels smooth. (San Luis Obispo Co.).....44. *A. pechoensis*

Leaves not auriculate and with distinct petioles.

Leaves green on upper surface, white-tomentose beneath. (Santa Cruz Island; South Coast Ranges near coast) .....45. *A. tomentosa*

Leaves alike on both sides.

Stems with bristly hairs.

Leaves yellowish-green, lightly tomentose when young. (Mt. Hamilton).....46. *A. Campbellæ*

Leaves pale green, tomentose, becoming dark with age. (N. Calif. northward.).....47. *A. columbiana*

Stems without bristly hairs.

Leaves pale, white-tomentose on both sides; flowers generally pink; pedicels pubescent; low shrubs. (North Coast Ranges) .....48. *A. canescens*

Leaves pale, velvety-tomentose, large and broadly oval, "petiole round"; pedicels pubescent or often glandular; tall shrub. (S. Ore. and n. Calif.)....49. *A. strigosa*

Leaves similar to leaves of preceding, but green and sparsely pubescent, "petioles flat." (S. Ore.)....50. *A. bracteata*

Leaves bright green and smooth. (N. Calif.) ....32. *A. Tracyi*

b. Upper bracts becoming subulate or deltoid

Leaves with a glaucous bloom that rubs off; young stems and leaves smooth. (Mt. Tamalpais and vicinity)....51. *A. Cushingiana*

Leaves bright green, brittle, obtuse or subcordate at base.

Stems bristly-hairy. (South Coast Ranges southward).... 52. *A. crustacea*

Stems not bristly-hairy. (San Francisco)....53. *A. Rosei*

Descriptions of Species

1. Arctostaphylos Uva-ursi (L.) Spreng., Syst. 2:287 (1825). Prostrate and trailing shrub with shreddy bark; leaves thick, obovate or spatulate, evergreen, smooth, glossy, entire, 2-2.5 cm. long, 5-10 mm. wide; flowers in short dense clusters and the fruit consisting of bright red smooth globular berries. It is the most widely distributed species in the northern hemisphere, known as Kinnikinick in the Colorado mountains and as Bear-berry on the Atlantic Coast. Three forms have been recognized by Fernald and Macbride (Rhodora 16:211-213,—1914): the typical native in the eastern hemisphere and the Arctic regions, var. *coactiles* of the Atlantic and Pacific Coast, and var. *adenotricha,* the most distinctive, with viscid-glandular pubescence, distributed from the Yukon to British Columbia. The variety *coactiles* in California is distributed along the coast from Sonoma County to Del Norte County and seems to hybridize with adjacent species.

2. Arctostaphylos pumila Nutt., Trans. Am. Phil. Soc., ser. 2, 8:266 (1843). Low shrubs forming mats with ascending branches; young stems and lower surface of leaves finely white-pubescent with appressed and spreading hairs; leaves smooth above, generally obovate, varying in size and shape on different bushes from 2 cm. long and 1 cm. wide to 1.5 cm. long and 8 mm. wide; flowers in short dense clusters, corollas about 3 mm. long; fruit smooth, globular, about 6 mm. in diameter. This seems to be restricted to the Monterey Bay region where it forms mats in sandy soil.

3. Arctostaphylos media Greene, Pitt. 2:171 (1891). Type description: "diffusely branching, the main divisions of the stem pro-

cumbent, a foot or two long; leafy branches ascending or erect, less than a foot high: leaves obovate-cuneiform, about an inch long exclusive of the short petiole, obtuse, puberulent beneath: racemes terminal, subsessile, few-flowered: fruit globose, slightly depressed, 3 or 4 lines broad, nutlets 5 to 7, firmly consolidated." It is found sparingly on dry gravelly ground in Mason County, Washington, where *"A. tomentosa"* (*A. columbiana* Piper) and *A. Uva-ursi* are very abundant. The author collected typical specimens at Mountaineers Camp, Kitsap County, Washington. Another hybrid grows along the Californian coast with *A. Uva-ursi* near Pt. Arena, Mendocino County, with glandular-viscid pubescence indicating a different parentage.

4. Arctostaphylos nevadensis Gray, Syn. Fl. N. Am. 2:27 (1878). Low procumbent shrub, carpeting the ground and spreading over rocks, often rooting where the stiff, intricately branching smooth stems touch the ground; leaves obovate to oblanceolate, cuspidate, mucronate, bright green, about 2 cm. long, 1-1.5 cm. wide; flowers white, in short densely flowered racemes or panicles, pedicels smooth but branches and young growth clothed with a close somewhat glandular puberulence; bracts deltoid, the lowest sometimes foliaceous: corolla about 5 mm. long; fruit somewhat globular-flattened, 6-8 mm. in diameter. The common species in the high mountains, extending northward to southern Oregon and probably farther northward. Great variability occurs in the leaves; specimens collected on Prospect Peak, Mt. Lassen National Park, show leaves from suborbicular to narrowly oblanceolate.

5. Arctostaphylos Hookeri G. Don, Gen. Syst. 3:836 (1834). Low shrubs forming loose clumps a meter or less high; old stems smooth, young stems and inflorescence clothed with a fine white pubescence; leaves ovate to elliptical, bright glossy green with margins entire or finely serrulate, mucronate-aristate, 1-2 cm. long, 1-1.5 cm. wide; flowers few in short dense clusters, with smooth pedicels; corolla 4 mm. long; fruit globular, smooth and glossy, about 4 mm. in diameter. This is peculiar to the Monterey Bay region.

6. Arctostaphylos franciscana Eastwood, Bull. Torr. Club 32:201 (1905). Low procumbent shrub clinging to the serpentine rocks and rooting where the smooth intricately branched stems touch the ground; in typical specimens, leaves bright green and pointed but showing great variation, some from Mt. Davidson being broader and less pointed; flowers in short terminal clusters on smooth pedicels, with small triangular bracts, the pubescence of peduncles, branches and young growth fine and dense; corolla white, about 7 mm. long; fruit flattened-globular, about 8 mm. in diameter, surface dull. Type locality, serpentine outcrop, Laurel Hill Cemetery, San Francisco. It has been identified with both *A. Hookeri* and *A. pumila.*

7. Arctostaphylos densiflora M. S. Baker, Leafl. West. Bot. 1:31 (1932). Low spreading shrub, rooting freely; young leaves, stems, and inflorescence pale with fine appressed pubescence, mature leaves smooth and glossy, generally elliptical, mucronate at apex, cuneate

at base, from 1.5 cm. long and 1 cm. wide to 3 cm. long and 1.5 cm. wide; flowering stems paniculately branching and each branch with a many-flowered panicle of white or pink-tinged flowers, bracts very small, pedicels smooth; corolla about 5 mm. long; fruit smooth, flattened-globular, 5-6 mm. in diameter. This seems to be a local species, spreading over clay banks, along the roadside just west of the Vine Hill Schoolhouse, about ten miles westerly from Santa Rosa.

8. ARCTOSTAPHYLOS STANFORDIANA Parry, Bull. Cal. Acad. 2:493 (1887). Low bushy erect shrub with slender open branches, smooth throughout; leaves bright glossy green, from narrowly lanceolate to broadly elliptical, pointed at both ends; flowers rose-colored, in open-branching panicles with almost thread-like branches and small bracts; corolla 6 mm. long; fruit generally globular, smooth and glossy, about 8 mm. in diameter. This is one of the loveliest of all the manzanitas. Calistoga is the type locality. It is distributed through Lake, Sonoma, Napa, Mendocino, and probably other adjacent counties in California.

9. ARCTOSTAPHYLOS HISPIDULA Howell, Fl. N. W. Am. 415 (1903). A closely related species, differing from the preceding in a rough, glandular, hispidulous pubescence. The leaves are not so glossy and the nerves more impressed. Type locality, Gasquet, Del Norte County, California.

10. ARCTOSTAPHYLOS LÆVIGATA Eastwood, Leafl. West. Bot. 1:76 (1933). A low bushy shrub, intricately branching; the young stems, leaves and inflorescence clothed with a fine close pubescence; mature leaves glossy and smooth, from oblong to lanceolate, with acute apex and base; flowers small, white, in drooping panicles with dark stems generally and small bracts shorter than the smooth pedicels; corolla about 7 mm. long; fruit not known. It is endemic on Mt. Diablo, California. It is related to *A. Stanfordiana,* but has white instead of rose-colored flowers, the panicles have pubescent and much thicker branches, and it lacks the delicacy of *A. Stanfordiana.*

11. ARCTOSTAPHYLOS BAKERI Eastwood, spec. nov.* A bushy shrub varying in height; the old stems black-purple, smooth, the young growth and inflorescence glandular-hispidulous. The leaves vary in shape and size, but on an average are about 3 cm. long and half as wide. They are dull green and feel rough to the touch. The white or rosy flowers are in ample terminal panicles blooming in March or April and are followed by globose fruits somewhat flattened. This covers an extensive serpentine area amid a grove of Cupressus, two miles east of Occidental, Sonoma County, California.

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* **Arctostaphylos Bakeri** Eastwood, spec. nov. Frutex viridis, 1-2 m. altus; ramis glandulare hispidulis; foliis ellipticis, circa 3 cm. longis, 1.5 cm. latis, scabridulis, inferiore parte et petiolis glandulare hispidulis; floribus albis, circa 6-7 mm. longis; ramis panicularum et pedicellis gracilibus, bracteis subulatis, hispidulis, pedicellis glabris brevioribus; fructo glabro.

Type: No. 211564, Herb. Cal. Acad. Sci., collected April 2, 1933, on a serpentine ridge in a grove of Cupressus, two miles east of Occidental, Sonoma County, by John Thomas Howell, *No. 10955.* Specimen with young fruit, No. 211565, Herb. Calif. Acad. Sci., Mr. Howell's *No. 10957.*

12. Arctostaphylos pungens H. B. K., Nov. Gen. et Sp. 3:278 (1819). This was described from shrubs in Mexico, specimens of which have not been seen, but from the description and from some Mexican specimens examined it seems to be the same as the common manzanita of Arizona, southern Texas, and Southern California. It is an erect, much-branched shrub, a meter or so in height, with old stems smooth and dark red, the young stems and inflorescence clothed with a dense white down. The leaves are smooth when old, somewhat downy when young, oblong to elliptic, pointed at both ends. The flowers are small and white and congested at the thickened ends of the peduncles or branches of the inflorescence, with short deltoid imbricated bracts much shorter than the spreading smooth pedicels. The berries are generally flattened-globular but sometimes not flattened and vary in size.

13. Arctostaphylos montana Eastwood, Proc. Calif. Acad. Sci., ser. 3, 1:83 (1897). Low bushy spreading shrub of serpentine areas of Mt. Tamalpais and other parts of Marin County. Old stems, leaves, and inflorescence clothed with a dense close white pubescence. Mature leaves bright green; elliptic to oblong and sometimes almost orbicular, apex mucronate-pointed, base obtuse. Flowers white, numerous in spreading panicles with small bracts and smooth pedicels; corolla 4-5 mm. long; fruit globular or sometimes flattened, smooth, about 7-8 mm. in diameter. This blooms later than the other species on Mt. Tamalpais and survives a fire only in the numerous offspring from seeds. It comes near *A. pungens* of the south, differing in the character of the inflorescence. It sometimes becomes arborescent, as shown by a bush growing amid the usual form near Camp Lilienthal, Marin County.

14. Arctostaphylos cinerea Howell, Fl. N. W. Am. 416 (1903). Erect and branching from the base; young growth and inflorescence clothed with a fine white pubescence; leaves rather pale green when young, becoming darker when old, narrowly to elliptic-oblong or sometimes obovate, 2.5-3.5 cm. long, 1-2 cm. wide, pointed at both ends; panicles spreading, bracts lanceolate, the lowest sometimes foliaceous, pedicels pubescent, spreading; flowers rosy or white, about 5 mm. long; fruit flattened-globular, slightly pubescent, about 1 cm. in diameter. Specimens agreeing in the main with the type were collected on the boundary mountains separating Del Norte County from Oregon, on hills near Adams Station near Gasquet, and at Poker Flat near Takilma, Josephine County, Oregon. Some bushes are paler than others.

15. Arctostaphylos viscida Parry, Bull. Calif. Acad. Sci. 2:492 (1887). Spreading shrub sometimes becoming arborescent, with smooth pallid foliage and smooth reddish stems. Flowers generally pink in large spreading panicles with pedicels so viscid-hairy that they stick together. The leaves vary greatly in shape and paleness, some almost white and others greener; sometimes short stipitate glands are scattered on the old stems. In the Sierra Nevada it is the domi-

nant species at middle elevations and extends from Kern County to southern Oregon. The berries are smooth with a bloom in the typical shrubs of the Sierra Nevada, flattened-globular, and with pulp sufficient for the Indians to use the berries to make cider. It occurs in the coast mountains, but is not common and the fruits are viscid instead of smooth. It is destroyed by fire.

16. ARCTOSTAPHYLOS GLAUCA Lindl., Bot. Reg. pl. 1791 (1836). This is the pale glaucous smooth-leaved and smooth-stemmed species common in Southern California. The flowers are larger than in other glaucous species, varying in length from 8-10 mm. The large viscid fruits, containing but one seed, vary in shape from orbicular to ovoid, having a diameter of about 1.5 cm., the berry showing lines of cleavage. The panicles when denuded of both flowers and fruits are distinctive because of the outwardly spreading, stiff, ovate-acuminate bracts. In the coast mountains, Mt. Diablo seems to be its northern limit; and, so far, it has not been reported from the Sierra Nevada.

17. ARCTOSTAPHYLOS MARIPOSA Dudley in Eastwood, Fl. Kings Riv. 52 (1902). This is a related species, pallid like the preceding, but with a viscid pubescence investing all parts of the shrubs. It grows about the same elevation as the preceding and extends from the mountains of Kern County, northward to the middle Sierra Nevada.

18. ARCTOSTAPHYLOS MEWUKKA C. H. Merriam, Proc. Biol. Soc. Wash. 31:101 (1918). This species has apparently a restricted range in the Sierra Nevada. It grows on the edge of the *A. viscida* zone and below that of *A. patula*. It is a pale green bushy shrub about a meter high, old stems with a glaucous bloom. The flowers are white or pink, about 6 mm. long, in drooping panicles with branches almost glabrous to puberulent, the lower bracts are lanceolate and the upper short and triangular. The fruit is large, smooth and glossy, about 15 mm. in diameter. It ranges from Placer County to Mariposa County. *Arctostaphylos pastillosa* Jepson (Madroño 1:83, 93,—1922, 1923) is undoubtedly this species, as the type came from the same region and is characterized by the pale green foliage and the large smooth berry.

19. ARCTOSTAPHYLOS OBLONGIFOLIA Howell, Fl. N. W. Am. 416 (1903). Erect branching shrub, sometimes arborescent with dark red bark, young growth with a close ashy pubescence; leaves generally oblong but varying, and paler or greener according to age and pubescence; flowers white, in panicles with glandular spreading pedicels longer than the lanceolate bracts; corolla about 5 mm. long; ovary downy-pubescent at top; fruit somewhat pubescent. This is a widely distributed species in southern Oregon related to *A. viscida* from which it differs in the pubescent ovary, the longer bracts, and foliage less pallid. Specimens from the boundary summit between Del Norte County, California, and Oregon agree well with the type. At Waldo, Oregon, specimens collected had greener leaves on shorter, rounder petioles. This might also be put with the foliaceous-bracted species.

20. Arctostaphylos insularis Greene in Parry, Bull. Calif. Acad. Sci. 2:494 (1887). A symmetrical shrub or sometimes arborescent, 1-3 m. or more high, old stems gray-glaucous over reddish-brown, young stems smooth or somewhat pubescent; leaves bright green, ovate to elliptical, obtuse or subcordate at base, generally obtuse at apex, from 4 cm. long and 2.5 cm. wide to 4 cm. long and 1.5 cm. wide; flowers in slender panicled racemes with minute bracts and long glandular-hairy pedicels; corolla about 6 mm. long; fruit flattened-globular, smooth, about 1.5 cm. in diameter. The typical shrubs are smooth with the exception of the glandular pedicels. Var. *pubescens* Eastwood (Leafl. West. Bot. 1:62,—1933) differs in the close pubescence on the inflorescence, young growth, and sparingly on the fruit. This is the largest and most common manzanita on Santa Cruz Island. When in bud the slender branches of the flower-clusters resemble strings of small beads with the round flower-buds nestling each in its small bract.

21. Arctostaphylos patula Greene, Pitt. 2:171 (1891). This is the common bushy manzanita of the upper but not alpine elevations of the mountainous regions of the Pacific Coast and extends from Washington to the mountains of Lower California. It is an openly branching shrub, becoming a meter or more in height, with smooth dark red old stems, the young smooth or slightly puberulent. Leaves spreading, orbicular, ovate, or even lanceolate, bright green, smooth, apex obtuse or acute, base obtuse, truncate or subcordate. The flowers are generally rose-color, in large spreading panicles, the branches of which are generally dark with a peculiar glandular puberulence; the bracts are lanceolate-acuminate to deltoid and the spreading pedicels smooth. The berries are generally large, glossy, dark brown or black when ripe. It is one of the most beautiful when in bloom and extremely variable in the shape of the leaves.

Arctostaphylos platyphylla (Gray) Kuntze (Rev. Gen. 385,—1891) can scarcely be separated from the above species. The pubescence of the inflorescence is similar, the leaves are the same except that the ovate-lanceolate ones seem more prevalent and somewhat heavier. It was made a variety of *A. pungens* by Gray, who founded it on the narrower-leaved shrubs of Utah (Syn. Fl. 2, pt. 1:28,—1878). It is the manzanita found in Nevada, Utah, and Arizona.

22. Arctostaphylos elegans Jepson, Erythea 1:15 (1893). Erect widely branching shrub, 1-2 m. high; branches and inflorescence smooth; leaves bright green, thick, smooth, and veiny, from 3 cm. long and 2 cm. wide to 7 cm. long and 4.5 cm. wide, apex acute or obtuse, petioles about 1 cm. long; flowers in simple racemes or panicles, white, 8 mm. long, on spreading pedicels surpassing the short deltoid spreading bracts; fruit globular, viscid, almost 1 cm. in diameter, with no or very little pulp. This is found in Lake, Napa, and Sonoma counties. It is common between the first and second peaks on Mount St. Helena.

23. ARCTOSTAPHYLOS MANZANITA Parry, Bull. Cal. Acad. Sci. 2:491 (1887). This is generally a tall arborescent shrub, the commonest and earliest in bloom in Lake, Sonoma, Napa, and Mendocino counties and in the foothills of the Sierra Nevada from Shasta County to Stanislaus County and perhaps farther south. It is variable in shape of leaves, size and color of the flowers, from white to pink, but in general the flowers are more than 5 mm. long, very numerous in large spreading panicles, and often in bloom at Christmas. The shrubs sometimes become true trees with a single short trunk. The one dependable character seems to be the pubescence on the young growth and inflorescence. It consists of a fine white down. The plants are destroyed by fire and sometimes remain like skeletons in the weird landscape.

24. ARCTOSTAPHYLOS PARRYANA Lemmon, Pitt. 2:68 (1890). This was considered to be a variety of *A. Manzanita* by Parry and seems to the author to be better so regarded until more fully understood. The chief difference is the consolidation of the nutlets into a single nut.

25. ARCTOSTAPHYLOS OBTUSIFOLIA Piper, Bull. Torr. Club 29:642 (1902). "Much branched shrub, about 1 m. high; bark dark red, smooth; young twigs glandular-pubescent: leaves bright green, ovate, obtuse, the bases usually truncate, sometimes cuneate, glabrous except the petioles and the bases of the midribs, these pubescent; blades 2-3 cm. long, about twice the petioles: panicle terminal, pendulous, 3-4 cm. long, its reddish branches glandular; bracts reddish, ovate-triangular, obtuse, glandular; pedicels glabrous, 4-6 mm. long, 3-4 times as long as the bracts; calyx-lobes pink, ovate, obtuse, 1.5 mm. long: corolla pale pink, urceolate, 5-6 mm. long, sparsely hairy within: filaments hairy at the broadened bases: fruit globose, 8-9 mm. in diameter, the nutlets not united. In great thickets about Black Butte, eastern Oregon, 30 July 1901, *Cusick, 2688a.*"

26. ARCTOSTAPHYLOS JEPSONI Eastwood, spec. nov.* Erect spreading shrub, 1-2 m. high; old stems almost black, young stems, petioles, and branches of the panicle glandular-pubescent; leaves bright green, oblong to broadly elliptic, from 5 cm. long and 3 cm. wide to 2.5 cm. long and 1 cm. wide, base generally obtuse, apex apiculate, petioles slender, 5-10 mm. long; flowers white, about 6 mm. long, in slender branching panicles, bracts ovate-acuminate, very small, pedicels spreading, glandular, about 5 mm. long; ovary and fruit smooth, ovoid or flattened-globular. Flowering shrubs from near Stella Lake,

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* **Arctostaphylos Jepsoni** Eastwood, spec. nov. *A. Mariposa* var. *bivisa* Jepson, Madroño 1:79 (1922). Frutex viridis, 1-2 m. altus; ramis gracilibus, glandulare hispidulis; foliis ovatis, oblongis, ellipticis, maximis 5 cm. longis, 3 cm. latis, minimis circa 3 cm. longis, 2 cm. latis, mucronatis, inferiore parte et petiolis, glandulare hispidulis; pedunculis et pedicellis gracilibus et glandulosis, bracteis late subulatis, pedicellis multo brevioribus; floribus albis, 6-7 mm. longis; fructo glabro et nitente.

Type: No. 171298, Herb. Calif. Acad. Sci., collected May 25, 1923, near Stella Lake, Wawona, Mariposa County, by John Thomas Howell, *No. 17*. Fruiting specimen, type No. 188924, Herb. Calif. Acad. Sci., obtained by the same collector, *No. 6683*, south of the summit of Chowchilla Mountain, Mariposa County. The fruit was immature, collected June 8, 1931.

Wawona, Mariposa County, fruiting shrubs from just south of the summit of Chowchilla Mountain, Mariposa County, both collected by J. T. Howell.

27. ARCTOSTAPHYLOS ANDERSONI Gray, Proc. Am. Acad. 11:83 (1876). Tall shrubs with erect branches; old stems smooth, red-brown, young stems clothed with a sparse white down and white spreading bristles which are on the petioles and extend up the midribs of the leaves; leaves bright green, sessile or almost so, oblong, 5-7 cm. long, 2.5-3 cm. wide, base auriculate, apex acuminate, lower margin spinulose-serrulate, often overlapping; flowers white, about 7 mm. long, in widely spreading almost sessile panicles; bracts generally lanceolate, shorter than the glandular fruiting pedicels; fruit flattened-globular, viscid. This grows in Santa Cruz County in and near the redwoods.

28. ARCTOSTAPHYLOS IMBRICATA Eastwood, Proc. Calif. Acad. Sci., ser. 4, 20:149 (1931). Low spreading shrub; bark deciduous but glossy and rather rough; young branches clothed with short and long viscid hairs; leaves bright green, oblong-ovate, cordate and almost sessile at base and so closely placed as to be imbricated, glabrous except for some viscid hairs on the lower part of the midrib, 2-3 cm. long, 1-2.5 cm. wide, entire or slightly serrate at base, apex acute; flowers white, about 3 mm. wide and long, in dense, almost sessile racemes or panicles; bracts similar to the leaves but smaller and diminishing upwards, more viscid and hairy-ciliate, surpassing the glandular pedicels; ovary glandular-pubescent; fruit globular, 6 mm. in diameter. This seems restricted to the San Bruno Hills, San Mateo County.

29. ARCTOSTAPHYLOS REGISMONTANA Eastwood, Leafl. West. Bot. 1:77 (1933). Erect spreading shrub, about 1 m. high; old stems black-glandular-hairy and viscid-pubescent; leaves pale green, oblong, sessile, auriculate at base, 2-6 cm. long, 2-3 cm. wide, apex acute, margin entire, ciliate, upper surface almost smooth, lower short-hairy; flowers rose-color or white in almost sessile widely spreading panicles with linear, nerved bracts, viscid and glandular-villous, generally surpassing the glandular-villous pedicels in flower; ovary glandular-villous; fruit viscid, flattened-globular. A species growing on Kings Mountain, San Mateo County, the rose-colored variety set off by the pale-green foliage.

30. ARCTOSTAPHYLOS PALLIDA Eastwood, Leafl. West. Bot. 1:76 (1933). Erect spreading shrubs, about 1 m. high; old stems black-purple, young stems downy and bristly-hairy; leaves thin, smooth, pale green, sessile and imbricated, base auriculate, apex acute, 3-5 cm. long, 1-2.5 cm. wide; flowers white, 5 mm. long, in sessile panicles with green almost smooth leafy bracts; pedicels glandular, varying in length; ovary and fruit glandular. On the hills back of Piedmont, Alameda County. It is related to *A. Andersoni,* differing in color of foliage, size and shape of leaves, habit of growth, sessile panicles, and smaller flowers.

31. ARCTOSTAPHYLOS SETOSISSIMA Eastwood, Leafl. West. Bot. 1:78 (1933). Tall shrub with erect branches; stems white-downy and with

white bristly hairs often 5 mm. or more long, usually glandular; leaves similar to those of *A. virgata* but with a fine white glandular tomentum which wears off; flowers in short dense panicles, the pedicels glandular, shorter than the lanceolate bracts; fruit flattened-globular, viscid. Common along the coast in Mendocino County; varying in the shape of the leaves, some with the leaves more rounded at the top and less than twice as long as broad.

32. Arctostaphylos Tracyi Eastwood, Leafl. West. Bot. 1:79 (1933). Shrub with tall erect stems, about 2 m. high; old stems red-purple, young puberulent; leaves ovate, oval or narrowly elliptical, 3-6 cm. long, 2-3 cm. wide, green, thin, leathery, veiny, smooth, apex apiculate, base obtuse, margin entire or somewhat wavy, petioles about 5 mm. long, puberulent; flowers 6 mm. long, in almost sessile panicles with leafy, puberulent, lanceolate, green, one-nerved bracts surpassing the smooth pedicels, the lowest 1.5 cm. long, 3 mm. wide at base; ovary densely white-downy. Big Lagoon and Patrick's Point, Humboldt County. It is related to *A. virgata, A. setosissima,* etc., but distinguished by being almost smooth and entirely without viscidity.

33. Arctostaphylos virgata Eastwood in Sarg., Trees and Shrubs 1:203 (1905). Tall shrubs with erect branches clothed with a dark, glandular, close pubescence; leaves bright green, thin, oblong, twice as long as wide, 4-6 cm. long, 2-2.5 cm. wide, with acute apex, obtuse base, petioles short, midribs and margins of leaves glandular-hairy; flowers white or rosy-tinged in densely flowered panicles with glandular lanceolate bracts longer than the glandular pedicels; fruit viscid, globular or somewhat flattened, dark brown when ripe. This fringes Muir Woods on the south side of Mount Tamalpais. It is one of the earliest in bloom, generally at Christmas. It is also found at other places in Marin County adjacent to the redwoods.

34. Arctostaphylos glandulosa Eastwood, Proc. Calif. Acad. Sci., ser. 3, 1:82 (1897). Low spreading shrubs with stems, leaves, inflorescence, and fruit viscid and glandular-hairy; leaves ovate-elliptical or even lanceolate, dark green, apex acute or obtuse, base obtuse; inflorescence short, branching; flowers white, about 8 mm. long; fruit brown when ripe and viscid. The type is common on the West Point Trail on Mount Tamalpais. What seems to be the same is found on Mount St. Helena and the mountains of Los Angeles County. It stump-sprouts after a fire and the large woody underground stems may be as old as the redwoods of Muir Woods.

35. Arctostaphylos intricata Howell, Fl. N. W. Am. 416 (1903). Erect shrub, 1-2 m. high, branching from the base and above; old stems almost black, young stems glandular-hairy and with an underlying downy pubescence; leaves oblong, elliptical or sometimes ovate, 3-5 cm. long, about 2 cm. wide, petioles hairy; flowers in short dense panicles, the bracts foliaceous, ovate-lanceolate, longer than the flowering pedicels, with ciliate margins; corolla rose-color or white, 4-5 mm. long and wide; ovary densely hairy; fruit flattened-globular, pubescent, 8-10 mm. in diameter. This is the most abundant species

on the old Gasquet road and in the valley near Adams Station on the Grants Pass road to Crescent City. When in fruit in August, the new leaves from the buds are pale-downy, yellowish-green, and the stems are clothed with spreading, glandular hairs. It is related to *A. glandulosa,* differing in habit, thinner leaves, and flowers much smaller.

36. ARCTOSTAPHYLOS BRACTEOSA (DC.) Abrams, Leafl. West. Bot. 1:84 (1934). *Andromeda bracteosa* DeCandolle, Prod. 7:607 (1839). Erect shrubs with old stems with shreddy bark, young stems clothed with dark, spreading, glandular hairs; leaves bright green, thin, elliptic, apex obtuse or mucronate, base generally obtuse, larger leaves 4 cm. long, 2.5 cm. wide; petioles short, with glandular-hairs which extend up the midrib and lower surface of the leaves; flowers generally white, 5-6 mm. long, in somewhat congested panicles, with glandular, lanceolate bracts surpassing the glandular pedicels; fruit apparently viscid. This is common around Monterey and the mountains adjacent.

Var. **hebeclada** (DC.) Eastwood, comb. nov. (*Andromeda bracteosa β. hebeclada* DC., lc.), is similar but without glandular hairs. Monterey.

37. ARCTOSTAPHYLOS SONOMENSIS Eastwood, Leafl. West. Bot. 1:78 (1933). Erect shrub with spreading branches, about 1 m. high; old stems almost black, young clothed with a close viscid puberulence; leaves oblong to ovate-lanceolate, 2-3 cm. long, 1-2 cm. wide, with pointed apex, lightly pubescent; flowers white, about 6 mm. long, in short almost sessile, densely flowered panicles; bracts leafy, surpassing the viscid pedicels; fruit viscid-pubescent. Sonoma County on Rincon Ridge near Santa Rosa.

38. ARCTOSTAPHYLOS SUBCORDATA Eastwood, Leafl. West. Bot. 1:61 (1933). Open-branching shrub, 1-2 m. high; old stems reddish-brown, young white-downy and generally with spreading glandular hairs; older leaves green, ovate-elliptical or somewhat lanceolate, 2-5 cm. long, 1.5-3 cm. wide, base subcordate, truncate, obtuse or acute, margin glandular-ciliate, petioles 2.5 mm. long, hispid, young leaves densely white-downy with rosy margins; flowers densely congested in almost sessile panicles, bracts foliaceous, viscid, glandular-ciliate, surpassing the pedicles; ovary densely white-hairy; fruit flattened-globular, reddish, sparsely hairy. This is common on Santa Cruz Island and is related to *A. glandulosa* Eastwood and *A. bracteosa* (DC.) Abrams.

39. ARCTOSTAPHYLOS CONFERTIFLORA Eastwood, spec. nov.* Tall bushes in sheltered dells or prostrate on rocky ledges; branches densely dark glandular-hairy; leaves generally broadly oval, sub-

* **Arctostaphylos confertiflora** Eastwood, spec. nov. Frutex elatus vel prostratus, viridis; ramis glandulare hispidis; foliis ovatis ovalibus, basi cordatis, apice obtusis, superiore parte glabris, inferiore parte et petiolis glandulare hispidis; inflorescentia ramosa glandulare hispida, bracteis foliaceis, confertis, oblongis obtusis; fructo glabro.

Type: No. 196181, Herb. Cal. Acad. Sci., collected December 6, 1930, on Santa Rosa Island, in a sheltered dell south of Black Mountain, by Ralph Hoffmann. A prostrate bush was collected on the same day, growing on rocky ledges.

cordate at base, somewhat overlapping, bright green, rounded at apex, varying from 3 cm. long and 1.5 cm. wide to 4.5 cm. long and 3 cm. wide, petioles and lower part of leaves glandular-hairy; flowers in densely flowered panicles with very glandular-hairy, obtuse, foliaceous, overlapping bracts in bud; fruit flattened-globular. This species of Santa Rosa Island approaches *A. pechoensis* var. *viridissima* in the shape of the leaves, but has not the auriculate leaf-bases of that species and has a more glandular and denser inflorescence. This is an insular variation quite different in general appearance from *A. subcordata,* its relative on Santa Cruz Island.

40. Arctostaphylos Pringlei Parry, Bull. Calif. Acad. Sci., 2:494 (1887). An erect shrub with spreading branches; old stems red-brown, smooth; young branches, petioles, and inflorescence glandular-hairy; leaves pale green, varying greatly in size and shape, 5 cm. long and about 4 cm. wide to 2.5 cm. long and 1 cm. wide, ovate, narrowly oblong, elliptical, or almost orbicular; flowers generally rose-color, 6-8 mm. long, in large spreading almost sessile panicles; bracts membranous, rose-color or sometimes greenish, lanceolate or linear, shorter than the long, slender, glandular pedicels; fruit globular or depressed, the typical form from Lower California and Arizona with nutlets variously separable. The young leaves from buds are thin, green or rose-color, and appear when the shrubs are in flower. They are in striking contrast to the old, pallid leaves.

Var. drupacea Parry, lc., 495. *A. drupacea* Macbr., Contrib. Gray Herb. 53:16 (1918). This is the common form in Southern California and differs from the type only in the consolidation of the nutlets into one.

41. Arctostaphylos zacaensis Eastwood, Leafl. West. Bot. 1:79 (1933). An erect branching shrub; old stems dark red, young stems densely glandular and with glandular spreading hairs; leaves pale green, oblong, ovate or almost round, 2-6 cm. long, 1-4 cm. wide, minutely pubescent, apex obtuse or apiculate, base obtuse, margin entire or minutely spinulose-serrulate, petioles glandular-hairy, 5-10 mm. long; flowers congested in short, almost sessile panicles, bracts glandular and hairy, lower bracts lanceolate, longer than the upper, pedicels glandular, in fruit surpassing the bracts; fruit immature with slightly pubescent, separable nutlets. On the mountains around Zaca Lake, Santa Barbara County. In Ventura and Santa Barbara counties inadequate specimens seem related to this; also shrubs common in the mountains of San Diego County.

42. Arctostaphylos Howellii Eastwood, spec. nov.* Erect shrubs with spreading branches; old stems smooth, dark brownish-red,

* **Arctostaphylos Howellii** Eastwood, spec. nov. Frutex flavo-virens, circa 1-2 m. altus; ramis junioribus rubescentibus et vestitis albo tomento; foliis tomentulosis ellipticis, maximis 5-6 cm. longis, 2 cm. latis, minimis 3 cm. longis, 2 cm. latis; inflorescentia glandulare hispida, bracteis foliaceis, lanceolatis; fructo viscido.

Type: No. 187976, Herb. Cal. Acad. Sci., collected October 25, 1930, in the canyon of the Arroyo Seco River, Santa Lucia Mountains, Monterey County, by John Thomas Howell, in whose honor it is named. It is his *No. 5687.* Three other collections were made, differing only in the general shape and size of the leaves. It is apparently a stump-sprouter.

young stems reddish under a close white down; leaves pale yellowish-green, elliptic to suborbicular, apex acute, base obtuse or acute, shorter leaves 3 cm. long and 2 cm. wide, longer leaves 5 cm. long and 2.5 cm. wide, both sides clothed with a sparse white down; inflorescence very glandular, branching, bracts linear, pale green; fruit flattened-globular, viscid, with separable nutlets. Arroyo Seco Canyon, Monterey County, growing amid chaparral. Apparently it is a stump-sprouter. It is a pleasure to name this in honor of the zealous collector, John Thomas Howell, his *Nos. 5686, 5687, 5684, 5685.*

43. Arctostaphylos auriculata Eastwood, Bull. Torr. Club. 32:202 (1905). Low spreading shrubs clothed with dense white down and bristly hairs; leaves pale-downy, sessile or almost so, ovate, overlapping, with rounded auricles at base, 2-4 cm. long, 2-2.5 cm. wide, rather thick; flowers white, 6-7 mm. long, in short sessile panicles with linear bracts surpassing the pubescent pedicels. Mount Diablo, along the old trail from the Country Club. It is related to *A. canescens* Eastwood.

44. Arctostaphylos pechoensis Dudley in Abrams, N. Am. Fl. 29:98 (1914). A bushy shrub with smooth bark and somewhat white-tomentose branches; the leaves auriculate at the sessile or subsessile base and slightly tomentose so that the bushes have a pale green appearance. The type came from the Pecho Mountains, San Luis Obispo County, and it is found also in other parts of the county.

The variety *viridissima* Eastwood (Leafl. West. Bot. 1:62,—1933), with bristly-hairy stems and bright green leaves, was described from plants on Santa Cruz Island. It also is found in parts of San Luis Obispo County.

45. Arctostaphylos tomentosa (Pursh) Lindl., Bot. Reg. 21: pl. 1791 (1836). *A. vestita* Eastwood in Sarg., Trees and Shrubs, 1:205 (1905). Erect, branching shrubs with old bark shreddy, young white-tomentose; leaves generally oblong, about 3-4 cm. long, 1-2 cm. wide, base obtuse, truncate or subcordate, apex aristulate; flowers white, about 6 mm. long, in short spreading panicles; bracts and branches of the panicle tomentose, the former lanceolate, surpassing the pubescent pedicels; fruit flattened-globular, about 8-10 mm. in diameter. Along the Monterey Bay and extending to San Simeon Bay and Santa Cruz Island. A variety growing near Año Nuevo Point, where *Pinus radiata* reaches its northern limit, is found with stems having spreading hairs.

I am considering the type of this to be the specimen with lower leaf-surface tomentose, on the sheet in the Herb. Brit. Mus. said to have been collected by Menzies on the Northwest Coast of America and named *Arbutus tomentosa* by Pursh (Fl. 1:282,—1814). Lindley's *A. cordifolia* (Bot. Reg. 21, under plate 1791), also collected by Menzies on the Northwest Coast of America, is probably a part of the same collection and both must have been collected at Monterey, the only place visited by Menzies with manzanitas having the lower leaf-surface tomentose and the upper shining. My opinion was reinforced

by this letter from Dr. Alfred Rehder, written in 1909, in answer to my inquiries concerning the type of *A. tomentosa*:

"Enclosed I send you a leaf from the type specimen of Arbutus tomentosa which Dr. Britten kindly gave me for you. Unfortunately there is no locality given, only N. W. America, Menzies & Nelson, and the specimen consists of several branches belonging apparently to two different species; I took the specimens with the leaves tomentose beneath as representing the type, of which I shall append here a short description:

"Leaves 3 to 4 cm. long, dark green above, whitish tomentose beneath. Corolla 5 mm. long, calyx-lobes semiorbicular, minute, ciliate. Branchlets, petioles and peduncles covered with a short and dense villous and whitish tomentum, not glandular.

"The other specimens on the same sheet have hispid branchlets, hispid petioles and almost glabrous leaves only cililate and sparingly hispid on the midrib beneath.

"I hope the description and the leaf will enable you to fix the type of the species; I suppose the trouble has been, that the specimens which do not belong to tomentosa have been included in the description." (Arnold Arboretum, Aug. 31, 1909.)

46. ARCTOSTAPHYLOS CAMPBELLÆ Eastwood, Leafl. West. Bot. 1:74 (1933). Erect shrub with spreading branches, about 1 m. high; old stems black-purple, young clothed with a fine white down and white spreading hairs; leaves yellowish-green, the older becoming smooth, the younger somewhat white-downy, oblong, elliptic or ovate, 3-4 cm. long, 1-2 cm. wide, apex cuspidate, base obtuse, margin entire or minutely spinulose-serrulate, petioles villous and downy, about 5 mm. long; flowers white, about 5 mm. long and wide, in almost sessile spreading panicles; lowest bracts foliaceous, upper becoming smaller, brownish at apex, downy, shorter than the pubescent pedicels; ovary tomentose; fruit sparsely white-hairy. This is the common species on the summit of Mount Hamilton. It is related to *A. canescens* Eastwood, differing in smaller flowers and the spreading white hairs on the stems. The tone of the bushes is yellowish-white instead of ashy-white.

47. ARCTOSTAPHYLOS COLUMBIANA Piper, Fl. N. W. Coast 279 (1915). Erect widely branching shrubs, 1-3 m. high; young stems densely white-downy and with spreading white hairs often gland-tipped; leaves pale when young with a dense white down on both surfaces, becoming smoother and bright green when older, oblong to oblong-ovate, petioles short; flowers short, about 6 mm. long, in short panicles or racemes, with lanceolate bracts surpassing the pedicels; ovary densely white-hairy; fruit flattened-globular, 1 cm. in diameter. This is the commonest species from Vancouver Island to Washington and probably farther south. It has been considered as the true *A. tomentosa* (Pursh), the confusion arising from more than one species having been mounted on the type sheet. In the author's opinion, Pursh described the Monterey shrub which was afterwards described as *A. cordifolia* Lindley and *A. vestita* Eastwood and is

most deserving of the name *tomentosa* because it is so distinctly white-tomentose on the lower leaf-surface. No specimens have been seen with cordate leaves.

48. ARCTOSTAPHYLOS CANESCENS Eastwood, Proc. Calif. Acad Sci., ser. 3, 1:84 (1897). Low shrub on gravelly slopes or taller amid other chaparral; stems dark red, young growth densely white-downy; leaves when young very pale and downy, becoming smoother when old, oblong-obovate or ovate, 1.5-3 cm. wide, 3-4 cm. long, thick and pale, petioles 4-10 mm. long; flowers generally pink, 8-9 mm. long, in short densely flowered panicles, on white-downy pedicels 5-10 mm. long; bracts foliaceous, lanceolate-subulate, generally surpassing the pedicels; fruit flattened-globular, red-tinged when young, becoming brown, sometimes smooth or with a bloom. This is destroyed by a fire and reproduces by numerous seedlings which often bloom on Mount Tamalpais, the type locality, when only a few inches high. It is one of the first to bloom, depending on the first good rains, generally in bloom at Christmas and one of the most attractive species. It is also found in the Santa Cruz Mountains and on Mount St. Helena.

49. ARCTOSTAPHYLOS STRIGOSA Howell, Fl. N. W. Am. 417 (1903). Erect shrub with spreading branches; old stems red-purple, young densely white-velvety-downy; leaves broadly oval, sometimes obovate, rounded or apiculate at apex, varying, the type about 4.5 cm. long, 3.5 cm. broad, distinctly pallid, with round petioles; flowers white, in panicles, with lanceolate foliaceous bracts generally longer than the flowering pedicels; ovary densely white-hairy; fruit flattened-globular, less than 1 cm. broad. Specimens that seem to be this species were collected at Waldo, Oregon, on the boundary mountains near Gasquet, Del Norte County, California, and at Anderson's, Josephine County, Oregon. This last greener than the type and approaching *A. bracteata.*

50. ARCTOSTAPHYLOS BRACTEATA Howell, Fl. N. W. Am. 417 (1903). Intricately branching shrubs; old stems dark purple-brown, young clothed with a sparse, dark, downy pubescence; leaves bright green, broad, ovate to broadly oblong or elliptic, not much longer than wide, apex acute, base obtuse, petioles short, flat; inflorescence short and almost sessile, with lanceolate, downy bracts which surpass the pubescent or glandular pedicels; fruit flattened-globular, pubescent but not glandular. Specimens collected in woods near Takilma, Josephine County, Oregon, seem to agree with the type. From an examination of the types of this and *A. strigosa* Howell, the chief difference seems to be in the color of the leaves, *A. strigosa,* pale and velvety, *A. bracteata,* green and less pubescent. In both the leaves are large and broad.

51. ARCTOSTAPHYLOS CUSHINGIANA Eastwood, Leafl. West. Bot. 1:75 (1933). A rather low densely branched shrub; old stems dark purple, young stems white-pubescent; leaves pale with a bloom that rubs off, lanceolate, ovate or elliptical, 2-4 cm. long, 1.5-2.5 cm. wide; flowers white, congested in almost sessile panicles, the lowest bracts leafy, linear-lanceolate, about 2 cm. long, the upper ovate, surpassing

the flowering, glandular pedicels; fruit smooth, flattened-globular. This is not destroyed by fire but stump-sprouts. It is the common species on lower elevations of Mount Tamalpais.

52. ARCTOSTAPHYLOS CRUSTACEA Eastwood, Leafl. West. Bot. 1:74 (1933). Erect branching shrub, 1-2 m. high; old stems dark purple, young densely downy and with white spreading hairs; leaves bright green, thin, oblong to roundish and sometimes lanceolate, 2-4 cm. long, 1.5-3 cm. wide, base obtuse, truncate, or subcordate, apex apiculate or acute, margin entire or serrulate; young leaves pubescent on lower surface, petioles about 5 mm. long, pubescent and villous; flowers rose-color or white, 5 mm. long, in almost sessile panicles, the lowest bracts leafy, the upper deltoid-acuminate, edged with hairs, pedicels about 5 mm. long, pubescent. This species, which seems to be entirely without any glandular pubescence, is common on the hills of Contra Costa and Alameda counties and is found also in Santa Cruz County and at Lake Merced, San Francisco.

53. ARCTOSTAPHYLOS ROSEI Eastwood, Leafl. West. Bot. 1:77 (1933). An erect branching shrub, about 1 m. high; old stems smooth, black-purple, young branches sparsely downy and without spreading hairs; leaves linear-oblong or ovate-oblong, thin and leathery, bright green, 4-6 cm. long, 1-2.5 cm. wide, apex pointed, base obtuse, petioles 2-5 mm. long; flowers white or tinged with rose, 5 mm. long, in almost sessile panicles with slightly downy branches, bracts green or reddish, keeled, lower ones foliaceous, upper short, deltoid, smooth or sparsely downy, ciliate, pedicels pubescent, shorter or longer than the bracts; fruit flattened-globular, sparsely pubescent. On hillsides bordering Lake Merced, San Francisco. It blooms a little earlier than the preceding at Lake Merced.

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EUPHORBIA ON GUADALUPE ISLAND

BY LOUIS C. WHEELER
La Verne, California

Concerning the occurrence of Euphorbiaceæ on Guadalupe Island, Lower California, J. T. Howell states "a species of Euphorbia was collected . . ., the first member of the Euphorbiaceæ to be found on the island" (Leafl. West. Bot. 1:51,—1933). However, there were earlier collections. A specimen of *E. melanadenia* Torr. from the island is in the herbarium of the Field Museum, *Palmer No. 783 in 1889*. Also two collections of *E. Pondii* Millsp. were made by Palmer in 1889: *No. 789* in the Field Museum and *No. 883* in the Field Museum and the Gray Herbarium. Millspaugh, in the original publication of *E. Pondii* (Contrib. U. S. Nat. Herb. 1:12,—1890), mentions, besides Lieutenant Pond's collection at Plaza Maria, Lower California, the type, "also Guadalupe Island by Palmer." *Euphorbia guadalupensis* J. T. Howell (Leafl. West. Bot. 1:51,—1933) is identical with *E. Pondii* Millsp. I have compared the types (*E. Pondii,* Field Museum No. 197298; *E. guadalupensis,* Cal. Acad. Sci. No. 200324) and can find no difference between the two.

MOLUCELLA LÆVIS L., figured in Bot. Mag., plate No. 1852. Should the Molluca Balm become established along water courses and in waste places of northern California, an exotic note will be introduced into our north country by the unusual appearance of this Syrian mint. A fruiting specimen with its remarkable calices was received in August, 1931, from Mr. C. E. Graves, who found it on a gravel bar of the Trinity River near Helena, where it is probably a garden-escape. It is also called Shell-Flower "because of the shell-like calyx in which the seeds nestle like eggs."—J. T. H.

POTENTILLA (COMARUM) PALUSTRIS (L.) SCOP. The Marsh Potentilla was collected as far south as southern Mendocino County in September, 1931, an extension of range southward along the Californian coast from Del Norte County. It was found by the writer in a peaty bog on a slough of the Garcia River bottom, three miles north of Point Arena. (*J. T. Howell No. 8113*).—J. T. H.

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BOTANICAL
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NOTES ON ROCKY MOUNTAIN PLANTS—I

BY LOUIS WILLIAMS
Missouri Botanical Garden, St. Louis

THE DISTRIBUTION OF GENTIANA BARBELLATA. *Gentiana barbellata* Engelm. is one of those montane plants with an altitudinal range of 9,000 to 12,000 ft. which flower late in the season in late August and early September, after collectors have usually gone from the field. Its distribution as shown by specimens in herbaria is rather disconnected.

It was first discovered and collected by Dr. C. C. Parry on Mt. Flora in the Snowy Range between Middle Park and South Park in Colorado. Several subsequent collections show its distribution from the Medicine Bow Mountains and Park Range down the Sawatch Range and over into the Colorado Front Range, and onto the higher peaks of the Needle and San Juan mountains. From these latter mountains there is a long break in its distribution across the Colorado Plateau to the isolated La Sal Mountains of Utah. Tidestrom [1] questioned its occurrence in Utah but reported it from Arizona. Wooton and Standley [2] reported it from northern New Mexico in the Sangre de Cristo Range and San Juan Mountains. Northward it has been collected by Dr. Aven Nelson in the Medicine Bow Mountains not far north of the Wyoming-Colorado line. It is possibly on this collection that Rydberg [3] gave the range of the species as "Colo.—Wyo." This collection, so far as is known to the author, was the northernmost collection of the species and the only one from Wyoming before 1933.

During the summer of 1933, Mr. O. J. Murie collected a suite of plants, consequent to his studies of the Rocky Mountain or Bighorn Sheep, in northwestern Wyoming and sent them to the author for determination. Among them was an excellent specimen of *Gentiana barbellata* which almost exactly corresponds to Engelmann's type. This collection extends the range some 300 miles northwestward from the previously known northern limit.

How this species of the high altitudes has attained its present distribution raises an interesting problem. Certainly it could

1 Flora of Utah and Nevada, Contrib. U. S. Nat. Herb. 25:416 (1925).
2 Flora of New Mexico, Contrib. U. S. Nat. Herb. 19:501 (1915).
3 Flora of the Rocky Mountains and Adjacent Plains, 659 (1922).

not have crossed the Colorado Plateau region which separates the mountains of southwestern Colorado from the La Sal Mountains of Utah. Similarly it is difficult to think of it crossing the forbidding Wyoming Basin from the high mountains of southern Wyoming toward those of northwestern Wyoming, or *vice versa.* Possibly, however, it may be regarded as a relict which was widely distributed when the topography and climate were different from what we know today; and, later, when uplifts and sags occurred and the climate changed, it followed up the mountains, remaining in a habitat similar to its original habitat. It is interesting to note, in connection with its known distribution, that it occurs for the most part on Pre-Cambrian formations.

It is fairly safe to predict, now that the species is known to occur in the Gros Ventre Mountains, that it will be found to occur along the high Wind River Mountains and some of the other mountains closely connected with the Gros Ventre Mountains when those little known mountains have been botanized as thoroughly as have the mountains of Colorado.

Collections. WYOMING: Brooklyn Lake, Albany Co., *A. Nelson;* Crystal Creek Divide, Teton Co., *O. J. Murie No. 1052.* COLORADO: near Breckenridge, Summit Co., *T. S. Brandegee,* Aug. 1871; sw. Colorado, without date or locality, *T. S. Brandegee;* Mt. Flora, (probably Boulder Co.), Sept. 1862, *C. C. Parry;* Colorado Territory, *Parry in 1864* and *1872,* possibly both from north central Colorado; Arapahoe Peak, Boulder Co.,[4] *Francis Daniels No. 836;* Gentian Dell, *F. E. and E. S. Clements No. 214* (possibly El Paso Co. or Teller Co.); Wagon Wheel Gap, Mineral Co., *John Murdock Jr. No. 4976;* high mountains about Gray's Peak near timberline, Clear Creek Co. or Summit Co., *H. N. Patterson No. 94;* Upper Clear Creek Valley, Clear Creek Co., *G. Engelmann,* Sept. 9, 1874; rocky slopes of Georgetown Pass, Clear Creek Co., *G. Engelmann,* Aug. 1874; Berthoud's Pass, Larimer Co., *G. Engelmann,* Sept. 2, 1874; Gray's Peak, Clear Creek Co. (?), *M. E. Jones No. 800.* UTAH: La Sal Mts., Grand Co. or San Juan Co., *Purpus No. 7032.*

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[4] The type of *G. Moseleyi* A. Nels., a synonym, came from somewhere in Boulder Co.

Polemonium viscosum Nutt. forma **leucanthum** L. Wms., forma nov. Corolla alba.

Wyoming: rock slide, Hoback Canyon, June 24, 1932, *Williams & Pierson No. 705* (type, Herb. Mo. Bot. Gard.).

The type was collected from a large colony of polemoniums, on part of which were borne white flowers and on part the normal blue ones. Except in the color of the flowers, the plants seemed to be identical. The following summer, 1933, an opportunity came to visit the colony again. Much to the author's surprise not one bunch bearing white flowers could be found in the entire colony. *Williams & Pierson No. 706* and *Williams No. 1149* are collections of blue-flowered plants from the same colony.

* * *

CRYPTANTHA PUSTULOSA Payson, Ann. Mo. Bot. Gard. 14: 252 (1927). (*Oreocarya pustulosa* Rydb., Bull. Torr. Bot. Club 40:480,—1913; *Hemisphærocarya suffruticosa* (Torr.) Brand var. b. *pustulosa* Brand, Pflanzenreich heft 97:156,—1931.) This was collected on the Sand Hills, Creston, Colorado, July 18, 1928, by Francis Ramaley, *No. 12,064* and *12,085*. Only two previous collections are known to the author, namely, *Rydberg & Garrett No. 9326* and *9569,* both from Elk Mountain in southeastern Utah and both in flower. Dr. Ramaley's collections, which are in fine fruit, extend the range some 200 miles eastward. The specimens are in the Rocky Mountain Herbarium.

GLADIOLUS SEGETUM KER-GAWL. IN SONOMA COUNTY, CALIFORNIA. Mrs. Adeline Crane, Petaluma, California, has recently sent good specimens of this southern European species for identification. She has noted it as growing on a part of the Vallejo Grant where she is living and has seen it appear for ten years, coming up in different places. As it is a native of the Mediterranean region, it was perhaps introduced by some member of the Vallejo family during the Spanish dominion as a desirable plant for the garden, has escaped, and is now growing as a native. In Curtis Botanical Magazine, where it is figured and described, pl. 719, it is called the Round-seeded Cornflag. The Venetian name is Ghiaggiulo. It is said to grow among corn and in dry sunny exposures on low hills in its native home.—Alice Eastwood.

NEW SPECIES IN LILIACEÆ

BY ALICE EASTWOOD

Allium cratericola Eastwood, spec. nov. Humile; folio radicali solitario, plano, falcato, 1-2 dm. longo, 3-5 mm. lato; scapo 3-4 cm. alto, 1-2 mm. lato, paulo plano, rubro; umbella multiflora, involucro tribracteato, bracteis conjunctis, atro-purpureis, ovatis, 1 cm. latis, apice caudatis, cauda 5 mm. longa; floribus basi attenuatis ad pedicellos 10 mm. longos; perianthii segmentis rubro-purpureis, linearioblongis, obtusis, 10-14 mm. longis, circa 4 mm. latis, interioribus paulo angustioribus; staminibus ad basem perianthii adnatis, filamentis linearibus, 5 mm. longis, basi dilatis et conjunctis; antheris lineari-oblongis, purpureis, 1 mm. longis; ovarii cristis brevibus, obtusis, stylum circumdatis; stylo 4 mm. longo, stigmate capitato; seminibus 5-6, ovoidis, atris, reticulatis.

Type: Herb. Calif. Acad. Sci., No. 81319, collected by the author in the crater area on Mount St. Helena, California, May 1, 1918, and in fruit, June 16, 1915. It grows in the sand and seems barely to lift its purple-flowered umbels from the ground over which its one long leaf spreads. The dark purple involucre has three partially united bracts with tail-like tips. The bulb has somewhat thin papery coats with a very minute reticulation. The sepals are obtuse, purple with a darker midvein, the stamens are about two-thirds as long, and the blunt short crests of the ovary closely surround the style. Several black seeds ripen in each pod. Sometimes two bulbs grow together.

This species seems to be related to *A. tribracteatum* Torr., a species from the Sierra Nevada. *Allium tribracteatum* has two leaves and more pointed sepals. The comparison has been made with the description of *A. tribracteatum* as no authentic specimen has been seen. *Allium cratericola* is very abundant in the old crater.

Allium yosemitense Eastwood, spec. nov. Humile; foliis radicalibus 2, planis, 2-5 dm. longis, 1-3 mm. latis; scapo 5-10 cm. alto, 1-3 mm. lato, paulo plano, rubro; umbella multiflora, involucro tribracteato, bracteis conjunctis, purpureis, ovatis, 1 cm. latis, apice caudatis, cauda 5 mm. longa, filiformi; floribus pallido-roseis, pedicellis purpureis, filiformibus, 1-2 cm. longis; perianthii segmentis lineari-oblongis, acutis, circa 1 cm. longis, 2 mm. latis; staminibus sepalis brevioribus vel longioribus, filamentis adnatis sepala, basi dilatis; ovarii cristis 6, brevibus, obtusis; stylo sepala superanti, stigmate minuto.

Type: Herb. Calif. Acad. Sci., No. 205887, collected by Mrs. Enid Michaels at the head of Bridal Veil Falls, Yosemite Valley, California, June, 1922. It is related to *A. anceps* Kellogg, differing in the much narrower longer leaves, an almost terete scape, larger flowers with broader sepals, and much longer style. It might be considered a subspecies of *A. anceps,* but the differences are so pronounced that specific rank seems advisable. The flowers seem to grow larger as they become older. The bulb is large, covered with a thin black coat that has no perceptible reticulations.

Calochortus maculatus Eastwood, spec. nov. Scapus nanus, gracilis; basi folio solitario, 1-2 dm. longo, 8 mm. lato, subtus glaucescenti; foliis floralibus lanceolatis acuminatis; pedunculis gracillimis, floribus erectis, capsulibus nutantibus; floribus luteis, 2.5-3 cm. diametro; sepalis obovatis apiculatis, circa 14 mm. longis, 5-10 mm. latis, calvis; petalis obovatis obtusis, 10-15 mm. longis, 5-10 mm. latis, pauci-barbatis supra glandem, nigris curvisque infra; staminibus luteis, antheris attenuatis, longitudine filamentibus æqualibus; capsulis alatis, ovalis, circa 24 mm. longis, 14 mm. latis, alis 4 mm. latis.

Type: Herb. Calif. Acad. Sci., No. 212304. It was collected April 24, 1934, near Redding, Shasta County, California, by Mrs. C. F. Rose who sent it to the author for identification. It is related to *C. monophyllus* (Lindl.) Lem.,* differing in smaller flowers, petals less bearded, and differently shaped and less curved gland not excavated below. The most conspicuous difference is that which the specific name suggests, the black claws of the petals which appear like eyes and which give this pretty little star-tulip a wide-awake look that is distinctly attractive.

* This species was originally described as *Cyclobothra monophylla* Lindl. in Jour. Lond. Hort. Soc. 4: 81 in 1849. In the same year the species was transferred to the genus Calochortus by Lemaire in Fl. des Serres, ser. 1, 5: 430b. Unaware that the combination had been made, Jepson, in 1917, renamed it in Madroño 1: 61.

PRELIMINARY STUDIES IN THE GENUS GALIUM IN SOUTHERN CALIFORNIA

BY MARTHA HILEND
University of California at Los Angeles
AND
JOHN THOMAS HOWELL
California Academy of Sciences

The new species and varieties which are described in this paper and the new names and combinations which are given are preliminary to a systematic study of the genus Galium in Southern California which will appear in an early issue of LEAFLETS OF WESTERN BOTANY.

Galium angustifolium var. **bernardinum** Hilend and Howell, var. nov. Plantæ humiles et compactæ, 1.5-3 dm. altæ; foliis brevibus, sæpe 0.5-1 cm. longis; inflorescentia staminali elongata et angusta, inflorescentia pistillata pyramidali, ramulis divaricatis et floribus numerosis congestis; fructu 1.5 mm. in diametro, pilis 1 mm. longis, albis vel griseis.

Type: Herb. Calif. Acad. Sci. No. 193306, near Cactus Flats, San Bernardino Mountains, San Bernardino County, California, *Hilend No. 475;* isotype, Herb. Univ. Calif. at L. A.

Galium angustifolium var. **diffusum** Hilend and Howell, var. nov. Caulibus laxe et diffuse ramulosis; inflorescentiis staminalibus pistillatisque diffuse ramosissimis, floribus sæpe solitariis in pedicellis gracilibus.

Type: Herb. Calif. Acad. Sci. No. 193308, Saragosa Spring, upper Holcomb Valley, San Bernardino Mountains, San Bernardino County, California, *Hilend No. 533;* isotype, Herb. Univ. Calif. at L. A.

Galium angustifolium var. **foliosum** Hilend and Howell, var. nov. Plantæ compactæ vel diffusæ, 1-6 dm. altæ, subæqualiter omnino foliosæ; foliis congestis vel distantibus, mucronulatis, interdum margine ciliatis, 5-8 mm. longis; floribus staminiferis sæpe in inflorescentiis angustis, inflorescentiis pistillatis congestis vel diffusis in inflorescentiis foliatis; fructu 1-2 mm. in diametro, pilis fructu longitudine æqualibus vel nonnihil longioribus.

Type: Herb. Calif. Acad. Sci. No. 193289 (pistillate) and No. 193290 (staminate), from rocky exposed slopes, Anacapa Island, California, *J. T. Howell No. 3792.*

Galium angustifolium var. **siccatum** (Wight) Hilend and Howell, comb. nov. *G. siccatum* Wight, Zoe 5:54 (1900).

Galium Jepsoni Hilend and Howell, spec. nov. *G. angustifolium* var. *subglabrum* Jepson, Man. Fl. Pl. Calif. 962 (1925). Perenne; caulibus pluribus cæspitosis ex extremis rhizomatum, erectis, 1-2 dm. altis, glabris lævibusque; foliis lineari-oblongis, inferioribus brevibus et lanceolatis vel ovatis, 0.5-1.5 cm. longis, 2 mm. latis, apice acutis, margine setoso-ciliatis, glabris utrinque, costa prominente infra; inflorescentia pauciflore, anguste paniculata vel subracemosa, floribus 1 vel 3 in ramulis axillaribus suberectis, dicœcis; corolla circa 2 mm. in diametro, glabra; fructu 2.5-3 mm. in diametro, subpiloso, pilis crassiusculis, 1-1.5 mm. longis, ascendentibus et subappressis.

Type: Herb. Univ. Calif. No. 144128, Whitewater Basin, 7000 feet, San Bernardino Mountains, San Bernardino County, California, *Wilder No. 1113;* isotype, Herb. Pomona College.

The following note from Mrs. Wilder accompanies the type specimen: "It may be interesting to know that the whole 7000-foot contour in the Whitewater Basin is full of it. . . . It does not at all suggest *G. multiflorum* as it grows but does bear a resemblance to *G. angustifolium,* only it is never massed or bunchy as that usually is, but is sparingly branched, mostly from the root."

Galium Munzii Hilend and Howell, spec. nov. *G. Matthewsii* var. *scabridum* Jepson, Man. Fl. Pl. Calif. 963 (1925); not *G. scabridum* Jord., Pl. Crit. 3:136 (1846), nor *G. scabridum* Willk., Flora 35:541 (1852). Caules numerosi, ex caudice lignoso aut ex rhizomate brevi, erecti, ramulosi, foliosissimi, 2-3.5 dm. alti; cortice subcinereo, exfoliante in ætate; caulibus et foliis cinereis, pubescentibus; foliis quaternis, angusto-ovatis vel suborbicularibus, acuminatis, 6-12 (vel 15) mm. longis, plerumque uninerviis; inflorescentia tenui, 1-3 cm. lata, 6-14 cm. longa; floribus dicœcis, pedicellatis, plerumque erectis; corolla subviridi, 2-3.5 mm. lata, villosa extrinsecus, lobis oblongis vel late ovatis; fructu 1-2.5 mm. lato, villoso, crinibus 1-1.5 mm. longis, subalbidis.

Type: Herb. Pomona College No. 8305, Bonanza King Mine, 3,000 feet, east slope of the Providence Mountains, San Bernardino County, California, *Munz, Johnston and Harwood No. 4217;* isotype, Herb. Univ. Calif.

This species has a very natural range, extending from the north side of the San Bernardino Mountains, east to the Providence Mountains, and north to Lone Pine and the White Mountains, Inyo County, California, and adjacent Mineral County,

Nevada. It belongs to the *G. multiflorum* group, differing from *G. multiflorum* in having smaller fruits and a cinereous pubescence. It resembles *G. Matthewsii* in the size and pubescence of the fruit, but differs from it in the larger leaves and in the presence of stiff, whitish, almost hooked hairs that cover the whole plant. The pubescence, fruits and flowers, and the white midrib suggest *G. stellatum,* but it is amply distinct in the larger, more expanded leaves without the mucro at the tip. To the eastward, *G. Munzii* approaches *G. Watsoni* (Gray) Heller in habit and aspect, but the leaves of *G. Munzii* are broader and the typical form of *G. Watsoni* is "mostly glabrous and smooth" (Gray, Syn. Fl. 1, pt. 2:40).

Galium Munzii var. **carneum** Hilend and Howell, var. nov. Caulibus et foliis sæpe minus pubescentibus quam in specie; foliis reductis in inflorescentia idem in *G. Matthewsii*; corolla carnea, subpubescenti vel glabra.

Type: Herb. Calif. Acad. Sci. No. 193322 (staminate) and No. 193323 (pistillate), from loose rocky soil on south side of Surprise Canyon near Panamint City, 8,000 feet, Panamint Mountains, Inyo County, California, *J. T. Howell No. 3892.* Also collected by Mr. Ralph Hoffman in Wild Rose Canyon of the Panamint Mountains (Santa Barbara Museum, Univ. Calif. at L. A.).

Galium Munzii var. **subalpinum** Hilend and Howell, var. nov. Plantæ humiles; caulibus brevibus, debilibus, 2-10 cm. longis; foliis ovatis vel ovato-lanceolatis; floribus paucis in inflorescentia brevi; corolla viridi-flavescenti, glabra vel subpubescenti.

Type: Herb. Calif. Acad. Sci. No. 193324, Sawmill Creek, 9,700 feet, Inyo County, California, *Peirson No. 1189;* isotype in Herb. Frank Peirson. Also collected by Mr. Peirson in the Rock Creek Lake Basin, Inyo County, 11,000 feet (Herb. Calif. Acad. Sci., Herb. Frank Peirson).

Galium Parishii Hilend and Howell, nom. nov. *G. multiflorum* var. *parvifolium* Parish, Zoe 5:75 (1900); *G. parvifolium* (Parish) Jepson, Man. Fl. Pl. Calif. 963 (1925); not *G. parvifolium* Gaud. in Roem. & Schult., Syst. 3:246 (1818).

A Southwestern Variety of Galium stellatum. That form of *Galium stellatum* which occurs in the deserts of California and southern Nevada differs in aspect from the plants which have come from Cedros (Cerros) Island midway down

the coast of Lower California where the species is typical. In the typical form, the herbage is more densely cinereous-pubescent, the leaves are generally ovate-lanceolate with margin strongly revolute, and the very shortly pedicellate flowers are congested, generally in 3's, at the ends of branchlets, the uppermost leaves subtending them like an involucre. The plants of California and Nevada are more intricately branched with leaves lanceolate to linear-lanceolate and with the cymes expanded, each flower terminating a branchlet that is frequently leafy-bracted near the middle. Because of these differences the latter form is named as a new variety, *G. stellatum* var. *eremicum.*

To the eastward in New Mexico, a variant of *G. stellatum* has been named *G. acutissimum* Gray (Proc. Amer. Acad. 7: 350,—1869). Since it and var. *eremicum* exhibit a closer relationship to each other than does either to the typical variety on Cedros Island, the possible specificity of the mainland forms has been considered. However, a narrower specific concept appears impractical because of the absence of a single differentiating character of sufficient importance and because of the variable nature of the several distinguishing characters used to separate the varieties.

On the other hand, a study of the more eastern plants has shown nothing that is exactly referable to var. *eremicum,* and most collections from Arizona and New Mexico differ widely and variously. Hence it does not seem probable that var. *eremicum* and *G. acutissimum* will be found to be the same, although they are closely related. From *G. acutissimum,* the plant of eastern California and southern Nevada differs by its lower denser habit, the paler narrower leaves, and the more numerous smaller flowers.

Gallium stellatum var. **eremicum** Hilend and Howell, var. nov. Ramosissimum; caulibus foliisque subscabrido-pubescentibus; foliis lanceolatis vel lineari-lanceolatis, margine nonnihil revolutis, apice aceroso-acutis vel acuminatis; floribus staminiferis numerosis in panicula diffusa, floribus pistilliferis multis, solitariis in extremis ramulorum foliari-bracteatorum, pedicellis sæpe 2-3 mm. longis.

Type: Herb. Calif. Acad. Sci. No. 205124, granite ledges at the west end of the Sheep Hole Mountains, San Bernardino County, *Fosberg No. 7963;* isotype, Herb. Univ. Calif. at L. A.

ON THE TYPE OF GALIUM MULTIFLORUM KELL.

BY JOHN THOMAS HOWELL

In connection with work on the Southern Californian species of Galium, the specimens in Herb. Calif. Acad. Sci. that have long been regarded as the type of *G. multiflorum* Kell. were carefully examined. The specimens are on two sheets, one carrying four pieces of staminate material, the other a staminate branch and a fruiting branch; and both sheets bear data in Kellogg's hand stating that the plants were collected by Veatch at Washoe, Nevada. The study of these specimens showed that there are several discrepancies between the specimens and the original description (Proc. Calif. Acad. Sci. 2: 96,—1863), and the question arose whether the specimens should be regarded any longer as the type of the species. On page 96,* Kellogg states that the angles of the branches are scabrous, that the leaves are "minutely granular," and, on page 98, that the segments of the corolla are villous externally. The study of the specimens showed that the angles of the stems are glabrous and nearly smooth, that the leaves are not granular, and that the corolla-lobes are glabrous externally but very minutely ciliate-papillate. It seems evident that Kellogg in his description magnified the minute characters discussed, that the occasional low roughness on the angles of the stems he termed "scabrous," that the cellular-veiny appearance of the leaf he termed "granular," and that the marginal papillae of the corolla he termed "villous." Although there appears to be a reason for Kellogg's terminology, for purposes of practical taxonomic description, the stems and leaves would be described as smooth and glabrous and the corolla would be described as glabrous externally. Hence, it would seem that the Veatch specimens and the original description can be brought into approximate, if not complete, agreement. Moreover, a careful comparison of Kellogg's drawing (lc., p. 97, fig. 27) with the fruiting specimen collected by Veatch shows that the specimen was the very piece reproduced by Kellogg. Therefore it seems clear that the specimens so long accepted as typical of *G. multiflorum* should continue to be regarded as the type.

* The page bears the printed number 97, but in this volume of the Proceedings, pages 97 to 109 should read 96 to 108.

A NEW SPECIES OF TALINUM FROM BRITISH COLUMBIA

BY ALICE EASTWOOD

Talinum Wayæ Eastwood, spec. nov. Herba nana, cæspitosa, suffruticosa, 2 cm. alta, ex radice longa, lignea, rubiginosa; foliis deciduis, teretibus, 5-7 mm. longis, basi amplexicaulibus et rubiginosis; floribus solitariis vel cymosis ex scapis rubris filiformibus, 2 cm. altis, bracteis oppositis, ovato-acuminatis; sepalis 2, ovato-orbicularibus, rubris, 3 mm. diametro; petalis albis, concavis, suborbicularibus, 5 mm. diametro; staminibus 18, inæqualibus, antheris flavis; stigmate trilobato; capsula trivalvata, ovato-globosa, calycem superante.

Type: No. 216937, Herb. Calif. Acad. Sci. It is named in honor of its discoverer, Mrs. Allan E. Way of Kamloops, British Columbia. She collected it on Mt. Baldy, British Columbia, at an altitude of 3,400 feet, and reported it as growing in rocky soil on exposed hillsides. Living specimens were sent to the author by Charles W. Armstrong, Van Alpine Gardens, Vancouver, in May, 1934. The description was made from these plants which bloomed after arrival.

This pretty little Talinum forms low mats sometimes covering an area a yard square. When in bloom it is a lovely sight with its hundreds of flowers rising amid the tiny clusters of dark bluish-green leaves. The flowers are half an inch across, open about noon and close when the sun goes down. The corolla at first is tinged with yellow or pink, becoming white as it gets older. The scapes are threadlike, reddish and about an inch high. The stems above ground are rather thick and branch intricately over the ground.

NEW SPECIES OF FREMONTIA

BY ALICE EASTWOOD

Fremontia crassifolia Eastwood, spec. nov. Frutex, 2-3 m. altus; foliis crassis obtuse trilobatis, 3-4.5 cm. latis longisque, supra viridibus et subglabratis, infra dense stellato-tomentosis, venosis, senectute fulvescentibus; floribus luteis, circa 6 cm. diametro, segmentis calycis apice lineari-caudatis, exterioribus oblongis, 15-18 mm. latis, interioribus obovatis, 2 cm. latis; tuba staminali 8 mm. longa, filamentibus 3 mm. longis, antheris æqualibus; capsula conica, acuminata, 2-2.5 cm. longa, basi 1.5 cm. diametro, dense ferrugineo-tomentosa.

Type of flowering plant: No. 51760, Herb. Calif. Acad. Sci., collected by C. A. Reed, May 1, 1918, on hills above Big Basin Park, north of Governor's Camp, Santa Cruz County, California. Type of fruiting plant: No. 51754, Herb. Calif. Acad. Sci., collected by the author, September 30, 1916, on hills above Big Basin Park. The following specimens also seem to be this species: near Salinas, collected April 7, 1917, by Anne Hadden; Redwood Peak, Alameda County, February, 1921, by Mrs. G. Earle Kelley; Soquel Creek, Loma Prieta, Santa Clara County, August, 1903, by A. D. E. Elmer, *No. 5015.*

This species is distinguished by the thick, heavy leaves, the densely stellate-tomentose pubescence on the stems, petioles, lower leaf-surface, and fruits. The upper surface of the leaves is green and glossy and almost smooth. The flowers are large, and those seen appear larger than any other Californian Fremontia.

Fremontia napensis Eastwood, spec. nov. Frutex circa 3 m. altus; foliis ovatis oblongisve, sinuatis vel 3-5-sublobatis, 2 cm. longis, 1.5 cm. latis, tenuibus, juventute infra albis et stellato-tomentosis, senectute viridibus et paulo stellatis; floribus luteis nonnumquam roseo-tinctis, 3.5 cm. diametro, segmentis calycis apice obtusis et apiculatis, exterioribus ovatis, 12 mm. latis, interioribus lato-obovatis, 15 mm. latis; tuba staminali 4 mm. longa, filamentibus gracilibus, 5-10 mm. longis; stylo gracili, stamina superante 3 mm.; capsula conica, 5-angulata, apice apiculata, 1.5 cm. longa, basi circa 15 mm. diametro, dense ferrugineo-tomentosa.

Type of flowering specimen: No. 139371, Herb. Calif. Acad. Sci., collected May 10, 1926, by Mrs. Myron Hobson on the north side of Mt. St. Helena, Napa County, California. Type of fruiting specimen: No. 51756, collected June 15, 1915, by Mrs. Cornelia S. Masters in the mountains of Napa County. C. F. Baker's *No. 2972* collected at Knoxville, Napa County, is the same.

This Fremontia is distinguished by the small flowers often rose-tinged, the small rather thin leaves from sinuate to slightly lobed with the lower surface becoming almost smooth when old and with veins not strongly marked. The fruit is a little longer than the base is wide and shaped like a bee-hive. As all the specimens seen are from Napa County, the geographical name seems most appropriate.

Fremontia obispoensis Eastwood, spec. nov. Frutex; foliis ovato-oblongis, integris vel sinuato-trilobatis, apice obtusis, basi truncatis,

1-2.5 cm. longis, 1-2 cm. latis, coriaceis, venosis, supra viridibus et stellato-papillosis, infra albo- vel fulvescenti-tomentosis; petiolis laminibus brevioribus; floribus luteis, circa 6 cm. diametro, bracteis infra flores lanceolatis deciduis; calyce patenti-campanulato, segmentis inæqualibus et diversis, aliquis apice truncatis, otris apiculatis, exteriore stellato-tomentosis, interiore glabris superiore parte, basi villosis; tuba staminali circa 5 mm. longa, filamentibus 3 mm. longis, divaricatis, antheris magnis tortuosis; stylo attenuato staminibus longiore; capsulis ovatis, acuminatis, 3 cm. longis, basi circa 1 cm. diametro, dense ferrugineo-tomentosis.

Type: No. 158888, Herb. Calif. Acad. Sci., collected by the author, *No. 15159,* and Miss Gertrude Sinsheimer, May 19, 1928, on the side of Pettitt's Canyon, not far from San Luis Obispo, California. Specimens from the Chorro district near San Luis Obispo were received from Miss Sinsheimer, May 1, 1934, and belong to this species. It differs from *F. californica* Torr. as figured in Torrey's Plantæ Fremontianæ, pl. 2, in having much smaller leaves prevailingly entire, the lobes when present more like waves than lobes. On the young leaves the tomentum is white becoming rusty on the older leaves. The bright yellow flowers are about the size of a silver dollar and deck the stems and branches, forming beautiful golden wreaths of bloom. Above the open-spreading flower, the short, broad stamen-tube stands erect, tipped with the twisted anthers on spreading filaments. The bushes seen in Pettitt's Canyon were staminate and none was found by Miss Sinsheimer in fruit. The fruiting specimen came from the Chorro district.

NOTES ON CAREX—I

BY J. W. STACEY

Carex mendocinensis Olney was found last year on Mt. Tamalpais, a considerable extension of its range in California, as it has not been reported before from south of Mendocino County. The specimens are deposited in the Herbarium of the California Academy of Sciences.

Mr. Frank W. Peirson, of Altadena, California, in 1933 brought back a very imperfect specimen of Carex from Inyo County. I asked him to look out for it again this year, and get, if possible, the basal leaves. After a full half day of searching,

he found one more plant. This proved to be *Carex pseudoscirpoidea* Rydb., a new record for California. The specimen was collected July 24, 1934, in Rock Creek Lake Basin, Inyo County, at about 11,000 feet on the west slope of a dry mountain. The specimen is in the private herbarium of Mr. Peirson, and is No. 11301. In 1933, Mr. John Thomas Howell found this same species in the Grand Canyon, Arizona.

In looking over the private herbarium of Frank Peirson, Altadena, California, there was found a species tentatively labeled *Carex Hoodii* Boott, which was introduced in the lawns of Pasadena. This species turned out to be *Carex cephalophora* Muhl., a very common and characteristic species of the eastern United States. Mr. Peirson thought it had been introduced with grass seed obtained from the east. As far as the writer knows, this is the first record of an introduced species of Carex in the state of California. It is very likely that another will be found soon, *Carex arenaria* L., which has been reported from near Portland, Oregon.

A NAME FOR A WEED

BY JOHN THOMAS HOWELL

It is not often that a plant introduction has such a series of hectic investigations and diverse opinions thrust upon it as has the weedy knotweed of the Imperial Valley alfalfa fields. As early as 1921, the achene of the plant was detected as an unknown impurity in alfalfa seed but it was not until 1928 that it was first found as a weed in southeastern California. Since then the several botanists who have examined it have determined it as *P. aviculare, P. prolificum, P. ramosissimum,* and *P. Bellardi;* one student believed it to be unnamed; and, according to Mrs. M. K. Bellue, Weed and Seed Botanist of the California Department of Agriculture, it has come to be known in the Seed Laboratory as "that Polygonum." The name of *P. Bellardi* appeared to be the one by which the plant would be called, until, more recently, Dr. S. F. Blake of the United States Bureau of Plant Industry and Mr. C. A. Weatherby of the Gray Herbarium agreed that the plant was *P. pulchellum* Lois. Because there were certain differences be-

tween the descriptions of *P. pulchellum* and the alfalfa knotweed, the material was again submitted by Mrs. Bellue to the present writer who had had something to do with one of the earlier determinations of the plant. Together we reopened the problem as if we had never before seen the plant and after careful scrutiny of plant descriptions and comparison of herbarium material, we concluded that the proper name for the weed is *P. argyrocoleon!*

The characters which our weed has which find nearly entire agreement in *P. argyrocoleon* Steudel are the erect but somewhat laxly branched habit, the much-reduced leaves of the subspicate inflorescence, the perianth-segments with broad green midrib and petaloid margin, the trigonous achenes with smooth and shining ovate faces, and the fruiting perianth closely and entirely enveloping the mature achene. In one or more characters the plant agrees with none of the other species in which it has been placed: in *P. aviculare* and *P. prolificum* the flowers are borne in the axils of leaves little reduced; in *P. ramosissimum* the petaloid margins of the perianth-segments are yellowish and the achenes are dull; in *P. Bellardi* the achenes are somewhat dull and minutely punctate; and, in *P. pulchellum* the stems are spreading, the wholly petaloid perianth-segments spread conspicuously, and, even in fruit, never closely invest the achene which is less shiny and minutely wrinkled.[1]

The almost perfect agreement between our weed and the descriptions of *P. argyrocoleon*[2] was confirmed in a most unexpected way. A plant from Herb. Albert Prager in Herb. Calif. Acad. Sci. bearing the name *P. argyrocoleon* resembled the Californian weed most closely in habit and aspect and in characters of flower and achene. On the label below the name of the plant are the words, quite legible, "e sem. Kotschyan" and lower still, in the same handwriting but in nearly unreadable German script, what appears to be "Bot. Lip. 44." The significance of this specimen was not apparent until the first

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[1] The following specimens in Herb. Calif. Acad. Sci. have been examined in this study as material representative of the Eurasian species: *P. Bellardi* (of Boissier, perhaps not of Allioni), Mt. Sinai, Arabia, *Schimper No. 388; P. pulchellum* Lois., La Seyne, France, *Tholin in 1882; P. arenarium* W. & K., a species closely related to *P. pulchellum*, Georgian Caucasus, *Hohenacker in 1835.*

[2] Kunze in Linnaea 20: 17; Meisner in DC. Prod. 14: 99; and, Boissier in Fl. Orient. 4: 1035.

description of the species by Kunze was studied in Linnaea. There it was learned that the original collection by Kotschy was a fruiting specimen and that from the fruit plants were grown in the Botanical Garden of the University of Letters in Leipzig in 1844. So it would appear that the alfalfa knotweed of California in agreeing with this specimen of *P. argyrocoleon* agrees with a plant grown from fruit of the type collection of the species. Furthermore, this specimen, if it is from the Leipzig garden, is undoubtedly a part of the collection on which Kunze based the first published description of the species. Kotschy's fruiting specimen which was the actual specimen named by Steudel was collected on sandy islands of the Tigris River near Mosul, Turkey, in 1841.

How this plant was introduced into California from the Mesopotamian region is not definitely known. It might have come as an impurity in Turkish alfalfa seed. Mrs. Bellue suggests another plausible way: in packing around transplants of date palms from the Mesopotamia to the Coachella and Imperial valleys of California. However it arrived, it is here to stay. Its fruit is a common impurity in alfalfa seed shipped from Imperial Valley; and it has recently been noted in northern California as far north as Tehama County. Such a weed needs a common name, so it is called Silver-sheathed Knotweed.

CENTAUREA DIFFUSA Lam. What appears to be the first naturalized colony of this white-flowered star-thistle in the United States occurs at The Dalles, Wasco County, Oregon. It grows in waste places along roads above the city on summer-dried slopes overlooking the Columbia River and was just coming into bloom when it was collected on July 4, 1931 (*J. T. Howell No. 7217*). From the other star-thistles naturalized in the Pacific Northwest, it can be easily marked by its diffusely branched panicle of small oblongish heads, the spinose-pinnate ends of the involucral bracts, and the slender white lobes of the clustered corollas.—J. T. Howell.

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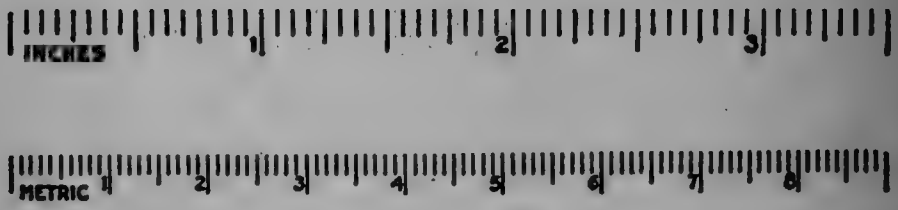

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THE GENUS GALIUM IN SOUTHERN CALIFORNIA

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Introduction

The present paper is a taxonomic study of the species of Galium found in Southern California. The region covered is that part of California east and south of San Luis Obispo Co., including the Santa Barbara Islands and the desert portion of Kern Co. south of the Tehachapi Mts. In this region are found not only species ranging far beyond the geographic bounds set, but there also occurs a number of endemic species whose distribution is frequently very limited. Nineteen species are recognized in this area. The species fall into several large groups that are readily separable from each other, but the species within each group are often so closely related and so variable that it is sometimes difficult to separate them satisfactorily and to describe diagnostic differences. To view the problems in proper perspective, rather intensive studies of certain related species occurring beyond the geographic limits set for this paper have been made. However, collections from other counties of California or from other states are cited only when such data are directly related to Southern Californian distribution.

Of special interest has been the study of those plants with fruits clothed with long silky hairs, the group containing most of the endemic types found in the genus in Southern California. These plants were formerly called either *G. angustifolium* Nutt. or *G. multiflorum* Kell. The former is recognized as one of the characteristic species of the sagebrush formation west of the mountains, but the latter is now known to occur only in regions several hundred miles to the northward and the plants in Southern California formerly placed in it are now referred to several closely related endemic species. In working out the relationship between these latter types and the plants to the north and to the east, it has been impressive to behold this group of endemics as a part of a long line of related entities extending from Washington and Oregon southward into Southern Cali-

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fornia. This striking linear distribution has raised the question of the origin of these forms and has led to speculation on the evolutionary processes involved.

In the Great Basin area of Utah, Nevada, and northern Arizona, occurs a variant of *G. multiflorum*; and, throughout the thousands of square miles of its distribution, it is a relatively uniform plant. But just as soon as it, in its far-flung distribution, impinges on the western montane borders of the Great Basin, there is developed this series of small but definite entities of which typical *G. multiflorum* is but one. Some of these variations are very distinct and are to be regarded as species, while others, less definitely separated from related forms, can only be considered subspecies or varieties. This linear sequence of related entities, it would seem, has not been produced by a variable species entering a diversified field, yielding unsustainable numbers, and finally, in a given locality, being represented by only a single "selected" variant. Nor does it seem possible to explain the origin of this line by the means of northward or southward migrations along the mountains. Rather, the variability in the *G. multiflorum* complex is probably to be traced to the influence of the last major western orogenic deformation which culminated in the late Tertiary with the rejuvenation of the Sierra Nevada and the Sierra Madre. It would appear that, along the western edge of its distribution, the relatively monotonous Basin variant of *G. multiflorum* was so affected by the new order of climate and physiography following that mountain-building revolution that diversity replaced monotony and, in time, that the diversity became fixed and genetic. It is not known whether the forces which are believed to have acted in the differentiation of these entities were physical, chemical, or radiant. But it is probable that on the front of a freshly uplifted sierra any or all of these forces might be present and might exert modifying influences. Certainly, there would seem to be a real causal force, either in the geology and physiography or in the chemical and physical interactions of soil, climate, and organism, which is responsible for this notable line of specialized types, of which the Southern Californian endemics are a part.

Acknowledgments. Need for critical investigation in the genus Galium in Southern California was first indicated to Miss

Hilend late in 1928 by Dr. Philip A. Munz of Pomona College, Claremont. In the botanical laboratory of the University of California at Los Angeles, Miss Hilend began the study and shortly after invited Mr. Howell, then Resident Botanist at the Rancho Santa Ana Botanic Garden, to coöperate. With the latter's return to northern California in March, 1929, he was able to assist by examining critical specimens in the northern herbaria, particularly the valuable collection of type specimens in the Herbarium of the California Academy of Sciences. Meanwhile Miss Hilend conducted field studies in the south, and worked over the extensive and valuable collections of the Pomona College Herbarium, as well as a collection including many type specimens from the Gray Herbarium, the loan of which was kindly arranged with Dr. B. L. Robinson by Dr. I. M. Johnston. In the north, Dr. W. L. Jepson kindly permitted Mr. Howell to study several type specimens in his herbarium at the University of California. Material has been available from the following herbaria, for which the abbreviations indicated in parentheses are used in citing specimens: California Academy of Sciences (CAS); Dudley Herbarium of Stanford University (D); Gray Herbarium of Harvard University (G); Los Angeles Museum (LAM); Pomona College Herbarium (P); Santa Barbara Museum (SBM); University of California (UC); University of California at Los Angeles (UCLA); Herbarium of Joseph Ewan (E); Herbarium of W. L. Jepson (J); Herbarium of Frank Peirson (FP). To those in charge of these herbaria, the authors wish to express their appreciation for the privilege they have had in studying the specimens of Galium deposited in them. Also they wish to acknowledge the interest and assistance of Miss Alice Eastwood, Dr. C. C. Epling, Mr. C. A. Weatherby, and the late Mr. Ralph Hoffmann. Especially, they wish to thank Dr. P. A. Munz for his continued interest, encouragement, and assistance throughout the course of the investigation.

Key to the Species

A. Mature fruits dry ..... B
A. Mature fruits fleshy, carpels like drupelets ..... P
B. Plants annual; hairs on fruits hooked C
B. Plants perennial ..... E
C. Leaves in whorls of 6-8; flowers 1-3 ..... 1. *G. Aparine*

C. Leaves in 2's or 4's; flowers solitary ..... D
D. Flowers pedicellate ..... 2. *G. bifolium*
D. Flowers sessile, subtended by foliaceous bracts ..... 3. *G. proliferum*
E. Fruit glabrous; leaves in 4's or 5's ..... F
E. Fruit generally hairy, sparsely to densely ..... G
F. Stems erect or loosely spreading; pedicels slender ..... 4. *G. trifidum*
F. Stems low or prostrate, plant mat-like; pedicels short and relatively stout ..... 5. *G. Brandegei*
G. Fruit hispidulous-pubescent, hairs hooked; leaves in 5's or generally in 6's ..... 6. *G. triflorum*
G. Fruit with straight or curved hairs; leaves mostly in 4's ..... H
H. Leaves pinnately veined; inflorescence conspicuously leafy ..... 7. *G. catalinense*
H. Leaves with 1-3 (or 5) veins from base; inflorescence generally not very leafy I
I. Corolla-lobes glabrous (or slightly hairy in *G. angustifolium* var. *siccatum*); leaves long, linear-oblong (or wider in *G. Jepsoni*); internodes glabrous (except in *G. angustifolium* var. *siccatum*) ..... J
I. Corolla-lobes hairy externally; leaves short, mostly lanceolate to oblong or ovate; internodes variously pubescent; flowers diœcious L
J. Hairs on fruit spreading ..... K
J. Hairs on fruit ascending and subappressed ..... 10. *G. Jepsoni*
K. Flowers polygamo-monœcious; corolla-lobes lanceolate-acuminate; style slender ..... 8. *G. Rothrockii*
K. Flowers diœcious; corolla-lobes generally acute; style stout ..... 9. *G. angustifolium*
L. Leaves acute but not acerose-acuminate; lateral veins usually present and nearly as prominent as midvein ..... M
L. Leaves acerose-acute or acuminate, midveins prominent, the lateral veins mostly lacking, margin often strongly revolute ..... 15. *G. stellatum*
M. Flower-clusters not drooping; corolla-lobes bristly-hairy ..... N
M. Flower-clusters drooping; corolla-lobes silky-hairy ..... 14. *G. Hallii*
N. Leaves essentially alike; inflorescence paniculate-branching; corolla 2-3.5 mm. broad, greenish or yellowish ..... O
N. Leaves dimorphic, rotund-ovate; inflorescence elongated, strict, the lateral branches reduced to subcapitate axillary clusters; corolla 1.5-2 mm. broad, often reddish ..... 13. *G. Parishii*
O. Leaves oblong to linear-oblong; pistillate inflorescence short-congested, flowers few ..... 11. *G. gabrielense*
O. Leaves ovate-lanceolate to ovate; pistillate inflorescence open-paniculate, flowers numerous ..... 12. *G. Munzii*
P. Stems from woody base or caudex, mostly long and clambering, or sometimes shorter and spreading or suberect ..... Q

P. Stems slender and procumbent or low and tufted, from slender branched rootstocks..... R
Q. Stems generally with retrorse, triangular trichomes; leaves mostly dark green, with sparse harsh pubescence; fruit glabrous or very rarely pubescent.....16. *G. Nuttallii*
Q. Stems and leaves cinereous-pubescent to subscabrous, gray-green; fruit pubescent.....17. *G. pubens*
R. Stems procumbent; stems and leaves mostly pilose; leaves lanceolate-ovate to broadly ovate, not acuminate; fruit glabrous or pubescent .....18. *G. californicum*
R. Stems densely tufted; stems and leaves glabrous or subpubescent; leaves narrow and acerose-acuminate; fruit glabrous ..... 19. *G. Andrewsii*

Taxonomic Treatment

1. Galium Aparine L., Sp. Pl. 108 (1753). Annual with slender taproot; stems 1-10 dm. long, short and erect or long and weak, growing up among other plants or sprawling over them, angles retrorsely hispid; leaves in whorls of 6-8, linear-oblanceolate or linear-oblong, mucronulate-acute, 0.5-5 cm. long, the margins and lower midrib retrorsely hispid, hairs on upper surface pointing forward; flowers in leafy cymules; fruit 3-4 mm. in diameter, dry, hispid with short uncinate bristles.

Type locality. European.

Distribution. Common among herbaceous growth in semi-shaded places up to 7500 ft., rare in the deserts; widely distributed through temperate lands of the Northern Hemisphere.

Collections. Near Zaca Lake, Santa Barbara Co., *Eastwood No. 523* (CAS); Sulphur Mt., Ventura Co., *Abrams & McGregor No. 26* (D, G); Pasadena, Los Angeles Co., *Grant in 1901* (D); near Seven Oaks, San Bernardino Co., *Hilend No. 610* (CAS, UCLA); Providence Mts., San Bernardino Co., *Brandegee in 1902* (UC); Strawberry Valley, Riverside Co., *Hall No. 2283* (D, UC); Escondido, San Diego Co., *Meyer No. 20* (UC); San Clemente Island, *Evermann in 1918* (a slender form referable to var. *Vaillanti*, CAS); Wilson's Cove, San Clemente Island, *Peirson No. 3431* (CAS, FP); San Nicolas Island, *Howell No. 8224* (CAS); Avalon, Santa Catalina Island, *Grant in 1900* (D); China Harbor, Santa Cruz Island, *Howell No. 6385* (CAS); Santa Rosa Island, *Hoffmann in 1929* (SBM); San Miguel Island, *Hoffmann in 1930* (CAS, SBM).

The island plants have been reported as *G. Aparine* var. *Vaillanti* (DC.) Koch, a slender variant with smaller fruits 1.5-2 mm. in diameter (Zoe 1:138,—1890).

2. Galium bifolium Wats., Bot. King Exped. 134 (1871). Delicate annuals, erect, 4-14 cm. tall, simple or slightly branching, glabrous; leaves oblong-lanceolate to nearly linear, acute, 5-25 mm. long, 1-5 mm. wide, smooth, 4 at a node and one pair much smaller than

the other, or the upper leaves in pairs, midvein and sometimes lateral veins visible; corolla white, about 1 mm. wide, the 1-flowered axillary and terminal peduncles in fruit about as long as the leaves and somewhat reflexed; fruits 2.5-4 mm. in diameter, covered with short whitish hooked bristles.

Type locality. "In the Trinity, Battle and East Humboldt Mountains, Nevada, and in the Wasatch; 5-7000 feet altitude." Type sheet seen (G).

Distribution. Occasional in moist, partly shaded places in the mountains, from 6500 to 8500 ft., ranging northward and eastward through the higher mountains of western North America.

Collections. Bear Valley, San Bernardino Mts., San Bernardino Co., *Davidson No. 2291* (D); Bluff Lake, San Bernardino Mts., San Bernardino Co., *Hilend No. 493* (CAS, UCLA); Mescal Creek, San Gabriel Mts., Los Angeles Co., *Munz No. 5579* (CAS, P, UC); Mt. Pinos, Ventura Co., *Hall No. 6668* (UC); Trinity and East Humboldt mts., Nevada, *Watson in 1868,* and Wasatch Mts., Utah, *Watson in 1869* (type sheet, G).

This species is distinct from all others because of its bifoliate condition and its slender somewhat reflexed bractless peduncles.

3. Galium proliferum Gray, Pl. Wright. 2:67 (1853). Slender annual, simple or with short branches above, glabrous or hispidulous; leaves 4 at a node, one of the pairs usually smaller than the other, 2-4 mm. long, oval or oblong; flowers solitary, axillary, whitish, 1 mm. wide; fruit 1.5-3 mm. in diameter, uncinate-hairy, subtended by a pair of leafy bracts about as long as the fruit.

Type locality. "High, rocky hills of the Pecos; June 1851."

Distribution. Providence Mts., California, and eastward from Arizona and southern Nevada to Texas.

Collections. Providence Mts., 4000 ft., San Bernardino Co., California, *Hoffmann in 1930* (SBM); Indian Springs, Charleston Mts., 4000 ft., Clark Co., Nevada, *Jones in 1906* (P); Pinal Mts., Gila Co., Arizona, *Eastwood No. 17019* (CAS).

This is a new record for California. The plants have conspicuous cotyledons, and the fruits are unusually large for the size of the plant.

4. Galium trifidum L., Sp. Pl. 105 (1753). Perennial from very slender rootstocks, stems slender, weak, prostrate or ascending, 1-3 (or 4) dm. high, slightly scabrous on the angles; leaves in 4's, 4-16 mm. long, narrow, oblong or linear-spatulate, obtuse, smooth, or slightly scabrous on margins and midrib; pedicels axillary, slender, 3-7 mm. long, glabrous, rarely scabrous; flowers minute, about 1 mm. in diameter, the corolla white, usually 3-lobed; fruit glabrous, each carpel 1-1.5 mm. in diameter.

Type locality. Canadian.

Distribution. Moist places in Los Angeles and San Bernardino counties; widespread in the Northern Hemisphere.

Collections. Elsie Caves, San Bernardino Mts., San Bernardino Co., *Wheeler No. 1250* (CAS); 2 miles east of Bluff Lake, San Bernardino Mts., *Munz No. 12697* (P, UC); Bear Valley, *Abrams No. 2844* (very small but with scabrous pedicels, CAS, D,); vicinity of San Bernardino, San Bernardino Co., *Parish No. 4579* (cited by Wight, Zoe 5:53, as *G. tinctorium* var. *submontanum,* D, P); Cienega, Los Angeles, Los Angeles Co., *Greata in 1900* (LAM); Baldwin Ranch, Santa Anita, Los Angeles Co., *McClatchie in 1893* (D).

The Southern Californian plant has been referred to var. *subbiflorum* Wiegand (Bull. Torr. Club 24:399,—1897) probably because among the specimens cited by Wiegand is *Parish No. 1505,* a collection from San Bernardino Co. However, a comparison of the Southern Californian material with a specimen of the type collection of var. *subbiflorum* in the Herb. Calif. Acad. Sci. (Colorado, *Hall & Harbour No. 230*) has shown the Southern Californian plants to be too variable and diverse to be referred entirely to this variety.

5. Galium Brandegei Gray, Proc. Amer. Acad. 12:58 (1877). Low, slender, weak-stemmed perennial, 5-12 mm. high, forming dense, very leafy mats; stems glabrous or minutely hispidulous; leaves in 4's, obovate to spatulate or elliptical, revolute, smooth or ciliate, 3-10 mm. long, 1-2 mm. wide, thin, the nerves inconspicuous but visible; flowers white, 1-1.5 mm. in diameter, on short thickened pedicels; fruit smooth, glabrous, about 1-1.5 mm. in diameter.

Type locality. "Valley of the Rio Grande, New Mexico, . . . at 9,000 ft." Type seen (G).

Distribution. Moist places in the higher mountains of western North America, Bluff Lake at 7500 ft. in the San Bernardino Mts., being the only known station in Southern California: *Munz No. 10478* (P, UC); *Hilend in 1932* (UCLA); *Peirson No. 4893* (CAS, FP); Los Pinos Trail, banks of the Rio Grande, New Mexico, *Brandegee in 1875* (type, G).

This species resembles *G. trifidum* var. *subbiflorum* Wiegand, but it can be distinguished from that plant "by its peculiar matted habit, commonly glabrous stem, thicker leaves and stouter glabrous pedicels" (Wiegand, Bull. Torr. Club 24:398).

6. Galium triflorum Michx., Fl. 1:80 (1803). Perennial from slender creeping rootstocks; stems slender, glabrous or very slightly scabrous, 2-6 dm. long; leaves 5 or 6 in a whorl, lanceolate-ovate to oblanceolate, cuspidate, 1.5-7 cm. long, thin, often somewhat scabrous on margins and midrib; peduncles usually 2- or 3-flowered, slender; corolla whitish, 4-lobed, 2-4 mm. in diameter; fruit covered with soft, slightly uncinate hairs, in length about equal to body of fruit, each carpel 1 mm. in diameter.

Type locality. "In umbrosis Canadæ sylvis."

Distribution. Rare on shaded creek banks in Southern California, 1000 to 7500 ft.; ranging widely in temperate North America and Eurasia.

Collections. Seven Oaks, San Bernardino Mts., *Mr. & Mrs. Grout in 1901* (P); shade along Lost Creek, San Bernardino Mts., 7200 ft., *Munz & Johnston No. 8570* (P); San Bernardino, *S. B. & W. F. Parish No. 79* (UC).

7. GALIUM CATALINENSE Gray, Syn. Fl. 1, pt. 2:445 (January, 1886). *G. buxifolium* Greene, Bull. Calif. Acad. Sci. 2:150 (November, 1886). Bushy perennial, erect, 6-12 dm. or more high; young stems sharply quadrangular, glabrous or more or less pubescent with short, soft curved hairs, old stems stout, often white and exfoliating, primary stems and branches with long internodes, the secondary flower-bearing branches leafy, with short internodes, frequently forming conspicuous lateral or terminal tufts on elongated stems; leaves mostly in 4's (or 5's) on main stems, in 2's on branchlets, oblong or elliptical, 3-25 mm. long, 1.5-8 mm. wide, obtuse or sometimes acute, mucronulate, narrowed below into short, petiole-like base, pinnately veined, the midvein conspicuous, the lateral veins usually visible; inflorescence cymosely branching, tufted and leafy, the flowers on short, hairy or subglabrous pedicels; corolla whitish, 2-4 mm. broad, lobes ovate, shortly acuminate, the tip often reflexed; fruit dry, the mature carpels oblong-reniform, 1.5-2 mm. long, 1 mm. thick, subglabrous or covered with thick, short, slightly curved hairs.

Type locality. Santa Catalina Island, California. Type seen (G).

Distribution. Rocky slopes on the Santa Barbara Islands.

Collections. Santa Catalina Island, *Lyon in 1884* (G, type; UC), *G. B. Grant in 1900* (CAS, D), *Eastwood No. 6512* (CAS); San Clemente Island, *Evermann in 1918* (CAS); near Lemon Tank, San Clemente Island, *Munz No. 6682* (P, UC), *Peirson No. 3432* (CAS, FP); Mosquito Harbor, San Clemente Island, *Abrams & Wiggins No. 371* (CAS, D, UC); Santa Cruz Island, *Greene in 1886* (CAS, type of *G. buxifolium;* D, G, P, UC); Prisoner's Harbor, Santa Cruz Island, *Howell No. 6363* (CAS, UCLA); Lady's Harbor, Santa Cruz Island, *Munz & Crow No. 11838* (P); San Miguel Island, *Greene in 1886* (CAS, G), *Hoffmann in 1930* (CAS, SBM).

The affinities of this species are not obvious. Because of the dry hairy fruits and the subpinnate venation of the leaves, *G. catalinense* appears to be related to *G. triflorum* Michx. although certain characteristics suggest a relationship with the baccate perennials. It is a most distinct species and its peculiar characters have probably developed through age-long isolation on the Santa Barbara Islands.

Due to some variability among the plants from the different islands, Greene believed that *G. buxifolium* was specifically distinct even after he learned of the earlier name of Gray (cf. Bull. Calif. Acad. Sci. 2:400,—1887).

8. GALIUM ROTHROCKII Gray, Proc. Amer. Acad. 17:203 (1882). Perennial; stems slender and diffuse or shorter and substrictly erect, glabrous and smooth, 1.5-6 dm. tall; leaves in 4's, linear-lanceolate

to linear, rigid; flowers pedicelled, polygamo-monœcious, the corolla small, 1-2 mm. wide, usually red, the lobes long-acuminate; style and style-branches very slender; fruit small, sparsely hairy, the hairs not longer than the body of the fruit.

Type locality. "S. Arizona." Camp Crittenden, 5000 ft., *Rothrock No. 675* (type, G).

Distribution. In California, known only from Clark Mt., San Bernardino Co., *Munz No. 12877* (P, UC); ranging eastward to New Mexico.

This species is very like *G. angustifolium* var. *diffusum* in habit, but *G. Rothrockii* can be distinguished by the smaller, polygamo-monœcious flowers and the smaller fruits. The collection from near Mountain Springs, San Diego Co., *Parish No. 792* (D), which was referred by Parish to *G. Rothrockii* Gray (Zoe 4:163,—1893) is a variant of *G. angustifolium* near var. *diffusum.*

9. GALIUM ANGUSTIFOLIUM Nutt. in T. & G., Fl. N. A. 2:22 (1841). Perennial; stems generally erect, glabrous or cinereous-pubescent, herbaceous and several from crown of woody caudex or more frequently woody and branched above the base so as to produce a low shrubby or suffrutescent plant, 1-12 dm. tall; leaves linear to linear-lanceolate and linear-oblong, or rarely even ovatish, 0.2-2.5 cm. long, pubescent or glabrous, the margins smooth and glabrous or roughened and ciliate, the apex acute; inflorescence varying from a short few-flowered cyme to an elongated many-flowered branching cymose-panicle, or to a diffusely branched leafy cyme with flowers scattered and solitary; corolla generally 2 mm. in diameter, the outside glabrous (or sometimes sparsely hairy in var. *siccatum*), the lobes ovate-lanceolate, acute to acuminate; body of fruit 1-2 mm. in diameter, its surface moderately to densely hairy, the hairs spreading, 1-2 mm. long, tawny, gray, or white.

Distribution. Rocky or gravelly slopes, from maritime, arid, and desert hills to pine forests and exposed montane ridges, 10 to 7000 ft., northern Lower California and San Diego Co. north to Kern, Monterey, and San Benito counties; Santa Barbara Islands.

The variations of the species over its broad range are as diverse in aspect as are the situations which they inhabit. In the present treatment, an attempt is made to distinguish several varieties which indicate ecotypic differentiation in the several types of habitat; but everywhere along the bounds of their distribution, the varieties intergrade with neighboring varieties in a most confusing way. Hence, many specimens have been seen which can be identified only approximately. The whole may be considered a single species without varieties, but it appears best to us to indicate the several types of variation or tendencies to variation in the species, thus presenting taxonomically a more adequate picture of the situation as it is found in nature.

KEY TO THE VARIETIES OF *G. angustifolium*

A. Pistillate flowers numerous, generally congested at the ends of the branches of the inflorescence (see also var. *foliosum*)..... B
A. Pistillate flowers few or if numerous more or less scattered in open cymose panicle..... D
B. Body of fruit 1.5-2 mm. in diameter, the hairs 1-2 mm. long; staminate inflorescence broad; plant 3-12 dm. tall..... C
B. Body of fruit 1.5 mm. in diameter, the hairs 1 mm. long; staminate inflorescence generally narrow; plant 1.5-3 dm. tall ..... 9c. var. *bernardinum*
C. Internodes glabrous..... 9a. var. *typicum*
C. Internodes cinereous-pubescent ..... 9b. var. *siccatum*
D. Staminate flowers in broad diffuse panicles; the whole plant laxly and diffusely branched..... 9d. var. *diffusum*
D. Staminate flowers in a narrow inflorescence..... E
E. Pistillate inflorescence conspicuously leafy-bracteate, the flowers short-pedicelled or subsessile; branches nearly equally leafy throughout ..... 9e. var. *foliosum*
E. Pistillate inflorescence not conspicuously leafy, the flowers frequently on long pedicels; leaves somewhat crowded at base of plant, the upper branches sparsely leafy..... ..... 9f. var. *pinetorum*

9a. GALIUM ANGUSTIFOLIUM var. TYPICUM Hilend & Howell, nom. nov. *G. angustifolium* Nutt., lc. Suffrutescent or shrubby, 3-12 dm. tall; stems and leaves glabrous, or the margins of the leaves scabrous-ciliate; staminate flowers in a narrow to moderately diffuse panicle, pistillate flowers numerous, congested in small cymes at the ends of branchlets; corolla glabrous; fruit moderately to densely hairy, 1.5-2 mm. in diameter, the hairs 1-2 mm. long.

Type locality. San Diego, California.

Distribution. Hot, rocky slopes of washes, hills, and lower mountains, 10 to 3000 ft., northern Lower California northward to Monterey, San Benito, and Kern counties; Santa Catalina Island; common in Southern California.

Collections. LOWER CALIFORNIA: Nochoguero Valley, *Mearns No. 3447* (D). CALIFORNIA: Mission Hills, San Diego, San Diego Co., *Abrams No. 3441* (CAS, D, G); Del Mar, San Diego Co., *Howell No. 6628* (CAS); Cold Spring, between Descanso and Cuyamaca, San Diego Co., *Wiggins No. 2103* (D, P); Dripping Springs, Temecula River, Riverside Co., *Peirson No. 4500* (CAS, FP); Santa Ana Canyon, Orange Co., *Howell No. 2416* (CAS); San Bernardino, San Bernardino Co., *Parish No. 5413* (D); San Antonio Canyon, Los Angeles Co., *Baker No. 3455* (CAS, UC); Glendora, Los Angeles Co., *Munz No. 2044* (D, P); Santa Monica, Los Angeles Co., *Howell No. 6564* (CAS); Conejo Grade, Ventura Co., *Howell No. 6571* (CAS); Ventura, Ventura Co., *Brandegee in 1885* (CAS); Gaviota Pass, Santa Barbara Co.,

Howell No. 5184 (CAS, the narrow pistillate inflorescence approaching var. *foliosum*); Santa Catalina Island, *Eastwood No. 6482* (CAS), *Hasse in 1888* (D). Some collections from Santa Barbara County are intermediate to var. *pinetorum*: Santa Barbara, *Elmer No. 3636* (D); Mission Creek, *Hoffmann in 1927* (SBM).

9b. GALIUM ANGUSTIFOLIUM var. SICCATUM (Wight) Hilend & Howell, Leafl. West. Bot. 1:135 (1934). *G. siccatum* Wight, Zoe 5:54 (1900). Similar to var. *typicum*, differing in stems and leaves sparsely to densely cinereous-pubescent.

Type locality. Del Mar, San Diego Co., California. Type seen (CAS).

Distribution. Hills, mostly near the coast, 10 to 1600 ft., San Diego Co. northward to Santa Barbara Co.; rare in the inner South Coast Ranges.

Collections. Del Mar, San Diego Co., *Brandegee* (CAS, type; UC, fragment); Torrey Pines near Del Mar, San Diego Co., *Howell No. 6627* (CAS); Cahuenga Peak, Los Angeles Co., *Ewan No. 2232* (E); Vermont Canyon, Griffith Park, Los Angeles, *Howell No. 3358* (CAS); Monrovia, Los Angeles Co., *Rixford in 1926* (CAS); Pt. Mugu, Ventura Co., *Howell No. 5176* (CAS, UC); Santa Susana Pass, Ventura Co., *Howell No. 6578* (CAS); Frazier Mountain Park, Ventura Co., *Hoffmann in 1928* (SBM); Santa Barbara, Santa Barbara Co., *Hoffmann in 1927* (SBM).

9c. GALIUM ANGUSTIFOLIUM var. BERNARDINUM Hilend & Howell, Leafl. West. Bot. 1:134 (1934). Plants low and compact, 1.5-3 dm. tall; leaves short, mostly 0.5-1 cm. long; staminate inflorescence elongate and narrow, the pistillate inflorescence pyramidal, with the branches divaricate and the flowers clustered at the ends; body of fruit 1.5 mm. in diameter, the hairs 1 mm. long, white or gray.

Type locality. Cactus Flats, San Bernardino Mts., San Bernardino Co., California. Type seen (CAS).

Distribution. San Bernardino and San Jacinto mts. southward to San Diego Co., 5000 to 6000 ft.

Collections. Cactus Flats, San Bernardino Mts., San Bernardino Co., *Hilend No. 475* (CAS type; UCLA), *Munz No. 10517* (P, UC); Santa Ana River Control Station, San Bernardino Mts., *Hilend No. 615* (CAS, UCLA; intermediate to var. *diffusum*); Forest Home, San Bernardino Mts., *Van Dyke in 1928* (CAS); Strawberry Valley, Mt. San Jacinto, Riverside Co., *Swarth in 1914* (CAS); Santa Rosa Mts., Riverside Co., *Munz No. 5858* (P, UC; intermediate to var. *pinetorum*); Monument Peak, Laguna Mts., San Diego Co., *Munz No. 8440* (P); Warners Hot Springs, San Diego Co., *Coombs in 1911* (CAS, varying towards var. *typicum*); Mt. Beauty Mine, San Diego Co., *Jones No. 6872* (P).

9d. GALIUM ANGUSTIFOLIUM var. DIFFUSUM Hilend & Howell, Leafl. West. Bot. 1:134 (1934). Stems laxly and diffusely branched; both

staminate and pistillate inflorescences very diffusely branched, the flowers generally solitary on slender pedicels.

Type locality. Saragosa Spring, Holcomb Valley, San Bernardino Mts., San Bernardino Co., California. Type seen (CAS).

Distribution. Desert slopes of mountains from Los Angeles Co. to San Diego Co., east to the Providence Mts., San Bernardino Co.

Collections. Near Mountain Springs, San Diego Co., *Parish No. 792* (D, reported as *G. Rothrockii* by Parish, Zoe 4:163); Palm Springs, Riverside Co., *Eastwood No. 3027* (CAS); Tahquitz Canyon, Riverside Co., *Munz & Street No. 2729* (D, P); Saragosa Spring, upper Holcomb Valley, San Bernardino Mts., *Hilend No. 533* (CAS, type; UCLA); Colton, Riverside Co., *Jones No. 3180* (CAS); San Gabriel Canyon, Los Angeles Co., *Eastwood No. 8990* (CAS, the staminate inflorescence less diffuse, the whole varying towards var. *foliosum*); Bonanza King Mine, Providence Mts., San Bernardino Co., *Munz, Johnston, & Harwood No. 4242* (P).

9e. GALIUM ANGUSTIFOLIUM var. FOLIOSUM Hilend & Howell, Leafl. West. Bot. 1:134 (1934). Plants compact or diffuse, usually 1-6 dm. high, nearly equally leafy throughout; leaves crowded or distant, oblong-linear, mucronulate, sometimes ciliate on margins, 5-8 mm. long; staminate flowers frequently in narrow inflorescences, the pistillate flowers crowded or diffuse in leafy inflorescences; fruit 1-2 mm. in diameter, the hairs equal to or slightly longer than the body of the fruit.

Type locality. Anacapa Island, California. Type seen (CAS).

Distribution. Anacapa, Santa Cruz, and Santa Rosa islands, an atypical form occurring on Santa Catalina Island and along the coast of the mainland from Los Angeles to Santa Barbara County.

Collections. Anacapa Island, *Howell No. 3792* (CAS type; UCLA), *Hoffmann in 1929* (CAS, SBM), *Abrams & Wiggins No. 275* (CAS, D, UC); Santa Cruz Island, *Greene in 1886* (CAS, D); Cochie Bay, Santa Cruz Island, *Howell No. 6295* (CAS); Smuggler's Cove, Santa Cruz Island, *Hoffmann in 1927* (CAS), *Abrams & Wiggins No. 190* (CAS, D, UC); Valle del Medio, Santa Cruz Island, *Howell No. 6196* (CAS); Bletcher's Bay, Santa Rosa Island, *Abrams & Wiggins No. 233* (CAS, D, UC); above Torrey Pines, Santa Rosa Island, *Munz & Crow No. 11575* (P). In the following specimens, the staminate inflorescence is more diffusely branched than in the typical plants but the pistillate inflorescence is rather conspicuously leafy: Avalon, Santa Catalina Island, *Carlson in 1915* (CAS); Pacoima Dam, Los Angeles Co., *Hilend & Howell in 1930* (CAS, UCLA); Santa Ana Creek, Ventura Co., *Eastwood in 1924* (CAS); trail to Manzana Creek, Santa Barbara Co., *Eastwood No. 634* (CAS).

This variety, even in its more typical state, presents diverse aspects, depending on whether the plants grow in sheltered nooks or on exposed slopes, for in the former places the inflorescences become expanded and diffuse and in the latter places the inflorescences are

reduced and slender. But always the pistillate inflorescences, and generally the staminate, are conspicuously leafy-bracteate, the best mark of the variety.

9f. GALIUM ANGUSTIFOLIUM var. PINETORUM Munz & Johnston, Bull. Torr. Bot. Club 49:357 (1922). Stems herbaceous, 2-4 dm. high, glabrous, the upper internodes usually much longer than the leaves, lower leaves more or less crowded; leaves 1-3 cm. long, 1.5-2 mm. wide; inflorescence open, few-flowered, 3-8 cm. long; fruits 2 mm. in diameter, covered with tawny hairs about as long as the body of the fruit.

Type locality. Sierra Madre Mts., Los Angeles Co., California. Type seen (UC).

Distribution. Dry slopes in the pine belt in the San Gabriel and San Bernardino mts., 5000 to 7000 ft., Los Angeles and San Bernardino counties; occasional. Atypical forms occur in the mountains of Santa Barbara, Riverside, and San Diego counties.

Collections. Sierra Madre Mts., Los Angeles Co., *Davidson in 1893* (UC, type); Mt. Wilson, Los Angeles Co., *Eastwood No. 9019* (CAS); Big Pines Camp, Los Angeles Co., *Peirson No. 3159* (CAS, FP); Swartout Canyon, Los Angeles Co., *Abrams & McGregor No. 657* (D); south slope of Cucamonga Peak, San Bernardino Co., *Johnston No. 5122* (D, P); head of South Fork of Lytle Creek, San Bernardino Co., *Johnston No. 1483* (D, G, P, UC).

Of this variety, Munz and Johnston write: "A variety of the pine-belt and differing from the typical form of the species only in habit of growth" (lc., p. 358). A plant collected by Mrs. Brandegee in the Santa Lucia Mts. is referred to the variety by Munz and Johnston, but it is believed by us to be nearer var. *typicum*. The following specimens are intermediate between var. *bernardinum* and var. *pinetorum*: Dark Canyon, San Jacinto Mts., Riverside Co., *Munz & Johnston No. 8702* (P); Santa Rosa Mt., Riverside Co., *Munz No. 5858* (P, UC); San Felipe Creek, San Diego Co., *Keck & McCully No. 117* (P); Cuyamaca, San Diego Co., *Brandegee in 1894* (UC). Elmer's *No. 3636* from Santa Barbara (D, UC) is intermediate between var. *pinetorum* and var. *typicum*.

10. GALIUM JEPSONI Hilend & Howell, Leafl. West. Bot. 1:135 (1934). *G. angustifolium* var. *subglabrum* Jepson, Man. Fl. Pl. Calif. 962 (1925). Perennial; stems several and tufted from the ends of underground stems, erect, 1-2 dm. tall, glabrous and smooth; leaves linear-oblong, the lower short and lanceolate or even ovatish, 0.5-1.5 cm. long, 2 mm. wide, generally a little longer than the internodes, the apex acute, the margin bristly-ciliate, the upper and lower sides glabrous, midvein conspicuous below; inflorescence few-flowered, narrowly paniculate or subracemose, the flowers 1 to 3 on suberect axillary branchlets, dicœcious; corolla about 2 mm. in diameter, the outside glabrous; body of fruit 2.5-3 mm. in diameter, the surface

moderately hairy, the hairs 1-1.5 mm. long, ascending and subappressed to the surface of the fruit.

Type locality. Whitewater Basin, 7000 ft., San Bernardino Mts., San Bernardino Co., California. Type seen (UC).

Distribution. Rare or local in the San Gabriel and San Bernardino mts., 7000 to 8000 ft.

Collections. Whitewater Basin, San Bernardino Mts., *Wilder No. 1113* (UC, type; type of *G. angustifolium* var. *subglabrum*); ridge crest at west end of Ontario Peak, San Gabriel Mts., San Bernardino Co., *Johnston No. 6612* (CAS, D', P).

Galium Jepsoni is certainly related to *G. angustifolium* and to *G. gabrielense*. Like the latter, it is a montane development in this variable complex, but, from all forms in the group, it can be distinguished by the much-reduced inflorescence and by the peculiar hairs which thinly cover the fruit.

11. GALIUM GABRIELENSE Munz & Johnston, Bull. Torr. Bot. Club 51:299 (1924). *G. siccatum* var. *anotinum* Jepson, Man. Fl. Pl. Calif. 962 (1925). Perennial; stems erect, tufted, herbaceous, arising from a woody base or branched caudex, 0.5-2 dm. tall, cinereous-pubescent with short, spreading hairs; leaves broadly elliptic to linear-oblong, 2.5-11 mm. long, 1-2 mm. wide, acute, cinereous-pubescent, the lower leaves sometimes smaller than the upper leaves but scarcely dimorphic; inflorescence paniculately branching, that of the pistillate plant narrow, oblong, the flowers relatively few, that of the staminate plant broader and more diffuse; corolla yellowish, 2-3 mm. in diameter, the outside bristly-hairy, the lobes lanceolate-ovate, abruptly acuminate; body of fruit 1.5-2 mm. in diameter, the hairs 1-1.5 mm. long.

Type locality. Ridge east of Ontario Peak, San Gabriel Mts. Type seen (P).

Distribution. Local on dry, exposed, gravelly slopes in the pine forests of the San Gabriel Mts., in Los Angeles and San Bernardino counties, 4000 to 8700 ft.; rare in the San Bernardino and San Jacinto mts.

Collections. Ridge east of Ontario Peak, 8400 ft., San Gabriel Mts., San Bernardino Co., *Munz No. 6078* (P, type; UC); summit of Ontario Peak, San Bernardino Co., *Johnston No. 1615* (D, UC); San Antonio Canyon, Los Angeles Co., *Johnston No. 1591* (D, G, P, UC); near summit of Mt. Islip, Los Angeles Co., *Fosberg & Ewan No. 4915* (E); Cow Canyon Divide, Mt. San Antonio, Los Angeles Co., *Peirson No. 215* (J, type of *G. siccatum* var. *anotinum*; FP, P); Wilson's Peak, Los Angeles Co., *McClatchie in 1896* (D); Whitewater Basin, San Bernardino Mts., San Bernardino Co., *Wilder No. 1113* in part (UC); Tamarack Creek at 8000 ft., Mt. San Jacinto, Riverside Co., *Hall No. 2604* (UC).

It is probable that the specimens from the "San Antonio Mts." referred to *G. Wrightii* Gray by Parish (Erythea 7:97,—1899) are

actually *G. gabrielense* M. & J. *Galium Wrightii* Gray is closely related to *G. Rothrockii* Gray, *G. Wrightii* differing from *G. Rothrockii* chiefly in the hirsute pubescence of stems and leaves. No specimen of *G. Wrightii* Gray has been seen from California, the species ranging from Arizona eastward to Texas.

According to Munz and Johnston, lc., *G. gabrielense* is to be related to *G. multiflorum,* but, to the present writers, it appears very nearly related to the *G. angustifolium* complex, intergrading almost completely with *G. angustifolium* var. *siccatum* and *G. angustifolium* var. *bernardinum.* Typical *G. gabrielense* is a tufted montane plant, low and strict in habit; but intermediates in habit to its montane neighbor and to the suffrutescent dweller of the lowlands are not uncommon (cf. *Johnston No. 1591, Peirson No. 215,* and *Hall No. 2604*), and Johnston's collection (P) made in 1924 from Cascade Canyon, Ontario Peak, San Bernardino Co., is 4.5 dm. tall and loosely branched. Nor is the vesture of the corolla a decisive help in this instance, only indicating a tendency which is correlated with distribution and habit. The corolla of *G. angustifolium* var. *siccatum* is sometimes glabrous but usually (and this is the case in the type specimen), there are a few bristly hairs present. The corolla in *G. gabrielense* is usually prominently hairy externally, but in Johnston's collection of 1924, described above, the corolla bears only an occasional bristly hair. The collection made from Mt. Islip, *Fosberg & Ewan No. 4915,* approaches *G. angustifolium* in yet another character: although it has the low tufted habit, pubescent leaves, and bristly corollas of *G. gabrielense,* its internodes are minutely roughened but in no way pubescent! The status of *G. gabrielense* is here allowed to rest, a final decision regarding its position awaiting further detailed field studies.

12. Galium Munzii Hilend & Howell, Leafl. West. Bot. 1: 135 (1934). *G. Matthewsii* var. *scabridum* Jepson, Man. Fl. Pl. Calif. 963 (1925). Stems numerous from a woody root-crown, or rising from short running rootstocks, erect, crowded, branched, leafy, 2-3.5 dm. tall, bark gray to brownish-gray, exfoliating in age; stems and leaves cinereous-pubescent, the spreading hairs broad at the base, tapering and often curved at the tip; leaves in 4's or the uppermost in pairs, lanceolate-ovate to orbicular-ovate, acuminate, 6-12 (or 15) mm. long, usually 1-nerved, or the larger leaves sometimes 3-nerved, nerves whitish, prominent on the lower surface; inflorescence slender, 1-3 cm. broad, 6-14 cm. long; flowers dicœcious, pedicelled, mostly erect, often 3 on a branch; corolla 2-3.5 mm. in diameter, greenish, villous-pubescent externally, the lobes broadly ovate to oblong, rounded at the apex or acuminate; body of fruit 1-2.5 mm. in diameter, densely villous, the hairs 1-1.5 mm. long, whitish.

Type locality. Bonanza King Mine, Providence Mts., San Bernardino Co., California. Type seen (P).

Distribution. Northern base of the San Bernardino Mts. northward to the White Mts. of Inyo Co., California, and of Mineral Co.,

Nevada; eastward to the Providence Mts., San Bernardino Co., California.

Collections. CALIFORNIA: Bonanza King Mine, Providence Mts., *Munz, Johnston & Harwood No. 4217* (P, type; UC, CAS fragment); Providence Mts., *Brandegee in 1902* (UC), *Hoffmann in 1930* (SBM); Cushenbury Grade, San Bernardino Mts., San Bernardino Co., *Hilend No. 444* (CAS, UCLA); near Cushenbury Springs, San Bernardino Mts., *Hilend No. 439* (CAS, UCLA); Big Pine Creek, Inyo Co., *Hoffmann in 1931* (CAS); Silver Canyon, White Mts., Inyo Co., *Jepson No. 7210* (J, type of *G. Matthewsii* var. *scabridum*). NEVADA: near Sunland, White Mts., Mineral Co., *Heller in 1912* (CAS).

Galium Munzii is in the *G. multiflorum* group, differing from *G. multiflorum* and related species in the vesture of the plant, the type of leaves, and the character of the flowers and fruits. The plant which has been called *G. Munzii* var. *carneum* Hilend & Howell (Leafl. West. Bot. 1:136) from the Panamint Mts., Inyo Co., California, is an anomalous form combining the habit of *G. Matthewsii,* the vesture and foliage of *G. Munzii,* and the large corollas of *G. multiflorum.* The dwarf Galium from high elevations of the southern Sierra Nevada in Inyo Co. has been described as *G. Munzii* var. *subalpinum* Hilend & Howell (Leafl. West. Bot. 1:136).

13. GALIUM PARISHII Hilend & Howell, Leafl. West. Bot. 1:136 (1934). *G. multiflorum* var. *parvifolium* Parish, Zoe 5:75 (1900); *G. parvifolium* (Parish) Jepson, Man. Fl. Pl. Calif. 963 (1925); not Gaud. in Roem. & Schult., Syst. 3:246 (1818): Stems numerous from the branched woody root-crown, erect or spreading, tufted, 0.5-3 (or 4) dm. tall; stems and leaves minutely but rather densely pubescent; leaves of two kinds, the lower cauline leaves scale-like, approximate and tending to clothe the base of the stems, 1-2 mm. long, ovate; the upper cauline leaves frequently distant, ovate-lanceolate to orbicular-ovate, 3-10 mm. long, 2-7 mm. wide, the midvein and rarely the lateral veins visible on the lower surface; inflorescence spicate-paniculate, slender, the cymules of both staminate and pistillate flowers subcapitate-congested in the axils of the upper leaves; corolla 1.5-2 mm. in diameter, usually red or sometimes yellowish, hairs on outside of corolla short-bristly, the corolla-lobes ovate, acute to acuminate; body of fruit 1.5-2 mm. across, sparsely to moderately hairy, the hairs gray, 1.5-2 mm. long.

Type locality. Bear Valley, San Bernardino Mts., California. Type seen (D).

Distribution. Gravelly slopes and rocky summits, 6400 to 10,000 ft., from Los Angeles Co. to Riverside Co., California, eastward to the New York Mts., San Bernardino Co., California, and to the Charleston Mts., Clark Co., Nevada.

Collections. CALIFORNIA: summit of Mt. San Antonio, San Gabriel Mts., Los Angeles Co., *Peirson No. 2280* (CAS, FP); head of San Antonio Canyon, Los Angeles Co., *Johnston No. 1698* (D, J, P); Bear

Valley, San Bernardino Mts., San Bernardino Co., *Parish No. 1829* (D, type of *G. multiflorum* var. *parvifolium* and *G. Parishii*, G, UC); Castle Rock Trail near Bluff Lake, 7300 ft., San Bernardino Mts., San Bernardino Co., *Hilend No. 466* (CAS, UCLA); Johnston Grade, 6400 ft., San Bernardino Mts., San Bernardino Co., *Howell No. 2717* (CAS); Hidden Lake, San Jacinto Mts., Riverside Co., *Hilend in 1928* (UCLA); granite ledges, Mt. San Jacinto, 8500 ft., Riverside Co., *Hoffmann in 1929* (CAS, SBM); Toro Peak, Riverside Co., *Munz No. 5873* (P); New York Mts., San Bernardino Co., *Parish No. 10340* (D). NEVADA: Kyle Canyon, Charleston Mts., Clark Co., *Goodman & Hitchcock No. 1705* (D, UC).

14. GALIUM HALLII Munz & Johnston, Bull. Torr. Bot. Club 49:358 (1922). Stems numerous from the branched root-crown, woody below with white exfoliating bark, erect and 1-3 (or 4) dm. tall or spreading along the ground with erect branches from the outer nodes; stems and leaves thinly to densely cinereous-pubescent with spreading hairs; leaves oblong-elliptic to broadly ovate, 0.5-1.5 cm. long, 0.2-1 cm. wide, the margins usually revolute, the midvein and sometimes the lateral veins prominent on the lower surface of the leaf; inflorescence slender-paniculate, 2.5 cm. broad, the pistillate flowers loosely congested on recurved, leafy, axillary or terminal branchlets, the staminate flowers on erect or spreading branchlets; corolla 2-3 mm. in diameter, the outside pilose-hairy, the lobes lanceolate to ovate, acute to acuminate; body of fruit 3-3.5 mm. in diameter, densely white-hairy, the hairs 2 mm. long.

Type locality. Coldwater Fork of Lytle Creek, San Gabriel Mts. Type seen (J).

Distribution. Rocky slopes in canyons from the San Rafael Mts., Santa Barbara Co., to the San Bernardino Mts., San Bernardino Co., and north to the southern Sierra Nevada, Kern Co., 4000 to 7000 ft.

Collections. Tehachapi, Kern Co., *Greene in 1889* (D, UC); Mission Pine, San Rafael Mts., Santa Barbara Co., *Hoffmann in 1930* (CAS); Mt. Pinos, Ventura Co., *Hoffmann in 1928* (SBM); Kings Canyon, Liebre Mts., *Dudley & Lamb No. 4432* (D); Rock Creek, San Gabriel Mts., Los Angeles Co., *Peirson No. 214* (CAS, FP); Coldwater Fork of Lytle Creek, San Bernardino Co., *Johnston No. 2067* (J, type; D, P); Swartout Valley, San Gabriel Mts., *Munz No. 7705* (P, UC); Arrowhead Grade, San Bernardino Mts., San Bernardino Co., *Jones in 1926* (CAS).

This species is related to *G. multiflorum* but can be distinguished by its nodding flowers and fruits and by its cinereous pubescence.

In the original description of *G. Hallii*, the type is cited from the Herbarium of the University of California, but a careful search disclosed no specimen of this collection in the university herbarium. The only specimen of the type collection at the University of California is deposited in the research collections of Dr. Jepson and this specimen is here accepted as the type.

GALIUM MULTIFLORUM Kell., Proc. Calif. Acad. Sci. 2:96 (1863). Glabrous perennial; leaves broadly ovate; flowers large, 4-5 mm. in diameter, glabrous externally. This species is not known from Southern California, but only from the region of the type locality in central eastern California and adjacent Nevada. Type seen (Washoe, Nevada, *Veatch,* CAS).

15. GALIUM STELLATUM Kell., Proc. Calif. Acad. Sci. 2:96 (1863). Stems 1-3 dm. tall, from a woody suffrutescent base, branches of the season green, the older ones with white papery bark or the oldest stems with a gray shreddy bark; stems and leaves harshly pubescent; leaves ovate-lanceolate to linear-lanceolate, 1-10 mm. long, 0.5-3 mm. wide, the margins more or less revolute, the midvein conspicuous below, the lateral veins generally lacking; inflorescence cymose-congested on axillary branchlets or paniculately cymose and more diffuse; corolla greenish-yellow, 2.5-3.5 mm. in diameter, the outside with erect bristly hairs, the lobes ovate, acute; body of fruit 2-3 mm. in diameter, densely white silky-hairy, the hairs 2-2.5 mm. long.

KEY TO THE VARIETIES OF *G. stellatum*

Plants with few branches; leaves ovate-lanceolate; pistillate flowers congested and closely subtended by the uppermost leaves..... .....15a. var. *typicum*

Plants much-branched from woody base; leaves lanceolate to linear-lanceolate; pistillate flowers terminal and solitary on the leafy-bracted branchlets.....15b. var. *eremicum*

15a. GALIUM STELLATUM var. TYPICUM Hilend & Howell, nom. nov. *G. stellatum* Kell., lc. Stems few-branched; the young stems and leaves densely cinereous-pubescent; leaves ovate-lanceolate, the margin strongly revolute, the apex pungent-acute; staminate flowers few in a narrow inflorescence, pistillate flowers generally 3 (1 to 3), congested at the ends of the branchlets, the pedicels about 1 mm. long and the uppermost leaves seeming to form an involucre.

Known only from Cedros (Cerros) Island, Lower California. Type seen (CAS).

Collections. LOWER CALIFORNIA: Cerros (Cedros) Island, *Veatch* (CAS, type); Cedros Island, *Greene in 1885* (CAS), *Anthony No. 317* (D, G).

15b. GALIUM STELLATUM var. EREMICUM Hilend & Howell, Leafl. West. Bot. 1:137 (1934). Plants bushy, much-branched above the woody base; stems and leaves more or less scabrous-pubescent; leaves lanceolate or linear-lanceolate, the margin somewhat revolute, the apex acerose-acute to acuminate; staminate flowers numerous in a diffuse panicle, pistillate flowers many, solitary at the ends of leafy-bracted branchlets, the pedicels generally 2-3 mm. long.

Type locality. Sheep Hole Mts., San Bernardino Co., California. Type seen (CAS).

Distribution. Deserts of southeastern California and southern Nevada.

Collections. CALIFORNIA: Yaqui Wells, San Diego Co., *Eastwood No. 2783* (CAS, G); Chuckawalla Mts., Riverside Co., *Munz & Keck No. 4729* (P); Agua Caliente (Palm Springs), Riverside Co., *Parish in 1896* (G, UC); Cajon Pass, San Bernardino Co., *Jones in 1923* (CAS); Bonanza King Mine, Providence Mts., San Bernardino Co., *Munz, Johnston, & Harwood No. 4216* (D, P, UC); Granite Mts., San Bernardino Co., *Hoffmann in 1930* (CAS); west end of Sheep Hole Mts., San Bernardino Co., *Fosberg No. 7963* (CAS, type; UCLA); 2 miles east of Bradbury Well, Black Mts., Inyo Co., *Howell No. 3627* (CAS); Marble Gorge, Surprise Canyon, Panamint Mts., Inyo Co., *Howell No. 3962* (CAS); Funeral Mountains, *Jones in 1907* (CAS, D, P). NEVADA: Amargossa Desert, Nye Co., *Jones in 1907* (CAS, D, P).

GALIUM MATTHEWSII Gray, Proc. Amer. Acad. 19:80 (1883). Glabrous perennial; leaves narrowly ovate, rigidly acute, the lower crowded, the upper remote and reduced; corolla small, 1.5-2 (or 3) mm. in diameter, hispidulous. *Galium Matthewsii* does not occur in Southern California but occupies the distributional gap in eastern California between *G. multiflorum* on the north and *G. stellatum* var. *eremicum* on the south. To the latter it seems very nearly related. Type seen (Camp Independence, Inyo Co., California, *Matthews,* G).

16. GALIUM NUTTALLII Gray, Pl. Wright. 1:80 (1852). *G. suffruticosum* Nutt. in T. & G., Fl. N. A. 2:21 (1841), not H. & A. Stems generally suffrutescent at base, mostly elongate and clambering over other plants, rarely low and tufted, 0.2-2 m. long, the angles of the stem rarely smooth, mostly armed with minute, retrorse-triangular or somewhat retrorse-curved trichomes, these rarely somewhat elongate and becoming hair-like; leaves in 4's, generally dark green, somewhat shiny, linear-oblong to ovate-oblong, 0.3-1 cm. long, pubescence harsh, sparse and somewhat variable, but generally the hairs on the upper surface of the leaf curved outward toward the apex and the hairs on the margins and lower side of midvein curved inward toward the stem; plants dicœcious, the pistillate flowers solitary on short axillary pedicels, the staminate in few-flowered cymules, the corolla yellowish-green; ovary glabrous or very rarely pubescent; fruit fleshy, waxy-translucent, whitish, tinted with gray or lavender.

Type locality. San Diego, California.

Distribution. Common on the lower hills of coastal Southern California; Santa Cruz Island; northern Lower California northward through the Coast Ranges to southern Oregon; foothills of the middle Sierra Nevada from Fresno Co. to Eldorado Co.

Collections. LOWER CALIFORNIA: Socorro, *Reed No. 6317* (P); Tia Juana, *Abrams No. 3490* (D, G, P). CALIFORNIA: Point Loma, San

Diego Co., *Eastwood No. 2543* (CAS, G); between Buckman Springs and Jacumba, San Diego Co., *Campbell No. 61* (CAS); St. John's Grade, Riverside Co., *Howell No. 4791A* (CAS); Laguna Beach, Orange Co., *Munz No. 2215* (D, P); Claymine Canyon, Santa Ana Mts., Orange Co., *Howell No. 2600* (CAS); Reche Canyon, San Bernardino Mts., San Bernardino Co., *Parish No. 2169* (D, P, UC); San Gabriel Wash, Los Angeles Co., *Howell No. 4101* (CAS); small canyon east of Rubio Canyon, San Gabriel Mts., Los Angeles Co., *Peirson No. 2653* (CAS, FP); Topango Canyon, Santa Monica Mts., Los Angeles Co., *Munz No. 3987* (P); Saticoy, Ventura Co., *Eastwood No. 5048* (CAS); Mission Ridge, Santa Barbara, Santa Barbara Co., *Howell No. 6545* (CAS); San Marcos Pass, Santa Ynez Mts., Santa Barbara Co., *Hoffmann in 1928* (SBM); Prisoner's Harbor, Santa Cruz Island, *Howell No. 6362* (CAS); Fry's Harbor, Santa Cruz Island, *Abrams & Wiggins No. 140* (CAS, D); Valle del Medio, Santa Cruz Island, *Howell No. 6254* (CAS).

The following specimens from Santa Cruz Island differ from the typical plants in the smooth stems and foliose aspect: near west end, *Howell No. 6322* (CAS); China Harbor, *Howell Nos. 6376, 6376A* (CAS); Valle del Medio, *Howell No. 6254A* (CAS); vicinity of Pelican Bay, *Abrams & Wiggins No. 158* (CAS, D, UC); vicinity of Fry's Harbor, *Abrams & Wiggins No. 140* (CAS, D, UC); Santa Cruz Island, *Eastwood No. 6427* (CAS, G).

An anomalous form with ovaries densely pubescent has been found on Mission Ridge, Santa Barbara, Santa Barbara Co. (*Howell No. 6544,* CAS). Only the one collection has been seen which shows this character.

GALIUM SPARSIFLORUM Wight, Zoe 5:55 (1900). Stems erect or spreading from perennial root-crown, smooth and glabrous, 3-5 dm. tall; leaves glabrous to hispidulous, oval or ovate; pistillate flowers solitary, staminate rather few in leafy cymules; fruit fleshy, glabrous. This species is closely related to *G. Bolanderi* Gray, of which it may be only a variety. The first cited specimen, which is taken as the type, was collected in Big Meadows, Plumas Co., California (*Austin in 1878,* CAS), but the species is most abundant in the southern Sierra Nevada. One collection, not considered typical by Wight, was collected in the Tehachapi Mts., Kern Co., very near, if not within, the geographic bounds set for this paper (Antelope Canyon, *Dudley No. 377,* UC).

17. GALIUM PUBENS Gray, Proc. Amer. Acad. 7:350 (1868). *G. grande* McClatchie, Erythea 2:124 (1894). *G. pubens* var. *grande* (McClatchie) Jepson, Man. Fl. Pl. Calif. 961 (1925). Stems from thickened, woody caudex, low and substrictly erect or elongate and clambering over brush, 0.1-1.5 m. tall, subscabrous or cinereous-pubescent; leaves mostly gray-green, linear-oblong to ovate-oblong, 0.5-1.5 cm. long, pubescent above and below with short hispidulous

or subscabrous hairs; plants dicœcious, the pistillate flowers solitary in the axils, the staminate flowers in few-flowered cymules paniculately arranged; corolla purplish or greenish; ovary hairy; fruit fleshy, grayish to black, shining, slightly puberulent or glabrate.

Type locality. Yosemite Valley, Mariposa Co., California. Isotype examined (CAS).

Distribution. Local in the San Gabriel Mts., Los Angeles Co., 3000 to 6000 ft.; northern Lower California; Sierra Nevada from Kern Co. to Plumas Co.; North Coast Ranges in Napa and Lake counties and perhaps northward.

Collections. San Gabriel Mts., 4000 ft., *McClatchie in 1893* (type collection of *G. grande*; G, UC); Mt. Wilson, Los Angeles Co., *Abrams No. 1516* (D); ridge between Monrovia and Fish canyons, *Peirson No. 448* (FP). Collections from Ensenada, Lower California, *Jones No. 3692* (CAS, P) and *Howell No. 10751* (CAS), although without flowers or fruit, evidently belong near *G. pubens*.

18. GALIUM CALIFORNICUM H. & A., Bot. Beechy Voyage 349 (1841). Stems slender and spreading from slender branched rootstock, mostly 1-3 dm. long, pilose-hairy to cinereous-pilose, rarely the hairs stiffer and somewhat recurved; leaves in 4's, broadly to narrowly ovate, rarely elliptical, subacuminate, acute or subobtuse, 4-10 mm. long, sparsely to densely pilose-hairy; flowers scattered, solitary or in 2- or 3-flowered cymes; corolla sordid yellowish, hairy or glabrous externally; fruit fleshy, pearly and subtranslucent when ripe, glabrous or hairy.

KEY TO THE VARIETIES OF *G. californicum*

Stems and leaves usually conspicuously pilose, the hairs generally straight; leaves ovatish to oblong, more or less distant..... 18a. var. *typicum*

Stems and leaves subglabrous or generally with stouter curved hairs; leaves broadly oblong or round-ovate, congested at the ends of branchlets.....18b. var. *miguelense*

18a. GALIUM CALIFORNICUM var. TYPICUM Hilend & Howell, nom. nov. *G. californicum* H. & A., lc. *G. flaccidum* Greene, Pitt. 1:34 (1887). *G. occidentale* McClatchie, Erythea 2:124 (1894). Hairs on stems and leaves pilose, long and generally straight; leaves narrowly to broadly ovate or oblong, mostly scattered, generally thin and herbaceous in texture.

Type locality. California. Photograph and leaf from type examined (UCLA ex Herb. Kew).

Distribution. Local and rare in coastal Southern California; common on Santa Cruz Island and on the mainland from San Luis Obispo Co. northward to Lake and Humboldt counties.

Collections. El Monte, Los Angeles Co., *Grant in 1900* (D); San Gabriel Mts., *McClatchie in 1893* (probably type collection of *G. occidentale* McClatchie; UC); Knapp's Lodge, Santa Ynez Mts., Santa Barbara Co., *Hoffmann in 1925* (SBM); Santa Cruz Island, *Greene in 1886* (type collection of *G. flaccidum* Greene; CAS, frag. UC), *Eastwood No. 6423* (CAS); Valle del Medio, Santa Cruz Island, *Howell No. 6309* (CAS); Pelican Bay, Santa Cruz Island, *Howell No. 6406* (CAS), *Abrams & Wiggins No. 60* (CAS, D, UC).

A leaf from the type and a photograph of the type sheet have been available for our study and they show that the plant is the one with long, slender, pilose hairs on the angles of the stems and on the leaves. The stems are short and the leaves ovate. Thus, in habit and vesture, the historical type is like plants generally referred to the species; but the vesture of the fruit of these latter is not generally in accord with the type. In the original description, the ovary is described as glabrous, but the ovary and fruit of much of the material of *G. californicum* vary from sparsely to densely hairy. Occasionally, especially along the Californian coast north of San Francisco Bay, plants are found with glabrous fruits. The only data given with the type is "California, Douglas." In the vicinity of Monterey, where Douglas collected extensively and where *G. californicum* is abundant and might have been collected by him, the plants generally have ovaries and fruits more or less hairy; but an occasional plant can be found which has glabrous fruits, low spreading habit, and pilose pubescence (cf., Pacific Grove, *Clemens in 1919,* CAS).

In this work we do not make a segregation within *G. californicum* depending on whether or not the ovary is pubescent, since the character is not distinctly correlated with other morphological variations nor with geographic distribution. However, if this character is used as a basis for a division within the species, Greene's *G. flaccidum* is the oldest name applicable to the hairy-fruited form. This was described from plants collected on Santa Cruz Island and the specimen of the type collection in Herb. Calif. Acad. Sci. shows it to be a form of *G. californicum* with densely hispidulose-pilose herbage, hispidulose corolla-lobes, and densely hairy ovaries. Mainland forms exhibit these characters in varying degrees without regard to geographic distribution.

18b. Galium californicum var. miguelense (Greene) Jepson, Man. Fl. Pl. Calif. 961 (1925). *G. miguelense* Greene, Pitt. 1:34 (1887). Hairs on the stems nearly lacking or short and curved; leaves crowded at the ends of branchlets, ovate to round-ovate, glabrous and shining above, crustaceous in texture.

Type locality. San Miguel Island, California. Type collection examined (CAS).

Distribution. Santa Rosa and San Miguel islands

Collections. San Miguel Island, *Greene in 1886* (type collection, CAS, G, frag. UC); Santa Rosa Island, *Brandegee in 1888* (G, UC); west end, Santa Rosa Island, *Hoffmann in 1930* (CAS, SBM).

Galium miguelense is almost exactly intermediate between *G. californicum* and *G. Nuttallii.* Brandegee (Proc. Calif. Acad. Sci., ser. 2, 1:211,—1888) referred it to *G. Nuttallii* and for a time the present writers believed that it showed a closer relationship to that species. But certain collections from the coast of northern California link *G. miguelense* definitely to *G. californicum* so that the plant is left where Jepson referred it in 1925. In fact, it is believed that some of these mainland collections are to be identified with var. *miguelense* (cf., *Howell No. 5436,* Pt. Lobos, Monterey Co., CAS). On the other hand, one collection from Santa Rosa Island (*Hoffmann in 1929,* CAS) would appear to be intermediate between *G. californicum* var. *miguelense* and *G. Nuttallii,* having the habit of *G. Nuttallii* but showing a tendency for the trichomes to become elongated.

19. Galium Andrewsii Gray, Proc. Amer. Acad. 6:537 (1865). Low, densely tufted perennials; stems erect or spreading, 0.5-2 dm. long, very leafy, the lower part slender, more or less prostrate and rooting at the nodes; leaves in 4's, 3-10 mm. long, crowded, very narrow, acuminate, rigid, very shiny, glabrous or slightly scabrous, with inconspicuous longitudinal striations, the midrib often raised; flowers solitary or in small clusters, diœcious, the slender pedicels often recurved and twisted especially in fruit; corolla lobes acute, glabrous; fruit large, baccate, glabrous, blackish in age, subtranslucent.

Type locality. "California."

Distribution. Dry slopes and flats of the lower mountains of California, generally away from the coast, 1500 to 5000 ft., eastern San Diego Co. (where it is common), northward through the Coast Ranges to Lake Co.; local in the foothills of the central Sierra Nevada; south to northern Lower California.

Collections. Trail to Manzana Creek, Zaca Lake Mts., Santa Barbara Co., *Eastwood No. 633* (CAS); Cuyama Valley, *Hoffmann in 1929* (SBM); Seymour Creek, Mt. Pinos, Ventura Co., *Munz No. 6982* (P); Topango Canyon, Santa Monica Mts., Los Angeles Co., *Mohr in 1911* (LAM); Arrastre Creek, San Gabriel Mts., Los Angeles Co., *Peirson No. 399* (FP); San Bernardino Mts. below Forest Home, San Bernardino Co., *Reed No. 2775* (P); summit of Jackrabbit Trail, Riverside Co., *Howell No. 6644* (CAS); south side of Santa Rosa Peak, Riverside Co., *Munz No. 5958* (P); between Campo and Buckman Springs, San Diego Co., *Howell No. 2979* (CAS); Palomar Mt., San Diego Co., *Chandler No. 5368* (UC), *Hilend in 1932* (CAS, UCLA), *Peirson No. 4499* (FP, P); between Ojos Negros and Neji Rancho, Lower California, *Wiggins & Gillespie No. 4131* (CAS, D).

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ERRATUM. On the cover of the last number of LEAFLETS OF WESTERN BOTANY, read Louis Williams instead of Louis Wheeler for author of "Notes on Rocky Mountain Plants."

THE RARE FESTUCA TRACYI. A sloping hillside partially shaded by a Douglas Oak (*Quercus Douglasii*) and brightly flecked with *Linanthus dichotomus* Benth. called me to halt along the road from San Benito to the Pinnacles in San Benito Co., California, in April, 1933. A collection of the Linanthus made, I glanced about for something further and noticed an annual Festuca which I took to be the uncommon *F. Eastwoodæ* Piper. Hastily a collection was made; but not until I returned to the herbarium did I find that I had collected three species of Festuca instead of one! These were referred to Mr. J. W. Stacey, who determined them as *F. pacifica* Piper, *F. Grayi* (Abrams) Piper, and *F. Tracyi* Hitchc.; and later these names were verified through the kindness of Dr. A. S. Hitchcock. The collection of *F. Tracyi* is notable since, to my knowledge, it represents the second known collection of the species and one from a locality more than 150 miles south of the type locality which is in the Napa Range. Also, it seems noteworthy that two other annual species of Festuca grew with *F. Tracyi*.—John Thomas Howell.

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SAN FRANCISCO, CALIFORNIA
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BOTANICAL
GARDEN

LEPTOSPERMUM AND ALLIED GENERA IN GOLDEN GATE PARK

BY ALICE EASTWOOD

Three related genera are Leptospermum, Kunzea, and Agonis. The first two seem most alike, differing noticeably in the stamens. Leptospermum has the stamens in one row and not surpassing the petals; Kunzea has more numerous stamens conspicuously surpassing the petals. Agonis differs from both with the flowers in globular heads in the axils of the leaves, instead of single or several on short stems.

The leptospermums are natives of Australia, Tasmania, New Zealand, and the Malay Archipelago while the other two genera are restricted to Australia. All have petals and sepals which surmount the ovary and are followed by woody pods which fall after the seeds are discharged. When these shrubs are in bloom, the flowers are so numerous that each branch becomes a beautiful festoon. With the exception of some varieties of *Leptospermum scoparium,* all in cultivation here have white flowers. All belong to the Myrtle Family.

Key to Species of Leptospermum

1. Flowers sessile 2
1. Flowers on stems 3
2. Leaves broadest at top ..... *L. lævigatum*
2. Leaves broadest at base ..... *L. scoparium*
3. Leaves and stems white-woolly ..... *L. pubescens*
3. Leaves and stems not as in preceding 4
4. Calyx-divisions rounded ..... *L. flavescens* and *L. citratum*
4. Calyx-divisions pointed ..... *L. ericoides*

Leptospermum lævigatum (Gærtn.) F. v. M. This Australian shrub is the most extensively planted and most useful of all the species of Leptospermum in Golden Gate Park. In the reclamation of the sand dunes, together with *Acacia longifolia,* it followed the beach grass and the lupines. It is used for hedges and mass planting. On the North Drive, a foot path passes through a tunnel of overarching verdure with cavernous sides of dark, shaggy, tortuous, fantastic stems and branches. The early colonists in Australia used the leaves to make tea, hence the name, Tea-tree. Captain Cook also is said to have used the leaves for the same purpose. The leaves are dull pale green, the ultimate branches drooping and in early spring are decked with white flowers about the size of a dime.

Leafl. West. Bot., Vol. I, pp. 169-176, March 15, 1935.

LEPTOSPERMUM SCOPARIUM Forst. This, a native of New Zealand, is the most polymorphic of all. Botanists who know these shrubs in their native home have given up the attempt to separate them even into varieties. However, several varieties are in cultivation and sufficiently distinct to have names. The typical form has white flowers and sharply pointed, lanceolate leaves; var. *grandiflorum* has larger flowers colored like apple blossoms; var. *flore-plenum* is similar to the preceding but has double flowers; var. *Nicollii* Turrill has flowers a dark crimson-red. Seeds from this variety produced shrubs with white flowers. In New Zealand, the natives called this Manuka and it is known in New Zealand by that name.

LEPTOSPERMUM PUBESCENS Lam. An Australian species which is not common and is known in Californian gardens as *L. lanigerum* Schau. It is readily distinguished by the silvery hairs appressed on the young leaves and by the woolly calyx.

LEPTOSPERMUM FLAVESCENS Sm. Another Australian species which is not common in cultivation. The leaves are small, narrowly lanceolate and the small flowers have stems.

LEPTOSPERMUM CITRATUM Challener, Cheel, and Penfold. This has been considered a variety of the preceding and is chiefly distinguished by the longer and lemon-scented leaves. It has been recently introduced.

LEPTOSPERMUM ERICOIDES A. Rich. This is a recent introduction from New Zealand, distinguished by the small heather-like leaves. It is a vigorous shrub, attaining a height of six feet in a short time.

* * *

Kunzea is represented in California by the following two species: *K. pedunculariis* F. v. M., with flowers having thread-like stems; and, *K. corifolia* Reichb., with sessile flowers. Both are densely flowered with small flowers having conspicuous stamens. The leaves are short and narrow.

* * *

Agonis is represented by three species in Golden Gate Park, the last two being recent introductions.

AGONIS FLEXUOSA (DC.) Lindl. This is a small tree with drooping branches and leaves like those of a weeping willow. The young leaves are silvery and rose-colored and the little knots of flowers dot the branches in the leaf-axils.

AGONIS LINEARIFOLIA (DC.) Lindl. This has flowers similar to the preceding and short linear leaves.

AGONIS MARGINATA (Lab.) Schau. This is a shrub with obovate, woolly-margined leaves and larger heads of flowers which are often terminal.

NOTES ON ROCKY MOUNTAIN PLANTS—II

BY LOUIS WILLIAMS
Missouri Botanical Garden, St. Louis

SOME ROCKY MOUNTAIN SPECIES OF ARNICA. During the attempt to determine some arnicas from the Rocky Mountains with Dr. Rydberg's treatment of that genus in the North American Flora 34:321-357 (1927), it soon became apparent that according to the keys a single specimen might easily be put into different sections, and might fit equally well several species. A few species of the section Latifoliæ, as treated by Dr. Rydberg, are reviewed here. Authentic material of *A. latifolia* Bong., Mem. Acad. St. Petersb. IV. 2:147 (1833), on which the section is based, is at hand.

Arnica granulifera Rydb., Fl. Rocky Mts. and Adj. Plains 978 (1917), does not belong in the section Latifoliæ. It is based on a Flodman collection which bears the number 896 and comes from the Little Belt Mts. of Montana. It is *A. cordifolia* Hook., Fl. Bor. Am. 1:331 (1834). *Arnica grandifolia* Greene, Pitt. 4:172 (1900), is based on the same number by Flodman but collected near Bridger Pass, Montana. Greene's species is a large-leaved form of *A. cordifolia* Hook.

That *A. teucriifolia* Greene, Pitt. 4:164 (1900), is very closely related to *A. latifolia* Bong. cannot be doubted. It can be found in a series of sizes, depending on the habitat and altitude; other than the smaller size and the different distribution it cannot be separated varietally successfully and consistently from *A. latifolia.* It may be known as **A. latifolia** var. **teucriifolia** (Greene) L. Wms., comb. nov.

Arnica ventorum Greene, Pitt. 4:173 (1900), based on Prof. A. Nelson's *No. 836* and *A. paucibracteata* Rydb., N. A. Fl. 34:336 (1927), *Nelson No. 7941,* as well as *A. latifolia* var. *teucriifolia* (Greene) L. Wms., *Leiberg No. 1229,* are all based on excellent specimens showing both sucrulose leaves as well as the flowering plants. They are all identical and may be referred to the last name.

Arnica Flodmanii Rydb., N. A. Fl. 34:334 (1927), based on *Flodman No. 898,* is placed in another section, Graciles, because of the smaller size of the specimens. Other than the smaller size of the specimens, which surely is not a specific character,

it is not distinguishable from, and may be referred to, *A. latifolia* var. *teucriifolia* (Greene) L. Wms. Rydberg's descriptions of the two plants, in the above cited work, bring out no specific character that one may use to separate the two, but give only contrast of size.

These names and synonyms may be summarized as follows:

ARNICA CORDIFOLIA Hook. *A. granulifera* Rydb., Fl. Rocky Mts. and Adj. Plains 978 (1917); *A. grandifolia* Greene, Pitt. 4:172 (1900).

ARNICA LATIFOLIA var. TEUCRIIFOLIA (Greene) L. Wms. *A. teucriifolia* Greene, Pitt. 4:164 (1900); *A. ventorum* Greene, lc., 173; *A. Flodmanii* Rydb., N. A. Fl. 34:334 (1927); *A. paucibracteata* Rydb., lc., 336.

FIELD DAYS IN SAN FRANCISCO—II

BY JOHN THOMAS HOWELL

(Continued from Page 91)

Situated at the crossroads of world commerce, San Francisco is the port of entry of many an alien plant that comes to find a home with us. Many of these pass on to interior districts to become established, but a few are adventive at the portal and thrive and persist about vacant lots and along city streets. Notes on several of these will probably be of interest especially since some of them have not appeared or been reported in any other part of the continent.

AGROPYRUM JUNCEUM (L.) Beauv. In her search in and about San Francisco for plants which cause hay-fever, Mrs. H. E. Tilden, of the Hooper Foundation of the University of California, has re-collected this rare and very interesting grass on the coastal sand dunes between the Cliff House and Lake Merced. This species was reported by Hitchcock in Jepson, Fl. Calif. 1:180, based on a collection made at the outlet of Lake Merced by J. W. Congdon, perhaps fifty years ago, the only specimen heretofore known from California. A native of Europe and northern Africa, the species is also known in the Pacific States from Linnton, Oregon (Abrams, Fl. 1:244). For the determination of the San Franciscan specimen, the writer is indebted to Mr. J. W. Stacey.

PLANTAGO ARENARIA W. K. That this central and southern European plant is now adventive in San Francisco is shown by specimens of the species that have been collected in weedy patches by Mrs. Tilden in her search for hay-fever plants. The erect stems bearing leaves up to the inflorescence distinguish this Plantago from all that have been known in California. Related as it is to the caulescent plantains of the Mediterranean region, this new immigrant makes our weed-flora even more representative of the flora of those parts whence we derive so many weedy species.

LAVATERA CRETICA L. Yet another weed from the Mediterranean region is this Cretan mallow, a tall Malva-like plant, definitely referable to Lavatera because of the united bractlets subtending the flower. It has been known from the northern part of San Francisco for many years, having been collected as early as 1912 by Miss Eastwood. At present it is one of the commonest weeds in vacant lots on the Marina, and its extension southward down the San Francisco Peninsula along the Bayshore Highway has been noted. This is perhaps the first occurrence of the plant to be noted in the United States. It is an annual 1 to 2.5 m. tall and not nearly related to the native *L. assurgentiflora* Kell. which belongs to another section of the genus.

MALVA SYLVESTRIS L. This European plant, which has been reported as an occasional garden escape in California and elsewhere, has been an unreported weed inhabitant of San Francisco for a number of years. It was first collected on Nob Hill by Miss Eastwood in 1912 and later on Russian Hill. During the past summer it was found by the writer on the Marina; and Mr. J. W. Stacey reports that it grows in waste places within a few blocks of the business district. A weed in its mode of life, it is a most showy and not unattractive plant when in full bloom with its tall stems and numerous, large, pinkish flowers.

RAPISTRUM RUGOSUM (L.) All. The only collection of this plant known to us from California was found as a sidewalk weed by Miss M. A. King on Lower Terrace, San Francisco, in the summer of 1930. At first sight the fruiting plant has the

appearance of a Sisymbrium or Brassica whose fruits have been galled by insects. Because of the glabrous fruits of our plant, it appears referable to the subvariety *leiocarpum* Webb & Berth. of the typical variety according to Hegi (Fl. Mitt. Eur. IV, 1:293). The species is indigenous to the Mediterranean region and in this country is only reported by Britton and Brown from ballast piles in eastern cities.

SISYMBRIUM ORIENTALE L. This member of Cruciferæ has also come to San Francisco as a sidewalk weed, growing near the Cliff House, where it was found by the writer in 1930. From the other true Sisymbriums that have become established in California, the plant can be distinguished by the upper leaves which are hastately lobed or subentire and by the long, rigid, somewhat divaricate siliques which are nearly continuous with the equally thickened pedicels. No record of *S. orientale* in the United States has been seen in the literature. It is a gerontogeous species, most abundant on the borders of the Mediterranean Sea but occurring northward through central and western Europe.

LEPTOCHLOA FASCICULARIS (Lam.) Gray. This grass, which is rare enough in the interior valley of California, it being reported only from Kern and Fresno counties, has appeared in San Francisco where it was found by the writer in September of 1933. A native of tropical and temperate America, it likes best to grow in moist soil of low fields, but, oddly enough, it luxuriated as a sidewalk weed in the midst of the city.

NEW SPECIES OF CALIFORNIAN CASTILLEJA

BY ALICE EASTWOOD

Castilleja multisecta Eastwood, spec. nov. Caules ramosi ex radice lignea, circa 3 dm. alti, parce divaricato-hispidi; foliis scabrido-hispidis, 3-7-divaricato-fissis, segmentis linearibus, 1-2 mm. latis, infimis longissimis, rachide trinervata; bracteis infimis similibus foliis superioribus, flores superantibus, segmentis bractearum superiorum latioribus et coccineis; spicis brevibus et densis; calyce 2-2.5 cm. longo, anteriore fisso 2 mm. majore posteriore, tuba circa 1 cm. longa, segmentis linearibus, 5 mm. longis; corolla circa 2 cm. longa, galea 11 mm. longa, labio prominenti, viridi, dentibus exterioribus longioribus medio; stylo exserto, stigmate bilobato.

Type: No. 176207, Herb. Calif. Acad. Sci., collected March 30, 1930, on moist shaded hillsides on west side of Pacheco Pass, California, about 1000 ft. alt., by John Thomas Howell, *No. 4642.*

This is related to *C. Douglasii* Benth., but differs in having all the leaves divided, with 3-5 narrow linear spreading divisions, some of the lowest leaves 6 cm. long, the rachis strongly 3-nerved. The pubescence is harsh, the hispid hairs scattered and spreading. The specimens on which the description is based are young with a dense red spike terminating the stems. The lower flowers are shortly pedicelled in the uppermost leaf-axils.

Castilleja nevadensis Eastwood, spec. nov. Caules ramosi ex radice lignea, simplices vel supra ramosi, 4-5 dm. alti, cinereo-tomentosi; foliis linearibus attenuatis, 2-8 cm. longis, 2-3 mm. latis; spicis gracilibus, media longissima, 15 cm. longa; bracteis integris vel 3-fissis, 1.5 cm. longis, segmento medio 8 mm. longo, 2 mm. lato, lateralibus erectis; calyce fisso 2-3 mm. anteriore, 4-6 mm. posteriore, lobis segmentorum erectis, obtusis, 1.5 mm. longis; corolla 15 mm. longa, galea gracili, 10 mm. longa, æquali tubæ, labio tricostato, circa 4 mm. longo, segmentis lanceolatis acuminatis, medio minore, capsula ovoidea, 8 mm. longa; seminibus inæquali-cuneatis, lucidis et areolatis.

Type: No. 28921, Herb. Calif. Acad. Sci., collected by the author, *No. 579,* near Nevada City, California, June 21, 1912.

This is a slender-stemmed species with several stems from a woody root, either simple or branching above at the inflorescence. The entire plant is gray with a fine close tomentum; the leaves are narrow, linear, in age spreading downwards; the spikes are slender, the flowers and bracts grayish or yellowish; the calyx is slit deeper in the back than in front and the divisions of the two lobes are short and obtuse; the galea of the corolla is very slender, exserted, and becomes curved outwards in age; the lower lip is but slightly protuberant, with three lobes, the two outer twice as long as the middle and all are erect. It seems unlike other known Californian species.

Castilleja Peirsoni Eastwood, spec. nov. Caules circa 1.5 dm. alti, ramosi ex radice lignea, basi squamosi et glandulosi, puberulentes, supra parce glanduloso-pilosi vel hispidi; foliis lineari-lanceolatis, integris vel 3-5-fissis, segmentis filiformibus vel anguste linearibus, rachide 3-5 mm. lata; bracteis similibus foliis superioribus; floribus

brevi-pedicellatis, 2 cm. longis, calycibus brevioribus galea sed superantibus labium, fissis anteriore magis posteriore, segmentis linearibus, 5 mm. longis, brevioribus tuba, galea circa 1 cm. longa, basi 1.5 mm. lata, apice obtusa, dorso puberulenti, labiorum segmentis oblongis obtusis, circa 2 mm. longis; stigmate biliobato exserto, 1 mm. lato.

Type: No. 220326, Herb. Calif. Acad. Sci., collected by Frank W. Peirson in Upper Rock Creek Lake Basin, 10,800 ft. alt., Aug. 4, 1930. The plants grew along the shores of the large lake on east side of basin; very striking, yellow being the dominant color. The bracts are red and the yellow appearance is due to the prominent exserted corolla. The pistil extends beyond the galea and has an unusually large bilobed stigma. This castilleja is related to *C. Breweri* Fernald, differing in being less pilose and with the galea and stigmas conspicuously exserted. In *C. Breweri* they are scarcely evident. Several low stems arise from a woody root, some being sterile and shorter than the flowering stems. The flower clusters are from 2-4 cm. long and 2-3 cm. wide.

ANODA CRISTATA IN CALIFORNIA. When this malvaceous weed was first received for identification, it was believed to be referable to one of the species segregated from the rather variable complex by Philippi in South America. So a specimen was forwarded to the Arnold Arboretum to Dr. I. M. Johnston, who is especially interested in the flora of western South America and its relation to the flora of western North America. Concerning the Anoda, he writes: "According to the last revision of Anoda (Hochreutiner, Ann. Conserv. et Jard. Bot. Genève 20:29-68,—1916), this plant falls readily into *Anoda cristata* (L.) Schlecht. This is the early and valid name for the species passing as *A. hastata, A. triloba,* etc. I am quite satisfied to call it *A. cristata* var. *typica.*" The collection so determined by Dr. Johnston was reported as an abundant and persistent garden weed at Placerville, Eldorado Co., by Mr. Ivan W. Lilly, County Agricultural Agent. If I remember correctly, there is a specimen of this same weed in the Herbarium of the University of California from the vicinity of Stockton, California, collected thirty or forty years ago.—John Thomas Howell.

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SAN FRANCISCO, CALIFORNIA
MAY 28, 1935

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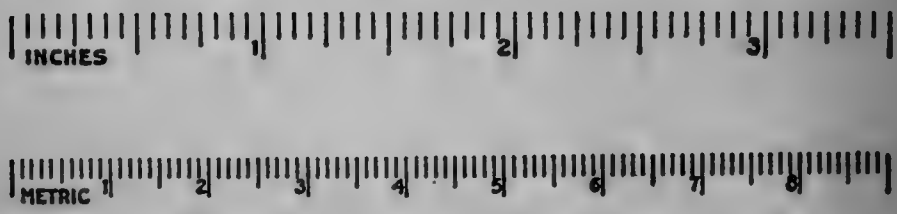

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ALICE EASTWOOD and JOHN THOMAS HOWELL

NOTES ON CAREX—II

BY J. W. STACEY

In looking over the Carices in the Herbarium of the California Academy of Sciences, a new record for California was detected, that of *C. filifolia* Nutt. This was labeled *C. exserta* Mackenzie, and was collected by M. Halperin, *No. 506,* at Mosquito Flat, Rock Creek, Inyo Co., elevation 10,500 feet. Later two more sheets of the same species were found in the private herbarium of Frank Peirson, Altadena, collected in the same general region.

A fine collection of duplicates was sent to me by Frank Peirson, collected at Rock Creek Lake Basin, Inyo Co., California. Among them was a new record for the state, *C. pyrenaica* Wahl. This was labeled *C. exserta* Mackenzie. It has long been surmised that *C. pyrenaica* would turn up sooner or later, but it had been expected from the northern rather than from the eastern part of the state. Still another record is *C. siccata* Dewey, which has often been reported from the state, but as far as the author knows, all other specimens have turned out to be *C. prægracilis* W. Boott. The rather rarely reported *C. Preslii* Steud. was also found by Mr. Peirson in the same region. Mr. Peirson deserves much credit for the collecting, not only of Carices, but of many other new and rare plants from this section.

In a collection by Marcus E. Jones from Prattville, Plumas Co., California, No. 81,318 of the Pomona College Herbarium, an unidentified sheet was found to be *C. limosa* L., which to my knowledge has not been detected before nearer than southern Oregon. To make certain that the label had not been misplaced, Dr. Philip Munz very kindly looked up Mr. Jones' diary, and found that he was in Prattville on the date shown on the label.

John Thomas Howell of the California Academy of Sciences has made two very interesting collections: first, that of *C. scopulorum* Holm, at Lost Lake, Modoc Co., which has only been found once before in California in Tulare Co.; second, that of *C. xerantica* L. H. Bailey, collected along the northern rim of Grand Canyon, Arizona, which has not been found before west of New Mexico.

JUN 4 - 1935

Leafl. West. Bot., Vol. I, pp. 177-184, May 28, 1935.

REVIEW OF W. F. BLAKELY'S "A KEY TO THE EUCALYPTS"

BY ERIC WALTHER

This work, the essential companion to Maiden's "Critical Revision," treats of 500 species and 138 varieties, in 339 pages of text. An elaborate classification is given, based on the primary distinctions between the anthers, followed by brief but pointed descriptions, notes on occurrence, range, uses, oil-content, etc. Complete references to the illustrations in Maiden's "Critical Revision," correcting all past errors and duplications, will be of service in making that monumental work at last useful. Numerous lists, indices, etc., are also given.

The following name-changes are quoted because of the possible interest they may hold for the foresters, nurserymen, botanists, and gardeners of California. Among the synonyms, which are given in italics, will be found several names which have been in general use in California and elsewhere.

E. AMPLIFOLIA Naud. . . . . *E. tereticornis* Hort. Cal.
E. CAMALDULENSIS Dehn. . . . . *E. rostrata* Schlech.
E. CEPHALOCARPA Blakely . . . . . *E. cinerea* var. *multiflora* Maiden
E. CLADOCALYX F. v. Muell. . . . . *E. corynocalyx* F. v. Muell.
E. FICIFOLIA var. GUILFOYLEI Bail. . . *E. calophylla* var. *rosea* Maiden
E. GUMMIFERA (Gærtn.) Hochr. . . . . *E. corymbosa* Sm.
E. LINDLEYANA DC. . . . . *E. numerosa* Maiden
E. MULTIFLORA Poir. . . . . *E. robusta* Sm.
E. PAUCIFLORA Sieb. . . . . *E. coriacea* A. Cunn.
E. RACEMOSA Cav. . . . . *E. crebra* F. v. Muell.
E. SALICIFOLIA Cav. . . . . *E. amygdalina* Labill.
E. SCABRA Dum-Cours. . . . . *E. eugenioides* Sieb.
E. TRIANTHA Link. . . . . *E. acmenioides* Schau.
E. UMBELLATA (Gærtn.) Domin. . . . . *E. tereticornis* Sm.

A NEW LOCO-WEED FROM OREGON

BY ALICE EASTWOOD

Astragalus viarius Eastwood, spec. nov. Cæspitosus, depressus, pilis incumbentibus, albidis, dense villosis; foliolis 5-7, oblanceolatis, obtusis, sessilibus, 5-8 mm. longis; stipulis attenuatis, 7 mm. longis, basi latis; pedunculis 1 cm. longis, brevioribus foliis, 3-5 floris capitatis; tubo calycis 5 mm. longo, rubescente, segmentis subulatis, attenuatis, 2 mm. longis; corolla violacea, 1 cm. longa, vexillo orbicu-

lari, reflexo, alis et carina longiore; legumine attenuato, circulatim incurvo, 4 mm. longo ex curvo, dense albo-villoso.

Type: No. 217610, Herb. Calif. Acad. Sci., collected by John Thomas Howell, *No. 7171,* July 3, 1931, along the road 7 miles north of Bend, Deschutes Co., Oregon.

This interesting Astragalus belongs to the section Eriocarpi Gray, species with 1-celled incurved shaggy pods, clothed with dense white-woolly hairs. The pods are much smaller than they are in any other described species of the group, more incurved, and only 4 mm. long from the base to the tip along the curve. The 3 to 5 flowers are purplish and clustered at the top of a slender peduncle which is shorter than the leaves. The corolla is about 1 cm. long, with the round banner surpassing the other petals. The caudex branches from a tap root forming mats about 1 to 2 dm. across. All parts except the corolla are white-woolly with the hairs appressed on the leaves and stems and spreading on the pods. The stems seem thick from the clasping bases of the stipules. The name refers to its growing along the roadside.

A NEW CALIFORNIAN ERIOGONUM

BY JOHN THOMAS HOWELL

Eriogonum ampullaceum J. T. Howell, spec. nov. Annuum; caulibus nonnullis ex basi, 1-2 dm. altis, erectis, glabris, coriaceis, glaucescentibus, fere trichotomis, ramis substricte erectis fastigiatisque; foliis basalibus, rotundis, 0.5-1 cm. diametro, albo-tomentosis subter, flocosso-tomentosis et flavoviridibus supra, petiolis 0.5-1.5 cm. longis; bracteis 3, circa 1 mm. longis, triangularibus, breviter acuminatis; involucris turbinato-campanulatis, 1.5 mm. longis, 1.5 mm. latis, glabris, sæpissime sessilibus, frequenter terminalibus in gracilibus ramulis, ut videtur pedicellatis sed involucris juxta subtendentibus bracteis parvis, involucris ex angulis inferioribus, interdum pedicellatis, pedicellis circa 1 mm. longis, dentibus involucralibus 5, circa 0.5 mm. longis, scariosis margine, obtusis; perianthiis 1 mm. longis, ochroleucis vel albescentibus, segmentis 0.5 mm. longis, oblongis, obtusis, integris vel minute irregulariterque crenulatis; achenio rostrato et amullaceo, 1 mm. longo, rostro triangulari, dense et subtiliter muriculato-papilloso.

Type: No. 218451, Herb. Calif. Acad. Sci., from dry slopes about Whisky Creek, Owens River, 6,700 ft., Mono Co., California, *Frank W. Peirson No. 10740,* July 29, 1933.

This Eriogonum is most nearly related to *Eriogonum mohavense* Wats. from which it differs not only in habit but also in the more campanulate involucres and in the ochroleucous perianth-segments. As in that species, the slender terminal branchlets carrying an involucre simulate the pedicels found in the subgenus Ganysma; but the closely subtending cauline bracts below the involucres would indicate that the plant is nearer the *mohavense* type in the subgenus Oregonium. The bottle-like shape of the achene from which the specific name is derived can scarcely be regarded a specific character.

CONCERNING THEODOR HARTWEG

To discover in new and unexpected sources matter pertaining to voyages of discovery and journeys of exploration in the experiences of early-day botanists and botanical collectors is a pleasure of high order to a discriminating reader. From such an account, there frequently flash details of character or of surroundings which illuminate an otherwise little-known personality or which fix a scene of botanical activity. Such an item has been published recently concerning Theodor Hartweg, well known and justly commemorated botanist and collector who was in California from 1846 to 1848 in the interest of the Royal Horticultural Society of London. The mention is made by Theodor Cordua,[1] who was Hartweg's companion on his visit to Bear Valley in the Sierra Nevada, and the incident is recounted with unusual vividness in the midst of Cordua's memoirs.[2] Not only its value as a detail in the botanical history of California, but also the high literary and pictorial quality found in this account prompt us to reprint the following passages from pages 292 and 293:

In the year of 1847, little of note occurred. I planted and sowed and made considerable improvements. In June of this year I was visited by Mr. Hartweg, a traveller for the London Botanical Society. With my guest I enjoyed frequent hunting and fishing trips and helped him to collect plants in the California mountains. We also visited the beautiful Bear Valley in those mountains. This valley of about the size of half a square mile forms a square, level meadow

1 Theodor Cordua was the first settler where the town of Marysville now stands. He became established in the autumn of 1842 and called his settlement Neu-Mecklenburg.

2 The Memoirs of Theodor Cordua, the Pioneer of New Mecklenburg in the Sacramento Valley, edited and translated by Erwin G. Gudde, Quarterly Calif. Hist. Soc. 12:279-311 (Dec., 1933).

through which a brook flows slowly. This is the small Bear River which empties into the Feather River. The small mountain valley was covered with the most beautiful green grass and a mass of spring flowers, while in the shadowy canyons of the mountains the snow had not yet melted. In the center of the valley we found a small isolated fir which caused the greatest surprise to the botanist because this species was entirely unknown to him. In spite of a thorough search we could not find a second tree of this kind in the vicinity. At the end of the valley was a great block of granite, larger than the largest building of Europe. Attracted by this immense mass of rock I called to my companion, "Tell me, how did this giant stone get here?" Mr. Hartweg, who was already on the block looking for moss and other plants, and holding a beautiful flower in his hand triumphantly replied, "But, please tell me first how this strange little flower gets here, where the tiniest moss hardly finds nourishment?" From this rock one saw the Yuba River making its way into a canyon about five hundred feet deep, foaming and roaring over thousands of rocky crevices and over innumerable cliffs, and now and then plunging over a rocky wall, forming a beautiful cascade. On the other side the eye fell upon a labyrinth of rugged mountains, whose valleys were shaded by proud coniferous growth, while their rocky peaks lay bald and deserted in the glaring sunlight. In the distance, high peaks covered with eternal snow appeared on the horizon. We remained several days on this beautiful high plateau, shot several deer, and Mr. Hartweg discovered many an unknown plant. . . .

The elevation of Bear Valley is estimated at 6,500 feet, that of the Emigrant Pass at 8,000 feet, and the highest peak of the Sierra Nevada from 11,000 to 12,000 feet. . . . At the elevation of 5,000 feet the region of coniferous growth begins. We found silver fir with a circumference of twenty-eight to thirty feet at a height of six feet from the ground; the lowest branches, however, were about one hundred and fifty to two hundred feet from the ground. The tallest trees usually stand in the impassable canyons and valleys.

We were satisfied to admire these trees, but the bold Yankee who surmounts even unsurpassable difficulties will know how to make use of them. At an elevation of 5,000 feet down to the 2,000-foot level the region of coniferous and deciduous trees extends. Among the latter the oak is most common. Here forests are open and light. Here and there regions without trees are found, where the slopes of the mountains are partially covered with manzanitas. The Indians use the leaves of this shrub as tobacco and its small red fruit makes an agreeable cooling drink, a healthful nourishing mush, or a tasty cake when pounded into meal and baked. Large valleys with fine grass and clover cut through this region of the mountains in all directions. The lower region, in which prevails the above mentioned reddish-brown clay, does not have many trees. Only here and there one finds thick thorny bushes and isolated crippled oaks and firs. . . .

NAIAS MARINA IN HOT SPRINGS

BY F. J. HERMANN
University of Michigan, Ann Arbor

Naias marina L. is well known to be a plant of wide distribution, occurring almost throughout the United States, in Eurasia, Australia, and the West Indies. It appears to be, nevertheless, a decidedly local species, particularly in western United States. Although known from a variety of habitats such as fresh and brackish marshes, ponds, lakes, and even salt springs, it seems not to have been reported from hot springs.

Dr. C. L. Hubbs, Curator of the Fish Division of the University of Michigan Museum, recently referred to the writer for determination a specimen collected by him in Nye County, Nevada, which proves to be this species. The locality was the hot springs of Hot Creek (Hot Creek Ranch) in the White River Valley. These springs were four feet deep and, at the date of his collection, September 10, 1934, had a temperature of 87° F. (air temperature 79° F.). The Naias, which reached to the surface of the water, formed a dense mat in the springs and was associated with a species of Utricularia. On September 9, Dr. Hubbs found a dense growth of the Naias in another hot spring in Nye County and at this station it formed the only vegetation of the spring. This spring, a tributary to Duckwater Creek, had a temperature of 90° F. (air temperature 76° F.), and here, too, the plant attained a length of four feet in reaching the surface.

While many species of algæ are able to thrive in hot springs, the number of vascular plants known to be adaptable to their high temperatures is very few. *Eleocharis flaccida* (Reichb.) Urban (*E. thermalis* Rydb.), although not restricted to this habitat, has been found at hot springs in Yellowstone Park. *Panicum thermale* Bolander grows, according to its author, "on hot rocks and in hot water flowing from Geyser springs and Geyser mountains," and has been reported only from the immediate vicinity of hot springs. Neither of these plants, apparently, is found entirely submerged in the springs as was the Naias.

In view of its great environmental adaptability it seems somewhat surprising that *Naias marina* is not a more plentiful species of our ponds and marshes than the number of collections in herbaria would indicate.

DATES OF PUBLICATION OF HOWELL'S "FLORA OF NORTHWEST AMERICA"

BY J. WILLIAM THOMPSON
Cleveland High School, Seattle

It is not generally known that Howell's "Flora of Northwest America" was printed in seven fascicles, by the author himself, who had been forced through circumstances to purchase a printing press, set the type, and print it under financial difficulties. The book was a financial failure, and at the author's death, the separate parts were turned over to J. K. Gill, book dealer in Portland. The parts were assembled, bound, and sold for $5 each. The book has long been out of print—a copy was recently sold for $37.50.

To aid in correct citation, the table below was compiled.

Fascicle	Pages	Date of Issue
I	1-112	15 Mar. 1897
II	113-274	1 Apr. 1898
III	275-386	21 Aug. 1900
IV	387-474	21 Mar. 1901
V	475-562	20 Nov. 1901
VI	563-666	20 July 1902
VII	667-792	10 Aug. 1903

The above information, except for the last item, was kindly furnished through the courtesy of Miss E. Ruth Rockwood, Head of the Reference Department, Library Association of Portland, Oregon, who owns the first six fascicles in their original covers. The last item was obtained by deduction from reading the review of the completed volume by Dr. P. A. Rydberg in Torreya 4:70 (1904).

"The relation of taxonomy to other branches of science may be summarized by saying that it furnishes the standard of measurement for them; or that taxonomy is to other branches of science what the dictionary is to literature, in that it enables workers to use given names in the same sense."—Dr. A. S. Hitchcock in Science, vol. 79, page 408, May 4, 1934.

ADDENDUM. A recent letter from Prof. M. L. Fernald calls to our attention the fact that *Galium Brandegei* Gray has a much more extended range than was indicated in our recent paper on "The Genus Galium in Southern California" (Leafl. West. Bot. 1:151). The references to the occurrence of this species beyond western North America were inadvertently overlooked in our distributional studies of those species not endemic in Southern California. Prof. Fernald's statement is as follows:

"I am wondering whether you are intentionally excluding from *Galium Brandegei* the material from eastern North America and from Greenland which has been referred to it. In several papers of mine[1] and in a very detailed study by Dr. Porsild,[2] of Disko, Greenland, plants which seem to match the Rocky Mountain species of Gray, are considerably emphasized. The species extends north in the Rocky Mountains to Montana, and eastward we get it in several of the northern states as well as in Quebec and Newfoundland, and Dr. Porsild has got a good deal of it from southern Greenland."—Martha Hilend and John Thomas Howell.

A WEEDY MINT. An adventitious mint, apparently unreported for California, was found by the writer as a well-established garden weed in Ross, Marin Co., last spring. It was sent for determination to Dr. Carl Epling, University of California at Los Angeles, who writes of it as follows: "The mint . . . is *Stachys arvensis,* a common weed in South America but less often appearing in North America, particularly in this country where it seems to have been introduced chiefly as a ballast plant."

Stachys arvensis L. is a native of Europe and has been reported in the United States as a weed along the Atlantic seaboard. From the native species of Stachys in California, it can be readily distinguished because it is an annual.—John Thomas Howell.

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1 Mem. Amer. Acad. Arts and Sci. 15:283 (1925), recording it from latitude 46 in Maine to latitude 58 in Labrador; Rhodora 28:123, 236 (1926), noting it in Newfoundland and Quebec.

2 "Stray Contributions to the Flora of Greenland," No. 2, pp. 22-30, reprinted from Meddelelser om Grønland, vol. 77 (1930).

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SAN FRANCISCO, CALIFORNIA
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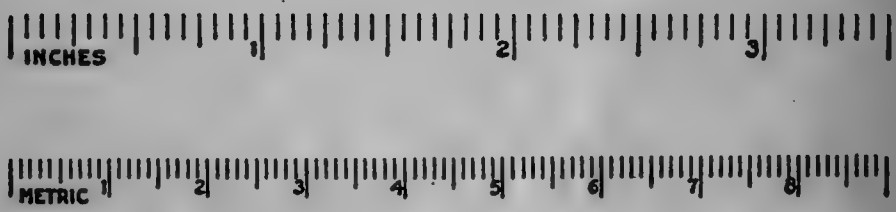

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TANICAL
DEN

DISTRIBUTIONAL NOTES ON PLANTS OF THE GREAT BASIN REGION—I [1]

BY BASSETT MAGUIRE [2]

The vast and interesting Great Basin has received no consistent botanical exploration; hence, its flora is far from completely known and particularly the distribution of its plants is altogether inadequately recorded. In an effort to make better known some of these plants, the writer submits this first of a contemplated series of articles under the above title.

ASPLENIUM SEPTENTRIONALE (L.) Hoffm. *4341:* [3] Grand Co., Utah, 9300 ft. Found growing commonly in crevices in limestone cliffs of southern exposure, one mile south of the Warner Ranger Station, La Sal Mts. The collection of this little grass-like fern confirms Tidestrom's [4] conviction that it doubtless occurs in Utah.

*CHEILANTHES COVILLEI Maxon.[5] *4709:* Washington Co., Utah, 4500 ft. This plant was observed to be locally common under shallow ledges and in rock crevices under piñon and juniper in the Beaver Dam Mts. The known range of this fern is apparently extended more than 100 miles northward and eastward.

PELLÆA BREWERI D. C. Eaton. *4351:* Grand Co., Utah, 9300 ft. Collected in crevices along cliffs of southern exposure, growing intimately with *Asplenium septentrionale* (cited above). This more northern fern is here represented from an interesting southern outpost in the La Sal Mts.

*POTAMOGETON EPIHYDRUS Raf. var. *NUTTALLII (C. & S.) Fernald. *3970:* Summit Co., Utah, 10,000 ft. Field notes concerning this plant are as follows: " . . . rare, in shallow, slow, silty stream, inlet to Lily Lake; only sterile plants found." This collection from the Uinta Mts. seems to constitute the first record from Utah and extends the limited range in the Rocky Mts.

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1 Contribution from Department of Botany, Utah Agricultural Experiment Station. Publication authorized by Director, Jan. 16, 1935.

2 In charge of the herbarium.

3 The numbers indicate the collection numbers under which these plants have been distributed by the writer.

4 Tidestrom, Fl. Utah and Nevada Contrib. U. S. Nat. Herb. 25:47 (1925).

5 Asterisk indicates those plants which seem to have been unknown from the state before this but herein reported.

Leafl. West. Bot., Vol. I, pp. 185-192, November 13, 1935.

AGROSTIS HYEMALIS (Walt.) B. S. P. var. *GEMINATA (Trin.) Hitchc.[6] *2498:* White Pine Co., Nevada, 9500 ft. Occurring along streams under spruce, Wheeler Peak (Mt. Jeff. Davis), Snake Range, apparently a considerable extension of the range of this more western plant.

BLEPHARIDACHNE KINGII (Wats.) Hack.[6] *2505:* White Pine Co., Nevada; *2507:* Elko Co., Nevada; *2506:* Juab Co., Utah. During the summer of 1933, this seldom-collected grass was observed to be commonly distributed in the shadscale basin deserts of central eastern Nevada and western Utah.

TRIODIA PILOSA (Buckl.) Merr. *1291:* Washington Co., Utah; *2508:* Millard Co., Utah. This beautiful little grass was apparently rare on rocky ridges of the Hurricane Fault near the town of Hurricane; on the rocky dry slopes of the House Range in Millard Co., however, it was growing abundantly. In addition, the writer has before him a specimen collected by Mr. Orval Winkler on May 24, 1932, from Pine Valley, Millard Co.

*CATABROSA AQUATICA (L.) Beauv. *2510:* White Pine Co., Nevada. The plant occurs in the cold, mountain stream under aspen, at Governor's Public Camp, Wheeler Peak (Mt. Jeff. Davis), Snake Range, apparently a considerable western extension of the known range of this grass.

POA CANBYI (Scribn.) Piper.[6] *3239:* Cache Co., Utah, 4775 ft. Since the collection of this species in a pasture on Providence Bench, near Logan, the station has been destroyed. This pasture had been under previous cultivation; hence, it seems probable that its occurrence here was due to recent introduction.

POA ARCTICA R. Br.[6] *4002:* Summit Co., Utah, 10,500 ft. In meadows at timberline, Stillwater Basin, headwaters of Bear River, Uinta Mts.

POA INTERIOR Rydb.[6] *4000:* Summit Co., Utah, 10,500 ft. Found growing in the Uinta Mts. with the preceding plant.

*POA NERVOSA (Hook.) Vasey.[6] *4001:* Summit Co., Utah, 10,500 ft. The interesting record of this more northern and western bluegrass, as well as the records of the two preceding species, is drawn from the same large cirque basin on the north summit of the Uinta Mts.

[6] Determined by Dr. A. S. Hitchcock.

BROMUS RUBENS L. *1298, 1299:* Clarke Co., Nevada; *2, 1300, 1301, 4354:* Washington Co., Utah. In 1925, Tidestrom[7] cited this grass from Bartlett Creek, northern Nevada, only. In 1932, the writer observed this troublesome weed commonly distributed along roadsides and in waste places in Washington Co., Utah, and in the adjacent states of Arizona and Nevada. Further observations in 1933 and 1934 seemed to show that the grass was rapidly spreading even to semi-cultivated areas. It seems possible that the apprehension of stockmen and farmers that this brome may become a troublesome pest is not without foundation.

*JUNCUS ALPINUS Vill. var. FUSCESCENS Fernald.[8] *84:* Rich Co., Utah. Occurring commonly on the sand beaches at the south end of Bear Lake.

*CORALLORRHIZA STRIATA Lindl. *2531:* Juab Co., Utah. This collection from the Deep Creek Range seems to represent the sole known locality for the species in Utah.

*ATRIPLEX ELEGANS (Moq.) Diet. subsp. FASCICULATA (Wats.) Hall & Clem. *1931:* Clarke Co., Nevada. This southern form was found sparingly along the base of talus slopes near the highway in the Moapa Valley, 5 miles south of Glendale.

BASSIA HYSSOPIFOLIA (Pall.) Kuntze. *137:* Salt Lake Co., Utah; *138:* Davis Co., Utah; *2218:* Boxelder Co., Utah. This chenopod was reported by Tidestrom[9] in 1925 from Fallon, Nevada, and again in 1934 by Flowers[10] from the Great Salt Lake region. The writer's observations, beginning in 1931, reveal this weed to be well established throughout most of Utah from Duchesne and Sevier counties west, occurring as a weed along roadsides and in waste places. It seems to be quite palatable to stock and might possibly possess forage value in alkali areas.

HERMIDIUM ALIPES Wats. *2579, 2580:* Juab Co., Utah. This plant occurs commonly in the washes of the shadscale desert of western Juab Co., probably extending into Millard Co. on the south, to Boxelder Co. on the north, and to the adjacent state of Nevada. Tidestrom[11] gives the distribution of this plant as

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7 Tidestrom, lc., 92.
8 Determined by Dr. K. M. Wiegand.
9 Tidestrom, lc., 178.
10 Flowers, S., "Vegetation of Great Salt Lake Region," Bot. Gaz. 95: 353-417 (1934).
11 Tidestrom, lc., 181.

western Nevada and California. Standley[12] cites a collection of the late M. E. Jones from "Willow Springs, Utah, 1891."

* HESPERONIA RETRORSA (Heller) Standl. *1349:* Washington Co., Utah. Occurring somewhat commonly in rocks and cliffs in southwestern Utah and adjacent states of Arizona and Nevada.

* STELLARIA CRISPA C. & S. *2583:* White Pine Co., Nevada. This little chickweed was observed growing abundantly along stream banks in spruce woods, Wheeler Peak (Mt. Jeff. Davis), Snake Range.

PAPAVER RADICATUM Rottb. *4121:* Duchesne Co., Utah, 11,500 ft. Rare in Utah, this little alpine poppy, which had previously been taken by Dr. W. P. Cottam, was collected by the writer in the Uinta Mts., where it occurred sparingly on dry shaly slopes on the southeast side of Mt. Agassiz.

* SPRAGUEA UMBELLATA Torr. *4090:* Summit-Duchesne county line, 11,000 ft. Apparently occurring frequently in sandy soil on ridges to the east of Mt. Agassiz, Uinta Mts., Utah.

* CAULANTHUS PILOSUS Wats. *2609:* Elko Co., Nevada; *2610:* Millard Co., Utah; *2611:* Juab Co., Utah. This crucifer occurs commonly in shadscale deserts of central and western Millard Co. and in Juab Co., Utah, and in the adjacent state of Nevada.

* SUBULARIA AQUATICA L. *4340:* Duchesne Co., Utah, 10,500 ft. Found growing abundantly in shallow muck of lake bottoms, in the vicinity of Mirror Lake, Uinta Mts.

PETERIA THOMPSONÆ Wats. *2664:* Juab Co., Utah. This plant with its deep tuberose roots occurs commonly in gravelly washes of the shadscale[13] desert regions of central western Utah and probably in adjacent Nevada.

* GAYOPHYTUM LASIOSPERMUM Greene. *3599:* Salt Lake Co., Utah. Collected by Dr. F. B. Wann in Cottonwood Canyon, Utah.

* HYDROPHYLLUM ALPESTRE Nels. & Kennedy. *2748:* Juab Co., Utah, 7300 ft. Growing abundantly under sagebrush in Granite Canyon, Deep Creek Mts. This locality seems to extend the known range for this plant considerably eastward.

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12 Standley, "The Allioniaceæ of the United States with Notes on Mexican Species," Contrib. U. S. Nat. Herb. 12:372 (1909).

13 "Shadscale," used in several places in this paper, is the common name of *Atriplex confertifolia* (Torr. & Frem.) Wats. The "shadscale deserts" are those parts of the Great Basin where the species prevails on "hard, stony, alkaline soils on benches or slopes." (See Hall & Clements, Carn. Inst. Wash. Publ. 326:338-340.)—J. T. H.

SEA-GULLS AND TARWEEDS: A DISTRIBUTIONAL MIX-UP

BY JOHN THOMAS HOWELL

For many years one of the mysteries of the Californian avifauna was a very distinct species of gull[1] reported only from Monterey and based on a collection obtained by naturalists on the French frigate *La Vénus,* which visited Monterey in 1837 under the command of Admiral Abel Du Petit-Thouars. For a still longer period, one of the unsolved problems of the flora of the Galapagos Islands has been the record of an endemic species of the Heliantheæ-Madinæ, *Hemizonia squalida* Hook. f.,[2] also based on a collection from *La Vénus* and known from no other. Not until 1876[3] was the beautiful Fork-tail Gull recorded as an endemic of the Galapagos Islands; and only now is it possible to refer the "Galapagian" tarweed to a Californian species.[4] It was during the course of the Templeton Crocker Expedition of the California Academy of Sciences in 1932 that Mr. Harry S. Swarth related to the writer the tale of the gull[5] and immediately the probable origin of the type of *H. squalida* was suggested. If the type locality of a bird had been misplaced, why not as likely an error for a plant? But until the type of *H. squalida* could be examined, any opinion expressed would be no more than a surmise of probability.

During the past summer, while studying historical collections from the Galapagos Islands in the Royal Herbarium, Kew, the type of *H. squalida* in the Hooker Herbarium was examined by the author. It was found to consist of a fragmentary specimen from "Herb. Mus. Paris.," which carries the sole datum, "Galapago Islands," but from the original description we learn

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1 *Creagrus furcatus* (Néboux). First described in Revue Zoöl. 3:290 (1840).

2 Trans. Linn. Soc. 20:208 (1847).

3 Trans. Zoöl. Soc. 9:506 (1876).

4 It should be noted that although *H. squalida* was as anomalous in the Galapagian flora as was the Fork-tail Gull in the Californian avifauna, the tarweed has been retained without question or comment as a valid endemic in all floras of the Galapagos Islands. In no floristic account is doubt expressed as to the identity of the plant or its endemic character, in spite of the fact that it constituted the lone outpost in distribution for a specialized genus otherwise confined to temperate western North America with center of distribution in California where most of the species are endemic.

5 See Swarth, Calif. Acad. Sci. Occasional Papers 18:65 (1931).

that the collection is to be referred to Du Petit-Thouars of *La Vénus*. From a study of the plant, it is apparent that it is a Hemizonia related to the coastal Californian species and corresponds to that form of *H. angustifolia* DC.[6] found in the Coast Ranges of California away from the immediate coast.[7] The truly squalid type, almost devoid of flowers and fruits and showing only the upper branches of a plant, corresponds in almost every detail of habit, vesture, and fruit to a late-flowering specimen also in Herb. Kew., *Bracelin No. 131*, collected in Santa Cruz County, California, October 26, 1930. The two specimens represent plants in which the main cauline leaves have dried up and broken away, and in which the principal flowering of the year has borne fruit and passed and has been followed by abbreviated autumnal branches subspicately arranged below the ends of naked peduncles. The shape and texture of the uppermost leaves in the two specimens are the same; and both have the same sorts of hairs in about the same proportion: a mixture of short, capitate, glandular hairs and longer, weakly hispidulous or subtomentulous, non-glandular hairs. The involucral bracts and flower parts in the two specimens are similar, but in the type of *H. squalida* they are a little smaller.

Because of this striking resemblance between these specimens, the question arises: when and where did *La Vénus* visit in California? In the library of the British Museum (Natural History), South Kensington, the rare journal of Du Petit-Thouars, "Voyage Autour du Monde sur la Frégate *La Vénus*" (Paris, 1840-1843), was consulted and it was learned that in 1837, on October 18, *La Vénus* arrived at Monterey, where it remained for nearly a month.[8] After a detailed and picturesque

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6 Prodr. 5:692 (1836).

7 In connection with this problem, specimens of the type collections of both *H. angustifolia* DC. and *H. corymbosa* (DC.) T. & G. were studied in Herb. Kew. where they have been annotated by Dr. H. M. Hall. The type collection of the former represents the tarweed so characteristic and common on the maritime mesas and bluffs of the Monterey Peninsula; and the specimens of the latter are characteristic of the more depauperate plants of this relationship found inland away from the coast. As indicated above, the type of *H. squalida* also represents the inland or non-maritime variant, but it is from a well developed plant that grew in a favorable situation. Critical observations of this plastic species were made during several years of field study by the writer and the different forms are represented by a long series of specimens in Herb. Calif. Acad. Sci.

8 The section relating to California is on pp. 77-142, vol. 2.

account of the sojourn in the Mexican capital of California, Du Petit-Thouars summarizes the activities of the expedition.

Le 14 novembre 1837, rien ne nous retenait plus en Californie; les observations nécessaires pour construire le plan de la baie de Monterey étaient achevées, . . . nous nous disposâmes donc à mettre à la voile. Le sejour prolongé que nous venions de faire en ce port, n'avait pas ete moins favorable a la santé de l'équipage qu'aux resultats scientifiques que nous venions de recueillir, et tout le monde, à bord remis de ses longues fatigues par l'usage de vivres frais, par un repos devenu nécessaire, et par des promenades à terre, non moins agréables que profitables à nos collections d'histoire naturelle, se trouvait animé d'un excellent esprit, d'un zèle nouveau et reprenait la mer avec plaisir.[9]

Undoubtedly during this autumnal visit, the type of *H. squalida* was collected; for, around Monterey, *H. angustifolia* is one of the most common æstival herbs on grassy sun-browned slopes or in brushy borders of pine and oak forest. As *La Vénus* sailed from Monterey for the Galapagos Islands[10] and parts south, it is safe to conclude that among the *objets d'histoire naturelle* that it bore were no Fork-tail Gulls but instead squalid specimens of *H. angustifolia*.

NOTES ON CAREX—III

BY J. W. STACEY

In looking over the collections of Carex in the Herbarium of the University of California, an undetermined sheet was found to be *C. petasata* Dewey, which is a new record for California. It was collected July 12, 1933, by George A. Fischer and Irwin H. Johnson, their number *F. 235,* at Patterson Flat, Lassen National Forest, Lassen Co., at an altitude of 5700 ft.

The author recently reported as a new Californian record *C. limosa* L., based on a collection of Marcus Jones at Prattville, California (Leafl. West. Bot. 1:177). Another Californian locality can now be reported, based on a sheet in Herb. Univ. Calif., collected by Ezra Brainerd at Lake Audrain, Eldorado Co. It is likely that the species will be found in widely separated localities in California.

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9 Pp. 141, 142.

10 The expedition was in the Galapagos Islands from June 21 to July 15, 1838.

In the Herbarium of the California Academy of Sciences is a sheet of *C. lasiocarpa* Ehrh., which was collected by P. B. Kennedy in the Klamath Marshes at Klamath Falls, Oregon, in 1926. This is a considerable extension of its range, as it has not been found before along the coast south of Washington, so far as the author knows. It may soon be found in similar marshes in California just across the state line.

Carex teneræformis Mackenzie is said by Mackenzie in the North American Flora to range in the Sierra Nevada from Butte Co. to Tulare Co. southward into the mountains of Southern California and to occur locally on Mt. Sanhedrin, Lake Co. Several sheets have been examined from southern Oregon and northern California, and this year Mr. Lewis S. Rose collected it on Mt. St. Helena in Napa Co., still farther south in the Coast Ranges from Mt. Sanhedrin.

We reported in a former note the extension of the range of *C. mendocinensis* Olney from Mendocino Co. to Mt. Tamalpais, Marin Co., California (Leafl. West. Bot. 1:141). Further study of the plant from Mt. Tamalpais shows it to be *C. debiliformis* Mackenzie. The plant illustrated in Abrams, Ill. Fl. Pacif. St., fig. 786, is *C. mendocinensis* Olney, while that illustrated in Jepson, Man. Fl. Pl. Cal., fig. 191, is *C. debiliformis* Mackenzie. An allied species *C. gynodynama* Olney is found in the Coast Ranges from southern Oregon to San Mateo Co., California; *C. mendocinensis* Olney is found only in Mendocino Co.; and *C. debiliformis* Mackenzie ranges from southwestern Oregon to Mt. Tamalpais. More study is needed on *C. mendocinensis* Olney, as it may be a hybrid between *C. gynodynama* Olney and *C. debiliformis* Mackenzie, as both of these species are found in Mendocino Co. The following is an artificial key to these puzzling species, adapted from Mackenzie:

Staminate spike sessile or very short-peduncled.

Pistillate spikes oblong-cylindric, 6-9 mm. wide; staminate spike 1-2 cm. long ..... *C. gynodynama*

Pistillate spikes linear, 3-4.5 mm. wide; staminate spike 2-3.5 cm. long ..... *C. mendocinensis*

Staminate spike long-peduncled; leaf-blades narrower than in the other two species, 1-2.5 mm. wide ..... *C. debiliformis*

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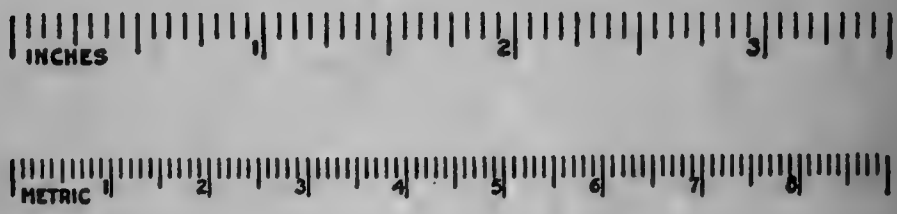

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ALICE EASTWOOD and JOHN THOMAS HOWELL

NEW BOREAL SPECIES OF CASTILLEJA

BY ALICE EASTWOOD

Castilleja eximia Eastwood, spec. nov. Caules simplices, robusti, purpurascentes, basi parce arachnoidea; foliis integris, oblongis, obtusis, 3-5-nervatis, parce arachnoideis, 4-6 cm. longis, 1-2 cm. latis; spicis eximiis, rubris, 10 cm. longis, 5 cm. latis; bracteis et calycibus rubris et arachnoideis; bracteis superioribus ovatis, obtusis, 1-2.5 cm. latis, integris vel obtuse trilobatis; calyce 3 cm. longo, tuba segmentis longiore, lobulis oblongis, obtusis, 8 mm. longis, 3-4 mm. latis, venosis et nervatis; corolla 4-5 cm. longa, galea exserta 2 cm., gracili, postice glandulosa, antice rubra et petaloidea; labio projecto, segmentis parvis, plerumque incurvis.

Type: No. 28945, Herb. Calif. Acad. Sci., collected on Forrester Island, southern Alaska, July, 1913, by Dr. Harold Heath.

This beautiful species has rather stout stems apparently from a running rootstock. The lower part of the spike is sparingly clothed with white cobwebby bracts that become denser and longer above. The broad, oblong, obtuse leaves have similar hairs and are 3-5-nerved, 4-6 cm. long, 1-2 cm. wide. The brilliant red spike is about as broad as long, with the lower bracts entire and very broad, the upper similar or obtusely 3-lobed, the middle the broadest. The lobes of the calyx-divisions are oblong, obtuse, red, veiny, with conspicuous midrib and reaching a little above the lower lip of the corolla. The galea of the corolla is long-exserted and stands out divaricately from the rest of the spike with the 2-lobed stigma projecting from the top and the anthers sometimes from the front. The lower lip of the corolla projects like a little green bracket with tiny divisions that generally incurve. It is an ally of *C. unalaschensis* (C. & S.) Malte.

Castilleja Kuschei Eastwood, spec. nov. Caules simplices, erecti, 10-15 cm. alti, costati, cinereo-hispidi; foliis erectis, subimbricatis, cuneato-incisis, lobis 2-6, linearibus, divaricatis, supremis sæpe dentiformibus, rachide 5-10 mm. lata; spicis brevibus et latis, pallidis vel brunnescentibus, dense cinereo-hispidis et pubescentibus; bracteis foliis conformibus, lobo medio obtuso vel tridentato, flores superante; calycibus æqualibus corollæ, 2.5 cm. longis, æqualiter fissis, segmentis 14 mm. longis, apice emarginatis; galea 8 mm. longa, postice puberulenti; labio trisaccato, 4 mm. longo, laciniis lanceolatis, erectis, obtusis, 2 mm. longis, callis inter lacinias minutis, lacinia media basi bimammillata.

Type: No. 28963, Herb. Calif. Acad. Sci., collected July, 1916, near Dawson, Yukon, by J. August Kusche, in whose honor it is named as a mark of appreciation for many speci-

Leafl. West. Bot., Vol. I, pp. 193-208, February 7, 1936.

mens brought from little explored regions and donated to the Herbarium of the California Academy of Sciences.

This low Castilleja is pallid from the dense pale stiff pubescence. The tips of the upper leaves and spikes are brownish tinged. The leaves have a broad main body with linear opposite spreading divisions, the lowest longest and the upper often becoming tooth-like. The two parts of the calyx are merely emarginate at tip and about equal to the corolla. This has a pointed galea surpassing the erect divisions of the lower lip which are lanceolate, obtuse, 2 mm. long, and, besides the small gland-like callosities between the divisions, the middle one on the inner side has two breast-like swellings.

Castilleja Mexiæ Eastwood, spec. nov. Perennis, caulibus basi ramosis et squamosis, 8-13 cm. altis, atro-purpureis, sulcatis; foliis linearilanceolatis, attenuatis, 2-3 cm. longis, 1-5 mm. latis, 1-3-nervatis, puberulis; spicis purpureis, arachnoideis, circa 2-4 cm. longis, 2-3 cm. latis, floribus erectis, congestis, bracteis brevioribus quam flores, divaricate 2-4-lobatis, segmentis circa 1 mm. latis; calycibus 14 mm. longis, fisso postico 6 mm., antico 5 mm., lobulis linearibus, 4-5 mm. longis, 0.5-1 mm. latis, longitudine labii inferioris corollæ vel paulo longioribus; corolla 12-18 mm. longa, galea apice tridentata, 6 mm. longa, postice pubescenti, antice petaloidea, labio inferiore saccato, 4 mm. longo, laciniis oblongis, nervatis, 2 mm. longis, ⅓-½ breviore quam galea, glandulis parvis inter lacinias.

Stems several from a woody root, dark purplish, ribbed, scaly at base. Leaves narrow-linear to lanceolate, acuminate, 1-3-nerved. Inflorescence purplish, erect in densely flowered spikes, white-arachnoid and somewhat longer than wide, the bracts and uppermost leaves with 2-4 divaricate narrow divisions, generally shorter than the flowers. Calyx 14 mm. long, cut more deeply posteriorly, the divisions of the parts linear, 4-5 mm. long, 1 mm. or less wide, slightly surpassing or about equalling the lower lip of the corolla. Corolla 12-18 mm. long, galea broad, 6 mm. long, densely pubescent on the back, petaloid on the front, lower lip 4 mm. long, swollen and trisaccate with oblong, 1-nerved divisions, about 2 mm. long and with round glands between the divisions.

Type: No. 168883, Herb. Calif. Acad. Sci., collected July 13, 1928, at Copper Mountain Camp, Mt. McKinley Park, Alaska, by Mrs. Ynes Mexia, *No. 2026,* in whose honor it is named. It grew at an elevation of 950 m. on dry gravelly crests of moraine ridges near the camp. Another specimen collected by Mrs. Mexia, *No. 2186,* was collected near the center of the north boundary of the park on hills west of Wonder Lake at 800 m., Herb. Calif. Acad. Sci., No. 168884. The flowers are

noted as cerise-pink. Joseph Dixon collected what seems to be the same species, *No. 53,* July 1, 1932, Herb. Calif. Acad. Sci., No. 219073. This has similar flowers but is a tall plant about 3 dm. high, branching above.

Castilleja Mexiæ has been described as a variety of *C. pallida* by Pennell, Proc. Phil. Acad. Sci. 86:526, and was founded on Mrs. Mexia's specimens.

CASTILLEJA MULTISECTA Eastwood, LEAFL. WEST. BOT. 1:174 (1935). This name has been previously given to a species from Idaho by Dr. Aven Nelson (Bot. Gaz. 54:148, 1912). My attention was very kindly called to the error by Louis Williams of the Missouri Botanical Garden. The name now published is the Greek equivalent, **Castilleja polytoma.**—Alice Eastwood.

A NOTE ON POTENTILLA NEWBERRYI

BY ETHEL CRUM

During the late summer and autumn of 1855, the engineers of the Williamson Expedition made explorations for a railroad route "from the Sacramento Valley to the Columbia River." By August 12, the party had reached "the banks of Rhett Lake," and it was here that John S. Newberry, botanist of the expedition, collected the species of Potentilla which now bears his name.

By the diversion of water for irrigation, Rhett Lake (now known as Tule Lake) has been reduced to a fraction of its former area. At that time it was about fourteen miles long, and thus extended for a short distance north of the California-Oregon boundary. For ten miles the route of the expedition followed the northeastern shore line, and, since the boundary was crossed during this march, it is uncertain whether the type locality of *P. Newberryi* Gray is in California or in Oregon. Subsequent collections of the species have been made occasionally in Washington and Oregon, but I have seen no record of its occurrence in California. Such a record, however, is afforded by the following recent collections: east side of Clear Lake, Modoc Co., July 2, 1934, *J. T. Howell No. 12359;* Nigger Ben Spring, southeast end of Clear Lake, Modoc Co., July 2, 1934, *J. T. Howell No. 12356*; near west end of Clear Lake, Modoc Co.,

July 29, 1935, *L. D. Whitney No. 3595.* These specimens agree very closely with the description of *P. Newberryi* var. *arenicola* Rydb., which appears to be an ecophene adapted to loose or sandy soil.

Potentilla Newberryi, as indicated by available herbarium specimens and published records, occurs only from near the junction of the Snake and Columbia rivers in southern Washington southward through Oregon to the Klamath Lakes region of southern Oregon and extreme northern California. It is apparently limited rather closely to a riparian habitat, having been collected usually in alluvial soil near lakes or streams, such as former lake beds and river flood plains.

As shown by the synonymy,[1] there has been some indecision as to the proper systematic position of the species. Although included in the monotypic section Arenicolæ by Rydberg, the affinities of *P. Newberryi* are conceded to be with section Supinæ (Rivales of Wolf), a cosmopolitan group. Wolf, who observed the species under cultivation for several years, found it to be a biennial or short-lived perennial, though occasionally flowering the first year. In flowering specimens at hand the taproot varies from 1.5 mm. to 12 mm. in diameter.

In most characters, *P. Newberryi* resembles other species of Supinæ. It is, however, in several respects anomalous. The aspect is distinctive: the herbage is villous-canescent, the leaflets much-dissected, the cymes repeatedly branched and somewhat leafy, the white flowers numerous. Most divergence is shown in the dissected leaflets, the long receptacular bristles, and the long, slender styles. In the three last mentioned characters *P. Newberryi* exhibits marked similarity to *P. millefolia* Rydb., an endemic of the Siskiyou region, belonging to the North American section Multijugæ. This similarity may argue an origin from intersectional hybridization. However, characters such as those involved, especially elongate styles and certain patterns of incision in the leaflets, often emerge independently in sections of the genus which may be widely separated geographically or genetically.

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1 ***Potentilla Newberryi*** Gray, Proc. Am. Acad. 6:532 (1865); Greene, Pitt. 1:105 (1887); Rydb., Mem. Dept. Bot. Columbia Univ. 2:111, pl. 49 (1898); Rydb., N. Am. Fl. 22:308 (1908); Wolf, Biblio. Bot. 16[11]:394, fig. 11 (1908). *P. Newberryi* var. *arenicola* Rydb., Mem. Dept. Bot. Columbia Univ. 2:112, pl. 45, fig. 1 (1898). *Ivesia gracilis* Gray, Pac. R. R. Rept. 6[3]:72, pl. 11 (1857); Brew. & Wats., Bot. Calif. 1:184 (1876).

ADENOPLEA MADAGASCARIENSIS

BY ALICE EASTWOOD

This is the vigorous climbing shrub cultivated in Californian gardens for many years as *Buddleia madagascariensis* Lam. The crowded small orange-colored flowers in large pointed panicles, the leaves green on the upper surface and white or rusty-tomentose on the lower, certainly marked it as a species of Buddleia. In 1934, fruiting specimens from the Presidio in San Francisco were brought to the attention of the author and instead of the dry dehiscent capsules of the genus Buddleia, they were pale rose berries as large as peas, with several seeds. In 1883, Radlkofer (in Bremen, Abh. 8:406) founded the genus Adenoplea on two species from Madagascar which differed from Buddleia in this fruit character.

While in Paris at the Herbarium of the Jardin des Plantes, the author was kindly permitted to see these species, but they proved to be unlike ours. Specimens of our plant were also represented in the herbarium by many flowering specimens from other places where it has been known in flower as a Buddleia for more than a hundred years.

At Hugh Evans' Nursery in Santa Monica and at the home of Mrs. Blanche Dugan in Brentwood Heights, the author saw rampant shrubby vines bearing flowers and fruits at the same time, the fruiting panicles as attractive as the flowering clusters.

As it is desirable to have the shrub in Californian gardens correctly named, the new combination **Adenoplea madagascariensis** (Lam.) Eastwood is here published.

After a Fire in California. *Nama Parryi* was growing in the Sespe region (Ventura Co.), at an altitude of three to four thousand feet, and it was a magnificent sight, as the mountain slopes were blue with it. There was a bad fire over this section a year and a half ago, which, I suppose, accounts for the sheets of color. I collected the Nama on a flat—almost acres of it, eight to ten feet high; and growing with it were Matilija Poppies (*Romneya trichocalyx*) and *Dicentra chrysantha* about six feet high. It was a most gorgeous sight. — Sarah E. Blanchard, Santa Paula, June, 1934.

THE YOUNG NATURALISTS' SOCIETY OF SEATTLE, WASHINGTON

BY GEORGE NEVILLE JONES
University of Washington, Seattle

The Young Naturalists' Society,* the first society of naturalists in Washington Territory, was founded in Seattle in December, 1879. Most of the members were amateurs whose interests included conchology, icthyology, ornithology, geology, entomology, and botany. During its twenty years of existence, ninety persons were elected to active or associate membership, and there were ten honorary or corresponding members, including Dr. David Starr Jordan. An average of ten or twelve meetings were held yearly with an average attendance of eight or nine persons, the largest attendance recorded being thirteen. By 1884, the Society had a collection of 96 birds, 15 mammals, and later came to possess numerous botanical specimens, an extensive conchological collection, and a library of several hundred volumes, housed in a large club-house near the former site of the University of Washington. After the Society was established in its own headquarters, one would have expected the commencement of a period of activity. Exactly the opposite seems to have occurred. As the members matured, they found their business and professional interests supplanting their youthful hobbies. The removal of the university from the downtown campus, the illness of Professor O. B. Johnson, and the necessity of leasing the property on which the club-house stood, disrupted the organization, and the members gradually disbanded. The last meeting occurred on January 15, 1905. As Professor Kincaid expresses it, "the Young Naturalists became old naturalists," and there were insufficient new ones to take their places. Henceforth the scientific interests of the community were carried on by the university, to which the collections of the Society, including its library, were transferred. Several of the members of the Society, including Trevor Kincaid in Zoölogy, Henry Landes in Geology, Edmond S. Meany in History, and Charles Vancouver Piper in Botany, have since become eminent.

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* For the following items, I am indebted to Dr. Melville H. Hatch, Assistant Professor of Zoölogy, University of Washington.

STELLARIA HUMIFUSA AND SCLERANTHUS ANNUUS IN WASHINGTON

BY GEORGE NEVILLE JONES
University of Washington, Seattle

In 1892, Professor L. F. Henderson, now Curator of the Herbarium at the University of Oregon, made an extensive collection of the vascular plants of the State of Washington to be exhibited at the Chicago World's Fair of 1893. At least part of one of Henderson's sets is in the Herbarium of the University of Washington at Seattle. Most of his specimens are cited in Piper's Flora of Washington (Contr. U. S. Nat. Herb. 11, 1906).

Recently, in sorting some material which apparently had been undisturbed since the time of the Young Naturalists' Society, one of Henderson's specimens labeled *Stellaria humifusa* Rottb., and evidently overlooked by Piper, was turned up. Comparison with European and Kamtchatkan material confirms Henderson's identification. The collection data are as follows: moist sandy ground near the ocean, Westport, Chehalis Co. (now Grays Harbor Co.), June 25, 1892, *L. F. Henderson.*

This species is included by Howell in the Flora of Northwest America 1 :83, 1897, but without any statement as to habitat or distribution. It is not mentioned by Piper & Beattie, Flora of the Northwest Coast, or by Jepson, Manual of the Flowering Plants of California. Henderson's collection seems to be the first and only one for Washington. This record adds another to the already rather extensive list of species which are known to extend southward along the coast from Alaska to the Olympic Peninsula of Washington and which reach their southern limit there.

SCLERANTHUS ANNUUS L. This European species, long since naturalized in eastern North America and more recently introduced into California, can now be listed as an adventive in Washington on the basis of the following collection: a weed in gravelly soil near Roy, Pierce County, April 29, 1934, *G. N. Jones No. 4614.*

NOTES ON CAREX—IV

BY J. W. STACEY

From the herbarium of the State College of Washington at Pullman comes a new record for the state of Washington, that of *Carex xerantica* L. H. Bailey. This was collected by Charles B. Fiker near Omak Creek, east of Omak, Okanogan Co., Washington, July 4, 1933, his number *1299½*. The known limits of this species are rather peculiar. It ranges from Manitoba and North and South Dakota west through Saskatchewan and Montana to Alberta and northeastern Washington. It is also found in Colorado, northern New Mexico, and northern Arizona. Very likely it will be found in Wyoming, and perhaps in the adjacent states.

In looking over sheets of Carex from the Willamette University, Salem, Oregon, one sheet of the rare *C. scabriuscula* Mackenzie was found to have been collected in the Siskiyou Mountains, one mile north of the California line, on the Grants Pass-Crescent City road. This locality is farther south than any other recorded, and undoubtedly it will soon be found on the California side in the Siskiyou Mountains. It is a very local species, so far found only in the Cascade and Siskiyou mountains in Oregon.

Our attention has been recently directed toward the species of Carex in the state of Arizona, and at least two new species have been detected, which will be described later, and several new records seem to have been established. From the National Herbarium at Washington was received an unnamed sheet collected in the San Francisco Mountains by Hitchcock, August 7-11, 1915. This proved to be *C. filifolia* Nutt., which, as far as the author knows, has not been hitherto reported from the state.

Two sheets, also from the National Herbarium, collected at Willow Springs, Arizona, by Palmer (*No. 553*), labeled *C. diandra* Schrank, were found to be *C. simulata* Mackenzie. Two other sheets, labeled *C. diandra* Schrank, were the somewhat common *C. alma* L. H. Bailey. *Carex diandra* Schrank has not been found up to the present time in Arizona.

Carex Hassei L. H. Bailey (*C. aurea* var. *celsa* L. H. Bailey) has been reported from Arizona, but so far all specimens ex-

amined have proved to be *C. aurea* Nutt. The occurrence of *C. Hassei* L. H. Bailey in Arizona is very doubtful.

Carex disperma Dewey and *C. stipata* Muhl. are definitely established as occurring in Arizona. A very curious slip was made by Mackenzie on one sheet (U. S. Nat. Herb.) which was annotated in his handwriting as *C. subfusca* W. Boott. The specimen in question was *C. disperma* Dewey. Of course, he knew better, but one may well wonder just what caused this slip.

Carex nubicola Mackenzie, published in North American Flora (18[3]:125), should be *Carex Haydeniana* Olney, according to the International Rules. A letter was written to H. A. Gleason, Curator of the New York Botanical Garden and editor for the late K. K. Mackenzie in the latter part of this monograph, calling his attention to this change, and he concurred in the opinion.

SOME CONFUSED WESTERN DAISIES

BY JOHN THOMAS HOWELL

In June and July, 1934, the writer made several collections of two species of Erigeron from the southern parts of the great Columbia Lava Plateau in Modoc County, California. Both were perennial herbs with narrowly linear leaves, appressed pubescence, and radiate heads. In the more remarkable one, the stems of the loosely matted or subcespitose base were of a peculiar coriaceous or almost bony texture and gave rise to short erect stems terminated by a single head with bright yellow rays, a homochromous anomaly in the Heterochromeæ. In this species, too, the pappus was double, there being a distinct shorter outer series of bristles. In the second species, the loosely erect stems, which developed from a short, somewhat woody base, branched more or less above and bore a narrow corymb of heads with lavender or mauve rays. In this species the pappus-bristles, which were much more slender and finely ciliate than in the first species, were evidently in a single series. Later, while attempting to name these collections of Erigeron, it was realized how involved was the nomenclature and how doubtful the identity of *Diplopappus linearis* Hook.[1] (*E. linearis*

1 Fl. Bor. Am. 2:21 (1834).

Piper[2]), *D. filifolius* Hook.[3] (*E. filifolius* Nutt.[4]), and *E. peucephyllus* Gray,[5] names which were to be applied in one way or another to the two species.

Although the problems were partially solved at the time, it was apparent that definite conclusions could only be reached if the original collections of the species involved could be examined. At this point, specimens were sent to Dr. S. F. Blake with tentative determinations and from him it was learned that the problem had been studied by the late Dr. H. M. Hall, who had indicated to him the identity of the entities and their proper names. During the past summer, while working in London at the Royal Herbarium, Kew, and at the Herbarium of the British Museum, the author had opportunity to look into the problem; and, although from annotations made by Dr. Hall it is evident that he had worked out the problem, it is presented here because it is believed that all the details of misdescriptions of plants and misapplications of names have not been understood or published. These difficulties which have caused the confusion can be grouped and discussed under three heads: first, the mistake made by Hooker or Douglas in describing the color of the rays of *Diplopappus filifolius*; second, the misinterpretation of *D. linearis* by Asa Gray and his consequent publication of *Erigeron peucephyllus*; and third, Piper's misapplication of his new combination, *E. linearis*.

A critical examination of specimens in Herb. Kew. and Herb. Mus. Brit. reveals that the homochromous daisy is *Diplopappus linearis* Hook. and *D. filifolius* Hook. is the one with mauve rays. Immediately, however, it is apparent that in the Hooker Herbarium at Kew there is a wrong field note regarding the color of rays attached to the specimen of *D. filifolius* collected by Douglas. This note by Douglas reads "flor. yellow," and it was undoubtedly used by Hooker in his type description of *D. filifolius, "radiis flavescentibus."* Although this is the only specimen in either Kew or the British Museum which is noted as having yellow florets,[6] the rest of the data on Douglas' label

2 Contrib. U. S. Nat. Herb. 11:567 (1906).
3 Fl. Bor. Am. 2:21 (1834).
4 Trans. Am. Phil. Soc., n. ser., 7:308 (1840).
5 Proc. Am. Acad. 16:89 (1881).
6 The writer suspects that this label by Douglas is misplaced and that it originally belonged to one of the several collections of the yellow-rayed species made by Douglas, such as, for example, the one in Herb. Benth. at Kew which is in full flower.

at Kew was not used by Hooker in naming the type locality of the species. This, in the original description, reads: "common on the Great Falls of the Columbia and barren grounds of the interior;" while on the Douglas label at Kew the following is given: "common (on) dry rocks and sandy parts of the river Columbia from the Clay Hills near the Bend to the Kettle Falls." In Herb. Mus. Brit., however, there is a specimen collected by Douglas carrying the data: "sandy ground near the Great Falls of the Columbia. 1825." For a time it was thought that this specimen in the British Museum should be taken as the type of *D. filifolius*; but, after considering the matter at length, it now seems entirely proper to choose for the type, as Dr. Hall did, the Douglas specimen in Herb. Hook. with the note about yellow florets, in spite of the published discrepancy in locality data.

This conclusion that the specimen in Herb. Hook. is the one better to be considered the type is further substantiated by the fact that Douglas collected two distinct variants of *Diplopappus filifolius,* and the type description seems to indicate more certainly the specimen in Herb. Hook. at Kew. This typical variant has stems more or less branched so as to form a narrow corymbose panicle which is described by Hooker *"ramis . . . subcorymbosis."* The second variant, which is best represented by the Great Falls specimen in the British Museum, has heads solitary at the ends of slender, mostly unbranched stems. This is the plant considered typical by Torrey and Gray[7] in the Flora of North America, where it is called *Erigeron filifolius* α; while the variant corresponding to the type is the variety β. Interestingly enough, on the type sheet at Kew is a single stem of the unbranched variety, and by Dr. Hall in his annotation it is excluded from *Diplopappus filifolius* and referred to *D. linearis.*

Not so much difficulty is attached to indicating the type of *Diplopappus linearis* Hook. and the identity of the plant is certain. The specimen in the Hooker Herbarium at Kew to be taken as the type is obviously the homochromous Erigeron of western America, for, although the plants bear only fruiting heads, the basal stems show the peculiar subosseous texture

[7] Fl. N. A. 2:177 (1841).

and the pappus is in two distinct series. Not only are Douglas' data which accompany the specimen the same as given by Hooker in the original description, but the fruiting specimens are certainly the ones described by Hooker. In spite of the indubitable evidence for considering this Douglas collection the type of *D. linearis* Hook., Asa Gray confused it with *D. filifolius* as shown by the determination on the sheet in his hand "*filifolius* Hook. Fl. pro parte." Also in Gray's hand over the label "Syn. Fl. N. Am." is his name for this plant, *Erigeron peucephyllus*; and in literature [8] he gives *D. linearis* as possibly a synonym of *E. ochroleucus* Nutt. It is not clear how Gray could have confused a plant so clearly indicated and described by Hooker, but certainly, in the light of present knowledge, Gray's name must be considered an exact synonym of *D. linearis*.

And yet one more confusion involving these two species remains to be cleared. Piper,[9] on transferring Hooker's *Diplopappus linearis* to Erigeron, proceeded to misapply his new combination, making it correspond to plants of *Erigeron filifolius*. In his Flora of Washington, in the key to the species of Erigeron,[10] Piper diagnoses the rays of *E. linearis* as "not yellow;" the plant to which the specific epithet *linearis* really applies he calls *E. filifolius*; and, *E. peucephyllus* he gives as a synonym of *E. filifolius!* Blake [11] in Tidestrom's Flora of Utah and Nevada corrects Piper's erroneous interpretation of *E. filifolius* and *E. peucephyllus,* but he does not treat Piper's misapplication of the name *E. linearis*.

While considering the historical complications in which *E. filifolius* and *E. linearis* have been embroiled, two relatives of the latter species have not been mentioned but should be discussed here so that our review of the problem may be complete. The first of these plants was described as *E. elegantulus* Greene [12] and differs from *E. linearis* chiefly in its bright blue rays. Apparently it is a rare plant, and since it seems to be confined to northeastern California and southern Oregon, it

8 Syn. Fl. N. Am. 1, pt. 2:213 (1884). From *E. linearis, E. ochroleucus* can be easily separated by the character of its basal stems and by its larger involucres with equal bracts.

9 Contrib. U. S. Nat. Herb. 11:567 (1906).

10 L. c., 564.

11 Contrib. U. S. Nat. Herb. 25:573 (1925).

12 Erythea 3:65 (1895). *Erigeron elegantulus* is given as a synonym of *E. ursinus* Eaton by Jepson (Man. Fl. Pl. Calif. 1052,—1925), but the two can be separated by habit, foliage, and pubescence.

cannot possibly be interpreted as Piper's blue-rayed "*E. linearis*" of Washington. *Erigeron elegantulus* was one of the daisies collected by the author in Modoc County, California, and, as might be imagined, it added considerably to the complexity of his first attempt to solve the identities of the several entities. So similar in all technical details is it to *E. linearis* and yet so strikingly different because of its blue rays, we propose to call this plant **E. linearis** var. **elegantulus** (Greene) J. T. Howell, comb. nov.

Still farther south, among the peaks of the Sierra Nevada from Nevada County south to Eldorado County in California and in adjacent Nevada, the second plant is found which is believed by the writer to be definitely related to *E. linearis*. This plant is *E. Sonnei* Greene[13] and, although it appears to be specifically distinct from *E. linearis,* it is like that species in technical characters of habit and stem. In it solitary heads terminate erect peduncle-like stems which originate from creeping or matted basal stems having that peculiar texture characteristic of the basal stems of *E. linearis*. Greene noted this peculiarity when in the type description he remarked, ". . . there is an enlargement of the nodes at the base of the stem which would seem to indicate that bulblets are ultimately formed in the leaf-axils." The leaves of *E. Sonnei* are oblanceolate or linear-oblanceolate and the pubescence of the leaves, erect stems, and involucres is "strigillose-canescent," somewhat less appressed than in *E. linearis*. The heads of *E. Sonnei* are larger than those of *E. linearis* and the rays are lavender or mauve. The pappus-bristles appear to be only in a single series, the chief difference between the species and *E. linearis*. Sonne's Erigeron heretofore has been related by several authors to *E. nevadincola* Blake,[14] *E. pygmæus* (Gray) Greene, and *E. ursinus* Eaton, but from all of these it appears distinct in its remarkable vegetative characters.

Summarizing the accepted names and their synonyms that have been discussed in this paper, we have:

ERIGERON FILIFOLIUS (Hook.) Nutt., Trans. Am. Phil. Soc., n. ser., 7:308 (1840). *Diplopappus filifolius* Hook., Fl. Bor.

[13] Pitt. 1:218 (1888).
[14] This name, first published in Proc. Biol. Soc. Wash. 35:78 (1922), must replace that of *E. nevadensis* Gray, not Wedd.

Am. 2:21 (1834); *Chrysopsis canescens* DC.,[15] Prodr. 5:328 (1836); *E. filifolius,* vars. α and β T. & G., Fl. N. Am. 2:177 (1841); *E. linearis* Piper, Contrib. U. S. Nat. Herb. 11:567 (1906), not *Diplopappus linearis* Hook.

ERIGERON LINEARIS (Hook.) Piper,[16] l. c. *Diplopappus linearis* Hook., l. c.; *E. peucephyllus* Gray, Proc. Am. Acad. 16:89 (1881); *E. ochroleucus* Gray, Syn. Fl. N. Am. 1, pt. 2: 213 (1884), in part not Nutt.; *E. luteus* A. Nels.,[17] Bull. Torr. Club 27:33 (1900); *E. filifolius* Piper, l. c., not *Diplopappus filifolius* Hook.

ERIGERON LINEARIS var. ELEGANTULUS (Greene) J. T. Howell. *E. elegantulus* Greene, Erythea 3:65 (1895).

ERIGERON SONNEI Greene, Pitt. 1:218 (1888). *E. nevadensis* var. *Sonnei* (Greene) Smiley, Univ. Calif. Publ. Bot. 9:373 (1921).

A NEW TOWNSENDIA FROM UTAH

BY ALICE EASTWOOD

Townsendia minima Eastwood, spec. nov. Herba nana, cæspitosa, caulibus subterraneis ramosis; foliis rosulatis circumdatis et superantibus capitulos sessiles, spathulatis vel oblanceolatis subcrassis, adpresso-pubescentibus vel subglabris, 10-15 mm. longis, 1-2 mm. latis, petiolis longis, ciliatis; capitulis 4 mm. diametro, 8 mm. altis, bracteis involucralibus 4-5-seriatis, obtusis, margine membranaceis et ciliatis; floribus radiatis sterilibus, rosaceis, pappi setis barbatis, exterioribus 4 mm. longis, longioribus interioribus; floribus disci femineis, tubulosis, apice 4-crenatis, pappi setis æqualibus, flores superantibus; acheniis oblanceolatis, tenuiter pubescentibus, pilis divaricatis, non glochidiatis.

Low plants forming mats, the caudex branching underground from a straight tap-root; leaves in rosettes surrounding and almost concealing the small sessile heads, spatulate to oblanceolate, rather thick, often concave above, appressed-pubescent to almost smooth, 10-15 mm. long, 1-2 mm. wide, with long broad ciliate petioles; heads about 4 mm. in diameter, 8 mm. high, bracts of the involucre in 3-4 series, obtuse, membranously

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15 A collection by Douglas "in Amer. boreal. occid. ad flumen Columbia" was the type of this species. A photograph of the type which is in Herb. DeCandolle. was seen at Herb. Gray. and it is clear that the plant represented is *E. filifolius,* to which species it has been referred without question for many years.

16 *Erigeron linearis* Spreng. in DC., Prodr. 5:474 (1836), was not validly published since it was "merely cited as a synonym" (Intern. Rules Bot. Nomen., 1930, Art. 40).

17 See also Bot. Gaz. 54:413-416 (1912), where A. Nelson in a discussion of this problem follows Piper's lead and states that if *E. luteus* "is ever reduced it will be to . . . varietal rank under *E. filifolius*"!

margined, ciliate; receptacle honey-combed; flowers of both ray and disk few; rays light rose-color, sterile, with outer pappus half as long as the inner, the latter equalling the pappus of the fertile disk-flowers which surpasses the tubular, 4-crenate corollas; achenes oblanceolate, with some sparse fine spreading hairs.

Type: No. 206955, Herb. Calif. Acad. Sci., collected on the rim of Bryce Canyon, Utah, June 19, 1933, by Alice Eastwood and John Thomas Howell, *No. 727*; also No. 206961, collected in the adjacent Red Canyon, the next day, *No. 785*. This species belongs to the same group as *T. sericea,* but is quite unlike that species and is the smallest so far known.

THE MOST MINUTE MIMULUS

BY ALICE EASTWOOD

Mimulus minutissimus Eastwood, spec. nov. Annuus, glandulosopilosus, minutus, circa 1 cm. altus; floribus sessilibus, solitariis, circumdatis foliis; foliis anguste oblongis vel oblanceolatis, 5 mm. longis, 1 mm. latis; calyce 4 mm. longo, segmentis inæqualibus, medio longissimo, tuba 1 mm. longa; corolla lutea, infundibulare, 6 mm. longa, tuba gracili, longiore calyce, segmentis obtusis; staminibus inæqualibus, antheris minutis; stylo glabro, stigmate lato; capsula ovato-oblonga, sulcata, 2 mm. longa, inclusa in calyce.

Type: No. 229256, Herb. Calif. Acad. Sci. This tiny Mimulus was collected by Miss Vesta Holt, May 18, 1934, on the road to Chester, Plumas County, California. It grew about two miles west of Lake Almanor near the junction of the Longville road with the Chester-Greenville highway.

These minute almost imperceptible plants are only about 1 cm. high, with one sessile flower. The calyx-divisions are very unequal, the middle lobe of the upper lip longest, surpassing the two lower, the tube about 1 mm. long. The whole plant is minutely glandular-hairy. The trumpet-shaped corolla is yellow with the two lower divisions red-dotted, the tube is slender and the throat about 3 mm. long. The style is glabrous, the anthers minute, anthers of longer stamens and the broad stigmas reach the top of the corolla but are not exserted. The ovary is enclosed in the calyx and has a line down the middle. It grew in a damp place in company with *Mimulus Pulsiferæ* and some species of Allocarya too young for identification.

TWO WESTERN PLANTS NEW TO OKLAHOMA

BY GEORGE J. GOODMAN
University of Oklahoma, Norman

Although Oklahoma is a plains state, it possesses a varied flora, as evidenced by the presence of *Taxodium distichum, Sabal minor, Liquidambar, Magnolia, Marshallia cæspitosa, Calopogon,* etc., in the eastern portion of the state, *Ephedra antisyphilitica, Condalia obtusifolia,* and *Opuntia Davisii,* to mention but three from the southwest portion, and such plants as *Pinus edulis, P. scopulorum, Juniperus monosperma, Eriogonum Jamesii,* and *E. tenellum* from the west end of the "panhandle."

Two plants new to Oklahoma, so far as the writer knows, may be of sufficient interest to western botanists to justify this recording of them:

STANLEYELLA WRIGHTII (Gray) Rydb. Three miles east of Kenton, Cimarron Co., Okla., August 27, 1934, *Goodman No. 2287.* The range has heretofore been considered as western Texas, Colorado, and New Mexico, westward to Lower California. Apparently the only Texas specimen is from the southwest corner.*

HOUSTONIA HUMIFUSA Gray. Breaks of the Canadian River near the Pack Saddle Bridge, Ellis Co., Okla., May 26, 1935, *Goodman No. 2599.* "Western Texas" seems to be the farthest east that this plant has been collected previously.

FURTHER DISTRIBUTION OF LACTUCA SALIGNA L. IN CALIFORNIA. The presence of this European lettuce in California was first reported in Madroño 2:20, as occurring in Lake, Solano, Alameda, and San Mateo counties. Field studies in 1932 have shown that this plant is a common weed in low fields of the Livermore Valley region (near San Ramon, Contra Costa County, *J. T. Howell No. 10819*), and that it occurs sparingly on the west side of the San Joaquin Valley (eight miles west of Tracy, San Joaquin County (*J. T. Howell No. 10846*). In 1933, Mr. M. S. Jussel collected it near Forest Knolls, Marin County.—John Thomas Howell.

* Cf. Payson, Ann. Mo. Bot. Gard. 9:315-317 (1922).

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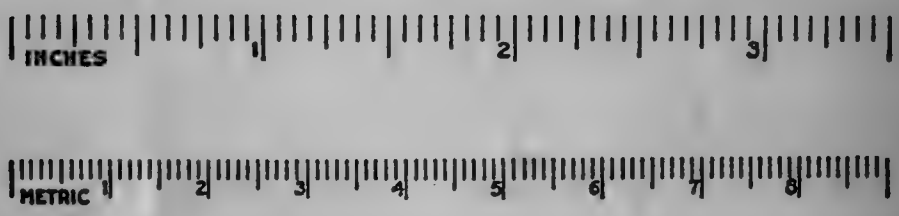

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NEW YORK BOTANICAL GARDEN

NOTES ON CAREX—V

BY J. W. STACEY

Carex Hendersonii L. H. Bailey has heretofore been found only along the coast from southwestern British Columbia to Sonoma Co., California. We were notified by Dr. Lincoln Constance of the Washington State College at Pullman that he had found it in Idaho. This was doubted, but on receiving a sheet of the plant, it was found to be true *C. Hendersonii.* This is a considerable extension of its known range. However, many other plants are found along the coast of Washington and do not occur in the intervening territory until they reappear in Idaho. Again, the species may possibly be found throughout British Columbia, and not only in the southwestern part. If so, in a movement of the species toward the south, the geological conditions may have been such that a small tongue moved forward into Idaho. The largest number of individuals of this particular species seems to be in Oregon, so unless we find a considerable extension of range, its occurrence in Idaho will for the present remain a mystery.

The data on the sheet received from Dr. Constance are as follows: humus, Abies-Thuja Climax, Three Devils Creek at Middle Fork Clearwater River, 4 miles below Lowell, Clearwater National Forest, Idaho Co., Idaho. Constance, et al., No. 1112. June 2, 1935.

* * *

A new record for Arizona is *Carex pityophila* Mackenzie. This was found by Eastwood and Howell on the north rim of the canyon, Grand Canyon National Park, June 22, 1933, their *No. 888.* It has been recorded from Utah, Colorado, and New Mexico, and was to be expected in Arizona. It is related to *C. Rossii* Boott.

* * *

There are four species in the section Hispidæ, each species separated from the others geographically. *Carex spissa* L. H. Bailey is found in southwestern California and Lower California. *Carex ultra* L. H. Bailey is found in southern Arizona and Sonora, Mexico.* *Carex Seatoniana* L. H. Bailey is found

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* Just recently in going over some unnamed plants in the Herbarium of the California Academy of Sciences, a sheet collected by Carl B. Wolf, *No. 2512,* July 6, 1928, in the San Jose Mts., 5 miles south of Naco, Sonora, Mexico, proved to be *C. ultra.*

in central Mexico, while *C. Pringlei* L. H. Bailey has been found only at the type locality in southern Mexico.

Mackenzie in North American Flora, 18[7]:421, gives the range of *Carex spissa* as from Los Angeles Co., California, southward into Lower California and eastward to southern Arizona. A large number of plants of this relationship from Arizona have been examined, and all have been found to be *C. ultra,* with the exception of one sheet examined from the Gray Herbarium, which is very doubtfully from Arizona. The sheet in question is from William Boott Herbarium, and in a corner of the sheet are written these words: C. Lemmonii Arizona Pringle.

Each of these words is in a different handwriting, and the presumption is that the plant was really collected around San Diego, California, where Pringle did some collecting, and that the word Arizona was added later, as was the name *C. Lemmonii.* So, unless other specimens are found in Arizona that prove to be *C. spissa,* it is reasonable to believe that this species is not in Arizona as reported.

* * *

In North American Flora, 18[2]:83, Mackenzie combined the large-headed Carex, *C. anthericoides* Presl, growing on the Pacific coast, with *C. macrocephala* Willd., growing on the Asiatic coast, southward to northern China and Japan, and we had been following him and naming our Pacific coast plant *C. macrocephala.* A short time ago the California Academy of Sciences received in exchange a sheet from F. J. Hermann of the University of Michigan, collected in Seaside Park, Ocean Co., New Jersey, his *No. 4216,* labelled *C. macrocephala* Willd., evidently naturalized. It was seen immediately that this plant was not the same as our Pacific coast plant. The most noteworthy differences were in the leaves and in the color of the pistillate scales. The one difference by which these species could be at once differentiated is that *C. anthericoides* is strikingly aphyllopodic while *C. macrocephala* is phyllopodic. The writer knows of no species of Carex where the fertile culms may be either aphyllopodic or phyllopodic—the degree of phyllopody is always the same. There are cases where the fertile culms may be phyllopodic and the sterile culms may be aphyllopodic, but again it is always constant.

Fernald (Rhodora 32:9-11,—1930) shows the distinctions very clearly. Mackenzie states that the descriptions of the Asiatic plant by Boeckeler (Linnaea 39:66, 67,—1875) and by Kunth (Enum. Pl. 2:428, 429,—1837) do not agree with the distinctions made by Fernald. The writer has very carefully read the descriptions by Boeckeler and Kunth, and, allowing for the differences in the descriptions of a Carex at that time and now, these descriptions do not seem to fit our Pacific coast plant. The differences in all parts of these two plants are so great that one must inevitably come to the conclusion that they are two species. Fernald has well enumerated all of these differences, but perhaps a key, showing the striking gross differences, will be in order.

Culms phyllopodic; bases of true leaves soon disintegrating into long fibers; upper culm leaves scarcely ribbed; fertile scales greenish or drab, membranaceous ..... *C. macrocephala*

Culms aphyllopodic; bract-like lower leaves scarcely disintegrating; upper culm leaves prominently ribbed; fertile scales brownish, shining, hyaline ..... *C. anthericoides*

This differentiation of these two species by the character of the lower part of the culm, whether it is aphyllopodic or not, serves to illustrate the fact that in gathering specimens of Carex it is very vital to the proper determination of the species that all parts of the plant should be collected, especially the lower part of the culm intact with the roots, and also any sterile culms that may be present. This is especially true in certain sections of Carex, notably the Acutæ, where, if the culm is simply pulled up without getting the lower leaves or roots, a correct determination is very difficult.

NORTHWESTERN BOTANY NOTES—I

BY J. WILLIAM THOMPSON

Seattle, Washington

POLYSTICHUM MOHRIOIDES (Bory) Presl var. LEMMONI (Underw.) Fernald, Rhodora 26:92 (1924). *Aspidium mohrioides* D. C. Eaton, Ferns of N. A. 2:251 (1880); *Polystichum Lemmoni* Underw., Our Nat. Ferns, ed. 6, 116 (1900). I have seen thousands of individual plants of this variety in the Wenatchee Mountains and at first I considered that it was a distinct

species. But it is always found with *P. mohrioides* var. *scopulinum* (D. C. Eaton) Fernald (l. c., 89). If the serpentine area where it grows is open with a warm southern exposure, the pinnæ are little divided and the plants pass as var. *scopulinum*. But on cold northern exposures, the habit is more dwarfed and the pinnæ are finely divided for their full length, and such plants are known as var. *Lemmoni*. The type locality of the latter is the Mt. Shasta region in northern California, so I was not surprised to find it in serpentine formations on Red Mt. in the Siskiyou Mts. at about 2000 m., and in company with the var. *scopulinum*. This is the first record for Oregon, distributed as my *No. 12376*.

POLYSTICHUM ANDERSONI Hopkins, Am. Fern. Journ. 3:116 (1913). I have collected this pretty fern in the Olympic Mts. and on Mt. Rainier, and others have found it in various places in the Cascade Mts., especially at Mt. Baker. It is usually found near timberline. While botanizing around Lost Lake, on the north side of Mt. Hood, I found quite a colony of this species. This is the first record for Oregon and was distributed as my *No. 11192*.

RANUNCULUS TESTICULATUS Crantz, Stirp. Austr., fasc. 2, 27 (1763). *Ceratocephalus orthoceras* DC., Syst. 1:231 (1818). *C. testiculatus* Kern., Sched. ad Fl. Exs. Austro-hung. no. 1702 (1888). While botanizing in Oregon in April, 1935, I found a great abundance of this odd buttercup scattered over the wheat fields and along roadsides near Condon. Mr. C. A. Weatherby of the Gray Herbarium kindly identified it and furnished the synonomy. He also stated that, as far as he knew, this was the second time it has been found in America, the first having been in Utah. The region where I found it is a high sagebrush plain, and how it could have been introduced is a mystery as deep as the advent of *Teesdalia nudicaulis* (L.) R. Br. that I reported in Rhodora last December. The buttercup was distributed as my *No. 11347*.

Astragalus siskiyouensis (Rydb.) Thompson, comb. nov. (*Phaca siskiyouensis* Rydb., N. Am. Fl. 24[6]:340,—1929.) This species seems amply distinct from the prostrate *A. Hookerianus* Gray. The pods are quite glabrous and the whole plant is densely cespitose and quite erect, and very much larger than *A. Hookerianus*. The pubescence is also quite different. The

type locality is Mt. Eddy in northern California, but I found it quite abundant at about 1800 m. in the Siskiyou Mts., on Red Mt., where a serpentine formation predominates. This is the first record for Oregon, extending the range north about 75 miles, and was distributed as my *No. 12375.*

THE SHRUBBY MALVASTRUMS OF CALIFORNIA WITH DESCRIPTIONS OF NEW SPECIES AND A KEY TO THE KNOWN SPECIES

BY ALICE EASTWOOD

These beautiful flowering shrubs are distinctly Californian though some extend into Lower California. These latter are not included since they are, as yet, not well enough known and their affinities uncertain.

If the character of the fruit is taken as the basis of division, the species are in two groups. In that of which *M. fasciculatum* may be taken as the type, the top of the carpels is covered closely with a short stellate pubescence which is generally glossy and often extends part way down the backs of the carpels. In the other of which *M. Fremontii* may be taken as the type the entire top of the fruit is not covered and the pubescence never extends down the back of the carpels. Instead of short stellate hairs, the pubescence consists of long white stellate hairs concentrated around the base of the style. In the key these groups form separate sections each with its own key. The pubescence whether lanuginous, tomentose, hairy, or scabrous is always stellate. Only the shrubby malvastrums are included since the herbaceous species are well known and readily distinguished. My sincere thanks go to Prof. M. L. Fernald of the Gray Herbarium and to Dr. P. A. Munz, Pomona College, Claremont, California, for the loan of specimens which enabled me to make the key by seeing the types of *M. Fremontii, M. marrubioides, M. Jonesii, M. clementinum,* and *M. gabrielense.* Since the Herbarium of the California Academy of Sciences has the type of *M. aboriginum,* isotype of *M. involucratum,* and topotypes of the other species, it has been possible to arrange this preliminary key to show the distinctive differences separating the different species as they appear to the author.

SECTION 1. *M. fasciculatum* Group

1. Inflorescence capitate 2
1. Inflorescence interrupted-spicate 3
1. Inflorescence in flower of short lateral panicles 8
1. Inflorescence of terminal panicles 10
2. Heads in bud globular; outer involucral bracts generally ovate; upper surface of leaves not stellate-pubescent, rugose when old ..... *M. involucratum* Robinson
2. Heads in bud more diffuse; outer involucral bracts generally lobed; leaves stellate-pubescent on both sides ..... *M. Palmeri* Watson
3. Calyx-segments acuminate 4
3. Calyx-segments acute 7
4. Bracteoles ovate; calyx-segments ovate, abruptly acuminate; buds pointed, angled ..... *M. aboriginum* Robinson
4. Bracteoles filiform, linear, or narrowly lanceolate 5
5. Pubescence of calyx densely white-tomentose, bracteoles as long as calyx-tube ..... *M. orbiculatum* (Greene) Robinson
5. Pubescence of calyx hairy 6
6. Hairs long and spreading; bracteoles as long as calyx ..... *M. densiflorum* Watson
6. Hairs short; bracteoles shorter than calyx ..... *M. marrubioides* Durand & Hilgard
M. gabrielense Munz & Johnston
7. Calyx-segments white with a dense tomentum; bracteoles as long as, or a little longer than, calyx-tube ..... *M. arcuatum* (Greene) Robinson
7. Calyx-segments greenish, the pubescence inclined to be scabrous; bracteoles shorter than calyx-tube ..... *M. fasciculatum* Nuttall
8. Leaves large, thick, lobed, densely tomentose ..... *M. Davidsonii* Robinson
8. Leaves thin 9
9. Leaves obtusely lobed; calyx scabrous ..... *M. laxiflorum* (Gray) Eastwood
9. Leaves acutely lobed; calyx tomentose ..... *M. catalinense* Eastwood
10. Calyx-divisions acuminate; leaves scarcely lobed, pallid on both sides ..... *M. Abbottii* Eastwood
10. Calyx-divisions acute 11
11. Leaves rather thick 12
11. Leaves thin 13
12. Leaves pale, densely tomentose on lower side, smoother on upper, cordate at base ..... *M. Hallii* Eastwood
12. Leaves bright green on upper side, white-tomentose on lower, obtuse to subcuneate at base ..... *M. Parishii* Eastwood
13. Leaves pale on both sides ..... *M. Nuttallii* (Abrams) Eastwood
13. Leaves green on upper side or on both sides 14
14. Calyx angled in bud, segments broadly ovate, mucronate ..... *M. splendidum* Kellogg
14. Calyx not angled in bud, segments ovate, acute ..... *M. nesioticum* Robinson

Malvastrum Abbottii Eastwood, spec. nov. Albescens, divaricate paniculatum, 1-2 m. altum; foliis late ovatis vel suborbiculatis, basi truncatis, margine late crenatis, supra minute stellato-pubescentibus, infra dense albo-tomentosis, reticulatis, maximis foliis 6 cm. longis latisque, petiolis circa 1 cm. longis; paniculis divaricato-ramosis, ramis gracilibus; calyce campanulato, albo-tomentoso, 1 cm. longo, segmentis ovatis, acuminatis, 5 mm. longis, costatis; bracteolis lanceolatis, 5 mm. longis, albo-tomentosis; pedicellis 2-3 mm. longis; corolla rosea, circa 3 cm. diametro, petalis obliquo-oblongis.

Type: Herb. Calif. Acad. Sci. No. 52708, collected Sept.-Oct., 1889, among willows along the Salinas River, Monterey County, California, by the late Dr. E. K. Abbott in whose honor it is named. Dr. Abbott's herbarium was given to the California Academy of Sciences by Mrs. Abbott after her husband's death.

This must be a very lovely mallow with the pale stems and leaves, the large widely spreading panicles, and the beautiful rosy flowers. It was classified like all the other panicled malvastrums as *M. Thurberi* var. *laxiflorum* Gray. It is much more lovely, with differences in pubescence, color and shape of leaves, much larger calyx with acuminate segments, and larger corolla. The panicle is open with slender branches and long spaces between the flowering stems. The margin of the leaves is broadly crenate.

Malvastrum catalinense Eastwood, spec. nov. Erectum, supra ramosum; caulibus denso breve tomento indutis; foliis tenuibus, acute 3-5-lobatis, supra viridibus, infra canescentibus, margine mucronato-crenatis, basi truncatis vel cordatis, maximis foliis 7 cm. longis, 8 cm. latis, breviter petiolatis, stipulis falcato-lanceolatis, deciduis; floribus dense aggregatis in paniculis lateralibus interruptis, breviter pedunculatis; calyce 7-8 mm. longo, segmentis deltoideis, acutis, 4 mm. longis, tomentosis; bracteolis linearibus, 4-5 mm. longis; corolla rosea, 3 cm. diametro.

Type: Herb. Calif. Acad. Sci. No. 52692, collected by the author near Avalon, Santa Catalina Island, California, July 20-25, 1917. The flowering type was collected near Avalon, June 13, 1915, by John T. Carlson, Herb. No. 52693.

This species is characterized by thin, acutely 3-5-lobed leaves, conspicuously green on the upper surface and canescent on the lower with a fine short close tomentum. The flowers are aggregated in interrupted, short, lateral panicles that become more wand-like and spicate towards the end of the flowering stem. The calyx is about 8 mm. long, divisions about as long as tube,

deltoid and acute, and clothed with tomentum longer and looser than that on stems and leaves. Like all the others it is beautiful with the rosy flowers bedecking the wand-like branches of the panicle. It has been included in *M. fasciculatum* Nutt.

Malvastrum Hallii Eastwood, spec. nov. 1-2 m. altum, supra ramosum, canescens; foliis suborbiculatis, prope 3-5-lobatis, crenatis, basi cordatis, infra densiore tomento quam supra, petiolis foliorum inferiorum circa 4 cm. longis, laminis 6 cm. longis latisque; paniculis terminalibus, ramis breviter pedunculatis, floribus sæpe congestis et secundis; calyce 5 mm. longo latoque, segmentis deltoideis, acutis, 2 mm. longis, appresso-tomentosis; bracteolis linearibus, 2 mm. longis; corolla rosacea, 2-5 cm. diametro, petalis obovatis, apice obliquis, circa 1 cm. latis, 1.5 cm. longis.

Type: Herb. Calif. Acad. Sci. No. 143419, collected May 30, 1916, by H. M. Hall and F. M. Essig (*No. 10131*) on Mt. Diablo, California, on the westerly side north of Pine Canyon, Upper Sonoran Zone, altitude about 275-290 m. It grew on a stony slope amid other shrubs. Dr. Hall, in whose honor it is named, notes it as a shrub 1-2 m. high, branched from an erect trunk; petals rose-color to pink or almost white. It was distributed as *M. arcuatum* (Greene) Robinson. Dr. Ira L. Wiggins on the label of the type notes the following differences from *M. arcuatum*: pubescence more sparse and shorter-rayed, leaves larger and more rounded, thinner, less rugose and brighter green on the upper surface; inflorescence loose and longer, the flowers short-pedicelled; bracts shorter; calyx shorter and less pubescent; petals shorter; seeds lighter in color and apparently glabrous. Another specimen also from Mt. Diablo, was collected May, 1903, by A. D. E. Elmer (*No. 4395*), Herb. Calif. Acad. Sci. No. 52707. This is younger with branches less developed, but showing the same tendency of the flowers to prevail on the upper side of the peduncles.

Malvastrum Parishii Eastwood, spec. nov. Albo-tomentosum præter paginam superiorem foliorum et corollam; foliis ovatis, subtrilobatis, basi obtusis, margine crenatis, circa 5 cm. longis, 4 cm. latis, supra viridibus, infra dense albo-tomentosis, petiolis circa 1 cm. longis; paniculis terminalibus, ramis patenter divaricatis; calyce 7-8 mm. longo, segmentis ovatis, acutis, nervatis, 5 mm. longis; bracteolis filiformibus, circa 2 mm. longis; corolla rosea, 2.5 cm. diametro.

Type: Herb. Calif. Acad. Sci. No. 52756, collected in the vicinity of San Bernardino, California, July 20, 1895, by S. B. Parish (*No. 3804*) in whose honor it is named. It grew at an altitude of from 300 to 500 m. (1000-1500 ft.).

The contrast between the dark green upper surface of the rather thick leaves and the white-tomentose lower surface is most striking. The leaves, too, at base are obtusely cuneate and distinctly 5-7-veined. The erect stems terminate in an open widely spreading panicle with all parts densely white-tomentose. The calyx in bud is pointed and angled. It was distributed as *M. Thurberi* Gray (*M. fasciculatum* Nutt.), but differs from all classified under that aggregate in the terminal open-spreading panicle, the marked contrast between the upper and lower surface of the rather thick leaves, and the larger calyx covered with a close white dense tomentum.

* * *

In the key, the following two new names are indicated: **Malvastrum laxiflorum** (Gray) Eastw., comb. nov. *M. Thurberi* var. *laxiflorum* Gray, Proc. Am. Acad. 22:291 (1887); **Malvastrum Nuttallii** (Abrams) Eastw., comb. nov. *Malacothamnus Nuttallii* Abrams, Bull. N. Y. Bot. Gard. 6:417 (1910).

SECTION 2. *M. Fremontii* Group

1. Inflorescence interrupted spicate 2
1. Inflorescence of short lateral pedunculate clusters or single flowers.... 4
1. Inflorescence of terminal panicles..... 5
2. Segments of calyx acuminate; bractlets filiform, as long as calyx; leaves lobed .....*M. clementinum* Munz & Johnston
2. Segments of calyx acute 3
3. Leaves wider than long, scarcely lobed, broadly crenate..... .....*M. Fremontii* Torrey & Gray
3. Leaves about as wide as long, slightly lobed, dentate..... .....*M. Helleri* Eastwood
4. Leaves truncate at base, crenate.....*M. Jonesii* Munz
4. Leaves cuneate at base, irregularly dentate.....*M. Dudleyi* Eastwood
5. Buds and calyx densely white-tomentose .....*M. fragrans* Eastwood
5. Buds and calyx scabrous .....*M. gracile* Eastwood
5. Buds and calyx woolly-tomentose; leaves truncate at base..... ..... *M. Howellii* Eastwood
5. Leaves cordate at base, with narrow sinus..... .....*M. Howellii* var. *cordatum* Eastwood

Malvastrum Helleri Eastwood, spec. nov. Ramosum, omnino denso albo tomento indutum, caudicibus senioribus nigrescentibus; foliis ovatis ad suborbiculatis, conspicue venosis, margine crenatis vel irregulariter crenato-dentatis, basi truncatis, apice obtusis, circa 2-5 cm. longis latisque, stipulis linearibus, deciduis, petiolis circa 5-10 mm. longis; floribus sessilibus vel subsessilibus in spicis interruptis, infimis floribus foliaceo-bracteatis, supremis nudis; calyce 5 mm. longo latoque, segmentis ovatis, obtusis,

2 mm. longis latisque; bracteolis filiformibus; corolla rosea, circa 1-2 cm. diametro, petalis apice obliquis, 1 cm. longis, 5 mm. latis.

Type: Herb. Calif. Acad. Sci. No. 52632, collected near Ladoga, Lake Co., California, June 8, 1919, by A. A. Heller, in whose honor it is named. It grew in the *Quercus Douglasii* belt with Adenostoma, Ceanothus, etc., and was distributed under *No. 13242*.

The whole plant except the old stems and corolla is white with a dense tomentum. The leaves are small, veiny especially on the lower surface. The interrupted spicate inflorescence is about 1-1.5 dm. long, the clusters becoming closer and more condensed at the end. The round white buds and the pubescence of the carpels ally it with *M. Fremontii* T. & G. This is the most northern collection of a shrubby malvastrum.

Malvastrum Dudleyi Eastwood, spec. nov. Fruticosum, canum denso appressissimo stellato tomento; foliis rhomboideis, suborbiculatis, basi cuneatis, inferiore parte integro, superiore parte irregulariter crenato-dentato vel duplo-crenato, circa 2-3.5 cm. latis longisque; petiolis 1-2 cm. longis; calyce campanulato, 6 mm. longo, segmentis 4 mm. longis, ovatis, acutis, nervatis, pedicellis 3-5 mm. longis; corolla 1 cm. longa, rosea; carpellis externe minute reticulatis, apice tomentosis; seminibus atro-brunneis, rugosis.

Type: Herb. Calif. Acad. Sci. No. 146103, collected June, 1929, in Fern Canyon, 2 miles west of Paso Robles, San Luis Obispo Co., California. It is named in honor of Chester Dudley, who is a most appreciated donor of many specimens to the Academy.

The type is in fruit with some withered corollas persisting. It is distinctive in the shape of the leaves and the open campanulate small calyx. It seems to have a slender habit and the flowers in racemes on short pedicels. It is related to *M. Jonesii* Munz, but differs in the shape of the leaves, denser whiter pubescence, and open spreading calyx.

Malvastrum fragrans Eastwood, spec. nov. Erectum, divaricato-ramosum, tomento stellato denso indutum; foliis ovatis, petiolatis, circa 2 cm. longis latisque, obtusis, basi truncatis, margine irregulariter crenatis, petiolis 5-15 mm. longis, stipulis viridibus, filiformibus, deciduis, circa 5 mm. longis; floribus inferioribus pedunculatis, 1-3 in axillis foliorum, superioribus paniculatis, bracteis foliaceis; pedunculis gracilibus, 2-4 cm. longis; calyce dense tomentoso, 1 cm. longo, segmentis ovatis, 5 mm. longis, acutis, acuminatis; bracteolis filiformibus, viridibus, brevioribus

calyce; corolla rosea, circa 4 cm. diametro, petalis oblique obovatis, 2 cm. longis; carpellis immaturis, glabris, apice albo-tomentosis.

Type: Herb. Calif. Acad. Sci. No. 204656, collected at El Dorado School near Santa Margarita, San Luis Obispo Co., California, May 28, 1933, by Mrs. Mary E. Wall. Other collections of the same species in the Herbarium of the California Academy of Sciences are the following, all from San Luis Obispo Co.: Indian Creek, La Panza Mts., *Chester Dudley,* June, 1927; along the new road to Pozo from Santa Margarita, *Alice Eastwood No. 15146,* May 17, 1928; Tepusquet Canyon, *Mrs. E. R. McKenzie,* June, 1923. It is named from the delicious fragrance of tea roses that pervades the plants and persists for years after drying.

This is a lovely shrub. The whole plant is snowy white from the close dense tomentum. The graceful open panicles terminating the stems are decked with the lovely pink flowers and the beautiful large roundish buds. The filiform green bracteoles are conspicuous on the snowy buds.

This is related to *M. Jonesii* Munz. It differs in habit, much larger calyx and corolla, and is a much more lovely species. Both are related to *M. Fremontii* T. & G.

Malvastrum gracile Eastwood, spec. nov. Erectum, paniculatum supra, 1-2 m. altum, omnino dense stellato-scabridum; foliis ovatis, subtrilobatis, petiolatis, basi truncatis, obtusisve, apice obtusis, margine crenatis, 2-5 cm. longis latisque; petiolis 5-10 cm. longis, stipulis deciduis; paniculis gracilibus ramis divaricatis; calyce cuneato, 7 mm. longo, segmentis acuminatis, rubescentibus externe scabro-stellatis, interne pilosis, longioribus tuba; bracteolis filiformibus, rubescentibus, 3-4 mm. longis, deciduis; corolla rosea, 2 cm. diametro, petalis oblique oblongis, circa 7 mm. latis, 15 mm. longis; carpellis apice stellato-tomentosis.

Type: Herb. Calif. Acad. Sci. No. 228727, collected by the author (*No. 14996*) July 30, 1927, on the road from Arroyo Grande to Huasna, San Luis Obispo Co., California.

This tall slender mallow grew amid the chaparral along the road. Its slender flowering panicles rose above the other shrubs. The whole plant is whitish with a densely appressed stellate scurf; leaves small, somewhat 3-lobed, truncate or obtuse at base with crenate margins; panicles with slender spreading branches, the lower bracts leaf-like, the upper small; calyx wedge-shaped with segments reddish and acuminate. The small

corolla is rose-color, about 2 cm. across, and the carpels smooth except for the white stellate hairs at the base of the style.

Malvastrum Howellii Eastwood, spec. nov. Fruticosum lanuginoso-tomentosum, erectum; foliis late ovatis vel paulo obtuso-lobatis, basi truncatis, margine crenato-dentatis, 4 cm. longis, 3-5 cm. latis, petiolis 1-2 cm. longis; paniculis terminalibus, ramis brevibus, pedunculis 1-3 cm. longis, floribus breviter pedicellatis, congestis; calyce dense lanuginoso, 1 cm. longo, in alabastro ovoideo, segmentis ovatis, acutis acuminatisve, 5 mm. longis; bracteolis filiformibus, 1 cm. longis; corolla rosea, circa 3 cm. diametro, petalis apice obliquis.

Type: Herb. Calif. Acad. Sci. No. 204366, collected May 12, 1931, at Nortonville, Contra Costa Co., California, by John Thomas Howell, in whose honor it is named. It is his number *6470*. The immature fruits indicate this to belong to the *M. Fremontii* group. It differs from the type of *M. Fremontii* in a larger ovoid bud and terminal paniculate inflorescence. Through the courtesy of the Gray Herbarium the author has been able to see the poor type of *M. Fremontii* T. & G. The exact locality of this is unknown though probably somewhere in the southern Sierra Nevada. It is described as interruptedly spicate and not paniculate.

Another specimen collected by J. T. Howell (*No. 2065*) was collected above San Antonio Valley, Santa Clara County, California, July 11, 1926, alt. about 1,400 m. This is an older plant with the carpels better developed and the inflorescence more spreading, peduncles much longer (Herb. Calif. Acad. Sci. No. 177895).

Another specimen collected by Chester Dudley, summer of 1935 at Junto del Puerto Canyon, western Stanislaus County, California, has the bases of the leaves cordate but otherwise similar.

Var. **cordatum** Eastwood, var. nov. Foliis basi cordatis.

Type: Herb. Calif. Acad. Sci. No. 227909.

These are lovely shrubs, white with the dense woolly pubescence covering all parts except the corolla. The large woolly buds distinguish this species from all its allies. It may be the same as the specimen collected by Dr. William H. Brewer at Corral Hollow, mounted on the same sheet in the Gray Herbarium with the type of *M. Fremontii.* The Brewer specimen also has paniculate inflorescence.

TWO NEW CALIFORNIAN PLANTS

BY JOHN THOMAS HOWELL

Phacelia ciliata var. **opaca** J. T. Howell, var. nov. A specie differt: sepalis senectute anguste oblongo-lanceolatis vel oblongo-linearibus, coriaceis opacisque, haud chartaceis nitentibusque.

Type: No. 188192, Herb. Calif. Acad. Sci., clay hills 5 miles northeast of Merced, Merced Co., April 25, 1929, *J. T. Howell No. 4192.* Other collections: from the type locality, *J. T. Howell No. 4117,* April 1, 1929, and *J. T. Howell No. 4210,* May 19, 1929; 2 miles northeast of Planada, Merced Co., April 25, 1929, *J. T. Howell No. 4202*; near Le Grand, Merced Co., Feb. 28, 1936, *R. F. Hoover No. 730.*

This variety, which is markedly distinct from typical *P. ciliata* in the character of its fruiting sepals, appears to be restricted to the vicinity of Merced, where it grows on low clay hills bordering the San Joaquin Valley. In the large collections of *P. ciliata* that have been examined from northern California to northern Lower California, no plants have been seen that show the narrow dull coriaceous sepals which are peculiar to the variety.

Downingia mirabilis J. T. Howell, spec. nov. Annua, glabra, circa 1 dm. alta; caulibus simplicibus vel pauciramosis, erectis; foliis oblongo-lanceolatis ad subovatis, 6-10 mm. longis; calycis lobis ascendentibus; corolla valde bilabiata, sinu inter labia extendentibus trans limbum corollæ; lobis duobus labii superioris extendentibus antice et prope in linea parallela, extremis loborum gracilibus, acutis, minute pubescentibus, divergentibus per circa 180°; limbo labii inferioris concavo et conchiforme, cornibus papilliformibus prominentissimis luteo-albis in angulo faucis et labii inferioris et rugis duabus similiter prominentibus cæsiis in sinibus inter labium, totis valde antice flexis; parte superiore faucis subrotundata, latere purpureo-venuloso; palato parce pubescenti albescenti vel purpureo-venoso; antheris paulum superantibus labium superior vel æqualibus labio, apice pilis duobus brevissimis setaceis vel pilis nullis.

Glabrous annual about 1 dm. tall; stems simple or few-branched, erect; leaves oblong-lanceolate to nearly ovate, 6-10 mm. long; calyx-lobes ascending; corolla strongly 2-lipped, the sinus between the lips extending beyond the frontal plane of the corolla-limb and curving downward and then upward at the end; the two lobes of the upper lip extending forward and parallel for half their length, the slender acute ends spreading apart at nearly 180°, the tips of the lobes somewhat recurved, finely pubescent on the inner surface, pale lavender; limb of the lower lip concave and shell-shaped, lavender with a central white field surrounding 2 merged greenish-yellow spots; 2 very prominent nipple-like horns at the angle

of the throat and the lower lip and 2 equally prominent nipple-like folds at the sinuses between the lips, the 2 middle horns yellowish-white, the lateral folds pale lavender, all noticeably outward-curving; the upper part of the throat dome-like, the sides veined with purple; the palate sparsely pubescent, whitish or with parallel veins of purple; anther-column equaling the upper lip or very slightly exserted, somewhat ciliate on top, with two very short bristly hairs at the apex or these sometimes lacking.

Type: No. 232457, Herb. Calif. Acad. Sci., from dried clay soil on bed of former rain-pool, 5 miles northeast of Merced, Merced Co., April 25, 1929, *J. T. Howell No. 4200.*

It was several years ago while doing field work on the Merced plains of the San Joaquin Valley that *D. mirabilis* was found and it was recognized as distinct from four other species of the genus which grow in the region. Further study would indicate that the plant has been undescribed, differing from the other species of Downingia in the conformation of its corolla which in it and related species is so marvelously and variously contrived. According to Jepson's Revision of the California Species of the Genus Downingia in Madroño (1:98-102,—1922), the present species would appear most nearly related to *D. ornatissima* Greene. In fact our plant resembles in certain details the figures given by Jepson for that species more closely than do plants with the "sharp protuberance at base of the upper pair of segments" referred by us to Greene's species. That *D. mirabilis* is distinct from *D. ornatissima* has been ascertained by study of Greene's species as it grows, not only in the vicinity of Merced and elsewhere in the San Joaquin Valley, but also in the region of the type locality near Elmira in Solano County. In both *D. mirabilis* and *D. ornatissima* the calyx-lobes are ascending and not rotately spreading as in other related species, and the lobes of the upper lip of the corolla are horizontally spreading or recurved and not erect or erect-divergent. But in *D. mirabilis* the upper frontal part of the corolla-tube is rounded and dome-like, without that ridge and spur so prominent and distinctive in *D. ornatissima,* and in *D. mirabilis* the folds and horn-like nipples in the angle of the throat are outward-curving and very much more elongate. From *D. bicornuta* Gray, a species also distinguished by very prominent processes in the angle of the throat, *D. mirabilis* is readily marked by the ascending calyx-lobes and the horizontally spreading lobes of the upper lip of the corolla.

THE NAMES FOR TWO COLUMBINES

BY LOUIS WILLIAMS
Missouri Botanical Garden, St. Louis

Dr. E. B. Payson, in his revision of the North American species of Aquilegia, Contr. U. S. Nat. Herb. 20:133-157 (1918), evidently overlooked *Aquilegia ecalcarata* Maxim., Fl. Tangut. 20, t. 8, fig. 12 (1889), and accepted *Aquilegia ecalcarata* Eastw., Zoe 2:226 (1891), as a tenable name. Under it he placed *Aquilegia micrantha* Eastw., Proc. Calif. Acad. Sci., ser. 2, 4:559 (1895), in a lesser category.

In so far as *A. ecalcarata* Maxim. excludes the use of Miss Eastwood's name, the following realignment seems to be necessary with *A. micrantha* Eastw. as the oldest available name:

AQUILEGIA MICRANTHA Eastw., Proc. Cal. Acad. Sci., ser 2, 4:559 (1895). *A. ecalcarata micrantha* Payson, Contr. U. S. Nat. Herb. 20:154 (1918).

AQUILEGIA MICRANTHA var. MANCOSANA Eastw., Proc. Calif. Acad. Sci. Botany, ser. 3, 1:77 (1897). *A. ecalcarata* Eastw., Zoe 2:226 (1891), non Maxim. 1889. *A. Buergeriana* var. *ecalcarata* Davis, Minn. Bot. Stud. 2:336 (1899). *A. Eastwoodiæ* Rydb., Bull. Torr. Bot. Club 29:146 (1902). *A. mancosana* Ckll., Torreya 2:75 (1902). *A. micrantha ecalcarata* Davis, acc. Payson in syn., l. c., 153. *Semiaquilegia Eastwoodiæ* Drum. & Hutch., Kew Bull. Misc. Inf., 165 (1920).

BEAUTY IN LONELINESS. There are parts of the world, not particularly rich in historical aspects, which often stand forth in our memories like pictures of silver on an ebony background because of their loneliness, barrenness, or isolation. Then it is that things, not conspicuous for beauty in other places, become shrouded with a garment of ideality and a halo of glory. It is in this manner that we may conceive a still moonlight on the Sahara, sunshine on icy mountains in Greenland, a lonely stretch of ocean in a storm, a solitary yellow butterfly against a blue sky.

Such is the concept that one draws from the isolation which exists in Spitzbergen. . . . —George Haley, "Spitzbergen," San Francisco Quarterly, February, 1936, page 18.

AN UNREPORTED SPECIES OF CAKILE IN CALIFORNIA. While spending a Sunday picnicking on the sand at Stinson Beach, Marin Co., just north of San Francisco and the Golden Gate, my attention was attracted to some large plants of Cakile. There seemed to be a definite difference between several plants in the same patch. Some of the plants had rather large, conspicuous, purplish flowers and pinnatifid leaves, while the other plants had simple, shallowly lobed leaves, with flowers apparently lacking, although plenty of conspicuous fruits were present. On closer examination of the flowers of the latter plants, tiny dull-colored petals were found.

Later the identity of the two species of Cakile was looked into. The plants with the oblong-ovate, coarsely crenate leaves and the inconspicuous flowers was readily determined as *C. edentula* (Bigel.) Hook. var. *californica* (Heller) Fern. which for many years has been known and included in the Californian flora under various names. The other plant, apparently unreported in the Californian flora before this, was found to be *C. maritima* Scop., a species which grows on sand beaches practically throughout the world. It has received a number of varietal and formal names because of its extreme variability. This plant was found again later by the writer in 1935, south of San Francisco at Salada Beach, San Mateo Co. The most recent treatment of the Mustard Family in California in the latest fascicle of Jepson's Flora of California (2[2]:17-176, Feb. 15, 1936) to come to our attention does not include this species.—Lewis S. Rose.

OSMANTHUS AURANTIACUS (Makino) Nakai. A recent inquiry from W. B. Clarke of San Jose concerning the orange-flowered Osmanthus has led me to look up its identification again. More than thirty years ago it was sent to me from a garden in San Rafael, and, since there were no books on Japanese plants available, the best I could do was to call it an orange-flowered variety of *O. fragrans.*

In Makino's Index Plantarum Japonicarum (2:496, 1912), I find the plant named *O. fragrans* var. *aurantiacus Makino.* In "The Trees and Shrubs of Japan Proper," published by Nakai in 1922, the variety is raised to specific rank as *O. aurantiacus* (Makino) Nakai.—Alice Eastwood.

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SAN FRANCISCO, CALIFORNIA
AUGUST 18, 1936

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YORK
BOTANICAL
GARDEN

NEW CALIFORNIAN PLANTS

BY ROBERT F. HOOVER
University of California, Berkeley

Brodiæa nana Hoover, spec. nov. Cormus 1-2 cm. diametro, exteriore brunneo-fibrosus, sine propagulis; foliis 2 vel 3, subteretibus, scapos multo superantibus; scapis 1 vel 2, 1-5 cm. altis; floribus umbellatis, 1-6, pedicellis 1-3.5 cm. longis; periantho pallide violaceo, tuba circa 5 mm. longa, fauci contracta, segmentis tuba duplo longioribus, circa 3 mm. latis, rotatis et recurvatis; staminodiis 6 mm. longis, albis, late divaricatis, apice profunde emarginatis, stamina multo superantibus, antheris 3 mm. longis, emarginatis apice et basi, filamentibus brevissimis.

Corm 1-2 cm. thick, with brown fibrous coat, without offsets; leaves 2 or 3, semi-terete, much exceeding the scape; scape solitary or 2 from a corm, rising 1-5 cm. above the surface of the ground; umbel 1-6-flowered, pedicels 1-3.5 cm. long; perianth bluish-lilac; tube about 5 mm. long, constricted at the throat; segments about twice as long as tube and about 3 mm. wide, rotate, strictly horizontal at base, recurved; staminodia 6 mm. long, white, widely spreading, with a deep notch at the apex, much exceeding the stamens; anthers 3 mm. long, notched at both ends, on extremely short filaments.

Low open foothills of the central Sierra Nevada, in hard white clay soil. Type collection: five miles north of Snelling, Merced Co., April 13, 1936, *Hoover No. 963.* Type in Herb. Calif. Acad. Sci.; isotype in Herb. Univ. Calif. Other collections: in beds of vernal pools, Warnerville, Stanislaus Co., *Hoover No. 1048*; in rocky stream bed near Farmington, San Joaquin Co., *Hoover No. 1056*; half mile southeast of Comanche, Calaveras Co., *H. S. Yates No. 5153*; North Sacramento, Sacramento Co., *F. Ramaley No. 11192* (Herb. Univ. Calif.); 5 miles southwest of Pentz, Butte Co., *Heller No. 11321* (Herb. Univ. Calif.); hills 8 miles north of Oroville, Butte Co., *Heller No. 11321* in part (Herb. Calif. Acad. Sci.); Durham, Butte Co., *Mrs. J. H. Morrison* (Herb. Calif. Acad. Sci.).

As the writer has observed it, *B. nana* occurs in large numbers and it may be common, but no description seen in the literature applies to these plants. They are easily overlooked for a stunted form of *B. synandra,* which is in flower at the same time, but close inspection reveals striking differences in vegetative as well as in floral characters. The associated native species are those generally found in such situations in this region: *Brodiæa synandra, B. laxa, Chlorogalum angustifolium,*

Leafl. West. Bot., Vol. I, pp. 225-232, August 18, 1936.

Calochortus luteus, Delphinium variegatum, Sidalcea Hartwegii, and *Linanthus filipes.*

This species superficially resembles *B. terrestris* both in habit and in flower. It differs in having fewer leaves, the flowers are paler than is usual in *B. terrestris,* the pedicels are shorter, the perianth-tube is constricted at the throat, and the staminodia are white and spreading. The perianth-segments also spread abruptly, while those of *B. terrestris* are ascending at the base.

As nearly as can be determined, *B. nana* is most closely related to *B. minor* (Benth.) Wats. (*B. Purdyi* Eastw.), although no fresh plants of *B. minor* are available for comparison. *Brodiæa nana* differs from *B. minor* as described in Jepson's "Flora of California" as follows: scape much shorter, flowers fewer, perianth-segments averaging broader, staminodia not purple but white and not 3-toothed but simply notched at the apex. From examination of herbarium specimens of *B. minor* it also appears that the staminodia of *B. nana* are broader and longer in proportion to the stamens. There has been some confusion in the application of names in this group of species (subgenus *Hookera*). While *B. nana* may fall within the range of variation of one of these species as it occurs in nature, it is certain that it cannot be included in any species as described up to this time in any available literature. Its small size cannot be due to environmental conditions, for in the heavy clay soil where it grows it thrives equally well on the hard dry tops of the rolling hills and in depressions where the soil is moist until flowering time.

Streptanthus lilacinus Hoover, spec. nov. Caulibus foliosis, 30-60 cm. altis, glabris, basi nonnumquam paulo hispidis; foliis glabris, oblongis vel lanceolatis, petiolatis, dentatis vel retrorso-pinnatifidis, superioribus integris; floribus racemosis, pedicellis et calycibus pilosis, sæpe glabratis; calyce 5-8 mm. longo, ventricoso-contracto supra basem, lilacino vel purpureo, sepalis rectis, apice divaricatis; petalis sepalis longioribus, rectis, linearibus, undulatis, albis vel pallide purpureis, purpureo-venosis; staminibus æqualibus et distinctis; stigmate paulo 2-lobato; siliquis rectis, gracilimis, planis, paulo hispidis, sæpe flexuosis.

Stems leafy, 30-60 cm. tall; stems and leaves glabrous, or the base of the plant rarely sparsely hispid; leaves oblong to lanceolate, petioled, dentate or in robust plants retrorse-pinnatifid, the upper entire; flowers in several racemes; pedicels and calyces pilose, often glabrate; calyx 5-8 mm. long, ventricose-constricted above the base, lilac or purple, its

sepals erect, spreading only at the tip; petals exceeding the sepals, erect, linear, undulate, white or pale purple with dark purple veins; stamens all equal and distinct; stigma slightly 2-lobed; pods erect, very slender, flattened, sparsely hairy, often flexuous.

Western border of the San Joaquin Valley or in the adjacent Coast Range from eastern Alameda Co. to western Fresno Co. Type collection in Herb. Calif. Acad. Sci.: central part of Corral Hollow, Alameda Co., April 7, 1935, *Eastwood and Howell No. 2111.* Also found at Tracy, San Joaquin Co. (possibly in the hills to the west or south), April 10, 1922, *Mrs. A. R. Arnold* (Herb. Calif. Acad. Sci.); and on the flood-plain of Little Panoche Creek, Fresno Co., March 29, 1935, *Hoover No. 416.* These may be the plants referred to under *Thelypodium Lemmonii* in Greene's Flora Franciscana as "abundant in grain fields near Tracy." No collection of *Thelypodium Lemmonii* could be located from Tracy or any other locality north of Fresno County.

In Streptanthus the species most closely related to *S. lilacinus* appears to be *S. flavescens,* which does not resemble it to any great degree. The species which is actually most closely related is probably *Thelypodium Lemmonii.* Assuming the undulate petals to constitute a valid generic distinction, I have referred this new species to *Streptanthus.* In habit and aspect it is much like *Thelypodium Lemmonii,* which at the Little Panoche locality was found growing with it, but it is distinct in several characters of the flowers and fruit.

The three collections listed differ from one another in details, yet they form a natural group quite distinct from anything previously described. In the Arnold collection from Tracy the plant is very robust and at least 2 feet tall, with the leaves deeply pinnatifid, while in the other two collections even the lower leaves are merely dentate. The pedicels and calyces are persistently pilose in the Fresno County collection, quite pilose but becoming glabrous in the plant from Tracy, and in the type only sparsely pilose even when young. One plant of the type collection has the base of the stem and the petioles of the lowest leaves sparsely hispid, but otherwise the stems and leaves are constantly glabrous. In view of the close similarity in flower structure among these three collections, these differences seem

relatively unimportant. If the species were better known, there might be good reason to name at least one variety.

Streptanthus lilacinus was found at Little Panoche Creek in the unusually favorable season of 1935. At the same time of year in 1936 neither this nor *Thelypodium Lemmonii* could be found at this locality after a careful search. *Lepidium Jaredi,* which grew near by in large numbers, also failed to appear in 1936, while *Streptanthus inflatus,* which was very abundant and conspicuous here in 1935, was represented in 1936 only by one small plant. It thus seems probable that the seeds of these Cruciferæ remain dormant for long periods, germinating only under exceptionally favorable conditions.

Allocarya Austinæ Greene var. **nuda** Hoover, var. nov. Nuculis inappendiculatis.

Appendages of the nutlet absent.

Growing with typical *A. Austinæ* near La Grange, Stanislaus Co., on the road to Snelling, just north of the Merced County line, April 13, 1936, *Hoover No. 967* (type, Herb. Calif. Acad. Sci.), and March 17, 1936, *Hoover No. 769*; not known elsewhere. Plants of both collections in Herb. Calif. Acad. Sci.; isotype in Herb. Univ. Calif.

Some plants are clearly intermediate. Typical *A. Austinæ* is described as having spines both on the dorsal keel and on the lateral angles of the nutlet. Some plants in this colony had several spines on the dorsal keel but very few on the lateral angles, others had a varying number of spines on the dorsal keel only, while the extreme form described here is entirely devoid of spines. The plants are otherwise identical in habit, flowers, and size and shape of the nutlets.

This is incidentally the southernmost locality recorded for *A. Austinæ.*

Orthocarpus campestris Benth. var. **succulentus** Hoover, var. nov. Caulibus plerumque simplicibus; foliis lanceolatis, succulentis, inferioribus minimis et squamiformibus; floribus luteis, minoribus quam in *O. campestri*; antheris uniloculatis.

Stems mostly simple; leaves lanceolate, succulent, the lower very small and scale-like; flowers bright yellow, smaller than in *O. campestris*; anthers 1-celled.

Known only from Ryer, Merced Co., where it was found growing in beds of vernal pools, May 1, 1936, *Hoover No. 1076.*

Ryer is a station on the Oakdale branch of the Southern Pacific Railroad, a short distance north of the Merced River. Type in Herb. Calif. Acad. Sci.

Although these plants have one-celled anthers, they are not closely related to any of the other species of that group, but rather to *O. campestris,* as shown by the entire leaves and bracts, the structure of all parts of the plant, and the habitat. Even in typical *O. campestris* the lower anther-cell is vestigial, according to Keck's monograph of the genus. Variety *succulentus* is distinct in the broad succulent leaves and smaller flowers, but there is too much evidence of close relationship to describe it as a distinct species from one collection only. The nearest locality for typical *O. campestris* is 4 miles south of Oakdale, Stanislaus Co., *Hoover No. 487.* All the plants from that locality have the usual narrow leaves and rather large flowers. The Merced County plants are quite different from any others seen either in the field or in herbaria.

Bæria Fremontii (Torr.) Gray var. **heterochæta** Hoover, var. nov. Receptaculo conico, piloso vel glabro; aristis pappi 10-15, inæqualibus, robustis, scabridis.

Receptacle conical, either hairy or glabrous; pappus of 10-15 (mostly 13) stout scabrid awns of unequal length.

East side of San Joaquin Valley from Tulare Co. to Kern Co., in "hog wallows," low places where water stands during the rainy season. Type collection in Herb. Calif. Acad. Sci., isotype in Herb. Univ. Calif.: Semitropic, Kern Co., April 11, 1936, *Hoover No. 944.* Also collected at the Deer Creek bridge near Earlimart, Tulare Co., *Hoover No. 926;* and at Delano, Kern Co., *Hoover No. 929.*

This is a well-marked local form which seems to have been overlooked by other collectors. The plants differ from other species of Bæria having one kind of pappus in the large number of awns, and in vegetative characters and flowers they are identical with *B. Fremontii.* The habitat of this variety also indicates a close relationship to *B. Fremontii,* since it grows in the same sort of situation as does the typical form of the species to the north. Some plants of each collection of var. *heterochæta* approach *B. Fremontii* in pappus, the shorter awns grading into the small paleæ typical of the species, but the shape

of the receptacle is constantly different. Since *B. Fremontii* extends as far south as Tulare County (8 miles north of Visalia, *Hoover No. 918*), forms intermediate in regard to both receptacle and pappus may occur in this region. Since there is only one constant difference and many evidences of close relationship, it is thought that the plants described here are best considered a variety of *B. Fremontii* rather than as a distinct species.

Although this new variety resembles *B. uliginosa* in the shape of the receptacle, it is less closely related to that species than to *B. Fremontii.* In addition to the pappus, *B. Fremontii* and its var. *heterochæta* consistently differ from *B. uliginosa* in the more slender stems, narrower leaves, shorter pubescence, broader bracts, frequently hairy receptacle, and most notably in habitat. *Bæria uliginosa,* at least in this region, never grows in wet places.

A NEW RIBES FROM THE SIERRA NEVADA

BY ALICE EASTWOOD

Ribes Watkinsi Eastwood, spec. nov. Caulibus glabris, fuscis vel brunneis; foliis 2 cm. longis latisque, supra viridibus, stipitato-glandulosis, rugoso-reticulatis, infra pallidis, glandulosis et tomentosis, 3-lobatis, lobis obtusis, margine crenato-serratis, revolutis, basi truncatis, petiolis æquantibus laminas, stipitato-glandulosis, basi membranaceo-dilatatis, stipulis pectinatis et ciliatis; racemis 3-4 cm. longis, pedunculatis, pedunculis 1-2 cm. longis, recurvatis, stipitato-glandulosis et pubescentibus, bracteis persistentibus, linearibus, superantibus pedicellas, bracteolis acuminatis, æquantibus ovarium; floribus rosaceis, circa 8-9 mm. longis, tomentosis et stipitato-glandulosis; tuba calycis 4 mm. longa, segmentis obovatis, 4 mm. longis latisque; petalis albis, 2 mm. longis, lamina orbiculata, abrupte et breviter unguiculata; antheris ellipticis, 2 mm. longis, longioribus quam filamenta; stylo basi piloso, bilobato, stigmatibus globosis; ovario circa 2 mm. longo, tomentoso et stipitato-glanduloso.

Stems smooth, gray-brown or darker; leaves 3-lobed with obtuse lobes, crenate-serrate on the somewhat rolled margins, upper surface green, wrinkled-veiny, stipitate-glandular, lower surface pale with main veins distinct, white-tomentose and glandular, stipules pectinate at the upper part, ciliate on the lower, petioles about as long as the blades; flowers rose-color in recurving racemes on peduncles about as long as the flowering part, glandular-stipitate and tomentose, bracts persistent, longer than the pedicels, bracteoles under the flower very narrow, pointed, as long as the ovary; calyx stipitate-glandular and tomentose, rose-color, tube 4 mm. long, divisions rose-color, obovate, about 4 mm. long and about as wide;

petals white, half as large, with orbicular blade and short claw; stamens with large anthers and very short filaments; style hairy at base, bilobed with globular stigmas terminating each lobe; ovary tomentose and stipitate-glandular.

Type: No. 228777, Herb. Calif. Acad. Sci., collected December 26, 1935, near Shingle Springs, Eldorado County, California, by W. G. Watkins, in whose honor it is named. Mr. Watkins reports the shrubs as growing amid *Pinus Sabiniana, Ceanothus cuneatus,* and *Arctostaphylos viscida* in a green serpentine formation on the west side of the Mother Lode.

This pretty species is most closely related to *R. indecorum* Eastwood, differing in the longer, rosy flowers, and the stipitate glands prevalent on every part except the corolla. It has a very different appearance and is far removed geographically.

NOTES ON CAREX—VI

BY J. W. STACEY

Mr. John Thomas Howell and the writer recently took a trip in Marin County, California, mainly for the collection of Carices. During the course of the day about twenty species were seen, but some of the commoner ones were not collected. Four new records for Marin County were found, each one of them representing a considerable extension in range. All are in the Herbarium of the California Academy of Sciences.

The three following were found in a Ledum swamp, beside the road between Inverness and Pt. Reyes, just beyond the highest ridge between these points:

Carex luzulina Olney. *Howell & Stacey No. 12641.* This has not been reported before from south of northern Sonoma County.

Carex lanuginosa Michx. *Howell & Stacey No. 12639.* This is entirely out of its range, since in California it has been found before only in the northern mountains, the Sierra Nevada, and the southern mountains.

Carex Hassei L. H. Bailey. *Howell & Stacey No. 12642.* This is also much out of its range as it has been found only in the northern mountains, the Sierra Nevada and the southern mountains, with the exception of its local occurrence on Loma Prieta in Santa Clara County (*Elmer No. 4865*).

Carex mendocinensis Olney. *Howell & Stacey No. 12658.* This was found on Mt. Tamalpais and has not been properly reported before from south of Mendocino County. The present collection was made not more than a half-mile from where the writer collected *C. debiliformis* Mackenzie, a closely related species, which for some time was mistaken for *C. mendocinensis* (cf. Leafl. West. Bot. 1:141, 192). As Mackenzie well stated, *C. mendocinensis* has the appearance of a hybrid between *C. debiliformis* and *C. gynodynama* Olney. We did not see *C. gynodynama* on Mt. Tamalpais that day, but we found it in the Ledum swamp, and also in the woods in the vicinity. However, *C. gynodynama* has been reported from Mt. Tamalpais and is undoubtedly there. The question needs further study. It is certain that these three species are very unlike in appearance.

* * *

In looking over the sheets of Carex in the University of Arizona at Tucson through the kindness of Dr. Thornber, two new records were found for Arizona:

Carex oreocharis Holm, collected at Summit Ranch, San Francisco Mountains, by Thornber, *No. 2955.* This species has been reported before only from Colorado.

Carex Hassei L. H. Bailey, collected at Sagie Canyon, northeastern Arizona, near the Utah line, by L. C. Whitehead, June-August, 1916 (in part). This was on a sheet together with *C. bella* L. H. Bailey. *Carex Hassei* has been reported before from Arizona, but all other specimens examined have been *C. aurea* Nutt.

MALVASTRUM FRAGRANS Eastwood, Leafl. West. Bot. 1:218 (1936). Mr. C. A. Weatherby has kindly called my attention to the fact that the name *Malvastrum fragrans* was previously given by Gray and Harvey to what is now *M. capense* (L.) Garke. I therefore substitute **Malvastrum niveum,** an equally appropriate name.—Alice Eastwood.

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NOVEMBER 12, 1936

LEAFLETS
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ALICE EASTWOOD and JOHN THOMAS HOWELL

CONCERNING ARCTOSTAPHYLOS NISSENANA

BY JOHN THOMAS HOWELL

The identity of *Arctostaphylos nissenana* was a real mystery in the Californian flora. Described in 1918* by Dr. C. Hart Merriam without flowers or fruits, nevertheless it was endowed with such distinctive vegetative characters that doubt as to its specificity vanished and there was left only a great curiosity as to the proper identity and relationship of so extraordinary a plant. From most of the species in the genus it was distinguished by the "reddish brown fibrous bark" and by the "hirsute" and "hispid" petioles, branchlets, peduncles, and bracts. The region of the type locality in the higher foothills of the Sierra Nevada in Eldorado County between Placerville and Georgetown was combed for the anomalous manzanita but nothing was found; and, in the later revisions of the genus *A. nissenana* remained too inadequately known to be treated.

But in January, 1935, less than six months after Miss Eastwood published her revision of the species of Arctostaphylos in the United States, flowering specimens of the elusive and mysterious manzanita were received at the Herbarium of the California Academy of Sciences from Mr. W. G. Watkins, who had found the plant on the outskirts of Placerville. Not only was the determination promptly communicated to Mr. Watkins but arrangements were immediately made to visit the locality to see the plant as it grew. So on February 10, Miss Eastwood, Mr. Lewis S. Rose, and the writer went to Placerville where Mr. Watkins led the way to a small colony of his rare plant on slopes at the head of Spanish Ravine.

The plants grew on a limited outcrop of sterile schistose rock and were surrounded by a chaparral composed almost exclusively of *A. viscida* Parry. In habit the plants were almost strictly erect, 1 to 2 meters tall, and the small compact clusters of pale pink flowers produced a pretty effect against the light green foliage. Since the flowers and fruits of this remarkable manzanita have not been described, the following diagnosis is published, the description of the flowers being taken from *Eastwood and Howell No. 1934* and the description of the fruit

* Proc. Biol. Soc. Wash. 31:102, t. 4, 5.

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from specimens received from Mr. Watkins in May, 1935. In regard to the fruit, it is noteworthy that on the fruiting specimen there were no fully matured fruits, only young fruits and those nearly mature with the pulp still moist, although the empty bracts of older inflorescences indicated that fruit had probably matured and fallen. Since this is the situation that obtains in the genus Schizococcus, it appears likely that *A. nissenana* will find its nearest relative in *S. myrtifolius* (Parry) Eastwood when its fruiting habit comes to be known positively through critical field observations.

Arctostaphylos nissenana C. H. Merriam, *char. florum frutusque.* Flowers in small dense racemes, the raceme simple or rarely with a secondary raceme arising from the axil of a basal bract; peduncle short, about 0.5 cm. long, rather densely villous-pubescent (as are the upper branchlets and petioles), lower bracts foliaceous, frequently exceeding the pedicels, oblong-lanceolate to ovate, to 6 mm. long, the upper bracts also foliaceous but reduced, all more or less villous-pubescent and villous-ciliate on the margins, not at all glandular; pedicels 1.5-3.5 mm. long, glabrous; calyx-segments 5, glabrous or minutely ciliate on the margins, suborbicular, 1 mm. long, appressed to the base of the corolla in anthesis; corolla pale pink, 6 mm. long, 4 mm. wide, 5-lobed; filaments abruptly expanded to the thickened, slightly hairy base, the anther-tails equalling the anthers or sometimes shorter; ovary pilose; fruit globular or somewhat angled, thinly hairy, 4 mm. in diameter, composed of usually 5 nutlets of 1 or 2 carpels each, the nutlets held together by the thin flesh, evidently disarticulating at maturity after the manner of fruits in Schizococcus.

Mr. Watkins' flowering specimen was accompanied with the following observations: "I am mailing you a rare type of Manzanita which I have watched closely for twenty years. This species begins to bloom about December and lasts until February 15. I have never seen bees on it. The wood is never red as in other Manzanita but it is very hard. The bushes average about 6 feet in height."

At the Placerville station where *A. nissenana* was immediately associated with *A. viscida,* an apparent hybrid between the two species was observed and collected (*Eastwood and Howell No. 1935*). In this plant the smooth mahogany-red stems, the elongated glabrous shining peduncles, the non-foliaceous floral bracts, and the stipitate-glandular pedicels are characters from *A. viscida*; and from *A. nissenana* come villous-pubescent branchlets and petioles, smaller and somewhat pubescent leaves, small congested racemes, and densely canescent ovaries.

VARIATIONS IN CASTILLEJA

BY ALICE EASTWOOD

Castilleja, an extremely variable genus, is widely distributed in North America, ranging from the arctic regions to the tropical. In the Synoptical Flora, Asa Gray described twenty-five species as found in the United States and Canada. Since then, about one hundred have been named and described, chiefly from the western states. Two well-known Californian species, *C. latifolia* and *C. affinis,* have been taken for special study, since they are known from San Francisco, the probable type locality. They were described by Hooker and Arnott in the Botany of Beechey's Voyage, collected with other plants by Lay and Collie at San Francisco and a few at Monterey. We have no record of *C. affinis* from Monterey and the type of *C. latifolia* found there does not agree so well with the description nor with the type in the Royal Herbarium at Kew as do the plants found in the Presidio in San Francisco. Both were common there and are still to be found.

Castilleja affinis was described originally as "pilose-hispid, leaves linear-lanceolate, 3-nerved, entire or rarely dentate-lobed; lower flowers pedunculate, calyx tubular, cleft, lobes trifid, segments linear, lanceolate, acute; corolla surpassing the calyx." The species is conspicuously distinguished by the strongly curved flowers, the yellowish corolla prominently exserted, the calyx and bracts bright red, stamens and stigma often protruding and the lower lip projecting from the anterior cleft of the calyx which is deeper than the posterior. The calyx-divisions are erect above the curved corolla, and the flowers, lower especially, are distinctly pedicelled.

The pubescence seems uniform except in specimens from Mendocino County which are also glandular and in general with more slender flowers; the leaves vary in length and width, varying also from entire to 3-cleft for half their length. The greatest variations, however, occur in the flowers. The flowers of fifteen collections were dissected and carefully examined from coastal areas: San Francisco; Bolinas Bay, Point Reyes, and Mt. Tamalpais in Marin County; along the coast from Crystal Springs to Pescadero in San Mateo County; and farther north

to Fort Bragg, Mendocino County. In all the flowers are much-curved outwards, the yellow galea exserted from the calyx almost at right angles, the red calyx-divisions standing up behind. The calyx varies from 2-3 cm. in length, 3-6 mm. in width, cleft anteriorly 13-19 mm., posteriorly 10-13 mm. The segments of the two divisions are linear-lanceolate, 2-7 mm. long. The corolla varies from shorter than the calyx (but always exserted), to almost 4 cm. long and exserted 15-18 mm. In spite of all these variations the species is always recognizable by the general shape of the flowers and the variations seem individual rather than specific or even varietal, except perhaps the plants from northern Mendocino County which may be considered subspecific. Plants from the Sierra Nevada and interior regions that are related have not been included.

Castilleja latifolia as a species is not so distinct. Specimens from different localities vary in general appearance as well as in the less evident characters of the flowers. The type is described as follows: subhirsute below, above subvillous; leaves ovate-oblong, obtuse, entire, floral cuneate-dilated, trifid, middle lobe broadest; flowers subsessile; calyx tubular, equally cleft, lobes shortly and obtusely bidentate; corolla-tube equal to calyx, upper lip shortly exserted. Thirty-five specimens were examined from the same or different maritime localities. Fresh specimens were examined from San Francisco, Monterey, and the coast of San Mateo County; those from Bodega, Pt. Reyes, Big Sur, Cambria, Mendocino County, and Santa Cruz Island were dried. In all the pubescence is clammy-glandular as well as more or less subhirsute below and subvillous above. The glandular character is not so evident when specimens are dry and might escape notice. The leaves vary from lanceolate and obtuse to oblong-ovate, suborbicular, and even almost square, the round leaves becoming truncate at the apex. In some plants almost all the leaves are trifid and the upper become 5-cleft with spreading lobes, the lateral segments half as wide as the middle. This variation in the leaves is perplexing as it alters the general appearance of the plant and seems a good subspecific character. The flowers are subsessile and the red or yellow spike lengthens with age. The seed pods are large and seeds truncate with an alveolate membranous coat. At first the flowers are subcapitate.

The bracts vary from entire to trifid with the middle lobe obtuse, truncate, crenately-toothed or slightly emarginate, sometimes surpassing the flowers but generally with the galea exserted. The calyx of the type is said to be equally cleft. In all the specimens examined, most of them fresh from San Francisco and Monterey, the calyx is cleft a little more anteriorly than posteriorly. In dissecting a dried flower when moistened, the tender tissue is so easily torn that it is not always easy to be sure. Two plants in the Presidio which grew side by side with no other castilleja near were examined. In one the segments of the calyx-divisions were bidentate and in the other linear, obtuse, 5-4 mm. long, 2 mm. wide. The variation was equally marked in other specimens, with the divisions from 1-8 mm. long, 2-3 mm. wide. The corolla generally surpasses the calyx, but in some the calyx is longer than the corolla though generally the tip of the galea is visible and sometimes the lip also can be seen. The following subspecies seem distinct from the type.

Castilleja latifolia subsp. **carmelensis** Eastwood, subsp. nov. Foliis obovatis, subrotundatis oblongisve, rare supremis trisectis, apice late obtusis vel truncatis; bracteis trisectis, nonnumquam integris, medio segmento latissimo, apice foliis similibus.

Type: No. 28654, Herb. Calif. Acad. Sci., collected by Dr. E. K. Abbott in 1889 (June to July) "common on shores of Monterey Bay in the sand." It occurs along the entire shores of the bay and extends at least as far south as Big Sur where specimens were collected by Katherine Inglis, a variant with very small congested leaves and more exserted corolla, No. 185268, Herb. Calif. Acad. Sci.

Castilleja latifolia subsp. **pinnatifida** Eastwood, subsp. nov. Foliosa, glandulosa, pilosa et pulverulenta; foliis 3-5-fissis, segmentis lateralibus linearibus, foliis longissimis, 6-7 cm. longis, foliis infimis nonnumquam integris, lanceolatis, obtusis.

Type: No. 202770, Herb. Calif. Acad. Sci., collected by John Thomas Howell, *No. 11364,* May 28, 1933, on rocky slope at head of Strawberry Canyon, Berkeley Hills, Alameda Co. Specimens are in the herbarium from Mt. Davidson, San Francisco; Granada, Salada Beach, and Crystal Springs Lakes, San Mateo Co.; and Pt. Reyes, Marin Co. It is distinguished by the crowded leaves almost all of which are deeply cut into 3 or 5 linear lobes, the middle the longest, some leaves becoming 6-7

cm. long. The galea is but little exserted. The color varies from pale pellow to pale red. The type has yellowish spikes.

Castilleja latifolia subsp. **mendocinensis** Eastwood, subsp. nov. Cinerea, glandulosa, hispida et pilosa; foliis oblongis obovatis vel cuneato-trifidis, obtusis, 1-2 cm. longis, 5-10 mm. latis; galea exserta 5-10 mm.

Type: No. 28896, Herb. Calif. Acad. Sci., collected by the author, *No. 11416,* at Mendocino City, June 28, 1922. This is the common maritime species at Mendocino City and adjacent Fort Bragg. It is distinguished by an ashy appearance due to the dense white hispid pubescence and the longer glandular hairs. The leaves in shape resemble those of the Monterey plants, but the pubescence and the conspicuously exserted galea are distinctive.

Castilleja latifolia subsp. **insularis** Eastwood, subsp. nov. Scabrido-hispida et subpilosa; foliis viridibus 3-5-fissis, 5-6 cm. longis, segmentis divaricatis, anguste linearibus, nonnumquam foliis linearibus obtusis; spicis rubris vel armeniacis, angustis; bracteis latis, flores occultentibus.

Type: No. 204670, Herb. Calif. Acad. Sci., collected April 11, 1931, by John Thomas Howell, *No. 6251,* on Santa Cruz Island in Valle del Medio. This is distinguished by the large spreading leaves with 3-7 linear divisions, sometimes with segments again lobed. The spike is either red or apricot color, densely flowered and narrow with broad bracts covering the flowers. Here also *Howell No. 3806* from Anacapa Island belongs, as well as other specimens from Santa Cruz Island.

CASTILLEJA LATIFOLIA var. WIGHTII (Elmer) Zeile represents another subspecies. It is more viscid than the typical form.

AN ADVENTIVE SCIRPUS. In the summer of 1933 and again in 1934, in the upper foothills of the central Sierra Nevada, Mrs. Fay A. MacFadden made two collections of a diminutive sedge which to my knowledge has not been reported as adventive in the Californian flora; and, in so far as I have been able to ascertain, these collections also appear to represent the first records of its occurrence in North America. The plant is *Scirpus setaceus* L., a species widespread through all the continents of the Old World, but lacking or rare in the New. It bears a superficial resemblance to *Cyperus lævigatus* and even a closer resemblance to species of Hemicarpha, but the characters of spikelets and flowers indicate at once that it is neither Cyperus nor Hemicarpha. From the diminutive species of

western Scirpus, it can be distinguished by the solitary or paired and apparently lateral spikelets, by the lack of perianth-bristles, and by the plump, 3-angled, longitudinally ribbed, subvitreous-shining achenes. Because of the small size of the spikelets, the species is referred by some botanists to the genus Isolepis, but certainly to the writer the differences between Isolepis and Scirpus appear scarcely sufficient to warrant generic separation.

The two Californian collections, represented in the Herbarium of the California Academy of Sciences by duplicates from the private herbarium of Mrs. MacFadden, are: Lewis Ranch near Nevada City, Nevada Co., *MacFadden No. 11027*; flood bed of Bear River on road from Colfax to You Bet Mine, Placer Co., *MacFadden No. 12642*. These collections correspond exactly with European specimens in the Academy herbarium.—John Thomas Howell.

A Mimulus New to Southern California. Among specimens laid aside as perhaps deserving special study, was an annual, red-flowered Mimulus, collected in 1931, high on the east slopes of Santiago Peak, Santa Ana Mts., Riverside Co. (*J. T. Howell No. 6613*). Recently this plant has been carefully examined to determine if it might be a new species, for it differed widely from all the species known in Southern California. The result has shown it to be *Mimulus Rattani* Gray, a plant heretofore known only from far to the north, it being reported by Dr. A. L. Grant in the central Coast Ranges from Santa Cruz Co. north to Colusa Co. (Ann. Mo. Bot. Gard. 11:289,—1924).

Mimulus Rattani is one of those species which grow most plentifully amid the chaparral of our mountains immediately after a fire. At such a time, plants which are usually rare appear in great profusion, arising Phœnix-like from the ashes, perhaps after years of dormancy. In the Santa Ana Mts., *M. Rattani* was found on the site of a small burn in the chaparral and to the glandular herbage of the specimens there still adhere small fragments of charred wood. It grew with *Phacelia brachyloba* (Benth.) Gray, a plant not uncommon on the slopes of the Southern Californian mountains, but one which covers itself with glory in the ashy soil of a burned area.—John Thomas Howell.

NOTES ON CAREX—VII

BY J. W. STACEY

Carex obispoensis Stacey, spec. nov. Cæspitosa; rhizomatibus aliquantum crassis longisque, nigrescentibus; culmis 6-18 dm. altis, glabris, folia superantibus; foliis 3 vel 4 ex singulis culmis fertilibus, laminis rectis, 2-4 dm. longis, 3-8 mm. latis, pallide viridibus, vaginis inferioribus usque ad 10 cm. longis; spicis masculis 1-3, 2-5 cm. longis; spicis femineis 3-8, sæpe 2 vel 3 ex singulis vaginis, 2-8 cm. longis, 4-6 mm. latis, supremis sessilibus, inferioribus pedunculis longis filiformibus; squamis ovatis, ¼-½ brevioribus quam perigynia; perigyniis ovato-lanceolatis, 6-8 mm. longis, 2-2.25 mm. latis, triangularibus, prominenter costatis, in tenue æquilongum rostrum sensim attenuatis.

Densely cespitose, rootstocks rather thick and long, blackish; culms 6-18 dm. high, glabrous, exceeding the leaves, aphyllopodic, dark brownish or blackish at base, the basal sheaths breaking and becoming conspicuously filamentose; leaves with well-developed blades, usually 3 or 4 to a fertile culm, the blades erect, 2-5 dm. long, 3-8 mm. wide, long-attenuate, deeply channelled and carinate, especially toward base, light green, whitish toward base, thick and many striate, the margins revolute, sheaths very long, concave at mouth, whitish and brownish-tinged ventrally, the ligule a little longer than wide; bracts leaf-like, the lowest with an elongate smooth sheath up to 10 cm. long, the upper with shorter blades and sheaths; terminal spike staminate, usually one or two smaller ones at base, long-peduncled, linear, 2-5 cm. long, 3-4 mm. wide, the peduncles very rough; scales ovate-oblong, obtuse or acutish, light brown with lighter center and hyaline margins; pistillate spikes 3-8, often 2 or 3 from a sheath, the upper approximate, the lower very strongly separate, the uppermost sessile or short-peduncled, the lower strongly exserted on long filiform peduncles, weakly erect or nodding, linear, somewhat loosely flowered, but strongly overlapping, 2.5-8 cm. long, 4-6 mm. wide; scales ovate, sharply keeled, acute to cuspidate, light brown with lighter midrib and hyaline margin, ½-¾ as long as the perigynia; perigynia lanceolate-ovate, 6-8 mm. long, 2-2.25 mm. wide, triangular, appressed-puberulent, light green, distinctly ribbed, tapering at base and substipitate, tapering above into a slender beak as long as the body, short-bidentate; achenes oblong, 3 mm. long, 1.75-2 mm. wide, triangular with concave sides and blunt angles, which are thickened and granular, abruptly and conspicuously apiculate, jointed with the long slender style; stigmas three, slender, long.

Type: Herb. Calif. Acad. Sci. No. 235733, *Eastwood and Howell No. 2271,* collected May 7, 1936, at Steiner Creek near San Luis Obispo, San Luis Obispo County, California. It grew on a boggy slope on serpentine. A collection made by I. J. Condit in April, 1910, at 1500 feet on Chorro Creek near San Luis Obispo is in the Herbarium of the University of Cali-

fornia. Sterile culms were also collected on the serpentine area at Chorro Creek by Eastwood and Howell, *No. 2213*. This species is named after San Luis Obispo County.

This species belongs to the Section Sylvaticæ Boott, and is very distinct and conspicuous. Probably the reason that it has not been detected before is on account of its very restricted range.

The following key will serve to differentiate this species from the other known species of this section that are found in California:

Staminate spike sessile or very short-peduncled.
- Pistillate spikes oblong-cylindric, 6-9 mm. wide.....*C. gynodynama*
- Pistillate spikes linear, 3-4.5 mm. wide.....*C. mendocinensis*

Staminate spike strongly peduncled.
- Pistillate spikes oblong-cylindric, 8-25 mm. long .....*C. hirtissima*
- Pistillate spikes linear, 2.5-8 cm. long.
  - Pistillate spikes up to 8 cm. long; perigynia firm, strongly ribbed, 6-8 mm. long.....*C. obispoensis*
  - Pistillate spikes up to 5 cm. long; perigynia membranaceous, obscurely few-nerved, 3-5 mm. long.....*C. debiliformis*

* * *

Last spring when coming into Denver on a train from the south we saw a Carex from the window growing along an irrigation ditch at Littleton, Colorado. That afternoon we drove back to Littleton and secured a specimen which turned out to be *C. Emoryi* Dewey.

In an endeavor to trace the limits of this species in northeastern Colorado, we afterward drove up the South Platte Valley nearly to the Nebraska line and it was very plentiful along irrigation ditches only. We stopped at many low places and also many times at what seemed to be suitable places along the South Platte River, but not a trace of this species could be found. We then retraced our way back along the South Platte Valley to try to find its western boundary. The species suddenly stopped at the base of the Rocky Mountains as it was not found beyond the longitude of Lyons, Boulder, and Golden. We regretted that we did not have the time to trace the species along the Arkansas Valley in southeastern Colorado, but there is little question that there, too, it would be found along irrigation ditches. In the adjacent Mesilla Valley in New Mexico the species is known to occur only along irrigation ditches.

Carex Emoryi is one of the most widely distributed species, ranging from New Jersey to Virginia in the east and from Manitoba to eastern Colorado and New Mexico in the west. In Colorado and New Mexico it has all of the appearance of an introduced species, in spite of the fact that it is given as native there by Mackenzie in the North American Flora.

* * *

The very rare and local *Carex hirtissima* Mackenzie has been found only in two or three isolated localities in the central Sierra Nevada and on Mt. Sanhedrin, Lake County, California. It was collected on July 4, 1936, between Willits and Sherwood, Mendocino County, by Eastwood and Howell, *No. 3818.*

* * *

A new record for Oregon is *Carex Bebbii* Olney, which was collected on June 27, 1936, eight miles west of Enterprise, Wallowa County, Oregon, by Eastwood and Howell, *No. 3420.*

* * *

In the herbarium of the Santa Barbara Museum of Natural History there are two sheets of *Carex Cusickii* Mackenzie, collected by Ralph Hoffmann, April 18, 1930, at Arroyo Grande, San Luis Obispo County, California. This is a considerable extension of its range, as it has not been reported before from south of San Francisco.

* * *

A new record for California is *Carex Eleocharis* L. H. Bailey. This was collected by Victor Duran on July 1, 1926, at McAfee Meadow, White Mountains, Mono County, California, near the Nevada line, at 11,500 feet. Heretofore the nearest reported collections have been from Oregon, Utah, and Arizona. It has not been detected from Nevada, but will probably be found in the high mountains of that state.

* * *

In the herbarium of Morton E. Peck of Willamette University, Salem, Oregon, we found a specimen of *Carex tumulicola* Mackenzie, collected at Argyle, San Juan Islands, Washington, *No. 12765.* As far as the writer knows, Bingen in southwestern Washington was the most northerly station for this species heretofore.

ERRATA

Page 10, line 42; *for* is is *read* it is.
Page 15, line 22; *for* L. *read* (L.) Spreng.
Page 32, line 32; *for* MANZANITA *read* MANZANITA.
Page 41, line 12; *for* Hoffman *read* Hoffmann.
Page 67, line 10; *for* Pvon *read* Pavon.
Page 75, line 37; *for* MANZANITA *read* MANZANITA.
Page 85, line 23; *for* A. *read* ARBUTUS.
Page 89, line 8; *for* (Nutt.) Eastwood, comb. nov. *read* (Nutt.) Heller.
Page 99, line 7; and page 100, line 14; *for* NUMMULARIA *read* NUMMULARIA.
Page 99, lines 12 and 21; and page 106, line 2; *for* NUMMULARIA *read* NUMMULARIUS.
Page 115, line 18; page 116, line 29; page 117, line 36; page 121, line 40; page 126, lines 19 and 31; *for* 1903 *read* 1901. (Cf. page 183.)
Cover, No. 12, line 9; *for* Wheeler *read* Williams.
Page 136, line 21; *for* Hoffman *read* Hoffmann.
Page 137, line 32; *for* GALLIUM *read* GALIUM.
Page 142, line 24; *for* knotweed *read* Polygonum.
Page 172, line 26; *for* AGROPYRUM *read* AGROPYRON.
Page 177, line 34; *for* Modoc *read* Lassen.
Page 219, line 7; *omit* all.
Page 219, line 10; *after* Tepusquet Canyon *add* Santa Barbara Co.
Page 219, line 25; *for* 5-10 cm. *read* 5-10 mm.
Page 225, line 11; *for* filamentibus *read* filamentis.

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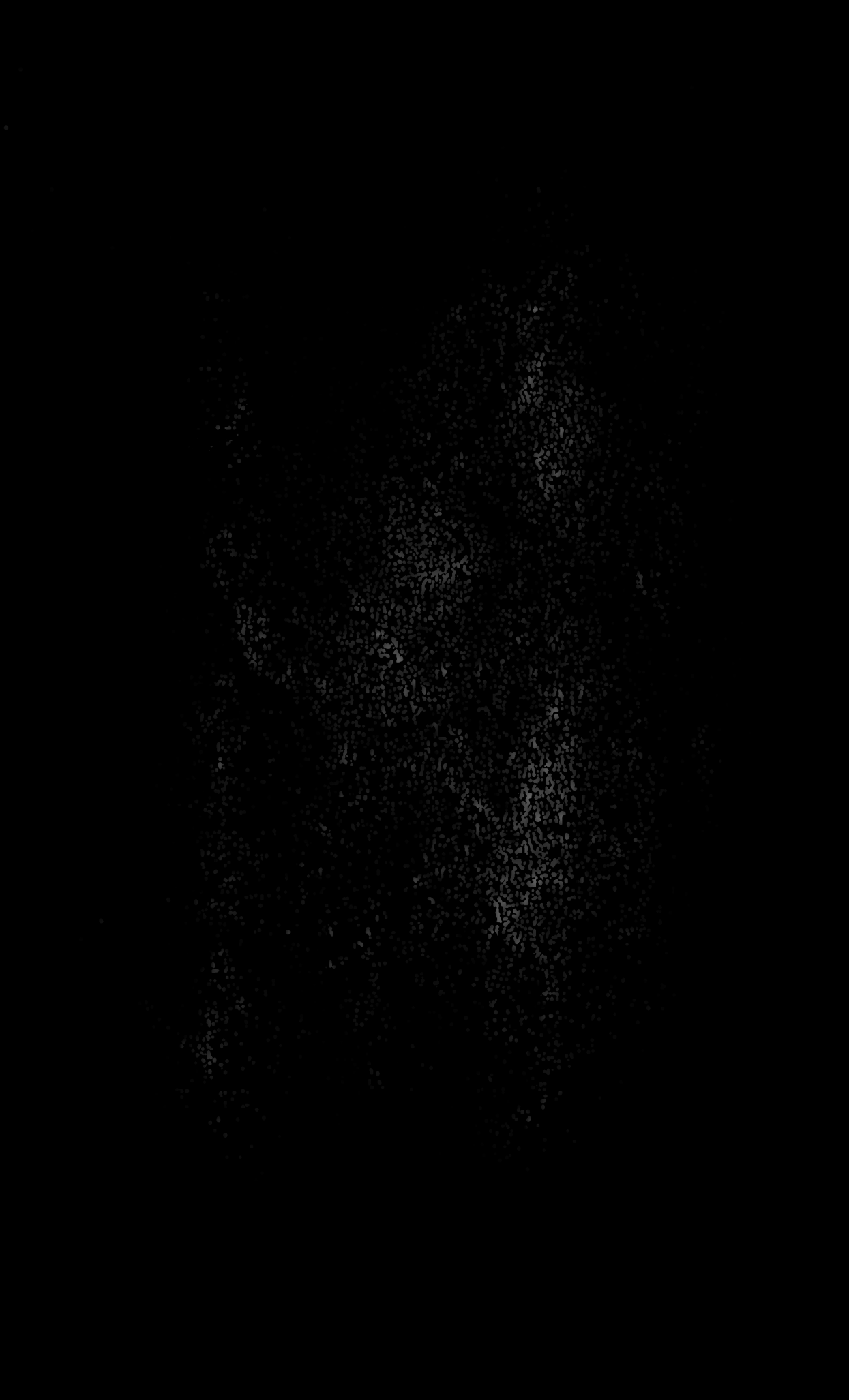

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