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LEAFLETS
OF
WESTERN BOTANY

VOLUME III

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Printed by

THE JAMES H. BARRY COMPANY
SAN FRANCISCO

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CONTENTS

	PAGE
The Closed-Cone Pines of Insular California JOHN THOMAS HOWELL	1
Great Basin Plants—IV BASSETT MAGUIRE and ARTHUR H. HOLMGREN	8
Further Studies in Eriogonum—IV SUSAN G. STOKES	15
New Western Plants—III ALICE EASTWOOD	18

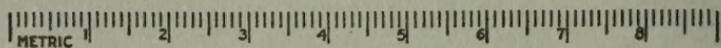
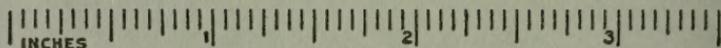
SAN FRANCISCO, CALIFORNIA

FEBRUARY 4, 1941

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as
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ALICE EASTWOOD and JOHN THOMAS HOWELL

THE CLOSED-CONE PINES OF INSULAR
CALIFORNIA

BY JOHN THOMAS HOWELL

The pines which are found on several of the islands of California and Lower California not only contribute to their picturesque scenery but are to be counted among their most interesting botanical features. The relation of the island pines and the associated plants to the coastal pine forests and groves of the Californian mainland has been vividly described by H. L. Mason in a series of papers which set forth matters pertaining to taxonomy, ecology, distribution, and geologic history (1930, 1932, 1934). The pines considered here are the closed-cone pines found on the islands of Santa Cruz and Santa Rosa off the coast of southern California and on the islands of Guadalupe and Cedros off Lower California, and the problem is presented only from the viewpoint of the taxonomy of living plants.

In April, 1931, I accompanied Ralph Hoffmann on a week's field trip to Santa Cruz Island off the Santa Barbara coast of California, principally, as he planned it, to study with him the island pines and manzanitas (*Arctostaphylos*). Of the pines an interesting collection was obtained, but because no definite opinion was reached on the taxonomic problem involved, the pines were not even mentioned by Hoffmann in his list of island plants published in 1932.¹

In November, 1931, and again in March, 1932, on the yacht *Zaca* of Mr. Templeton Crocker, I visited Guadalupe Island which is a little northwest of the central coast of Lower California. On both occasions, I visited the pine grove high on the northern ridge of the island, obtaining specimens of variants not before known from the island. In August, 1932, as the Templeton Crocker Expedition of the California Academy of Sciences was returning from the Galapagos Islands, a brief stop was made at Cedros Island off the middle western coast of Lower California; and though we had excellent views from the *Zaca* of the pine ridge at the northern end of the island, I was not able

¹ Although both parts of this paper were published posthumously, it is evident from the editor's note on page 60 that the first part, which would have included a consideration of the pines, had been submitted for publication by Mr. Hoffmann before his death on July 21, 1932. (See Bibliography.)

to explore or study the trees. What is written of them is taken from specimens in Herb. Calif. Acad. Sci. made on other expeditions of the Academy.

THE GUADALUPE ISLAND PINE

The first collection of pine on Guadalupe Island was made by Edward Palmer in 1875 and was referred to George Engelmann, who named and described it as a new variety of the Monterey Pine, *Pinus insignis* var. *binata* (1880). According to Engelmann, the new variety had cones typical of the species, but had needles in pairs. In 1895 (p. 42), Lemmon transferred the varietal name to *P. radiata* Don, an earlier name of the Monterey Pine; and following Greene (1887, p. 413) and Brandegee (1888, p. 217; 1890, p. 145), he continued that confusion in names between the pines on the Californian and Lower Californian islands that persisted until recently corrected by Abrams (1923, p. 60) and by Mason (1930, p. 8). My opinion is that the only pine on Guadalupe Island is *P. radiata*, but Mason has more recently reported the occurrence there of *P. muricata* Don (1932, p. 51; 1934, p. 147). His decision² is based on material in the Dudley Herbarium, Stanford University, but the specimens I examined there I believe are referable to *P. radiata*. McMinn and Maino (1935, p. 86) report the occurrence of *P. remorata* Mason on Guadalupe Island, but the report is perhaps based on statements that the Guadalupe Island pine approaches *P. remorata* (cf. Mason, 1932, p. 52).

When I visited the pine grove on Guadalupe Island, I distinguished trees with three kinds of cones, one type with the cones very asymmetrical with the umbos of the outer scales much thickened, a second type with cones almost symmetrical with the scales alike on all sides, and a third type, intermediate between the other two, with the cones somewhat asymmetrical with the outer scales noticeably but not prominently umbonate. In the specimens I collected, the first two types have somewhat larger cones (10—11 cm. and 9—10 cm. long respectively) and the intermediate type has somewhat smaller ones (8—9 cm.). Trees with cones of the first two types are only occasional or rare, those with the third type are the most common. The needles of all of these are usually in 2's, but on the more vigorous shoots

² Verbal communication.

the needles are almost uniformly in 3's. The bark of the trees is dark gray-brown, finely ridged longitudinally and checked by shallow transverse cracks. The trunks are massive for Monterey Pine; the largest measured 28 feet in circumference (2.71 m. or 8 ft. 11 in. in diameter). The height of the trees was estimated at 70 to 100 feet. Neither seedlings nor young trees were seen; the ravaging goats have taken care of them.

In considering how to treat taxonomically the situation here described, the first question to decide is whether more than one species is involved. In spite of the entirely different appearance of the very asymmetrical and nearly symmetrical types of cones, I regard them as belonging to a single species, not only because there is complete intergradation from one extreme to the other through the common intermediate type, but also as the trees grow, there is no other character discernible to which even a secondary value might be assigned. Since the variants grew together without that geographic segregation which I regard as an essential mark of a variety (or subspecies), I interpret these variants, diverse as they are, as forms, and as such they are named here. Because of the known variation in the number of needles³ in the Monterey Pine at Monterey, California, the type locality, and the variation that has been discovered in the pine on Guadalupe Island, the variation in cones is used as a basis for the forms. Dr. George J. Goodman kindly compared the type of *P. insignis* var. *binata* at the Missouri Botanical Garden with specimens I sent to him, and he determined, as might be expected, that the type coincided most nearly with the common form of pine on Guadalupe Island, the form with the intermediate type of cone. This I am designating as *P. radiata* f. *binata*⁴; while the form with the very asymmetrical cone I am referring to typical *P. radiata* Don, as has been done by Mason (1932, p. 53; 1934, pp. 104, 138, 149). The type with the nearly symmetrical cones I am naming as *P. radiata* f. *guadalupensis*.⁵ The list of

³ See: F. W. Haasis, *Madroño* 2:29, 30 (1931); Chaney and Mason, *Carnegie Instl. Wash. Publ.* 415:55 (1933); Todd, *Madroño* 2:159 (1934).

⁴ *Pinus radiata* Don forma *binata* (Engelm.) J. T. Howell, comb. nov. *P. insignis* Dougl. var. *binata* Engelm., *Bot. Calif.* 2:128 (1880).

⁵ *Pinus radiata* Don forma *guadalupensis* J. T. Howell, f. nov. Foliis 2 vel 3 in fascicula; conis fere congruentibus subovatis, 9—10 cm. longis, squamis non umbonatis, haud muricatis.

Type: Herb. Calif. Acad. Sci. No. 280936, collected on Guadalupe Island, Lower California, Mar. 16, 1932, by John Thomas Howell, No. 8267. The type of mature cone is *J. T. Howell* No. 8185, collected Nov. 15, 1931.

my collections of each form will be published later in a catalogue of my Guadalupe Island collections.

THE SANTA CRUZ ISLAND PINE

The first botanical record of the occurrence of a pine on Santa Cruz Island is given by Greene, who briefly mentions the "dense forests of a small pine, identical with that which is found on Cedros and Guadalupe . . ." (1887, p. 381), and later (p. 413) lists the pine as *Pinus insignis* var. *binata* Engelm. Brandegee (1890, p. 145) lists this same name for both Santa Cruz and Santa Rosa islands; and after Lemmon (1895, p. 42), most botanists continued to call the pines either *P. radiata*⁶ or *P. radiata* var. *binata*⁷ until Abrams reported *P. muricata* Don from Santa Cruz Island (1923, p. 60), although he continued to report *P. radiata* var. *binata* from Santa Rosa Island (p. 57). Mason (1930, p. 9), dealing only with "the Santa Cruz Island Pine," described from there and Cedros Island a new species, *P. remorata*, "clearly related to *Pinus muricata*" (1932, p. 52), but with cones nearly smooth and symmetrical.

In 1931, when I visited Santa Cruz Island with Ralph Hoffmann, we studied the trees in the three pine groves on the island, the more extensive forest at the west end and the smaller ones at Pelican Bay and China Harbor. In each place we found a series of variations entirely comparable to those I have described for *P. radiata* on Guadalupe Island, only on Santa Cruz Island the variations are in *P. muricata*. From the symmetrical and nearly smooth but definitely prickly cones distinctive of *P. remorata* to the strongly asymmetric and muricate-umbonate cones characteristic of *P. muricata*, every intergrading form connecting them was found. These series of variants from Santa Cruz and Guadalupe islands are interpreted as an impressive example of parallel variation in two related species. That the pines with nearly smooth symmetrical cones on the two islands belong to two different species has been decided by the relative development of the prickles on their cones and the number of resin-ducts in the needles: whereas the form on Guadalupe Island has a prickle even weaker than can be found on cones at Monterey, the Santa Cruz Island pine has a cone that is pungently

⁶ Jepson (1909a, p. 42; 1909b, p. 76).

⁷ Sargent (1897, p. 104); Sudworth (1908, p. 58); Jepson (1910, p. 101).

prickly; and the number of resin-ducts in the needles is two on Guadalupe Island and more than two on Santa Cruz Island.

Because of the importance of the *P. remorata*-type in the paleontologic history of the closed-cone pine since early Pleistocene and also because of my inability to correlate Dr. Mason's studies with my field observations, I offer no new nomenclatural expression for the type. However, it seems significant to me that of the two recorded occurrences of fossils of this type, one is on Santa Cruz Island where the type still persists (Chaney and Mason, 1930, p. 10), the other at Carpinteria on the Santa Barbara coast where only "two fragmentary cones" were found and these "might readily have been transported across it (*i. e.*, the Santa Barbara Channel) to the mainland" from Santa Cruz Island (Chaney and Mason, 1933, p. 56).

Also it is of interest to note the possible occurrence of the *P. remorata*-type on the mainland in present-day forests of *P. muricata*. This suggestion is expressed by Carl Wolf (1940) who writes: "Rumors of the occurrence of this pine (*i. e.*, *P. remorata*) in the Bishop Pine forests near Lompoc, Santa Barbara County, are of interest, for if the species still persists on the mainland that is the most likely spot." If this variation is discovered on the mainland, it will offer an interesting and notable parallel to the same sort of variation found in the Monterey Pine at Monterey which prompted Lemmon's varietal name *laevigata* which has appeared under at least three different specific epithets (*P. tuberculata* Don, *P. insignis* Dougl., and *P. californiana* Lois.).

My collections of the Santa Cruz Island pine are as follows. Pine forest at west end of island: No. 6328 (form with cone nearly smooth and symmetrical); No. 6329 and 6330 (intermediate types with more umbonate scales and asymmetrical cones); No. 6331 (*P. muricata*-type). Pine forest above China Harbor: No. 6371 (not entirely typical of *P. remorata*-type, the somewhat elongate cones reminiscent of *P. attenuata* Lemm. in shape); No. 6373 (*P. remorata*-type but cones very small, the smallest only 3.5 cm. long); No. 6372 (intermediate); No. 6374 (cones small but unmistakably *P. muricata*). Pine forest above Pelican Bay: No. 6403 (very near *P. remorata*-type); No. 6402 (*P. muricata*-type).

THE SANTA ROSA ISLAND PINE

Following the first report in botanical literature of the closed-cone pine on Santa Rosa Island by Brandegee in 1888, the Santa Rosa Island pine had the same nomenclatorial history as the Santa Cruz Island pine, except that Abrams (1923, p. 57) continued to refer it to the 2-leaved variety of *P. radiata* at the time when he referred the pine on Santa Cruz Island to *P. muricata*. Mason mentions the occurrence of a closed-cone pine on Santa Rosa Island (1934, p. 113), but I have not found that he names the pine.

Specimens of the pine from Santa Rosa Island are very rare, the only ones that I have seen, being specimens collected in 1930 by Ralph Hoffmann (Herb. U. C.; Herb. Santa Barbara Mus.). From these it is clear that the pine is related to *P. muricata* and that it represents the *P. remorata*-type of that relationship. From the meagerness of the material it is not possible to determine what variation, if any, is to be found on the island. The specimen at the University of California bears the note by Hoffmann that it is "from one of a few scattered groves on the n. e. slope of Black Mt." Mrs. Ruth H. Nordoff of the Santa Barbara Museum of Natural History has written me that part of the data referring to the Santa Rosa Island pine in Hoffmann's catalogue (ms.) of the island plants reads: "about 30 trees in three canyons on Black Mt. . . ." Certainly one of the problems to be looked into on Santa Rosa Island concerns the closed-cone pine, possible variation in the shape of the cones, and data on the occurrence and abundance of the trees.

THE CEDROS ISLAND PINE

The earliest botanical reference to the pine on Cedros Island seems to be that of Greene, who wrote that the northern summit of the island "is adorned with open groves of *Pinus muricata*" (1888, p. 197); and reports and floras continued to list it as that species until Abrams (1923, p. 60) referred it to *P. muricata* var. *Anthonyi* Lemmon (1892, p. 10), a trivial variant which was originally described from the mainland "near San Quentin, Lower California."⁸ In the original description of *P. remorata*,

⁸ An examination of a specimen of the type collection of Anthony's pine from San Quentin in Herb. U. C. shows it to be typical of *P. muricata* but with somewhat smaller cones than usual, but scarcely as small as some forms to be found on Santa Cruz Island.

Mason (1930, p. 9) referred a collection made by Anthony on Cedros Island to his new species; and although in 1932 Mason cites Cedros Island in the distribution of *P. muricata* (1932, p. 51), it seems apparent from later distributional data that he regards the Cedros Island pine entirely as *P. remorata* (1934, p. 147) and the San Quentin pine as *P. muricata* (Chaney and Mason, 1933, p. 55).

As in the Santa Cruz Island pine, the cones of the Cedros Island pine vary from strongly asymmetrical to symmetrical, but the apophyses even on the enlarged umbos are nearly smooth or even shallowly excavated instead of bearing those prominent prickles on extended apophyses which are so characteristic of the asymmetric forms of the Santa Cruz Island pine. In fact, the cones of the Cedros Island pine, except that they are smaller, are much more like the cones of the Monterey Pine than those of the Bishop Pine, but the numerous resin-ducts in the leaves relate the pine definitely to *P. muricata*.⁹ Because the Cedros Island pine seems sufficiently different from all other variants in *P. muricata*, I am calling it a new variety: ***Pinus muricata* var. *cedrosensis***.¹⁰

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⁹ Jepson (1910, p. 97) calls attention to the intermediate character exhibited by the cones of the Cedros Island pine when compared with those of the Monterey and Bishop pines.

¹⁰ *Pinus muricata* Don var. *cedrosensis* J. T. Howell, var. nov. Conis 6—7 cm. longis, paulum incongruentibus, squamis exterioribus et superioribus rotundo-umbonatis, aculeum parvum tenuissimum ferentibus.

Type: Herb. Calif. Acad. Sci. No. 146917, collected June 6, 1925, on the summit of the ridge, Cedros Island, by H. L. Mason, No. 2030. A collection of over 50 cones collected by G. D. Hanna in 1922 (Herb. Calif. Acad. Sci.) illustrate the variation in shape and size of cones.

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GREAT BASIN PLANTS—IV

BY BASSETT MAGUIRE

Logan, Utah

AND

ARTHUR H. HOLMGREN

Chief of Party, U. S. Grazing Service

For the past two seasons plants collected on the United States Grazing Service survey in Elko County, Nevada, have been submitted to the Utah State Agricultural College for identification. From this fine series and collections of the senior writer, the following records seem worthy of comment.

TRIODIA PILOSA (Buckl.) Merr. Dry rocky soil in sagebrush area, Utah-Nevada line, 12 miles south of Wendover, Utah, May 18, 1939, *A. H. Holmgren et al.* This collection is an interesting northern extension of the range of this attractive grass, characteristic of dry, stony soil of the Sonoran Desert. It is an infrequent plant of the southern part of the Great Basin.

MELICA STRICTA Boland. Rare on rocky slopes, 12 miles southwest of Wendover, Utah, 6000 feet, in Elko Co., Nev., June 1, 1939, *H. W. Cooper*. Known from only this one station in northeastern Nevada, this rarely collected grass was locally common.

BLEPHARIDACHNE KINGII (S. Wats.) Hack. Rare in dry rocky places with sagebrush, 12 miles south of Wendover, Utah,

6000 feet, in Elko Co., Nev., May 18, 1939, *A. H. Holmgren et al.* In some areas in the vicinity of the above collection this grass becomes the dominant species. This species, previously considered rare, is apparently commonly distributed in the desert regions of southeastern Elko Co. and eastern White Pine Co., Nev., and western Box Elder, Tooele, Juab and Millard counties, Utah (Maguire, 1935).

**CORALLORRHIZA STRIATA* Lindl. Gollither Pasture, 18 miles northeast of San Jacinto, Elko Co., Nev., July 5, 1939, *M. Shipley*. Previously known by one collection from the Great Basin (Maguire, 1935), the above station seemingly extends the known range of this orchid for the first time into Nevada.

**PÆONIA BROWNII* Dougl. Stebbins (1938), treating the western American species of *Pæonia*, gave the following range for *P. Brownii*: "Northern California . . . , north to British Columbia, east to Wyoming." Further discussing its range he wrote:

The exact eastern limits of *Pæonia Brownii* are uncertain. Rydberg (Rocky Mt. Flora, p. 315) includes Utah in the range; Tidestrom (Fl. Utah and Nevada, p. 202) questions its occurrence there, but includes Alberta, which Rydberg does not. In answer to requests by the writer, Dr. Ellsworth P. Killip of the United States National Herbarium (US), Mr. C. A. Weatherby of Gray Herbarium (G) and Dr. H. A. Gleason of the New York Botanical Garden (NY), have examined the material of this species in their collections and report no specimens of *P. Brownii* from either Utah or Alberta. One collection is reported from Wyoming: Jackson's Hole, Lincoln County, *Payson & Payson 2196* (G, NY).

In view of these interesting comments, the following records are noteworthy. IDAHO: 0.5 mile west camp F-83, June 16, 1935, Custer Co., *A. D. Smith No. 34*; basalt outcropping edge of saline meadow, 4 miles west of Hill City, May 13, 1939, Elmore Co., *A. Cronquist No. 1187*. WYOMING: glade in Lodgepole-Spruce woodland, shore of Jenny Lake, June 11, 1936, Teton National Park, Teton Co., *Maguire No. 13585*. NEVADA: common about willow thickets, Burnt Creek, 12 miles north of Wells, June 10, 1939, Elko Co., *Maguire No. 16818*; common, meadows in vicinity of ranch house, Gollither (Mts.) Pasture, 18 miles northeast of San Jacinto, June 12, 1939, Elko Co., *Maguire No. 16819*; common, meadows and browse slopes.

* Plants designated by the asterisk denote plants which are apparently hitherto unrecorded from the state in question.

vicinity of Bull Camp, east slopes of Elk Mts., Humboldt National Forest, June 11, 1939, Elko Co., *Maguire No. 16820*; *A. H. Holmgren et al.*, same data, June 10; moist sandy loam, vicinity of Three Creek, north slopes of Elk Mts., Humboldt National Forest, Elko Co., 6000 feet, May 20, 1939, *Jacobsen*; moist, deep alluvial soil, Mud River, Elko Co., 5000 feet, June 10, 1939, *J. Gustafson*. УТАН: woodland, clay-loam, Ephraim Canyon, 8700 feet, June 12, 1936, Sanpete Co., Utah, *Basil Crane*.

Mr. Arthur Cronquist has made verbal communication that *Paeonia* occurs locally, common at stations on Mink and City creeks, in the vicinity of Pocatello, Idaho. The unpublished type-written check list of plants of the Pocatello region prepared by Mrs. M. E. Soth in 1924 includes record of *P. Brownii*. Plants cited in this list were identified by Dr. Rydberg. It would seem, then, from the above cited Idaho specimens and this further information, that *P. Brownii* is generally distributed in southern and central Idaho.

The Wyoming collection cited above is apparently the second on record from Wyoming. The numerous recent collections from Elko Co., Nevada, where the plant occurs generally and commonly at interval thickets and on foothill meadows and slopes, seem to be the first records from that state. Stebbins (*l. c.*), in discussing the eastern limits of the species, remarks upon the uncertainty of the Utah record as ascribed by Rydberg. The above collection confirms the Utah inclusion in the range of *Paeonia* by Rydberg and by Munz in the "Manual of Southern California Botany."

The Gollieher Mountain (Nevada) station of the senior writer, is about 20 miles west of the Utah line. It is not improbable that the plant will be found in the Goose Creek Mts. of northwestern Utah which are in general continuation with the hilly region of Nevada to the west where the plant is so generally distributed. Further, the hills of the Pocatello region in Idaho extend into northern Utah. Although *P. Brownii* has not been found in the adjacent Cache Co., Utah, it is again not improbable that a more thorough knowledge of the flora of this region will reveal its presence.

ERIOGONUM SHOCKLEYI S. Wats. A number of specimens of this relatively uncommon species has come to the herbarium

within the last few years, representing two quite distinct and rarer populations which extends considerably the known range of each:

ERIOGONUM SHOCKLEYI subsp. *CANDIDUM* (Jones) Stokes. Semi-desert valley, Trout Creek, Juab Co., Utah, June 29, 1932, *Becraft & Starr No. 378*; desert shadscale, rare, 5600 feet, 4 miles east of Trout Creek, Juab Co., Utah, June 18, 1933, *Maguire & Becraft No. 2541a*; shadscale association, rare, 27 miles west of Delta, Millard Co., Utah, June 15, 1933, *Maguire & Becraft No. 2540a*; dry rocky soil, occasional, vicinity of Currie, Elko Co., Nev., June 16, 1938, *H. B. Passey No. 65*; dry gravelly soil, foothills west of Wendover, Utah, in Elko Co., Nev., June 5, 1939, *Holmgren & Lund*.

ERIOGONUM SHOCKLEYI subsp. *LONGILOBUM* (Jones) Stokes. Mesa top, 11 miles north of Bluff, San Juan Co., Utah, July 1, 1933, *Maguire et al. No. 5846*; sand desert, 14 miles southeast of Bluff, San Juan Co., Utah, June 29, 1933, *Maguire et al. No. 5846a*. This subspecies has apparently been previously known only from the type locality. The above stations are nearly 200 miles removed.

**Eriogonum chrysocephalum* A. Gray subsp. *desertorum* Maguire, subsp. nov. Cæspitosis; foliis ellipticis vel elliptico-ovalibus, 2—4 cm. longis; involucriis campanulato-turbinatis; floribus flavis, 2—2.5 mm. longis, segmentis obtusis vel retusis.

Closely caespitose from a multicapital base borne on a stout woody root, acaulescent; leaves 2—4 cm. long, mostly 5—9 mm. broad, petiole slender, equalling the blade, the latter elliptic to elliptic-oval, acutish at both ends, margins slightly revolute, both surfaces floccose-tomentose, the upper less densely so; peduncles 3—5 cm. long, monocephalous; involucries several, campanulate-turbinate, loosely tomentose, thin, conspicuously toothed; perianth yellow, sometimes red-tinged, the segments enlarged toward the base, rounded or retuse at the apex, 2.5—3 mm. long; achene 2 mm. long, stipitate, the body biconvex, the beak sharply triangular, hirsutulous, at least when immature.

Type: dry gravelly lake bar, associated with *Atriplex confertifolia*, foothills 8 miles west of Wendover, Utah, 4800 feet, June 5, 1939, in Elko Co., Nev., *A. H. Holmgren & C. Lund No. 163*. Deposited at the Utah State Agricultural College. Cotype: low range under pinyon and juniper, 36 miles west of Wendover, Utah, in Elko Co., Nev., June 2, 1934, *Maguire et al. No. 5842*.

This entity represents the desert ecotype of the species characterized particularly by its densely cespitose habit and yellow flowers. It seems to be most similar to subsp. *mancum* (Rydb.) Stokes (1936), of Montana, but differs from this in its much larger leaves and yellow perianth.

DRABA DOUGLASII A. Gray. Common, 45 miles southwest of Elko Co., Nev., Apr. 27, 1938, *D. Lund*. A later collection has been made by C. Lund from the Toana Range, Elko Co., Nev. This crucifer and the *Lepidium* cited below were submitted to Dr. C. L. Hitchcock for identification. His comment (correspondence of Feb. 4, 1939) concerning them is, in part, as follows: "The white-flowered . . . *Draba Douglasii* . . . is the first collection I have seen from central or eastern Nevada"; and of the latter collection: "The other plant . . . *Lepidium nanum* . . . is very seldom collected . . . I notice that Tidestrom makes no mention of the plant's being rare, but if you will notice in my treatment of the genus, I saw only 4 or 5 collections of *Lepidium nanum* and the most recent collection was in 1904. . . . I would suggest that you make mention of this plant, . . . especially should it be emphasized that the flowers are yellow rather than white."

LEPIDIUM NANUM S. Wats. Common in dry places under juniper at 5800 feet, Elko Co., May 11, 1938, *A. H. Holmgren*; locally abundant, sandy loam under sage, 3 miles south of Sadler's Ranch, 12 miles south of Jiggs, Elko Co., Nev., 5800 feet, May 25, 1939, *A. H. Holmgren*; rare, vicinity of White Horse Pass, 30 miles southwest of Wendover, in Elko Co., Nev., May 28, 1939, *H. MacDowell*.

This species is generally distributed in northeastern Nevada, becoming abundant in local areas under sagebrush and juniper. When well-developed, plants reach a large size, attaining a diameter of almost 2 feet, and become elevated on hummocks 8 to 10 inches high by the infiltration of soil into the densely multicapital caudex.

*LINUM KINGII S. Wats. var. SEDOIDES Porter. Dry lake bed, Dolly Varden, Antelope Valley, 6000 feet, Elko Co., Nev., June 10, 1939, *W. C. Christensen*. This collection from dry desert habitat, although known previously only from the montane region from the Wasatch Front, Utah, eastward, is inseparable from the above named entity.

PETALOSTEMON SEARLSIÆ A. Gray. Common in dry gravelly soil, Ferguson Springs, 25 miles southwest of Wendover, Utah, in Elko Co., Nev., 5900 feet, May 5, 1939, *A. H. Holmgren*. Two other collections of less exact locality, are likewise known from Elko Co. These new stations extend the northern range in Nevada for this species some 200 miles.

The Holmgren collection was made from an area where the above species was growing intimately with the northern *P. ornatus* Dougl. Lack of clear-cut characters separating the two raises the question as to their specific distinctness.

**MIMULUS PARRYI* A. Gray. Slopes, 10 miles south of Alamo, Lincoln Co., Nev., *Maguire No. 16308*. *Mimulus Parryi*, considered by Grant (1924) to be of very restricted distribution, was known to her only from Washington Co., Utah. The above collection extends the range northwestward some 100 miles. Other collections, *Maguire No. 5003, 5005*, both from Beaver Dam Wash in the vicinity of Littlefield, Mohave Co., Arizona, further extend the range into the northeastern corner of that state.

**ERIGERON AUSTINÆ* Greene. Idaho: lava rock benchlands, House Creek, Owyhee Co., June 28, 1912, *Nelson & Macbride No. 1768*; dry gravelly soil, sagebrush type, foothills west of Rock Creek, Cassia Co., June 12, 1938, *R. K. Gierisch No. 597*. Nevada: gravelly ridge, vicinity of San Jacinto, Elko Co., June 4, 1938, *A. H. Agee*; dry gravelly soil, 15 miles southwest of O'Neil, Elko Co., Nev., 6500 feet, June 10, 1939, *Holmgren et al.*; common on sage slopes, vicinity of Hot Creek Reservoir, 42 miles north of Wells, Elko Co., June 10, 1939, *Maguire No. 17025*. The above cited collections show this species to be commonly distributed in northeastern Nevada and adjacent Idaho. Hitherto it has been known only from northern California and Oregon.

**ERIGERON COMPACTUS* Blake (*E. pulvinatus* Rydb., 1917, not Wedd., 1857). Poor, dry, rocky soil at 5200 feet, 50 miles south of Wells, Elko Co., *H. B. Passey*; rare in sand dunes, east side of Antelope Valley, 4800 feet, Elko Co., Nev., June 7, 1939, *C. O. Lund*. The ligules in these Nevada collections are pink, not white as given in the original description. The species is a Great Basin endemic previously known only from Utah.

**WYETHIA HELIANTHOIDES* Nutt. Meadow loam, 6000 feet, 15 miles west of San Jacinto, Elko Co., *H. B. Passey*. The beautifully prepared and extensive series of this collection from the northeastern corner of Nevada extends the known range of this northern species considerably more than a hundred miles southward.

ARTEMISIA PYGMÆA A. Gray. Rare, only in local areas, dry poor soil, at 5600 feet, south of Nine-mile Well, Elko Co., Nev., Aug. 18, 1938, *H. B. Passey*; locally abundant, dry gravelly soil, under sage, 3 miles west of Pilot Mt. (vicinity of Wendover, Utah), Elko Co., Nev., June 17, 1939, *C. Lund*; 8 miles southeast of Duchesne, Utah, Aug. 18, 1936, *Stoddart & Passey*. Hall and Clements (1923) record this infrequently collected shrub from western Utah and Eureka and Lincoln counties in Nevada. The above collections and Graham's (1937) station from Uintah Co., Utah, extend the known range eastward by more than 200 miles, and northwestward more than 100 miles.

BALSAMORHIZA HIRSUTA Nutt. var. *NEGLECTA* Sharp. Idaho: hillside, Shoshone Falls, Twin Falls Co., May 9, 1939, *A. Cronquist No. 1113*; dry gravelly soil, sagebrush type, foothills west of Rock Creek, Cassia Co., June 12, 1938, *R. K. Gierisch No. 591*. Nevada: with sage, north of O'Neil, Elko Co., *W. H. Hirst*; 18 miles west of San Jacinto, Elko Co., 6500 feet, *A. H. Agee*; dry slopes at 6000 feet, Diamond A Ranch, vicinity of Jarbidge, Elko Co., May 15, 1939, *F. Gallaway*; thin stony soil, slopes above camp, Golliber Pasture, 18 miles northeast of San Jacinto, Elko Co., June 12, 1939, *Maguire No. 16987*. The previously known localities (Sharp, 1935) for this variety are Washoe, Humboldt, and Ormsby counties, Nevada, and Uintah and Daggett counties, Utah, regions more than 400 miles apart. The area of the above recorded collections lies almost equidistant between the two previously known areas.

BALSAMORHIZA PLATYLEPIS Sharp. 18 miles west of San Jacinto, Elko Co., Nev., 6000 feet, *A. H. Agee*; stony ridges, southwest of Bull Camp, 10 miles south of San Jacinto, Elko Co., Nev., June 11, 1939, *Maguire No. 16991*; browse slopes, Golliber (Mts.) Pasture, 18 miles northeast of San Jacinto, Elko Co., Nev., June 13, 1939, *Maguire No. 16986*. The large series of plants collected under the above numbers most closely fall into

the recently described *B. platylepis* of Sharp. The range attributed to this species is "southern Oregon, southward to west-central Nevada and northern California," being cited in Nevada from Washoe County only.

All cited specimens recorded in this paper are on deposit at the Utah State Agricultural College.

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FURTHER STUDIES IN ERIOGONUM—IV

BY SUSAN G. STOKES

In a very remarkable set of specimens of *Eriogonum* sent to me by Mr. M. French Gilman from the Death Valley region of California, the following seem to be worthy of taxonomic recognition.

***Eriogonum effusum* Nutt. var. *limbatum* Stokes, var. nov.** Caulibus lignosis pallidis basi, foliis et caulibus superioribus albo-pubescentibus; foliis brevi-petiolatis, crenatis; pedunculis paulo brevibus; involucriis congestis in subcapitata cyma, sessilibus vel breviter pedunculatis, 1—2.5 mm. longis; floribus 2—3 mm. longis, glabris, basi attenuatis, rubris basi et in medio sed albescenti-limbatis.

Type: Herb. Calif. Acad. Sci. No. 280845, collected on Sept. 28, 1939, at Pinyon Mesa, Panamint Mts., Inyo County, California, 6200 ft., by M. French Gilman, No. 3954. Another specimen is from Arcane Meadow, Panamint Mts., 9000 ft..

Gilman No. 2700, Sept. 1, 1937. The color of the flowers is quite similar to that of *E. bicolor* Jones.

Eriogonum Gilmani Stokes, spec. nov. Herba perennis, humilis, compacta, ex radice elongata, lignea, cortice fusca lamellata vestita, caudice foliis senioribus tecto; foliis rosulatis confertis, paucis ad 12 vel 14, suberectis, dense pubescentibus, tomento albo crasso, laminis 2—4 mm. longis, ellipticis, basi attenuatis in petiolum marginatum lamina æquilongum, squamis gemmarum membranaceis; pedunculis solitariis ex singulis rosulis, 1—2 cm. altis, 2 vel 3 involucri cymoso-composita ferentibus, bracteis linearibus; involucris 1.5 mm. longis, turbinatis, acute 5-dentatis; floribus eburneis ad rosaceis, glabris, insignibus, sepalis exterioribus orbicularibus inflatis, 3—4 mm. diametro, conniventibus, obcordatis, interioribus longioribus, paulum exsertis, angustis, panduratis; acheniis acute 3-angulatis, 2.5 mm. longis.

Type: Herb. Calif. Acad. Sci. No. 280838, collected by M. French Gilman, *No. 3953*, on Pinyon Mesa, Panamint Mts., Inyo County, California, 6200 ft., Sept. 28, 1939. In appearance the plants suggest *E. cæspitosum* Nutt., but the pubescence is different and the flowers are not at all stipitate.

Eriogonum Hoffmanni Stokes var. **robustius** Stokes, var. nov. Robustum, ad 9 dm. altum; caulibus basi 1 cm. diametro; foliis magnis, orbiculatis, 6 cm. diametro, margine percrispis; inflorescentiis glabris, multo-ramosis, involucri multa brevia sessilia vel subsessilia ferentibus.

Type: Herb. Calif. Acad. Sci. No. 254891, collected at 1500 ft. elev. on Ryan Wash in the Funeral Mts., California, by M. French Gilman in February, 1938.

Mr. Gilman sent in two other specimens of var. *robustius* from Ryan Wash (*No. 2728* at 1500 ft. elev.; *No. 3918* at 3000 ft.), and although they differ in habit, they seem to be the same. In *No. 2728* the plant is low in habit with numerous clustered branches from the axils of the leaves, but in *No. 3918* one large and three smaller naked peduncles raise the much-branched inflorescence well above the leafy base. The type of the variety is intermediate between these two variants.

Besides the specimens of var. *robustius*, Mr. Gilman sent in a specimen that does not differ in any material way from the type of *E. Hoffmanni*. This came from the Telescope Peak Trail at 10000 ft. in the Panamint Mts. (*Gilman No. 3288*).

Eriogonum mensicola Stokes, spec. nov. Herba perennis, caudice dense ramoso, ramis paucis, foliis senioribus siccatis vestitis et rosulas ferentibus; foliis dense et compacte albo-pubescentibus, lamina ovata, 6—9

mm. longa, petiolo brevior; pedunculis albo-floccosis, 8—10 cm. longis; cyma 2- vel 3-radiata, bracteis subfoliaceis linearibus, radiis ramosis, ramis involucri 2 vel 3 sessilia racemose ferentibus; involucri late turbinatis, breviter dentatis; floribus viridulo-albis ad carnis, attenuatis sed non stipitatis, 3—4 mm. longis, glabris, sepalis exterioribus obovatis acutis, interioribus similibus.

Type: Herb. Calif. Acad. Sci. No. 280839, collected on Pinyon Mesa, Panamint Mts., Inyo County, California, 6800 ft., Sept. 29, 1939, by M. French Gilman, *No. 3983*. The flowers suggest *E. pyrolæfolium* Hook.

Eriogonum racemosum Nutt. var. **desertorum** Stokes, var. nov. A specie differt: humilior; ramis late patentibus, floccoso-tomentosis, internodiis infimis 6—10 cm. longis; foliis late obovatis ad orbiculatis, dense tomentosis, nodiis inferioribus foliosis; involucri turbinatis, 3—4 mm. longis, circa eodem latitudine; floribus 3—4 mm. longis, costis sepalorum coloratis.

Type: Herb. Calif. Acad. Sci. No. 280844, collected Aug. 25, 1938, in Arcane Meadow, 9200 ft., Panamint Mts., Inyo County, California, by M. French Gilman, *No. 3332*.

Eriogonum umbellatum Torr. subsp. **aridum** (Greene) Stokes var. **versicolor** Stokes, var. nov. Segmentis perianthii versicoloribus, rubromaculatis vel roseo-tinctis.

Type: Herb. Calif. Acad. Sci. No. 280854, collected by M. French Gilman, *No. 1929*, at Arcane Meadow, 9200 ft., Panamint Mts., Inyo County, California, July 12, 1935. Other specimens from the Panamint Mts., corresponding to the type, in Herb. Calif. Acad. Sci. are: Baldy to Telescope Peak, *Hoffmann No. 466*; trail from Wild Rose Canyon to Telescope Peak, *Munz No. 14804*; Telescope Peak, 10,000 ft., *Epling in 1937*.

Collections by Mr. Gilman differ so in color that they seem worthy of special notice. Like the other members of subsp. *aridum*, they have loosely branching caudex, simple rosettes of small leaves, and bear a small umbel of 2 to 4 rays. The involucre is short-toothed and the flowers are stipitate. The first specimen (*Gilman No. 1819*, from Titus Cañon, Grapevine Mts., alt. 6800 ft., June 23, 1935) has pale yellow flowers with some strongly marked deep red spots on the outer sepals. The second specimen, here designated the type of the variety, *Gilman No. 1929*, has flowers pale yellow, but both inner and outer sepals are marked with a conspicuous, long, red blotch, extending from the base nearly to the margin of the sepals. The third specimen,

(*Gilman No. 3336*, Arcane Meadow, Panamint Mts., alt. 9200 ft., Aug. 25, 1938) gives a brilliant appearance with a deep pink blotch from the attachment to the tip of the sepals bordered by a rose-colored margin.

NEW WESTERN PLANTS—III

BY ALICE EASTWOOD

Lilium inyoense Eastwood, spec. nov. Caules aliquot ex bulbis rhizomaticis, circa 7 dm. alti, glabri; foliis dispersis, supremis verticillatis, lineari-lanceolatis, circa 8 cm. longis et 5 mm. latis, vel oblongo-lanceolatis, 9 cm. longis et 15 mm. latis, glabris; floribus axillaribus, nutantibus; pedunculis 10—15 cm. longis; segmentis perianthii multo recurvatis, basi aurantiacis brunneo-punctatis, partibus recurvatis flavis, sine punctis, circa 3 cm. longis, 8—10 mm. latis; staminibus et stylo exsertis, antheris 4 mm. longis, 2 mm. latis; stigmatibus clavatis, superante stamina.

Type: Herb. Calif. Acad. Sci. No. 246211, collected near Bishop, Inyo County, California, by Miss Anita M. Noldeke, June 29, 1937. Another specimen without flowers which seems to be the same is Herb. No. 211884, collected at Rock Creek Lodge, Inyo County, Aug. 6, 1932, at 8000 ft., by Maurice Halperin, *No. 545*. The bulb of Miss Noldeke's plant was so imbedded in the grass that it was removed with difficulty. It is a flat bulb with numerous bulblets like rice grains and is most nearly related to *L. fresnense* Eastw.*

Lupinus Blaisdellii Eastwood, spec. nov. Annuus?, caules graciles, ramosi, circa 4—5 dm. alti, paulo appresso-sericei; foliolis 5—7, anguste oblongis, maximis circa 2 cm. longis, 4 mm. latis, apice obtusis, basi acutis, paulo appresso-sericeis, viridibus; petiolis gracilibus, 2—5 cm. longis; stipulis liberis, attenuatis, sericeis, 2—3 mm. longis; floribus carneis, circa 9 mm. longis, 10 mm. latis, verticillatis in racemis circa 1 dm. longis, æquilingis pedunculis, verticillis circa 1—2 cm. separatis; bracteis lanceolatis, subdeciduis; calyce subsaccato basi; labio inferiore 4 mm. longo, obtuso, labio superiore latiore et brevioribus, bisecto; vexillo reflexo, 1 cm. lato et longo, glabro, alis paulo brevioribus, 6 mm. latis; carina brevi, curvata, obtusa, ciliata longis villis ex medio ad infra apicem.

* ***Lilium fresnense*** Eastwood, comb. nov. *L. nevadense* Eastwood var. *fresnense* Eastwood, Leaf. West. Bot. 1:42 (1933). Since seeing specimens collected by Mr. J. T. Howell in the Kings River Canyon in the summer of 1940, I am convinced that this lily should be raised to specific rank. It is what I called *L. pardalinum parviflorum* Eastwood (Fl. S. Fk. Kings River, Publ. Sierra Club No. 27:14,—1902). Mr. Howell reports it as filling the air with fragrance. He collected specimens near Charlotte Creek and at Junction Meadow in Fresno County and near Reflection Lake in Tulare County.

Type: Herb. Calif. Acad. Sci. No. 63219, collected at Mokelumne Hill, Calaveras County, California, by Dr. F. E. Blaisdell in 1905. It is named in honor of Dr. Blaisdell, who gave the herbarium many specimens before the 1906 fire. Some of the lupines were saved, this among them, as they were at the Gray Herbarium.

Without a root it is not possible to be sure whether this is annual or perennial, but the probabilities are with the former, and it may be an ally of *L. nanus* Dougl. The almost circular corolla with the unusually large banner is not like that of any of the *L. nanus* allies; but it does not belong with *L. citrinus* Kellogg or *L. deflexus* Congdon.

Lupinus Brandegeei Eastwood, spec. nov. Caules ramosi ex caudice ligneo, decumbentes, circa 2—4 dm. alti, dense villosi, vestiti villis brevibus et villis longis divaricatis inæqualibus, foliosi, ramosi supra, ramis brevibus; foliis oblanceolatis vel anguste spatulatis, 2 cm. longis, 3—5 mm. latis, dense villosis; petiolis nonnumquam longioribus foliis; stipulis disjunctis, attenuatis, circa 5 mm. longis, villosissimis; racemis superantibus folia; pedunculis brevibus; bracteis caducis, superantibus gemmas, filiformibus et villosis; floribus circa 10 mm. longis, vexillo et alis approximatis; calyce basi saccato, 2 mm. lato; labio superiore 2-dentato, dentibus approximatis, labio inferiore longiore, integro, obtuso; vexillo basi calcarato, glabro, circa 1 cm. longo, reflexo; alis 1 cm. longis, 4 mm. latis, margine crispis; carina falcata, glabra, tecta alis in juventute, exserta in senectute.

Type: Herb. Calif. Acad. Sci. No. 62028, collected at Lakeport, Lake County, California, May, 1886, by T. S. Brandegee, in whose honor it is named.

It seems to be related to *L. lilacinus* Heller, differing most noticeably in the shaggy hairs clothing the entire plant except the corolla. The racemes at first are short and densely flowered, later elongating and more laxly flowered. Owing to the age of the specimen which was at the Gray Herbarium at the time of the fire in 1906 and so saved, the color of the flowers cannot be determined. The plant was undoubtedly white from the dense shaggy hairs.

Lupinus brunneo-maculatus Eastwood, spec. nov. Caules erecti vel decumbentes ex caudice patenti ramoso et lignea radice simplici, circa 15 cm. alti, foliosi, ramosi, appresso-sericei; foliis 5 vel 6, anguste oblongis vel oblanceolatis, maximis circa 2 cm. longis, 5 mm. latis, acutis, sericeis villis appressis et divaricatis; petiolis gracilibus, erectis, multo longioribus foliis; stipulis brevissimis, adnatis ad medium; floribus albis, brunneo-

maculato vexillo, in brevibus racemis, ramulos terminantibus; pedunculis brevibus, tectis foliis; bracteis caducis, attenuatis, villosis, superantibus gemmas; calyce 4 mm. longo, labiis æquilongis, labio superiore bisecto, segmentis obtusis approximatis, labio inferiore ovato, obtuso, 3 mm. longo, basi 2 mm. lato; corolla 1 cm. longa; vexillo rotundo, reflexo, glabro, circa 1 cm. diametro, separatim alis 1—2 mm.; alis 1 cm. longis, 4 mm. latis; carina curvata, paulo ciliata supra medium et infra apicem obtusum.

Type: Herb. Calif. Acad. Sci. No. 281101, collected by Lewis S. Rose, *No. 35373*, July 16, 1935, on Mammoth Crest, Mammoth Lakes region, Mono County, California, alt. 10000 ft. Its affinity is unknown.

Lupinus candidissimus Eastwood, spec. nov. Perennis, densissime albo-tomentosus et villosus pilis tenuibus et divaricatis, 4 dm. altus, ramosus et foliosus; petiolis foliorum inferiorum multo longioribus foliolis, stipulis brevi-adnatis, subulatis, 4—5 mm. longis, foliolis circa 8, anguste oblongis vel oblanceolatis, mucronatis, 3—4 cm. longis, 6—8 mm. latis, argenteo-sericeis pilis adpressis; racemis brevi-pedunculatis, circa 1 dm. longis, verticillatis, pedicellis 5 mm. longis, brevioribus calycibus, bracteis semipersistentibus attenuatis, pedicellos superantibus; floribus 8 mm. longis, roseo-cæsiis; basi calycis gibbosa, dentibus labii superioris approximatis, labio inferiore lanceolato, acuto, 7 mm. longo; vexillo æquali alis, 8 mm. lato, obovato, dorso basi villoso; alis latis, albo-marginatis; carina basi 3 mm. lata, curvata, villosa supra medium, apice glabra et purpurea, tecta alis; leguminibus argenteo-sericeis, longissimis, 2—5 cm. longis, 8 mm. latis, seminibus 3 vel 4.

Type: Herb. Calif. Acad. Sci. No. 277670, collected June 19, 1940, at the old saw mill site, Sheep Mt., Clark County, Nevada, elev. 6600 ft., by Annie M. Alexander and Louise Kellogg, *No. 1753a*. "It grew at the base of the hill and part way up a small canyon, a rank-growing plant with pinkish-lavender flowers, the edge of the wings white." We are greatly indebted to Miss Alexander and Miss Kellogg for this and other fine specimens from Nevada.

This is related to *L. caudatus* Kell., but differs in the smaller flowers and the calyx saccate but not calcarate. The leaves are spreading and the whole plant very lovely with the snowy pubescence and rosy-lavender flowers. When the flowers first come into bloom there is no space between the banner and wings, later it varies from 3—5 mm.

Lupinus elegantulus Eastwood, spec. nov. Caules multi et simplices ex radice lignea, 3—4 dm. alti, graciles, infra prope nudi, supra foliosi, leviter vestiti villis tenuibus appressis; foliolis 7—11, oblanceolatis, viridibus, conduplicatis, apice apiculatis, 3—4 cm. longis, 5—7 mm. latis, villis

tenuibus appressis, infra densioribus; petiolis foliorum inferiorum multo longioribus laminis, foliorum superiorum brevioribus; racemis 1—2 dm. longis, pedunculis tectis foliis superioribus; floribus violaceis, circa 15 mm. longis, laxè diffusis; bracteis gemmarum minimarum subulatis, pedicellos superantibus, bracteis gemmarum seniorum caducis; calyce argenteo-sericeo, bracteolato, labiis prope æqualibus in longitudine, superiore 2-dentato, inferiore integro, acuto, calcare 2 mm. longo; pedicellis brevioribus calycibus et longioribus calcaribus; vexillo reflexo, violaceo, purpureo-maculato, dorso pubescenti, superanti alas, lamina late ovata, 1 cm. longa et lata, ungue 5 mm. longo, 3 mm. lato, inserto in calcaribus calycis; alis apice pubescentibus et conniventibus; carina ciliata supra medium et infra purpureum apicem, tecta alis.

Type: Herb. Calif. Acad. Sci. No. 281105, collected June 13, 1940, on Fandango Pass, Warner Mountains, Modoc County, California, by Eastwood and Howell, *No. 8141*.

This might be considered a variety of *L. calcaratus* Kellogg, but the two plants are so different in appearance that it seems better to consider this a species. The smaller, violet flowers, scattered diffusely in the raceme, the more slender habit, the narrower spur, narrower leaflets, greener and more lightly pubescent leaves and stems are some of the differences. The bracts fall even before the buds open and the stipules are more slender. The spur on the calyx seems to grow as the flowers expand. On the young buds it is scarcely evident.

Lupinus Lelandsmithii Eastwood, spec. nov. Caules fistulosi, alti, erecti, foliosi, simplices vel ramulis parvis axillaribus; foliolis 6—9, circa æquilongis petiolis gracilibus, 6—9 cm. longis, 3—5 mm. latis, supra leviter appresso-sericeis, infra vestitis villis longioribus divaricatis; stipulis villosis, adnatis ad medium, 2 cm. longis, filiformibus; racemis terminalibus, paulo superantibus folia, 10—15 cm. longis; pedunculis circa 1 dm. longis; floribus circa 15 mm. longis, vexillo et alis separatim 5 mm.; bracteis villosis, filiformibus, superantibus gemmas, caducis; calyce subsaccato basi, labio superiore circa 3 mm. longo, 2-lobato, labio inferiore 7 mm. longo; vexillo circa 1 cm. diametro, purpureo, albo-maculato, brumneo-maculato in senectute; alis 7 mm. latis; carina falcata, glabra, 4 mm. lata medio, fere tecta alis.

Type: Herb. Calif. Acad. Sci. No. 62032, collected at Hornbrook, Siskiyou County, California, May 4, 1913, by Mr. Leland E. Smith, whose collections many years ago added valuable specimens to the herbarium. Mr. Smith was a commercial traveller who became interested in learning about the plants that he saw on his travels and sent them to me for identification. I am glad to be able to name this in his honor.

The lower parts of the stems are lacking, but it is undoubtedly perennial. It belongs to the *L. formosus* group, differing from its allies in the narrow leaflets and the long bracts surpassing the buds. This group is the most variable of any in California and needs a careful revision.

Lupinus Rosei Eastwood, spec. nov. Perennis, decumbens, ramosus basi et supra ex ligneo caudice, foliosus, 2—3 dm. altus, vestitus villis tenuibus, paulo divaricatis, margine et costa dense appressis, argenteo-sericeis, margine ciliatis, petiolis inferioribus longioribus foliolis, petiolis superioribus æquilongis foliolis; stipulis 2—3 mm. longis, ad medium adnatis; foliolis 5—9, lanceolatis, 2—3 cm. longis, 4—6 mm. latis; floribus violaceis, circa 10 mm. longis, verticillatis in racemis brevibus, pedunculis brevibus, pedicellis perbrevibus in gemmis, longioribus sub anthesi, bracteis caducis; calyce bracteolato, basi appresse sericeo, labio superiore bisecto ad basin, segmentis lanceolatis, obtusis, divaricatis, circa 6 mm. longis, labio inferiore longiore, apice obtuso, abrupte curvato; vexillo dorso et ventre villosa, circa 7 mm. lato et 9—10 mm. longo, separatim alis 4 mm.; alis 5 mm. latis, prope basin ciliatis; carina curvata, medio 3 mm. lata, ciliata ex basi prope apicem exsertum; legumine 2 cm. longo, 7—8 mm. lato, dense argenteo-sericeo, seminibus plerumque 3 vel 4, albis, orbiculatis, nitidis.

Type: Herb. Calif. Acad. Sci. No. 281103, collected in open desert country near Mono Lake, Mono County, California, at an elevation of 6700 ft., Sept. 29, 1937, by Lewis S. Rose, No. 37701, in whose honor it is named. The lower lip of the calyx curves over the rest of the flower in the buds. This lupine does not seem to be closely allied to any other species.

Valeriana anomala Eastwood, spec. nov. Caulis erectus, 4—5 dm. altus, robustus, striatus, glaber vel inconspicue, puberulus, nodis densius, basi sarmentosus et membranaceus; foliis radicalibus late orbiculatis, 1.5—2.5 cm. latis, apice truncatis, obtusis vel retusis, plerumque pauci-lobatis, petiolis latis; foliis caulinis infimis 4-divisis, segmento superiore suborbiculato, 4—5 cm. longo, 3—5 cm. lato, undulato, apice obtuso, approximato ad segmenta superiora lateralibus, segmentis inferioribus 2—3 cm. distantibus, omnibus segmentis lateralibus oblongis vel ovatis, 2—3 cm. longis, 1—2 cm. latis, petiolis 4—5 cm. longis; foliis superioribus prope sessilibus, segmentis ovatis, margine sinuato-serratis; foliorum supremorum segmentis lanceolato-acuminatis, integris; foliis stolonum variabilibus, 3—5-divisis, segmentis diversis; floribus glomeratis, bracteis lineari-lanceolatis; corolla infundibulari, 9 mm. longa, basi brevi-stipitata, glabra vel hirta exteriori et interiori; lamina 4—5-lobata, 4 mm. diametro; staminibus exsertis, stylo stamina superanti, stigmatibus vix lobatis; acheniis glabris.

Type: Herb. Calif. Acad. Sci. No. 271190, collected on Black Mountain, Marble Mountains, Siskiyou Co., California, Aug. 8,

1939, by John Thomas Howell, *No.* 15162. Another specimen was collected by Mr. Howell at Spirit Lake, Marble Mountains, Aug. 3, 1939, *No.* 15017.

This valerian is anomalous in having flowers in the same glomerules with both four and five lobes on the corolla, the base of which is either smooth or somewhat hairy. It is a tall robust plant with large leaves, extremely diverse. The inflorescence branches when older. It is most nearly related to *V. Adamsiana* Eastwood in the shape of the flowers, but unlike it in other respects.

Valeriana maculata Eastwood, spec. nov. Caules ex rhizomate lignoso, erecti, simplices, graciles, circa 15 cm. alti, puberuli; foliis radicalibus plerumque simplicibus, oblongis, basi attenuatis, apice obtusis, circa 15 mm. longis, 5—7 mm. latis, petiolis gracilibus, duplo longioribus laminis; foliis caulinis oppositis vel 3-verticillatis, trilobatis, lobo medio foliorum inferiorum simili foliis radicalibus, lobis lateralibus divaricatis, multo minoribus; lobis foliorum superiorum lanceolato-acuminatis; floribus in juventute glomeratis, in senectute divaricate paniculatis, ramis elongatis, gracilibus, bracteis linearibus, attenuatis; corolla circa 4 mm. longa, infundibulari, pallido-rosea, lobis roseo-maculatis, tubo brevissimo, stipitato, basi gibboso, lamina 3 mm. diametro; acheniis maturis sessilibus, anguste ovatis, nervatis, glabris, nonnumquam rubro-punctatis, pappo rubescenti, basi conjuncto.

Type: Herb. Calif. Acad. Sci. No. 271193, collected by Annie M. Alexander, June 15, 1939, *No.* 610c, along moist creek banks, common, alt. 8250 ft., Deer Creek, Charleston Mts., Clark Co., Nevada. Other specimens by the same collector and in the same mountains are as follows, all having been used in the description: *No.* 610b, Twin Falls, alt. 8250 ft., June 12; *No.* 610a and 610d, upper end of Lee Canyon, alt. 8650 ft., May 24 and June 16. The specimens were given to the Herbarium of the California Academy of Sciences for determination by the Botany Department of the University of California. The specimens were doubtfully identified as *Valeriana occidentalis* Heller.

The corolla is quite unlike that of *V. occidentalis* Heller in shape, approaching that of *V. Follettiana* Eastwood, but with a narrower and more flaring tube. The plants are low and graceful from slender woody rootstocks; leaves are clustered at base both radical and adjacent cauline, the upper cauline leaves are far apart and either opposite or 3-verticillate with divisions lanceolate-acuminate. When young, the flowers are in a close cluster which later becomes a branched panicle. The stem is

puberulent and the nodes not hairy. The red spots on the short corolla-lobes are much darker in the young flowers than in the old.

Valeriana Whiltonæ Eastwood, spec. nov. Caulis erectus, glaber, prope nudus, circa 3.5 dm. altus, simplex, gracilis, basi squamosus et stoloniferus; foliis radicalibus infimis spatulatis, apice truncatis vel obtusis, 2—5 cm. longis, 1.5 cm. latis, petiolis latis, lanato-ciliatis; aliis foliis radicalibus 3- ad 5-lobatis, medio lobo simili foliis spatulatis, lobis lateralibus lanceolatis, divaricatis, 5—10 mm. longis, 3—4 mm. latis, petiolis lanato-ciliatis; foliis inferioribus caulinarum similibus, petiolis brevioribus et latioribus, apice loborum mediorum dentato vel dentato-laciniato; foliis superioribus caulinarum paucis, tenuissimis, basi dilatis, circa 1 cm. longis; nodis pubescentibus; inflorescentia cymoso-paniculata, duobus pedunculis inferioribus gracilibus, circa 2 cm. longis, 2—6 cm. ex cyma terminali, bracteis similibus foliis supremis, autem brevioribus; corolla infundibulari, 5 mm. longa, lamina 4 mm. diametro, segmentis obtusis, rubris, 1 mm. latis; staminibus exsertis, superantibus stigma capitatum; acheniis anguste ovatis, 3 mm. longis, albo-villosis.

Type: Herb. Calif. Acad. Sci. No. 273727, collected by Inez Whilton Winblad, July 25, 1938, on the Tioga Grade, Mono Co., California. Her father, Mr. Whilton, has decorated his hotel in Tulare with hundreds of species of pressed Californian flowers collected by his daughter, Mrs. Winblad. They are from all parts of California and were sent to Mr. Howell to be named. They are remarkable for their beauty and the preservation of the color of the flowers. It is a pleasure to name this distinct valerian in her honor.

This tall, slender valerian seems to be leafless above, from the very small, almost filiform leaves that are far apart and only one or two pairs. The leaves are clustered near the base and on the stolons, where both entire and lobed leaves occur. The flowers approach those of *V. californica* Heller, but the white woolly achenes and almost leafless stems mark it as distinct from that or any other described species.

DESCHAMPSIA ATROPURPUREA IN CALIFORNIA. In August, 1939, two collections of *Deschampsia atropurpurea* (Wahl.) Scheele were made in the Marble Mt. region of Siskiyou County, California, the first at Spirit Lake, the second on the ridge south of Marble Valley (*J. T. Howell No. 15003, 15229*). This species is not reported for California in Hitchcock, Man. Grasses U. S., p. 289, but it has been known from Oregon at least as far south as Crater Lake. In the Marble Mts., it grows on high steep northern slopes where snow banks linger longest.—John Thomas Howell.

LEAFLETS *of* WESTERN BOTANY

CONTENTS

	PAGE
To the California Botanical Club	25
F. M. MACFARLAND	
On the Golden Anniversary of the California Botanical Club	26
ALICE EASTWOOD	
The Islands of Southern California and a List of the Recorded Plants	27
ALICE EASTWOOD	
My Visits to Guadalupe Island	36
JOHN THOMAS HOWELL	
The <i>Lupinus latifolius</i> Aggregate	41
ALICE EASTWOOD	
The Use of Plants for Fish-Poisoning by the California Indians	43
ROBERT F. HEIZER	
A Note on Halogeton	45
C. V. MORTON	
Notes on the Eastwood Blackberry	46
JOHN THOMAS HOWELL	
A New Name for <i>Heterocodon rariflorum</i> Nutt.	48
ROGERS McVAUGH	

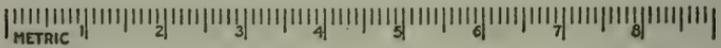
*This number published with funds from the
California Botanical Club*

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as

LEAFL. WEST. BOT.



Owned and published by

ALICE EASTWOOD and JOHN THOMAS HOWELL

CALIFORNIA ACADEMY OF SCIENCES
Founded in 1853
GOLDEN GATE PARK
SAN FRANCISCO

March 31, 1941

Miss Alice Eastwood, Curator
Department of Botany
California Academy of Sciences

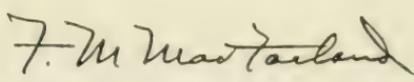
Dear Miss Eastwood:

On behalf of the California Academy of Sciences, may I extend through you to the California Botanical Club our sincere congratulations upon the fiftieth anniversary of the founding of your organization. It has had a long and very useful existence and has most admirably succeeded in promoting botanical knowledge and interest in this region. We wish for it long continued activity and success.

The Academy has deemed it a privilege to cooperate in some measure in promoting the aims of the Club, and hopes to have that opportunity continued in the future. To your own infectious enthusiasm and unhesitating self-sacrifice, my dear Miss Eastwood, is without question most of the success due.

With highest esteem,

Ever faithfully yours,



F. M. MacFarland
President

FM:EL

ON THE GOLDEN ANNIVERSARY OF THE
CALIFORNIA BOTANICAL CLUB

BY ALICE EASTWOOD

In *Zoe*, volume 2, page 93, the founding of the California Botanical Club is recorded as follows:

In response to a call from Dr. H. W. Harkness, Dr. H. H. Behr, Dr. Gustav Eisen, T. S. Brandegee, Mrs. Mary W. Kincaid, Miss Agnes M. Manning, and Mrs. Katharine Brandegee, a meeting was held at one P. M., on March 7, 1891, in the herbarium room of the California Academy of Sciences.

The meeting was called to order by Dr. H. W. Harkness, who briefly explained that the objects of the proposed Club were to promote the study of plants, especially those found on the Pacific Coast of North America, and by bringing into more intimate relations the botanists of the Coast to arouse a greater interest in so rich a field of science. All persons joining the Club were invited to meet the botanical curator of the California Academy in the herbarium room every Monday afternoon for the study of living plants. . . .

While the objects of the Club have never changed, it became undesirable to keep to the original formal organization. Eventually the officers became reduced to the president or leader and the treasurer. During the fifty years of the Club's existence only three treasurers have served, Miss Agnes M. Manning and Mrs. W. B. B. Ingalls until death and Mrs. E. C. Sutcliffe still active. A subscription to *Zoe*, a scientific magazine published under the auspices of Mr. and Mrs. T. S. Brandegee, was included in the dues. When they moved to San Diego, *Zoe* was discontinued.

After I came to the Academy, Mrs. Brandegee, who had been the leader, put me in charge and I have been in the position ever since.

The Club meets almost every week in the Herbarium of the California Academy of Sciences to study living plants, both native and exotic. Excursions into the country take place in the spring months, and during the rest of the year, Golden Gate Park with its 4000 species is a profitable field.

The members generally know the principal native plants and the more common exotics. Since they have so much greater knowledge of plants than the public in general, they are looked upon as authorities wherever they go. Mrs. E. C. Sutcliffe has

given especial attention to the liverworts or *Hepaticae* and our collection has greatly increased under her care. Wherever the members go they watch for unusual species of plants and have contributed personally a great deal to the herbarium, including several new species.

"A Key to the Common Families of Flowering Plants in California," written by me, was published by the Club, and each year they help financially the publication of LEAFLETS OF WESTERN BOTANY. The Club has donated many valuable books to the library of the Department of Botany, has purchased sets of botanical specimens for the Herbarium, and gives twenty-five dollars every year to Save the Redwoods League.

It has done much through its members to spread the knowledge of the activities of the California Academy of Sciences to the people of San Francisco.

THE ISLANDS OF SOUTHERN CALIFORNIA AND A LIST OF THE RECORDED PLANTS—I

BY ALICE EASTWOOD

My knowledge of these islands has been chiefly derived from the descriptions of those who have visited them. My own knowledge has come from a few visits to Santa Catalina Island and one to Santa Cruz Island. The list of species has been compiled from scattered publications of scientific societies, floras, revisions, monographs, lists, and general descriptions. To be sure of the validity of the species, years of study would be necessary, access to all herbarium material, and extensive field work. Doubtless some names may have escaped my search, but the list has been brought pretty well up to date. A bibliography at the end of the list will give the chief sources of my information, especially those concerning the insular species.

SANTA CATALINA ISLAND

Santa Catalina Island is about 22 miles long and about 4 miles wide except at the Isthmus, where the island is about a mile wide and is divided into two parts which at one time were believed to have been separated by a narrow channel. The whole island is mountainous, the two parts rising from the sea to heights of

from 1400 to 2000 ft. It has an area of 43,438 acres and is cut up by canyons and washes with some fertile valleys between. The canyons form almost a labyrinth as they divide and subdivide. Generally the upper part is narrow and they broaden as they descend. Most of them have small streams at the bottom which often contain water throughout the year. One, known as Silver Creek, a never-failing stream, runs through a sandy wash where cottonwoods grow. The fogs condense on the higher ridges, giving moisture to the western slopes where the vegetation is the most luxuriant. The eastern slopes are dry and here the cactus grows in dense masses, predominating, but also protecting, other plants from the ravages of the goats. Avalon, the only town, is a resort for pleasure-seekers and anglers. It has one of the best beaches in California and a delightful climate.

Dr. William Gambel of Philadelphia came to Santa Catalina Island in 1847 to collect birds, but he also collected some notable plants, the first known from any of the coast islands. They were described by Thomas Nuttall in the Journal of the Philadelphia Academy of Sciences in 1848. The most remarkable is *Crossosoma californicum*. This genus has been a puzzle to taxonomists. In the Botany of California (Geological Survey), it is placed in the *Ranunculaceæ*. Bentham and Hooker in Genera Plantarum doubtfully included it in the *Dilleniaceæ*, tribe *Hibbertiæ*. This tribe is chiefly Australian. Engler in Die natürlichen Pflanzenfamilien considers it a monotypic genus in a new family which he named *Crossosomataceæ*. *Crossosoma californicum* has also been found on San Clemente and Guadalupe islands.

Not until many years later were these islands visited by anyone interested in natural history. W. S. Lyon of Los Angeles made a short trip in September, 1884, and the next year in June and July. Among his collections on Santa Catalina was a new tree, named *Lyonothamnus* in his honor. This genus, too, is anomalous. Asa Gray named it in 1885 and was doubtful whether to put it into the *Saxifragaceæ* or *Rosaceæ*. N. L. Britton in Flora of North America establishes it in the *Cunoniaceæ*. This is an order chiefly Australian but found also in South Africa, South America, and the East Indies. It is notable that both *Crossosoma* and *Lyonothamnus* are allied to plants in regions so far distant. Mr. Lyon listed 151 species, of which

15 were insular. The Catalina Cherry, *Prunus Lyoni*, was considered a variety of *P. ilicifolia*, but differs in being truly arboreous with large glossy leaves usually entire and fruit with much more pulp. It is restricted to the islands.

Mr. T. S. Brandege made several visits in 1884, 1889, 1890, and 1899. He added about 56 species, none of which was undescribed, according to him, and all except a very few found also on the mainland. He describes the more luxuriant growth of many species and some varietal differences. Since then other authors, especially Dr. E. L. Greene, Dr. J. N. Rose, Dr. P. A. Rydberg, Alice Eastwood, and Dr. C. F. Millspaugh, have added over thirty new species, most of them endemic on Santa Catalina. Many additions have come from the collections of Mrs. Blanche Trask. She lived at Avalon for many years and walked over all parts of the island, even sleeping out in the open if night overtook her when she wandered too far. Her most complete collection was in the Herbarium of the California Academy of Sciences. It, together with all the other island collections, were better represented in the Academy herbarium than in any other, but all were destroyed in the earthquake and fire of 1906. Only the types were saved. Some specimens were distributed by Mrs. Trask to other herbariums and from these at least 30 have been described as new, most of them endemic on Santa Catalina Island. Undoubtedly as revisions of Californian genera appear, the number of new species will increase.

The most important and latest work on the flora of Santa Catalina Island is that of Millspaugh and Nuttall published in 1923 as one of the botanical publications of the Field Museum, Chicago. The description of the island has been my source of information, added to my own knowledge gained many years ago by several trips with Mrs. Trask. From inspection of many herbariums a list of all who have collected on the island is given by Dr. Millspaugh. The mosses, hepatics, fungi, and lichens are included in the flora, the first record of these groups. Leaving these out, the vascular cryptogams number 11 species and the phanerogams 446 species; 8 were described as new.

SAN CLEMENTE ISLAND

San Clemente Island, lying 20 miles west of Santa Catalina Island, is 18 miles long and from 1½ to 3 miles wide. Its highest

peak, Mt. Cortez, is 1904 ft. in elevation. The island is volcanic in origin, and, together with San Nicolas, the two most distant from the mainland, is believed to have had a later development than the other islands. On San Clemente, what seems to have been an ancient crater is at the northwest end and everywhere evidences of volcanic action are visible. The island is girded with a succession of caves rising one above the other and even going down below the sea. They show former levels, the result of upheavals and depressions. Some extend into the bowels of the earth and have never been explored. The sea rushes in and out with explosive force and noise. The surface of the island shows few level areas not cut into by the deep and narrow gorges that lead towards the ocean. Few of them reach the beach and when rains come, the water dashes down to fall in cascades over the cliffs. The upper rocky part is covered with the ice-plant, which hides the rocks and is so dense and fleshy as to soak the boots and leggings of the trespasser, and the danger of slipping is imminent. According to John Robearts, an old inhabitant, the ice-plant was confined to the sand-dunes, but is now continually spreading on to the uplands and increasing.

Mrs. Trask describes the descent into any of the canyons leading to the sea as hazardous. The sharp volcanic rocks are completely hidden by dense vegetation. *Trifolium tridentatum* grows 4 to 6 feet high and the long thick stems spread vine-like so that to avoid being tripped, hands and feet are both needed to crawl down the steep defiles. Sailing around the island, Mrs. Trask could count the groves of *Lyonothamnus* up the canyons, and, near the summits, the oaks.

W. S. Lyon of Los Angeles, accompanied by the Rev. J. C. Nevin, was the first to bring back a collection of plants from San Clemente. Lyon's account and list was published in the Botanical Gazette in 1886. The plants were named by Asa Gray. They visited the island in April, 1885, and spent four days there. Eighty-one species were collected, six described as new.

Mrs. Trask spent three months on San Clemente Island in 1903. Her specimens were sent to me for identification, but both specimens and list were lost in the earthquake and fire of 1906. However, in a fine descriptive account which was published in the Proceedings of the Southern California Academy of Sciences

in 1904, she described the appearance and habitat of some important species that Lyon did not list. Among these were the two oaks, *Quercus chrysolepis* and *Q. tomentella*, *Crossosoma californicum*, heretofore listed only from Guadalupe and Santa Catalina islands, and *Lavatera assurgentiflora*, the tree or bush mallow restricted apparently to San Miguel, San Clemente, and Anacapa islands.

There are three kinds of cactus on San Clemente, *Opuntia prolifera*, *O. Engelmanni* var. *littoralis*, and *Cereus Emoryi*. Thickets of the two species of *Opuntia* are so dense at the east end as to make penetration almost impossible. At the south end, *Cereus Emoryi* hangs down snake-like over the caves and dangles back and forth in the wind.

The caves were evidently used as homes by the Indian inhabitants, as indicated by the traces that they have left.

SAN NICOLAS ISLAND

San Nicolas Island is farthest from the mainland, nearly 70 miles, but it is not the most western. It is a small wind-swept island about 8 miles long and with an average width of 3 miles. It has a central peak 850 ft. in elevation, the crater of an ancient volcano, and the evidences of volcanic action are everywhere evident.

Mrs. Blanche Trask was the first to make a botanical collection on this island, and in April, 1897, she spent some time there collecting the plants and relics of the former Indian inhabitants. Her account with the list of plants was published by the author in the Proceedings of the California Academy of Sciences (ser. 3, 1: 89—120,—1898).

Dr. Stephen Bowers published an account of his visit to the island in the Ninth Annual Report of the State Mineralogist (1889, p. 57). He reported an abundance of water, but slightly brackish. He did not see even a bush growing, though a portion of the island was said to have formerly been clothed with trees and brush. He thought two-thirds of the island capable of being cultivated. Mrs. Trask found no soil on the broad uplands but tons of pebbles, round as shot and about the same size, supporting only the ice-plant and some common weeds. A small lake was discovered where *Eleocharis* grew. The only fresh water

comes from dripping rocks at the west end, where also the most abundant evidences of the former inhabitants can be found.

The island is apparently being gradually blown into the ocean. The pebbles on the uplands are taken up by the wind like sand and blown about. The caves along the coast are similar to other ocean caves. Sand-dunes fill the canyons and have carved the bluffs into giant stairs leading from the mesa to the ocean. The surrounding beds of kelp make landing difficult.

Mrs. Trask collected 80 plants, but some were not sufficiently advanced for identification. Twelve were described as new.

In March, 1932, Mr. J. T. Howell, when on the Templeton Crocker Expedition of the California Academy of Sciences to the Galapagos Islands, landed at the south end and collected 34 numbers, adding 7 to Mrs. Trask's list, and, from more adequate material, naming some that had not been specifically determined. He collected also some hepatics (*Asterella*, *Targionia*, and *Sphaerocarpus*). His account and list were published in the Proceedings of the California Academy of Sciences (ser. 4, 21:277—284,—1935).

Other species have been described from specimens that Mrs. Trask distributed to other herbariums. Altogether about 95 species and varieties have been listed from San Nicolas. Among the shrubs found by Mrs. Trask are *Heteromeles arbutifolia*, *Lycium californicum*, *Lycium verrucosum*, *Artemisia californica* var. *insularis*, *Baccharis consanguinea*, *Coreopsis gigantea*, and two species of *Opuntia*.

SANTA CRUZ ISLAND

This is one of the larger islands, 21 miles long and averaging 5 miles wide. Like all the other large islands, it is mountainous, several peaks reaching an elevation of over 2400 ft. These mountain ridges are cut into by innumerable canyons and gulches, many of which reach the sea. Small streams run through them and form sandy beaches where small boats can land. These canyons are more easily explored from the sea than from the land.

The caves along the shores are very remarkable, some so large as to be able to hold over 100 persons, and one especially that extends into the interior of the island in a succession of caves, the outer ones lofty and large, the inner unknown. As it takes only three hours in a launch to reach Santa Cruz Island

from Santa Barbara, its easy accessibility has lured many explorers, not only botanical but also archæological. At one time the island supported a large population of Indians whose relics are found throughout the island.

In 1874, Dr. Albert Kellogg and W. G. G. Harford spent a short time on Santa Cruz Island. Only six species resulted from their collecting, but all were new. Dr. Kellogg described *Leptosyne gigantea* (now *Coreopsis*), *Dendromecon Harfordii*, and *Grindelia latifolia*. Later, from their collection, Dr. E. L. Greene described *Saxifraga malvæfolia* (now *Jepsonia*), *Eriogonum arborescens*, and *Hazardia detonsa*. The *Lyonothamnus*, which was brought to Dr. Greene by Mr. Hazard of Santa Barbara in 1885, differs from the species on Santa Catalina. Instead of the simple leaves of the Santa Catalina tree, this has pinnately compound leaves, each leaflet similar to the simple leaves of the Santa Catalina tree. Dr. Greene named this *Lyonothamnus asplenifolius* from the resemblance to the fronds of *Asplenium*. However, similar leaves are occasionally found also on the tree of Santa Catalina Island, so now it is considered as a variety only. It is found also on Santa Rosa and San Clemente islands.

Dr. E. L. Greene spent some time on this island in July, 1886, as a guest of the owner, Justinian Caire of San Francisco. In his account which was published in the second volume of the Bulletin of the California Academy of Sciences, he describes the island and puts forth the botanical problems which it suggests. I am drawing largely from his fine description. From the harbor the island presents a delightful woodsy aspect. Pines rise on the slopes amid which shrubs flourish. One of the most interesting shrubs is *Comarostaphylos diversifolia*. This genus, founded on a Mexican plant, has characteristics of *Arbutus* and *Arctostaphylos* and is very different from the typical Californian manzanitas. When I was on Santa Cruz Island, the bushes were loaded with red berries and the color could be seen from the sea, more conspicuous than the green foliage.

The only pine on the island was originally considered to be *Pinus insignis* var. *binata*, named from trees on Guadalupe Island. As it has been found as a fossil in the early Pleistocene sediments on Santa Cruz Island and in the asphalt beds of Carpenteria, California, Dr. Mason named it *Pinus remorata*

(Madroño, 1930). Three groves occur on Santa Cruz Island, one of the largest facing the harbor. The pine is very close to, if not identical with, *Pinus muricata*, originally collected in San Luis Obispo County, but also common in many coastal areas to the north. From the northern summits, a deep and fertile valley spreads below, where the fields and vineyards, the cottages and barns of the various ranches of the Caires are situated. In the western part of the valley a never-failing stream flows down a broad and beautiful canyon to Prisoners Harbor. Dr. Greene especially mentions the trees, *Acer macrophyllum*, *Quercus agrifolia*, *Populus trichocarpa*, *Salix laevigata*, *Prunus Lyoni*, and the fern-leaved *Lyonothamnus*. Dr. Greene's collecting was limited to the western part of the island. He collected 321 species and described more than 20 as new. Later, he added other species after more study.

In the early spring of 1887 or 1888, Mr. T. S. Brandegee visited Santa Cruz and Santa Rosa islands. He published a list of the species collected on Santa Cruz and an account of Santa Rosa with a list of species in the Proceedings of the California Academy of Sciences, October, 1888. His additions to Dr. Greene's list numbered about 80.

Mr. Ralph Hoffmann, Director of the Santa Barbara Museum of Natural History, who lost his life in 1932 while exploring San Miguel Island, probably knew the natural history of the island as no one else. He was an authority on birds. His interest in plants was later. His collections are in the Herbarium of the Santa Barbara Museum of Natural History. It is unfortunate that he did not live to finish his work on these islands. He began to publish the list of additions in the Bulletin of the Southern California Academy of Sciences, vol. 31, pt. 2 (1932). From his notes and lists, Dr. P. A. Munz completed the list in part 3 of the same volume, adding several species from a list of Ira D. Clokey published in the Bull. S. Calif. Acad. Sci., vol. 30.

SANTA ROSA ISLAND

I have taken the description which follows from Rider's "California," with some alterations. Santa Rosa Island lies 3 miles from San Miguel Island and is separated from Santa Cruz Island by a 5-mile channel. Rider likens it to a giant ray measuring 15 miles across the fins from east to west and 10 miles

from head to tail. The highest peak has an elevation of 1562 ft. and rises near the center of the island. The shores are high precipitous bluffs with many small bays but no good harbors. Many large caves penetrate the bluffs. At Sandy Point, there are sand-dunes 400 ft. high. The canyons contain water and in them and on the sheltered slopes the trees and other vegetation flourish. It has less protection from wind than Santa Cruz Island and that may account for fewer species. However, it has been less explored. The whole island is a great sheep ranch of 45,000 acres.

The first botanical collection was made by Mr. T. S. Brandegee, who visited it on the same trip as that to Santa Cruz. In the Proceedings of the California Academy of Sciences, 1888, he gave a description of the island, comparing the flora with that of the other islands and the mainland. Among the 100 species that he listed, 36 were insular and had been named as species from Santa Cruz and San Miguel islands by Dr. Greene. There were also many cosmopolitan species, mostly weeds.

Mr. Ralph Hoffmann made several trips to this island, and, in the lists published in the Proceedings of the Southern California Academy of Sciences (vol. 31,—1932), added 48 grasses and sedges, 5 ferns, and 35 miscellaneous.

There are two species of pines on Santa Rosa Island, *Pinus remorata*, the Santa Cruz Island Pine, and *Pinus Torreyana*, which is found also on the mainland near San Diego. It is remarkable that this pine should be found only in these widely separated parts of California, and suggests that, like *P. remorata*, it belongs to a previous geologic age.

SAN MIGUEL ISLAND

San Miguel Island is the most western and northern of all the islands of the archipelago. It is a small island $7 \frac{1}{7}$ miles long and 2 miles wide. It does not have the protection of Pt. Conception as do the other Santa Barbara Islands, but receives the full force of the northwest winds and appears to be blowing away. The great sand-dunes at the west end are continually increasing, drifting over the island, destroying whatever vegetation may once have flourished or still persists.

According to Dr. E. L. Greene, who was the first to make a botanical collection on the island late in August, 1886, it is of

the nature of a tableland, its shores rising abruptly to a height of 200 to 300 ft. elevation. The mound-like peaks near the center of the island have an elevation of 850 to 861 ft. Cuyler Harbor, where Cabrillo landed, is the most sheltered harbor on the southern coast, though navigation is dangerous owing to the many low reefs, the fogs, and the winds. Dr. Greene found only three shrubby species, *Heteromeles arbutifolia*, *Lavatera assurgentiflora*, and a few stunted specimens of *Rhus integrifolia*. These shrubs were all apparently verging to extinction. Dr. Greene collected 121 phanerogams, 7 of which he described as new. No ferns were found.

Mr. Ralph Hoffmann began to collect on the islands in 1925 and added many species to former lists. On San Miguel, he collected 74 not listed by Dr. Greene. Among these were 18 species of grasses, all cosmopolitan except *Poa Douglasii*. The common small rush, *Juncus bufonius*, was the only other addition to the monocotyledons.

MY VISITS TO GUADALUPE ISLAND

BY JOHN THOMAS HOWELL

I have made two short visits to Guadalupe Island off the coast of Lower California, both with Mr. Templeton Crocker on his yacht *Zaca*. My first visit was in November, 1931, when I spent two days ashore near the north end of the island and one day at the south end inland from Melpomene Cove; the second visit was in March, 1932, when the Templeton Crocker Expedition of the California Academy of Sciences stopped at the island for three days *en route* to the Revillagigedo Islands and the Galapagos Islands. Since even after nine years no complete account of these visits has been given, I am taking this opportunity to record some of my observations made at that time and later plan a list of the vascular plants which I collected.

Guadalupe Island is composed of volcanic rocks and lies about 135 miles west of the coast of Lower California, a little above the middle of the peninsula. In outline, resembling an elongate mis-shapen Indian arrowhead with nearly a north-south axis, about 20 miles long and up to 7 miles wide, the island rises

from oceanic depths as a colossal peak, of which only the upper fourth is above water. Its shores rise precipitously at nearly all points directly from the sea: near the north end rising to the highest peak of 4500 ft., but at the south end to only 1000 ft. or less. Deep, steep canyons cut back into the island, and here and there along the shore are smaller or larger beaches which are usually awash at high tide, the home of the grotesque Northern Elephant Seal. The elevated ridges at the north end of the island penetrate a higher, moisture-laden stratum of air, and it is there that the trees of the island, the pine, cypress, and oak, are found. The lower southern part is a desert where the sparse vegetation nowhere conceals the raw vestiges of recent volcanic activity.

Thousands of goats, introduced many years ago in a commercial goat-raising project, roam over the island seeking all plant life that they may devour. Because of their ravages, many of the rare plants endemic to the island have been exterminated and it is only a matter of time until the trees disappear too, since they are unable to reproduce. It would seem that the goats have been most destructive on the northern part of the island; from observations I made I judged that they rarely go into the extreme desert at the south end and that there the vegetation may be much less affected.

On my first excursion ashore on November 14, I hoped to climb to the cypress grove high on the top of Mt. Augusta, more than 4000 ft. above sea-level; but immediately I was delayed by liverworts, which proved an irresistible attraction (see D. Suttcliffe, "Hepaticae of Guadalupe Island," *Bryologist* 35:41), and by noon I was lunching in a small cluster of oaks at the head of the rocky canyon above the barracks. I returned later to the *Zaca* without reaching the cypresses to find that Mr. Crocker had brought aboard some delectable botanical booty, found in steep-walled coves along the shore, inaccessible to the ravaging goats.

The next day I climbed to the pines which grow on the narrow top of the high northernmost ridge of the island. To the west of this ridge, which is a veritable hogback in places, a precipice drops to the surf-bordered blue of the Pacific. Pines contorted in trunk and wind-blown in crown cling tenaciously to the rocky wall, framing charming vistas of cliff and sea. Down the steep

slope they grow, together with the island oak, to meet the island palm, *Erythea edulis* (Wendl.) Wats., which marches singly and in small groves up the slopes from the strand. Where else in nature do palm and pine meet to frame such a delightful prospect?

The enjoyment of this inspiring scene and the study of the pines was abruptly terminated by a torrential downpour which seemed to envelop the entire northern end of the island. After it had abated we began our slippery descent to the *Zaca*. Streams of muddy water poured down the gullies, and from the cliffs across the canyon from us a half-dozen waterfalls leapt into the air to mingle below with the muddy torrent in the canyon bottom. Nowhere had the ravaging goats left enough vegetation to hold soil and rocks, and the roar that filled the air was the dull roar of rocks and mud being dragged down to the sea.

The third day, November 16, I went ashore at Melpomene Cove at the south end of the island. Here precipitous bluffs of stratified beds of ash, lava, and lithified mud are capped by a lava flow. The rocks are light colored and are in marked contrast to the dark and more massive volcanic rocks of the northern part of the island. Inland from the cove is a volcanic tableland bounded by ashy ridges and cinder-cones and everywhere is the facies of an extreme desert. Apparently it had not even sprinkled in this parched land although only the day before there had been such a torrential downpour at higher elevations a few miles to the north. It was a region without trees, the most abundant and noticeable vegetation being low scraggly bushes of *Atriplex Palmeri*, thickets of *Lycium californicum*, and hemispherical mounds of *Hemizonia Greeneana*.

Four months later, on March 16, 1932, I again found myself beneath the forbidding dark brown and gray cliffs and ridges of Guadalupe Island's Northeast Anchorage. Intrigued by the problem of insular variations noted in the pines on the island, I again climbed to the pine grove. Small herbs, such as grasses, clovers, and filaree, were abundant among the rocks on the steep slope of the ridge, and the grove itself was especially attractive with its smooth undercover of green grass which was kept well mowed by the goats. The appearance was that of a carefully tended park. Alas! the goats were tending it only too carefully!

The day following, accompanied by Jack Ratikan, able seaman of the *Zaca*, I began a two-day traverse of the island from the Northeast Anchorage near the north end to Melpomene Cove at the south end. It was a grand adventure and it proved very profitable botanically because I found not only a number of the rare island endemics but also a number of plants not reported before from the island. Each of us carried his own bed-roll, Jack carried water and food, and I was loaded with plant-press, camera, and other paraphernalia. Most of the first day was spent attaining the 4000-foot summit of Mt. Augusta and the grove of Guadalupe Cypress. It was a long climb, first up the rocky canyon and steep slopes above the barracks, then over basaltic escarpments and terraces to the crest of the island. The cypress grove presented an extensiveness for which I was not prepared. The fringe of trees along the skyline as viewed from the Northeast Anchorage proved to be only the eastern edge of a fine and beautiful grove which grows on an undulating mesa with a gentle slope to the west. The grove at its northern end thins out to a narrow scattered growth, but a mile farther south it is broad, perhaps a mile wide, and encloses grassy meadows with attractive park-like vistas. For about two miles it extends thus along the summit plateau, at the south edge ending rather abruptly where the plateau drops off into the somewhat lower, middle stretches of the island.

We camped for the night near the southern limit of the cypresses where there was an abundance of dry wood and where we were able to obtain water for tea from pot-holes in the bed of a small stream. Little or no water flowed in the numerous shallow brook channels which extended westward across the cypress grove, their water-carrying being limited to periods of rainfall. From our camp we looked out over the billowy top of a high fog which was perhaps 2000 ft. below us and which extended as far as the eye could see. A north wind blew, a wind which had been violent at lower elevations, but was more moderate and warmer at the top of the island. Darkness fell rapidly after sunset and there was a wonderful golden afterglow; and overhead the night was perfectly clear. An ambition was being realized: I was sleeping out in the only grove of Guadalupe Cypress in the world!

At 5:20 the following morning (March 18), we were up just as dawn began to dim the stars and by 6:30 we were off for the south end of the island. Immediately after leaving the cypress grove, which ended abruptly with the lava plateau, we descended to the middle stretches of the island which is punctuated with numerous cinder cones. Everywhere the ground was covered by loose rocks about the size and shape of a baseball and walking was very difficult and very tiring. About 1.5 or 2 miles south of the cypresses we came to a ghost grove which I took to be what was left of the California Juniper (*Juniperus californica*) reported by Palmer as "all over the middle of the island . . ." (Proc. Amer. Acad. 11:119) and by Greene as on the verge of extinction (Bull Calif. Acad. Sci. 1:217). Apparently the species is now extinct on the island although it once extended for several miles as evidenced by the dead remains. Soon the dead remains of another plant appeared (*Franseria camphorata*), but as we advanced a few live stumps were seen and still farther south we found shrubs a foot or two tall. This seemed to indicate that the ravages of the goats decrease as one passes from the middle of the island southward. Whereas several large herds of goats were seen in the northern part of the island, only a few individuals (6 or 8) were counted in the valley at the south end above Melpomene Cove.

The day was very hot and all the water we had was what we carried. We crossed broad transverse valleys and we skirted others which descended to the coast, but all the time we remained high above the coast in the middle of the island; and everywhere the ground was covered by the rocks that were too small to walk on and too numerous to step between. By noon we reached the peak above Jacks Bay, the highest point in the southern part of the island. Just beyond it we had our first glimpse of Melpomene Cove still far to the south of us and below us, and we hastened on toward the ashy ridges and cinder cones which I had explored the preceding November. In the late afternoon, we were met by men from the *Zaca* who came inland to look for us and they relieved us of excessive impedimenta for the last lap of our tramp. I still paused here and there to collect, but by 5 o'clock I was again aboard the *Zaca*. On the strenuous two-day trip during which Jack Ratikan and I had climbed over a 4000-foot

mountain and traversed about 20 miles of intolerable terrain, I had collected about sixty-five specimens of which twenty had not before been reported from the island or had been known from only a single collection.

THE LUPINUS LATIFOLIUS AGGREGATE

BY ALICE EASTWOOD

All of these have either been considered varieties of *L. latifolius* Agardh or identical with that species and those named as varieties have not been listed in Index Kewensis. Since, after all, the distinction is relative, it has seemed simpler to me in this key to consider all as species. The group may be characterized as follows: plants widely branching above; leaflets generally broadest near the top, generally glabrous above, finely pubescent below; corolla with broad banner and wings; keel ciliate near the base.

KEY TO THE SPECIES

Flowers 15—16 mm. long.

Stems stout and erect, with large, long-petioled basal leaves, pubescence fine and appressed.....*L. Parishii* (C. P. Sm.) Eastw.

Stems decumbent at base, 3—4 dm. tall, villous with long spreading hairs.....*L. Dudleyi* (C. P. Sm.) Eastw.

Flowers 12 mm. long.

Leaves green on upper surface, paler on lower; raceme densely flowered.....*L. Pennellianus* Heller

Leaves green on both sides; racemes loosely flowered.

Pubescence fine and appressed.....*L. lasiotropis* Greene

Pubescence fine but spreading.....*L. cytisoides* Agardh

Flowers 10 mm. long.

Leaves green on both sides, pubescence fine and appressed, leaflets obtuse at apex.....*L. latifolius* Agardh

Leaves green on upper side, paler below, sometimes finely appressed-pubescent above, denser below, leaflets acute or acuminate
.....*L. columbianus* Heller

Flowers less than 10 mm. long; leaves green on both sides.....
.....*L. viridifolius* Heller

LUPINUS PARISHII Eastwood. This species has been discussed in LEAFLETS OF WESTERN BOTANY, 2:181. It is the largest-flowered perennial lupine in the Sierra Nevada, growing in wet places, distinguished by the large long-petioled basal leaves and the keel ciliate near the base.

Lupinus Dudleyi (C. P. Sm.) Eastwood, comb. nov. *L. latifolius* var. *Dudleyi* C. P. Sm. in Jepson Man. Fl. Pl. Calif. 530 (1925). Apparently this is a local species, so far found only on Mt. Montara, San Mateo County, California, where it was collected by Dr. William R. Dudley.

Lupinus Pennellianus Heller, spec. nov. Robustus, circa 1 m. altus, supra ramosus brevibus ramulis, puberulus; foliolis circa 7, oblongo-oblanceolatis, exigue aristatis, 5—6 cm. longis, 1—2 cm. latis, supra glabris, infra pallidis et adpresse pubescentibus; petiolis tenuissimis, longioribus foliolis; stipulis disjunctis, subulatis, infimis 1 cm. longis, villosis; racemis dense floriferis, superantibus folia, longioribus pedunculis; bracteis deciduis; pedicellis 3 mm. longis; floribus 12 mm. longis, violaceis, vexillo et alis separatim 5 mm.; calycis superiore labio basi saccato, 6 mm. longo, ovato, acuminato, breviter 2-dentato, labio inferiore 5 mm. longo, lanceolato, obtuso; vexillo basi saccato, suborbiculari, prope 1 cm. lato, apice conjuncto; alis 12 mm. longis, 7 mm. latis, 1—2 mm. longioribus vexillo; carina curvata attenuata exserta, ciliata basi; legumine ignoto.

Type: Herb. Calif. Acad. Sci. No. 281632, collected June 5, 1940, from a large colony growing on a roadside bank on the edge of the forest in granitic soil along the Feather River Highway between Pulga and Arch Rock Tunnel, Butte County, California, *Heller No. 15705*. "Dr. Francis W. Pennell, his wife, and son accompanied me on the trip when it was collected. It gives me pleasure to commemorate Dr. Pennell's services to taxonomy by naming this beautiful lupine in his honor."

Lupinus lasiotropis Greene, spec. nov. in herb. Elatus, ramosus divaricate, leviter adpresse pubescens; foliolis circa 7, oblanceolatis, 4 cm. longis, 1—1.5 cm. latis, acutis et exigue aristatis, viridibus, supra glabris, infra adpresso-pubescentibus; racemis circa 2.5 dm. longis, laxe floriferis, superantibus folia; bracteis filiformibus, superantibus gemmas, deciduis; pedicellis filiformibus, divaricatis, circa 8 mm. longis; pedunculis abditis foliis; floribus 12 mm. longis, purpureis, brunneis in senectute; calyce basi 4 mm. lato, adpresso-pubescente, labio superiore ovato, basi saccato, 5 mm. longo, bidentato, labio inferiore 6 mm. longo, lanceolato, obtuso, vexillo et alis separatim 2 mm., vexillo suborbiculari, circa 12 mm. lato, basi saccato, paulum brevioribus alis; alis 12 mm. longis, 6 mm. latis; carina curvata, apice acuta, ad basin ciliata.

Type: Herb. Calif. Acad. Sci. No. 62852. This is *No. 470* of C. F. Baker's distribution and was collected by him at Crystal Springs Lake, San Mateo County, California. "Small colonies frequent along banks, especially in shady places, the plants 2—3 feet in height. One of the largest, finest lupines of this region.

Also not uncommon near Stanford University." "Long known to me, never described." (E. L. Greene.)

This differs from typical *L. latifolius* Agardh most noticeably in the larger flowers and more pointed leaflets, and from *L. cytisoides* Agardh in the different pubescence. Specimens from Monterey where Douglas probably collected *L. latifolius* have been used for comparison.

LUPINUS CYTISOIDES Agardh. Specimens collected by the author in Mission Canyon, Santa Barbara, seem to fit the description of this species. The flowers are larger than those of *L. latifolius* Agardh of which it has been made a synonym. The fine short hairs of the pubescence are spreading rather than appressed as in *L. latifolius* and altogether it is more hairy.

LUPINUS LATIFOLIUS Agardh. This was probably collected at or near Monterey by Douglas. Several specimens from there agree with the photograph and description of the type. It is also common in other places. The purplish flowers soon turn a tawny brown on the long racemes.

LUPINUS COLUMBIANUS Heller. This lupine grows at lower elevations in the Mt. Hood region, Oregon. It extends into Washington and the Siskiyou Mts. in northern California.

LUPINUS VIRIDIFOLIUS Heller. This is common at lower elevations in the mountains of northern California and is readily distinguished by its vivid green leaves and small purplish flowers.

THE USE OF PLANTS FOR FISH-POISONING BY THE CALIFORNIA INDIANS

BY ROBERT F. HEIZER

University of Oregon, Eugene, Oregon

Within the present territorial boundaries of the State of California in aboriginal times were a series of Indian tribes who employed crushed plant materials to secure fish. The usual method was to crush or macerate the plant stalks, leaves, or roots, and to throw them into the water. The action of the plant juices had a narcotic or stupefying effect upon the fish, and they soon floated to the surface and were easily picked up. Smaller fish usually were killed outright, but larger ones might be less affected and could then be easily harpooned as they swam about sluggishly.

Two plants were favored most widely, Turkey Mullein (*Eremocarpus setigerus* Benth.) and Soaproot (*Chlorogalum pomeridianum* Kunth). Plants of Turkey Mullein are crushed into a pulp and thrown into a slow-moving stream or pool by the following tribes:¹ Yokuts (southern San Joaquin Valley), Mono, Pomo (vicinity of Clear Lake), Maidu, Wappo (Napa Valley), and Nisenan. Roots of the Soaproot are used in a similar manner by the Sinkyone (upper Mattole River), Chilula, Wiyot, Nongatl, Yuki, Mattole, Yana, Wintu, Pomo, Valley Maidu, Foothill Nisenan, Miwok, and Yokuts. Seeds of Buckeye, *Æsculus californica* (Spach) Nutt. are hulled, pounded, and either thrown into the water directly, or soured up and down in the pool in an open-work basket. The tribes known to have used these seeds for fish-stupefying include the Pomo, Coast Miwok, Nisenan, Miwok, and Yokuts. Other plants used by various tribes are as follows: Wild Parsnip, Sinkyone tribe; Pepperwood or Bay (*Umbellularia californica* Nutt.), Southern Miwok; Horehound (*Lycopus* sp.), Maidu; Manroot (*Echinocystis fabacea* Naud. or *E. oregana* Cogn.), Pomo; Slim Solomon (*Smilacina sessilifolia* Nutt.), Owens Valley Paiute; *Leptotenia multifida* Nutt., Washo of Lake Tahoe; *Trichostema lanceolatum* Gray, Nomlaki and Maidu.

A comparison of the actual distribution of botanical species (from Jepson's Manual of Flowering Plants . . .) with the distribution of the ethnographic or cultural use of individual plant species clearly indicates that there is a differential of natural occurrence and cultural utilization. The implication is of possible general significance, particularly in view of parallel examples, in demonstrating that the efficient utilization of the external environment depends upon "cultural recognition" of the utilitarian possibilities in the plants which nature offers. Merrill² shows by a series of maps that the actual botanical distribution of plants used for basketry by the California Indians is consistently wider than the areas of their utilization.

¹ For the exact locations of these tribes, see A. L. Kroeber, Handbook of the Indians of California, Bureau of American Ethnology, Bulletin 78, Washington, 1925.

² Merrill, R. E. Plants Used in Basketry by the California Indians, Univ. of Calif. Publ. in Amer. Arch. and Ethnol. 20:215-242 (1923). List (pp. 235-240) of seventy-eight plant species representing thirty-six plant families.

A NOTE ON HALOGETON¹

BY C. V. MORTON

Washington, D. C.

A new weed of the family *Chenopodiaceae* has recently been introduced into the United States, and from present indications may possibly become a pest like its relative *Salsola*. It was first reported by Dr. Paul C. Standley² under the name *Halogeton sativus* (L.) C. A. Mey, the identification being by Dr. Paul Aellen. The original specimens were collected at Wells, Elko County, Nevada, in August, 1935, by Mr. Ben Stahmann.

Recently Dr. Bassett Maguire has sent two additional collections of the same species, one collected at Bull Canyon, Elk Mountains, Humboldt National Forest, Elko County, Nevada, June 11, 1939, *Maguire No. 17043*, the other at Wells, Nevada, September 29, 1938, by Howard Passey. Dr. Raymond Fosberg has also shown the author two specimens, one collected at the junction of the Ruby Valley-Ely Highway, at Warm Springs Ranch, Elko County, Nevada, 6000 feet elevation, September 10, 1937, *Train No. 960*, and one 10 miles north of Deeth, Elko County, Nevada, July 30, 1937, *Train No. 557*.

There are some questions of nomenclature which need to be discussed. The author of the combination *Halogeton sativus* is not C. A. Meyer, as given by Standley. Meyer (in Ledebour, *Flora Altaica* 1: 378,—1829) merely referred *Salsola sativa* L. to the genus *Halogeton* with doubt, and did not make a combination. The binary name was first published by Moquin-Tandon in his "Chenopodearum Monographica Enumeratio," p. 158 (1840). Dr. J. F. Macbride has shown, however, that *Salsola sativa* L. (1762) is antedated by *Salsola Souda* Loeff. (*Iter Hispanicum* 132,—1758), and has made the combination *Halogeton Souda* (Loeff.) Macbr. (*Contr. Gray Herb. n. ser.* 53:13,—1918).

Halogeton Souda is a native of Algeria and Spain. The author has examined a good specimen with both flowers and fruits from Biskra, Algeria, collected by Professor L. Chevallier. The plants introduced into Nevada do not agree with this, but do agree exactly with specimens of *H. glomeratus* (M. Bieb.)

¹ Published by permission of the Secretary of the Smithsonian Institution.

² *Field Mus. Publ. Bot.* 17:240 (1937).

C. A. Mey. from the Altai Mountains, Siberia, collected by Bunge, and from Songaria, Siberia, collected by Schrenk. The species, the type of the genus, differs from *H. Souda* in having 3, rather than 5 stamens, and in the smaller, more nearly equal wings of the fruiting perianth. The proper name and citation for the plant introduced into the United States is as follows:

HALOGETON GLOMERATUS (M. Bieb.) C. A. Mey. in Ledebour, Fl. Altaica 1: 378 (1829); Ledebour, Icon. Pl. Nov. Fl. Ross. 1: pl. 40 (1829). *Anabasis glomerata* M. Bieb. in Mem. Soc. Nat. Moscou 1: 110 (1808).

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NOTES ON THE EASTWOOD BLACKBERRY

BY JOHN THOMAS HOWELL

In 1905, as now, it was a custom that visitors to the Academy's Department of Botany should be guests on a field excursion to Mt. Tamalpais in Marin County, in order to see at first-hand one of California's outstanding botanical districts. So it is not surprising that on June 15 of that year Miss Eastwood had as her guest on an excursion to the mountain, Dr. P. A. Rydberg of the New York Botanical Garden; and it is also quite understandable that he should show his appreciation by naming a peculiar blackberry he discovered during the course of the day, *Rubus Eastwoodianus*. Since even now, after thirty-six years, very little is known about the field occurrence and taxonomic status of this blackberry, I am presenting herewith what I have learned about it since I rediscovered it on Mt. Tamalpais.

According to Miss Eastwood, she and Dr. Rydberg went from Mill Valley as far as Rock Spring at the west end of the mountain, where they had lunch. Since she had a field excursion to Muir Woods in the afternoon with the California Botanical Club, she returned to Mill Valley to meet the club, leaving Dr. Rydberg to botanize and to return later. Hence, it can be reasonably inferred that it was some place on the south side of Mt. Tamalpais between Mill Valley and Rock Spring where Rydberg collected the Eastwood Blackberry. It is there I have searched for a blackberry that is nearly glabrous throughout, even to the fruit.

Blackberries are not uncommon on the south side of Mt. Tamalpais, usually growing on partly shaded slopes in the can-

yons or in exposed sunny places on the edge of the chaparral. Such plants are variable in appearance and character, but none of them was seen with subglabrous stems and leaves and all have hairy fruits. In only two places on the south side of Mt. Tamalpais have I found plants which agree in matters of vesture with Rydberg's original description. These are plants growing near springs in thickets of Western Azalea (*Rhododendron occidentale*) at Azalea Flat on the Matt Davis Trail and near Bootjack. Although the leaves of the plants that have been studied and collected at these two places do not entirely agree with the leaves of *Rubus Eastwoodianus* as described by Rydberg or as shown by photographs of the original specimens collected by Rydberg, I believe these plants are definitely the Eastwood Blackberry. In fact it seems quite probable that the locality where the plant was originally collected is in the vicinity of Bootjack, a locality less than a mile from Rock Spring, where Miss Eastwood and Dr. Rydberg lunched.

Rubus Eastwoodianus is not the only peculiar plant found in the springy places at Bootjack and Azalea Flat, for at both places there are other plants that are either generally rare or that are rare and unusual as they occur on Mt. Tamalpais. The wet sloping meadow at Bootjack is the type locality of *Zigadenus fontanus* Eastwood and probably the type locality of *Cirsium montigenum* Petrak, both of which are species restricted to the Tamalpais region or extending but little beyond it. In both places are shrubby plants of the California Wax-myrtle (*Myrica californica*) as well as Western Azalea, and in both are such herbs as *Carex debiliformis*, *Parnassia californica*, and *Hypericum anagalloides*. At Azalea Flat there are also such notable species as *Panicum pacificum*, *Eleocharis rostellata*, *Carex ablata*, *Juncus Bolanderi*, *Sisyrinchium californicum*, *Horkelia tenuiloba*, and *Cicuta californica*; and at Bootjack *Brodiaea peduncularis* and *Stachys pycnantha* have been found. So, it will be seen that on Mt. Tamalpais the Eastwood Blackberry is a part of a unique plant association; and it may be surmised that the peculiar factors, climatic, edaphic, and geologic, that have conditioned this association have perhaps also been the selective factors by which this distinctive plant has been segregated from the variable complex of Californian blackberries.

A NEW NAME FOR *Heterocodon rariflorum* Nutt.

BY ROGERS MCVAUGH

Washington, D. C.

The campanulaceous genus *Heterocodon* Nutt. (Trans. Amer. Phil. Soc. n. s. 8:255,—1843), comprises a single species, *H. rariflorum* Nutt., *l. c.*, a native of the northwestern United States and southwestern Canada. The genus is closely related to *Specularia* Heist. ex Fabric. and is, indeed, inseparable from that group except by the following character:

In *Specularia* the capsule is dehiscent by well-defined lateral valves, these formed by the curling from base toward apex of a small portion of the capsule wall. The opening thus formed in the wall is usually symmetrical, ellipsoid or oval, with smooth and sharply defined margins.

In *Heterocodon* the dehiscence of the capsule is exactly as described above except that the valve is less well-differentiated, curling of the valve is less in extent, and the capsule wall is ruptured irregularly. The resultant opening is thus not smooth and symmetrical, but has jagged edges and is partly closed by the persistent and partially upcurved "lid" of the valve.

A character of the sort described above does not seem to the writer to be of generic value, especially since *Specularia* includes a considerable number of species which have the following characters in common with *Heterocodon rariflorum*: 1. annual duration; 2. sessile leaves and flowers, the latter in small clusters in the axils; 3. flowers of two sorts, the earlier with undeveloped corolla and 3 or 4 calyx-lobes, the later complete, with 5 calyx-lobes.

It seems best, therefore, to regard the species previously called *Heterocodon rariflorum* Nutt. as a member of the widely distributed and well-marked (for the *Campanulaceæ*) genus *Specularia*. The species in question may be designated as ***Specularia rariflora*** (Nutt.) McVaugh, comb. nov.

Division of Plant Exploration and Introduction,
Bureau of Plant Industry, U. S. Department of Agriculture,
Washington, D. C.

LEAFLETS *of* WESTERN BOTANY

CONTENTS

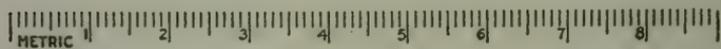
	PAGE
Interesting Western Plants—V	49
PHILIP A. MUNZ	
Two Names in <i>Mentzelia</i>	53
GEORGE J. GOODMAN	
The Islands of Southern California and a List of the Recorded Plants	54
ALICE EASTWOOD	
Plants New to California	79
JOHN THOMAS HOWELL	

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

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ALICE EASTWOOD and JOHN THOMAS HOWELL

INTERESTING WESTERN PLANTS—V*

BY PHILIP A. MUNZ

Pomona College, Claremont, California

Astragalus Jaegerianus Munz, spec. nov. Planta perennis, diffusa; ramis decumbentibus aut ascendentibus, flexuosis, 3—5 dm. longis; caulibus teretibus, striatis, 2—2.5 mm. crassis, strigosis, cum ramulis cinereo-strigosis ascendentibus, 1—1.5 dm. longis; foliis 3—7 cm. longis; stipulis lanceolato-deltaideis, 1—4 mm. longis; foliolis 7 ad 13, sublinearibus aut linear-ellipticis, 5—25 (vel 30) mm. longis, 0.5—2 (vel 3) mm. latis, subcinereis; pedunculis 3.5—6 cm. longis; racemis 2—6 cm. longis, floribus 5 ad 11, bracteis lanceolatis, 1 mm. longis; calycibus nigro-strigosis, tubo 2.5—3 mm. longo, dentibus subulatis, 2 mm. longis; corollis roseis vel ochroleucis, 9 mm. longis; vexillis 8 mm. latis; alis 8 mm. longis, 2.5 mm. latis; carinis 6 mm. longis; capsulis siccis duris, pendulis, rectis, glabris, compresso-teretibus, 2—2.5 cm. longis, 3—3.5 mm. latis, 2.5 mm. crassis, subreticulatis, stipitatis (3—4 mm.), fere 2-loculis.

Perennial, somewhat woody at base, with decumbent and often zigzag branches at least 3—5 dm. long or more, usually growing up through low bushes; main stems terete, striate, 1.5—2.5 mm. thick, strigose, the internodes 2—5 (or 7) cm. long, branches ascending, 1—1.5 dm. long, slender, cinereous-strigose, with internodes 1.5—2.5 cm. long; leaves 3—7 cm. long; stipules lance-deltoid, 1—4 mm. long, with some black hairs; leaflets 7 to 13, linear to linear-elliptic, 5—25 (or 30) mm. long, 0.5—2 (or 3) mm. wide, subcinereous-strigose; peduncles 3.5—4.5 (or 6) cm. long, racemes 2—6 cm. long, flowers 5 to 11, bracts lanceolate, about 1 mm. long; calyx black-strigose, the tube 2.5—3 mm. long, the teeth subulate, 2 mm. long; corolla ochroleucous or purple- to violet-rose with deeper veining and becoming ochroleucous in age, about 9 mm. long; banner 9 mm. long, 8 mm. wide, suborbicular in terminal portion, slightly emarginate; wings about 8 mm. long, 2.5 mm. wide, subacute, the claw 3 mm. long; keel 6 mm. long, 2.5 mm. wide, blunt; pod mottled and fleshy when fresh, rather hard when dry, pendant, straight, glabrous, subterete and shining when fresh, somewhat compressed and coarse-reticulate when dry, 2—2.5 cm. long, 3—3.5 mm. wide, about 2.5 mm. thick, abruptly acute at apex, gradually attenuate at base into a stipe 3—4 mm. long, upper suture forming a low flat ridge, the lower somewhat the same but less conspicuous, the septum quite reaching the upper suture but not the apex of the pod; seeds several.

Type from 2 miles south of Jay Mine, about 12 miles south of Goldstone and 30 miles northeast of Yermo, Mohave Desert, San Bernardino Co., California, April 26, 1941, at about 3000 ft., *Munz No. 16580*, Pomona College Herbarium No. 258775; isotypes will be deposited in several herbaria. First collected by

* Unless otherwise indicated, the plant specimens cited in this paper are in the Herbarium of Pomona College.

E. C. Jaeger at about the same place, April 16, 1939; another collection is *Munz No. 16581* from 15 miles north of Barstow on the road to Superior Dry Lake. So far as I can determine, the proposed species runs in Rydberg's treatment in the North American Flora (24: 399,—1939) to the genus *Brachyphragma* and seems nearest to *Astragalus pachypus* Greene in its compressed, stipitate, almost 2-celled pod, but differs in its glabrous, more narrow, straight pod, smaller leaflets and flowers, and more intricately branched and decumbent habit.

Astragalus Marcusjonesii Munz, nom. nov. *Astragalus amphioxys* × *Layneæ* Jones, Rev. Astrag., 215 (1923); *Xylophacos melanocalyx* Rydb., Bull. Torr. Bot. Club 52:149 (1925), not *Astragalus melanocalyx* Boiss., Nouv. Mém. Soc. Nat. Hist. Mosc. 12: 59 (1860). Study of a considerable series of specimens from Utah, Nevada, and Arizona convinces me of the specific validity of Rydberg's *Xylophacos melanocalyx* with its black-hairy calyx and straighter pod than in *Astragalus amphioxys* which has a white-hairy calyx. Rydberg's type was *Jones No. 5009* from Copper Mine, southwestern Utah. Since the name *melanocalyx* has already been used in *Astragalus*, I propose the appellation *Marcusjonesii* in honor of a long-time student of this genus. I refer here two Californian collections, both from San Bernardino Co.: 10 miles north of Kessler Springs, eastern Mohave Desert, at 4000 ft., May 5, 1935, *Munz No. 13750*; and west side of Ivanpah Mts., May 11, 1940, *E. C. Jaeger*.

ASTRAGALUS WOOTONI Sheldon, Minn. Bot. Studies 1:138 (1894). *A. triflorus* (DC.) Gray, 1853, not *Phaca triflora* DC., 1802; *A. playanus* Jones, Contr. W. Bot. 8: 6 (1898); *A. triflorus* var. *playanus* Jones, Rev. Astrag., 106 (1923). Reported by Rydberg (No. Amer. Fl. 24: 350,—1929) as from Arizona to Texas and Mexico. Collected at Goffs, eastern Mohave Desert, San Bernardino Co., California, Apr. 7, 1940, *Munz No. 16336*.

ASTRAGALUS SERENOI Sheldon, Minn. Bot. Studies 1:130 (1894). Previously reported from western Nevada and White Mts., California (Jepson, Fl. Calif. 2: 363,—1936). Has recently been collected in Cottonwood Mts., Death Valley.

Oenothera cavernæ Munz, spec. nov. Planta acaulescens, cæspitosa; foliis lyrato-pinnatifidis, glanduloso-puberulentis pilosisque, 3—13 cm. longis, 0.6—2.0 cm. latis; lobis lateralibus apice rotundatis, lanceolato-

oblongis aut ovato-oblongis; lobo terminali oblongo-ovato, 0.7—2.2 cm. longo; petiolo alato; hypantio tenue, piloso et glanduloso-puberulento, 2.5—4 cm. longo; sepalis reflexis, lanceolatis, 5—9 mm. longis, 2.5—3 mm. latis; petalis albis, late obovatis, 8—12 mm. longis; staminibus subæqualibus, 4—6 mm. longis; stylo glabro, lobis stigmatis rectis, 2—3.5 mm. longis; capsula sessili, lignosa, lanceolato-ovoidea, 1.5—3 cm. longa, 0.6—1.0 cm. crassa, tuberculato-costata; seminibus multis, 2 mm. longis.

Acaulescent, caespitose, winter annual with fleshy, tapering taproot; leaves in a rosette, regularly lyrate-pinnatifid into simple lobes or these somewhat crenate-dentate, the leaves oblanceolate in outline, glandular-puberulent, also pilose, with the longer non-glandular hairs with somewhat pustulate bases and borne particularly on the margins and veins; leaves 3—13 cm. long, 0.6—2.0 cm. wide, sometimes somewhat reddish, the lateral lobes rounded at the apex, lance-oblong to ovate-oblong, the smaller deltoid, about 5 to 15 lobes on each side of the winged midrib, the terminal lobes oblong-ovate, 0.7—2.2 cm. long, rounded at apex, the narrowly winged petiole constituting about $\frac{1}{4}$ the leaf-length; flowers nocturnal; hypanthium slender, whitish, coarsely and sparingly pilose and glandular-puberulent, 2.5—4 cm. long; sepals reflexed in pairs at anthesis, pilose and glandular-puberulent, green, lanceolate, acute, 5—9 mm. long, 2.5—3 mm. wide; petals white; not much reddened in age, broadly obovate, 8—12 mm. long, almost as wide; stamens subequal; the filaments whitish, flattened, about half the length of the petals, anthers yellow, 2—4 mm. long; style equalling the stamens, glabrous; stigma-lobes erect, 2—3.5 mm. long; capsule sessile, woody, lance-ovoid, with some reddish tinge, 1.5—3 cm. long, 0.6—1.0 cm. thick, somewhat pilose, with 8 longitudinal strongly tuberculate ridges; seeds many, brown, about 2 mm. long, with deeply furrowed raphe.

Type from high rocky limestone slope at Gypsum Cave, Frenchman Mts., 18 miles east of Las Vegas, Clark Co., Nevada, at 1500 ft. elevation, April 8, 1940, *Munz No. 16376*, Pomona College Herbarium No. 255352; isotypes will be distributed to a number of herbaria. First seen by me April 5, 1937, *Munz No. 14942*, but most of that collection was lost. Two other collections from Clark Co., Nevada, are the following: foothills of Spring Mts. above Arden, on limestone at 3600 ft., *R. C. Barneby No. 2885*; Sheep Mt. above Jean, on calcareous rocky slopes, *Ripley & Barneby No. 3327*, May 4, 1941.

This species seems to be a winter annual, since leaves and fruits of only one season seem to be found on a plant, and individuals of drier situations were mostly quite dead at the time the type was collected. Its leaves and habit are those of *(E. primiveris* Gray, but the smaller white flowers and less pubescence easily separate it from the yellow-flowered species. In the key

in my paper on the subgenus *Pachylophis* to which this belongs (Amer. Jour. Bot. 18:728—738,—1931), it would seem to run to *Æ. caspitosa* because of the white flowers, but the lobing of the leaves (regular and oblong), the smaller flowers, and the more definitely annual habit easily separate it. In its elongate tuberculate capsules and seeds with deeply furrowed raphe, it is unquestionably a *Pachylophis*.

In Tidestrom's Fl. Utah & Nev. (Contr. U. S. Nat. Herb. 25:380,—1925) and Rydberg's Fl. Rocky Mts., 598, 1917, it would run to *Pachylophis Johnsonii* (Parry) Rydb. But I cannot agree with the interpretation of these writers as to Parry's *Ænothera Johnsonii* (Amer. Nat. 9:270,—1875), of which the original description reads: "flowers large and yellow" and "petals one inch long" and "capsules 9—12 lines long, somewhat 4-angled, strongly veined, not crested." On an earlier page of the same volume of the American Naturalist for 1875, namely, page 18, Parry wrote, "We accordingly note the appearance of several species of *Ænothera*, conspicuous among which is a large yellow-flowered one, which being undescribed, I take pleasure in dedicating to my esteemed friend, J. E. Johnson, Esq., as *Ænothera Johnsonii* n. sp. (See appendix No. 64). Mr. Johnson, who has had this plant for many years in his garden, called my attention to the regularity and suddenness of its opening, from fifteen to twenty minutes after sunset. This opening process, as frequently observed by both of us," etc. Obviously Dr. Parry knew this plant and it cannot be the same as the white-flowered one to which I now refer. I consider *Æ. Johnsonii* a synonym of *Æ. primi-veris* Gray.

Ænothera heterochroma Wats. var. ***megalantha*** Munz, var. nov. Hypanthium 7 mm. longum; sepalis 5—6 mm. longis; petalis 1 cm. longis.

Hypanthium 7 mm. long; sepals 5—6 mm. long; petals 1 cm. long, rose to lavender, with carmine spots at base; longer stamens about as long as petals.

Type, Cain Spring, 50 miles southeast of Beatty, Skull Mts., near Wahmonie, Nye Co., Nevada, at 3400 ft. elevation, Aug. 24, 1938, *Percy Train No. 2358*, Pomona College Herbarium No. 253923; isotypes at Calif. Acad. Sci. and U. S. Dept. Agriculture. This variety differs from the typical *Æ. heterochroma* in its larger flowers, the hypanthium in the typical form being 2.5—3.5 mm. long, sepals 2.5—3 mm. long, and petals 3—5 mm. long.

Oenothera clavæformis Torr. & Frem. var. *purpurascens* (Wats.) Munz, comb. nov. *O. scapoidea* var. *purpurascens* Wats., Proc. Amer. Acad. 8:595 (1873). *O. cruciformis* Kell., Proc. Calif. Acad. 2:227, f. 71 (1863). *Chylismia scapoidea* var. *cruciformis* Small, Bull. Torr. Bot. Club 23:193 (1896). *Oenothera clavæformis* var. *cruciformis* Munz, Amer. Jour. Bot. 15:235 (1928). *Chylismia lancifolia* Heller, Muhlenbergia 2:226 (1906). This yellow-flowered variety from east of the Sierra Nevada was treated by me in my revision of the subgenus *Chylismia* as *cruciformis*, because Watson in his original description of *purpurascens* gave the flower-color as "pinkish-white or purplish, rarely yellow." But the first three specimens he cited (*Brewer No. 1845*, Mono Lake; *Watson No. 415*, Unionville Valley; and *Anderson No. 70*, Carson City) belong here and the first should be taken as the type. In dried material, flower-color is not very reliable and may account for Watson's statement.

Boisduvalia densiflora (Lindl.) Wats. var. *salicina* (Nutt.) Munz, comb. nov. *Oenothera salicina* Nutt. ex Torr. & Gray Fl. No. Amer. 1:505 (1840), in synonym.; *Boisduvalia salicina* Rydb., Bull. Torr. Bot. Club 40:62 (1913). Differing from typical *B. densiflora* in the more appressed pubescence and lack of gland-tipped hairs, and in the lance-ovate rather than orbicular-ovate floral bracts, as well as in its distinctly more inland geographic range.

TWO NAMES IN MENTZELIA

BY GEORGE J. GOODMAN

Iowa State College

In Miss Darlington's monograph of the genus *Mentzelia*,¹ one of the names, with its bibliographic reference, is given as follows: "*M. multicaulis* (Osterh.) Nelson in Coulter and Nelson, Man. Bot. Rocky Mts. 326. 1909." The first synonym listed is *M. pumila* var. *multicaulis* (Osterh.) Nelson, with the identical bibliographic reference from Nelson's Manual. The reference for the synonym is correct, the crediting to Nelson of *multicaulis* as a specific epithet under *Mentzelia* is a slip. Inasmuch as Miss

¹ Ann. Mo. Bot. Gard. 21:103-226 (1934).

Darlington treats Osterhout's entity as a species, the name can best be treated as a new combination, with it and reference as follows: *Mentzelia multicaulis* (Osterhout) Darlington, Ann. Mo. Bot. Gard. 21: 156 (1934).

Another name which may be commented on, although less importantly, for no changes are suggested, is *Mentzelia stricta* (Osterhout) Stevens ex Jeffs & Little (p. 143 of the monograph). It is probably best to do as is usually done when a transfer is thus incorrectly made, and accept Jeffs and Little as the publishing authors, although the Jeffs and Little publication is a check list, and the "new comb." is followed by neither description nor bibliographic reference. Further, the specific epithet was originally published as *stictus* (under *Hesperaster*). Dr. Aven Nelson, Curator of the Rocky Mountain Herbarium, where the Osterhout Herbarium is now deposited, tells me that *strictus* is correct, however.

THE ISLANDS OF SOUTHERN CALIFORNIA AND A LIST OF THE RECORDED PLANTS—II

BY ALICE EASTWOOD

This list of names has been compiled from many sources, the most important of which will be found in the appended bibliography. It is hoped that no name has been overlooked in the search but if some may be found later they can be added in another issue of this journal.

Some species may also be listed under two names since the plants themselves were not available. This would result from the difference of opinion among taxonomists in regard to the limits of genera and species. The last list which included all the islands was published in 1890 by T. S. Brandegee, *Zoe*, vol. I, pp. 129—148.

I wish to acknowledge with thanks the courtesy of Dr. Ira L. Wiggins in sending me his list of island plants from which several names were found not before recorded. Mr. J. T. Howell furnished a manuscript list of plants on Anacapa Island. I hope that my list will prove helpful to those who may be interested in the flora of the archipelago of Southern California.

LIST OF PLANTS ON ISLANDS OF SOUTHERN CALIFORNIA

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Adiantum Capillus-veneris</i> L.....	—	—	×	×	×	×
<i>Adiantum pedatum</i> L. var. <i>aleuticum</i> Rupr.	—	—	—	×	—	—
<i>Adiantum Jordani</i> C. Müll.....	—	—	×	×	×	×
<i>Pellaea andromedæfolia</i> (Kaulf.) Fée.....	—	—	×	×	×	×
<i>Pellaea mucronata</i> D. C. Eat.....	—	—	×	×	×	—
<i>Pityrogramma triangularis</i> (Kaulf.) Maxon.....	—	—	×	×	×	×
<i>Pityrogramma viscosa</i> (D. C. Eat.) Maxon	—	—	×	×	×	×
<i>Polypodium californicum</i> Kaulf. var. <i>Kaulfussii</i> D. C. Eat.	—	—	×	×	×	×
<i>Polypodium Scouleri</i> H. & G.....	—	—	—	×	—	—
<i>Dryopteris arguta</i> (Kaulf.) Watt.....	—	—	×	×	×	—
<i>Cheilanthes californica</i> (Hook.) Mett.....	—	—	×	×	×	—
<i>C. myriophylla</i> of Brandegee.						
<i>Cheilanthes Clevelandi</i> D. C. Eat.....	—	—	×	×	—	—
<i>Notholæna Newberryi</i> D. C. Eat.....	—	—	—	×	—	×
<i>Notholæna californica</i> D. C. Eat.....	—	—	×	×	×	—
<i>Woodwardia Chamissoi</i> Brack.....	—	—	×	×	—	—
<i>Athyrium Filix-femina</i> (L.) Roth var. <i>sitchense</i> (Rupr.) Gilbert	—	—	×	×	—	—
<i>Pteridium aquilinum</i> (L.) Kuhn var. <i>pubescens</i> Underw.....	—	—	×	×	×	—
<i>Polystichum munitum</i> (Kaulf.) Presl.....	—	—	×	×	—	—
<i>Cystopteris fragilis</i> (L.) Bernh. Schrad.....	—	—	—	×	—	—
<i>Equisetum Telmateia</i> Ehrh.	—	—	—	×	×	—
<i>Equisetum Funstoni</i> A. A. Eat.....	—	—	—	×	×	—
<i>Equisetum kansanum</i> Schaffn.	—	—	—	×	×	—
<i>Equisetum hiemale</i> L. var. <i>californicum</i> Milde.....	—	—	—	×	—	—
<i>Selaginella Bigelovii</i> Underw.....	—	—	×	×	×	—
<i>Pinus Torreyana</i> Carr.	—	—	×	—	—	—
<i>Pinus remorata</i> Mason (1930, p. 9).....	—	—	×	×	—	—
<i>P. muricata</i> of authors.						
<i>Typha augustifolia</i> L.	—	—	×	×	×	—
<i>Typha latifolia</i> L.	—	—	—	—	×	—
<i>Potamogeton pectinatus</i> L.....	—	—	—	×	—	—
<i>Ruppia maritima</i> L.....	—	—	×	—	—	—
<i>Zannichellia palustris</i> L.....	—	—	—	—	×	—
<i>Zostera marina</i> L.....	—	—	×	×	—	—
<i>Phyllospadix Torreyi</i> Wats.....	—	×	×	×	×	—
<i>Andropogon saccharoides</i> Swtz.....	—	—	×	—	×	—
<i>Phalaris minor</i> Retz.....	×	×	×	×	×	×
<i>Phalaris Lemmoni</i> Vasey.....	—	—	×	—	×	—
<i>Phalaris caroliniana</i> Walt.....	—	—	—	—	×	—
<i>Phalaris bulbosa</i> L.....	—	—	—	×	—	—
<i>Phalaris intermedia</i> Bosc	—	—	—	×	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Monanthochloe littoralis</i> Engelm.	—	—	—	—	×	—
<i>Lolium temulentum</i> L. var. <i>arvense</i> (With.) Bab.....	—	—	×	×	×	—
<i>Lolium perenne</i> L.....	—	—	—	×	—	—
<i>Pholiurus incurvus</i> (L.) Schinz & Thell.....	—	—	×	—	×	—
<i>Trisetum barbatum</i> Steud.....	—	—	—	×	—	—
<i>Hordeum pusillum</i> Nutt.	—	×	—	—	×	×
<i>Hordeum nodosum</i> L.....	—	×	×	×	×	×
<i>Hordeum murinum</i> L.....	×	×	×	×	×	—
<i>Hordeum vulgare</i> L.....	—	—	—	—	×	—
<i>Hordeum Gussoneanum</i> Parl.....	—	—	×	—	—	—
<i>Elymus condensatus</i> Presl.....	—	×	×	×	×	—
<i>Elymus triticoides</i> Buckl.....	—	×	×	×	×	—
<i>Elymus glaucus</i> Buckl.....	—	—	×	×	×	—
<i>Sitanion jubatum</i> J. G. Smith.....	—	—	—	—	×	—
<i>Agropyron repens</i> (L.) Beauv.	—	×	×	×	×	—
<i>Koeleria cristata</i> (L.) Pers.....	—	—	×	×	×	×
<i>Dissanthelium californicum</i> (Nutt.) Benth.....	—	—	×	×	×	×
<i>Stenochloa californica</i> Nutt. (1847, p. 189)						
<i>Distichlis spicata</i> (L.) Greene	×	×	×	×	×	—
<i>Cynodon Dactylon</i> (L.) Pers.	×	×	×	×	×	—
<i>Avena fatua</i> L.....	×	×	×	×	×	—
<i>Avena barbata</i> Brot.....	×	×	×	×	×	—
<i>Agrostis verticillata</i> Vill.....	—	—	×	×	×	—
<i>Agrostis diegoensis</i> Vasey.....	—	—	×	×	×	—
<i>Agrostis exarata</i> Trin.....	—	—	×	×	×	×
<i>Agrostis Scouleri</i> Trin.....	—	—	×	×	—	—
<i>Gastridium ventricosum</i> (Gouan) Schinz & Thell.....	—	—	×	×	×	×
<i>Polypogon lutosus</i> (Poir.) Hitchc.	—	×	×	×	×	—
<i>Polypogon monspeliensis</i> (L.) Desf.....	×	×	×	×	×	—
<i>Muhlenbergia microsperma</i> (DC.) Kunth	—	—	×	×	×	—
<i>Stipa lepida</i> Hitchc.....	×	—	×	×	×	×
var. <i>Andersonii</i> (Vasey) Hitchc.....	—	—	×	—	×	—
<i>Stipa pulchra</i> Hitchc.....	×	×	×	×	×	×
<i>Aristida adscensionis</i> L.....	×	—	×	×	×	—
<i>Oryzopsis miliacea</i> (L.) B. & H.....	—	—	×	—	—	—
<i>Bromus hordeaceus</i> L.....	—	—	×	×	×	—
<i>Bromus rubens</i> L.....	—	—	×	×	×	—
<i>Bromus Trinii</i> Desv.....	×	×	×	—	×	—
<i>Bromus tectorum</i> L.....	—	—	—	—	×	—
<i>Bromus rigidus</i> Roth.....	—	×	×	—	×	—
var. <i>Gussonei</i> (Parl.) Coss. & Dur.....	×	×	×	×	×	—
<i>Bromus Orcuttianus</i> Vasey.....	—	—	—	—	×	—
<i>Bromus subvelutinus</i> Shear	—	—	×	—	×	—
<i>Bromus carinatus</i> H. & A. var. <i>Hookerianus</i> (Thurb.) Shear	×	×	×	×	×	×

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Bromus laevipes</i> Shear.....			X	X		
<i>Bromus maritimus</i> (Piper) Hitchc.....		X				Anacapa Island
<i>Bromus marginatus</i> Nees.....		X	X	X		
<i>Bromus vulgaris</i> (Hook.) Shear.....		X		X	X	
<i>Festuca octoflora</i> Walt. var. <i>hirtella</i> Piper	X	X	X	X	X	
<i>Festuca reflexa</i> Buckl.....					X	
<i>Festuca megalura</i> Nutt.....		X	X	X	X	
<i>Festuca microstachys</i> Nutt.....			X	X		
<i>Festuca Myuros</i> L.....		X	X	X	X	
<i>Festuca bromoides</i> L.	X	X	X	X	X	X
<i>Festuca pacifica</i> Piper.....	X	X		X		
<i>Poa annua</i> L.....	X	X	X	X	X	
<i>Poa nevadensis</i> Vasey.....				X		
<i>Poa scabrella</i> (Thurb.) Benth.....			X		X	
<i>Poa Douglasii</i> Nees.....		X	X			
<i>Poa Howellii</i> V. & S.....				X		
<i>Poa tenuifolia</i> Buckl.....				X		
<i>Lamarckia aurea</i> (L.) Moench.....		X	X	X	X	X
<i>Melica Torreyana</i> Scribn.....		X		X	X	
<i>Melica imperfecta</i> Trin.....		X	X	X	X	X
var. <i>flexuosa</i> Boland.....				X		
<i>Eleocharis palustris</i> (L.) R. & S.	X		X		X	
<i>Scirpus pacificus</i> Britt.					X	
<i>Scirpus pungens</i> Vahl			X			
<i>Scirpus riparius</i> Spreng.		X	X	X		
<i>Scirpus californicus</i> (C. A. Mey.) Britt.				X		
<i>Scirpus cernuus</i> Vahl			X			
<i>Scirpus Olneyi</i> Gray			X			
<i>Carex triquetra</i> Boott			X	X	X	
<i>Carex angustata</i> Boott				X		
<i>Carex Douglasii</i> Boott			X	X		
<i>Carex globosa</i> Boott			X	X	X	
<i>Carex tumulicola</i> Mkze.				X		
<i>Carex Barbaræ</i> Dewey				X		
<i>Carex gracilior</i> Mkze.			X	X		
<i>Carex glabra</i> Boott				X		
<i>Carex montereyensis</i> Mkze.				X		
<i>Carex abrupta</i> Mkze.				X		
<i>Carex pansa</i> Bailey			X			
<i>Carex prægracilis</i> W. Boott			X	X		X
<i>Carex senta</i> Boott				X		
<i>Juncus bufonius</i> L.		X	X	X	X	
<i>Juncus acutus</i> L.					X	
<i>Juncus balticus</i> Willd.		X	X	X	X	

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Juncus robustus</i> Wats.	—	—	—	—	×	—
<i>Juncus effusus</i> L.	—	—	—	×	—	—
<i>Juncus patens</i> Mey.	—	—	×	—	—	—
<i>Juncus xiphiodes</i> Mey.	—	—	×	—	—	—
<i>Luzula comosa</i> Mey.	—	×	×	×	—	—
<i>Luzula campestris</i> DC. var. <i>congesta</i> (DC.) Buch.	—	—	×	×	—	—
<i>Allium peninsulare</i> Lemmon	—	—	—	—	×	×
<i>Allium amplexans</i> Torr.	—	—	—	×	—	—
<i>Allium præcox</i> Brandg.	—	—	×	×	×	—
<i>Allium lacunosum</i> Wats.	—	—	×	×	—	—
<i>Bloomeria crocea</i> (Torr.) Cov.	—	—	×	×	×	—
<i>Brodiaea capitata</i> Benth.	×	×	×	×	×	×
<i>B. insularis</i> Greene (1886, p. 134)						
<i>Brodiaea synandra</i> (Heller) Jeps.	—	—	×	×	×	—
<i>B. jolonensis</i> Eastw. fide Hoover (1939, p. 563)						
<i>Chloragalum pomeridianum</i> (DC.) Kunth	—	—	×	—	×	—
<i>Lilium Humboldtii</i> R. & L. var. <i>ocellatum</i> (Kell.) Jeps.	—	—	—	—	×	—
<i>L. Bloomerianum</i> Kell. var. <i>ocellatum</i> Kell. (1873, p. 88)						
<i>Calochortus catalinae</i> Wats. (1879, p. 268)	—	—	×	×	×	—
<i>Calochortus albus</i> (Benth.) Dougl.	—	—	×	—	—	—
var. <i>rubellus</i> Greene	—	—	—	×	—	—
<i>Calochortus luteus</i> Dougl.	—	—	—	×	×	—
<i>Calochortus splendens</i> Dougl.	—	—	—	—	×	—
<i>Zigadenus Fremontii</i> Torr.	—	—	×	×	—	—
<i>Sisyrinchium bellum</i> Wats.	—	×	×	×	×	—
<i>Habenaria Michaeli</i> Greene	—	—	×	×	—	—
<i>Epipactis gigantea</i> Dougl.	—	—	—	×	—	—
<i>Anemopsis californica</i> Hook.	×	×	×	×	×	—
<i>Populus trichocarpa</i> T. & G.	—	—	×	×	×	—
<i>Populus Fremontii</i> Wats. var. <i>Wislizeni</i> Wats.	—	—	×	×	×	—
<i>Salix lævigata</i> Bebb	—	—	×	×	×	—
<i>Salix lasiolepis</i> Benth.	—	—	×	×	×	—
<i>Salix argophylla</i> Nutt.	—	—	×	×	×	—
<i>Salix lasiandra</i> Benth.	—	—	—	×	—	—
<i>Salix Gooddingii</i> Ball	—	—	—	×	—	—
<i>S. longifolia</i> Muhl.						
<i>Quercus dumosa</i> Nutt.	—	—	×	×	×	—
<i>Quercus MacDonaldi</i> Greene (1889, p. 25)	—	—	×	×	×	—
<i>Quercus chrysolepis</i> Liebm.	—	—	—	×	×	×
<i>Quercus tomentella</i> Engelm. (1878, p. 393) Anacapa Island	—	—	×	×	×	×
<i>Quercus agrifolia</i> Nees	—	—	×	×	—	—
<i>Quercus oblongifolia</i> Torr.	—	—	×	×	—	—
<i>Quercus lobata</i> Nees	—	—	×	×	—	—
<i>Quercus morehus</i> Kell.	—	—	—	×	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Quercus parvula</i> Greene (1887, p. 40)	—	—	—	×	—	—
<i>Urtica urens</i> L.	—	—	×	×	×	—
<i>Urtica holosericea</i> Nutt.	—	—	—	×	×	—
<i>Hesperocnide tenella</i> Torr.	—	—	—	×	×	×
<i>Parietaria floridana</i> Nutt.	×	—	×	×	×	×
<i>Polygonum aviculare</i> L. var. <i>littorale</i> Koch	—	—	×	×	—	—
<i>Polygonum ramosissimum</i> Mx.	—	—	—	×	—	—
<i>Pterostegia drymarioides</i> F. & M.	—	×	×	×	×	×
<i>Chorizanthe Wheeleri</i> Wats.	—	—	×	×	×	×
<i>C. insularis</i> Hoffm. (1932, p. 56)						
<i>Lastarriaea chilensis</i> Remy	—	—	—	×	×	—
<i>Rumex crispus</i> L.	—	×	×	×	×	—
<i>Rumex maritimus</i> L.	—	×	—	×	×	—
<i>Rumex Acetosella</i> L.	—	—	—	×	—	—
<i>Rumex salicifolius</i> Weinm.	×	—	×	×	×	×
<i>Rumex conglomeratus</i> Murr.	—	—	—	×	—	—
<i>Rumex pulcher</i> L.	—	—	—	×	—	—
<i>Eriogonum arborescens</i> Greene (1884, p. 11) ..Anacapa Island	—	—	×	×	—	—
<i>Eriogonum giganteum</i> Wats. (1885, p. 371)	—	—	—	×	×	×
var. <i>formosum</i> K. Brandg. (1897, p. 79)	—	—	×	—	—	×
<i>Eriogonum grande</i> Greene (1887, p. 38)Anacapa Island	—	—	×	×	×	×
<i>Eriogonum rubescens</i> Greene (1887, p. 39)	—	×	×	×	×	×
<i>Eriogonum cinereum</i> Benth.	—	—	×	—	—	—
<i>Amaranthus græcizans</i> L.	—	×	×	×	×	—
<i>Amaranthus blitoides</i> Wats.	—	×	×	—	—	×
<i>Atriplex pacifica</i> A. Nels.Anacapa Island	×	—	×	×	×	×
<i>A. microcarpa</i> Dietr.	—	—	—	—	—	—
<i>Atriplex Watsoni</i> A. Nels.	×	×	×	×	×	—
<i>A. decumbens</i> Wats.	—	—	—	—	—	—
<i>Atriplex Coulteri</i> Dietr.	—	×	×	×	×	—
<i>Atriplex Serenana</i> A. Nels.	—	—	×	×	×	—
<i>A. bracteosa</i> Wats.	—	—	—	—	—	—
<i>Atriplex Serenana</i> A. Nels. var. <i>Davidsonii</i> Standl.Coronado Islands	—	—	×	×	—	—
<i>Atriplex californica</i> Moq.Santa Barbara, Anacapa islands	×	×	×	×	×	×
<i>Atriplex leucophylla</i> (Moq.) Dietr.	×	×	×	×	×	×
<i>Atriplex Breweri</i> Wats.	×	×	—	×	×	×
<i>Atriplex expansa</i> Wats.	—	—	×	×	—	×
<i>Atriplex patula</i> L. var. <i>hastata</i> (L.) Gray	—	×	—	—	—	—
<i>Atriplex semibaccata</i> R. Br.Santa Barbara Island	—	×	×	×	×	×
<i>Chenopodium album</i> L.	—	×	×	×	×	×
<i>Chenopodium ambrosioides</i> L.	—	—	×	×	—	—
<i>Chenopodium murale</i> L.Santa Barbara, Anacapa islands	×	×	×	×	×	×
<i>Chenopodium californicum</i> Wats.Anacapa Island	×	×	×	×	×	×

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
Monolepis Nuttalliana (R. & S.) Greene	—	×	×	×	—	—
Suaeda Torreyana Wats.	—	×	×	×	×	×
Suaeda californica Wats.Anacapa Island	×	—	—	×	×	—
Arthrocnemum subterminale (Parish) Standl.	—	×	×	×	×	×
<i>Salicornia subterminalis</i> Parish						
Salicornia Bigelovii Torr.	—	×	—	—	—	—
Aphanisma blitoides Nutt.Santa Barbara Island	—	—	×	×	—	×
Abronia maritima Nutt.Anacapa Island	—	×	×	×	×	×
Abronia minor Standl.	—	—	×	×	—	—
Abronia umbellata Lam.	—	×	×	×	—	×
Abronia latifolia Esch.	—	×	—	—	—	—
Abronia insularis Standl. (1909, p. 311)	—	—	—	—	—	×
Abronia alba Eastw. (1898, p. 97)	×	×	×	—	—	×
var. platyphylla (Standl.) Jeps.	—	—	×	—	—	—
Abronia neurophylla Standl. (1909, p. 314)	×	—	—	—	—	—
Hesperonia californica (Gray) Standl. var. microphylla Standl.	—	—	×	×	×	×
Hesperonia laevis (Benth.) Standl.	—	—	×	—	—	—
Hesperonia cedrosensis Standl. (1909, p. 362)	—	—	—	—	—	×
Tetragonia expansa Murr.	—	×	×	—	—	—
Mesembryanthemum chilense Mol.	—	×	×	×	×	—
<i>M. aequilaterale</i> Haw.						
Mesembryanthemum crystallinum L.Santa Barbara Island	×	×	×	×	×	×
Mesembryanthemum nodiflorum L.Santa Barbara Island	×	×	×	—	×	×
Calandrinia Menziesii (Hook.) T. & G.	—	—	×	—	—	—
Calandrinia caulescens HBK.	—	×	×	×	×	—
Calandrinia maritima Nutt.	—	—	×	×	×	—
Calandrinia Breweri Wats.	—	—	×	×	—	—
Montia fontana L.	—	—	—	×	×	—
Montia perfoliata (Donn) Howell	—	×	×	×	×	×
var. parviflora (Dougl.) Jeps.	—	—	—	×	—	—
Portulaca oleracea L.	—	—	—	×	—	—
Stellaria media (L.) Cyr.	—	×	×	×	×	×
Stellaria nitens Nutt.	—	×	×	×	—	—
Sagina occidentalis Wats.	—	×	×	×	×	—
Arenaria Douglasii Fenzl	—	—	×	×	×	—
Spergularia macrotheca Heynh.Anacapa, Santa Barbara islands	×	×	×	×	×	×
Spergularia rubra (L.) J. & C. Presl	—	—	—	—	—	×
Tissa valida Greene (1893, p. 107)	—	—	—	×	—	—
<i>Spergularia macrotheca</i> Heynh. fide R. P. Rossbach (1940)						
Spergularia Clevelandii (Greene) Rob.	—	—	—	—	×	—
<i>S. villosa</i> (Pers.) Canb. fide R. P. Rossbach						

	N. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Spergularia salina</i> Presl	—	—	—	×	×	×
<i>S. marina</i> (L.) Griseb. fide R. P. Rossbach						
<i>Spergularia</i> Boconi (Scheele) Foucaud	—	—	—	—	×	—
<i>Polycarpon depressum</i> Nutt.	—	—	—	×	×	—
<i>Spergula arvensis</i> L.	—	—	×	×	—	—
<i>Pentacæna ramosissima</i> Weinm.	—	×	×	×	—	—
<i>Silene gallica</i> L.	×	×	×	×	×	×
<i>Silene antirrhina</i> L.	×	×	×	×	×	—
<i>Silene simulans</i> Greene (1887, p. 63) Anacapa Island	—	×	×	×	×	—
<i>Silene multinervia</i> Wats. Anacapa Island	—	×	×	×	×	—
<i>Cerastium viscosum</i> L.	—	×	×	×	×	—
<i>Clematis ligusticifolia</i> Nutt.	—	—	×	×	×	×
<i>Clematis pauciflora</i> Nutt.	—	—	×	—	×	×
<i>Clematis biflora</i> Eastw. (1905, p. 193)	—	—	—	×	—	—
<i>Clematis lasiantha</i> Nutt.	—	—	×	×	—	—
<i>Ranunculus californicus</i> Benth. var. <i>cuneatus</i> Greene	—	×	×	×	×	—
<i>Ranunculus hebecarpus</i> H. & A.	—	—	—	—	×	—
<i>Delphinium Parryi</i> Gray	—	×	×	×	×	×
<i>Delphinium hesperium</i> Gray	—	—	—	—	×	—
<i>Mahonia pinnata</i> (Lag.) Fedde	—	—	×	×	—	—
<i>Crossosoma californicum</i> Nutt. (1847, p. 150)	—	—	—	—	×	×
<i>Papaver californicum</i> Gray	—	—	—	×	—	—
<i>Stylomecon heterophylla</i> (Benth.) G. Tayl.	—	×	×	×	×	×
<i>Meconella denticulata</i> Greene (1886, p. 59)	—	—	—	×	×	—
<i>Dendromecon flexilis</i> Greene (1886, p. 216)	—	—	—	×	—	—
<i>Dendromecon rhamnoides</i> Greene (1905, p. 305)	—	—	—	—	×	×
<i>Dendromecon arborea</i> Greene (1905, p. 305)	—	—	—	—	×	—
<i>Dendromecon densifolia</i> Greene (1905, p. 304)	—	—	×	—	—	—
<i>Dendromecon Harfordii</i> Kell. (1873, p. 102)	—	—	×	—	×	—
<i>Eschscholzia glauca</i> Greene (1905, p. 226)	—	—	—	×	—	—
<i>Eschscholzia elegans</i> Greene (1905, p. 182)	—	×	×	×	×	×
<i>Eschscholzia ramosa</i> Greene (1886, p. 217)	—	—	—	×	—	×
<i>Eschscholzia maritima</i> Greene (1905, p. 193)	—	×	×	×	—	—
<i>Eschscholzia robusta</i> Greene (1905, p. 266)	—	—	×	—	—	—
<i>Eschscholzia crossophylla</i> Greene (1905, p. 268)	—	—	—	—	×	—
<i>Eschscholzia Wrigleyana</i> Millsp. (1923, p. 109)	—	—	—	—	×	—
<i>Eschscholzia trichophylla</i> Greene (1905, p. 268)	—	—	—	×	—	—
<i>Platystemon hispidulus</i> Greene (1905, p. 193)	×	—	—	—	×	—
<i>Platystemon cernuus</i> Greene (1905, p. 193)	—	—	—	—	×	—
<i>Platystemon aculeolatus</i> Greene (1905, p. 167)						
..... Santa Barbara Island	—	—	—	—	—	—
<i>Platystemon setosus</i> Greene (1905, p. 194)						
..... Santa Barbara Island	—	—	—	—	—	—
<i>Platystemon Ornithopus</i> Greene (1905, p. 167)	—	×	×	×	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Isomeris arborea</i> Nutt. var. <i>insularis</i> Jeps. (1936, p. 11)	—	—	×	×	×	—
var. <i>globosa</i> Cov.	—	—	×	×	×	—
<i>Reseda odorata</i> L.	—	—	×	—	—	—
<i>Oligomeris glaucescens</i> Camb.	×	×	×	×	×	×
<i>Capsella Bursa-pastoris</i> (L.) Moench	—	×	×	×	×	—
<i>Capsella procumbens</i> (L.) Fries var. <i>Davidsonii</i> Munz	—	×	×	×	—	—
<i>Dithyræa californica</i> Harv. var. <i>maritima</i> Davidson	×	×	—	—	—	—
<i>Descuriania pinnata</i> (Walt.) Britt.	—	—	×	×	×	×
<i>Alyssum maritimum</i> (L.) Lam.	—	—	—	—	×	—
<i>Lepidium latipes</i> Hook.	—	—	—	—	×	—
<i>Lepidium lasiocarpum</i> Nutt.	×	×	×	×	×	—
<i>Lepidium nitidum</i> Nutt.	×	×	×	×	×	×
<i>Lepidium dictyotum</i> Gray var. <i>acutidens</i> Gray	—	—	—	×	×	×
<i>Lepidium Draba</i> L.	—	—	—	×	×	—
<i>Lepidium Robinsonii</i> Thell.	×	—	—	×	—	—
<i>Lepidium pubescens</i> Desv. Anacapa Island	×	—	—	—	—	×
<i>Lepidium oblongum</i> Small	×	×	—	×	×	—
<i>Rorippa Nasturtium-aquaticum</i> (L.) Schinz & Thell.	—	—	—	×	×	—
<i>Thysanocarpus laciniatus</i> Nutt.	—	—	—	×	×	—
<i>Thysanocarpus conchuliferus</i> Greene (1886, p. 218)	—	—	—	×	×	—
<i>Thysanocarpus curvipes</i> Hook.	—	—	—	×	—	—
<i>Thysanocarpus emarginatus</i> Greene	—	—	—	×	—	—
<i>Thysanocarpus ramosus</i> Greene (1887, p. 390)	—	—	×	×	—	×
<i>Thysanocarpus affinis</i> Greene	—	—	—	—	×	—
<i>Athysanus pusillus</i> (Hook.) Greene	—	—	—	×	—	—
<i>Tropidocarpum dubium</i> Dav. (1894, p. 179)	—	—	—	—	—	×
<i>Thelypodium lasiophyllum</i> (H. & A.) Greene..Anacapa Island	—	×	×	×	×	×
<i>Arabis maxima</i> Greene var. <i>Hoffmannii</i> Munz (1932, p. 63)	—	—	×	×	—	—
<i>Arabis perfoliata</i> Lam.	—	—	—	×	—	—
<i>Dentaria californica</i> Nutt.	—	×	×	×	×	—
<i>Cardamine oligosperma</i> Nutt.	—	—	—	×	—	—
<i>Cardamine filifolia</i> Greene (1887, p. 30)	—	—	—	×	—	—
<i>Sibara filifolia</i> Greene						
<i>Cakile edentula</i> (Bigel.) Hook. var. <i>californica</i> (Heller)						
Fernald	—	×	×	—	—	—
<i>Brassica campestris</i> L.	—	×	—	×	×	—
<i>Brassica nigra</i> (L.) Koch	—	—	—	×	×	×
<i>Sisymbrium officinale</i> (L.) Scop.	—	—	×	×	×	—
<i>Raphanus sativus</i> L.	—	—	×	×	×	—
<i>Erysimum asperum</i> (Nutt.) DC. Anacapa Island	—	—	×	×	×	—
<i>Erysimum insulare</i> Greene (1886, p. 218)	×	×	×	—	×	—
<i>Tillæa erecta</i> H. & A.	×	×	×	×	×	—
<i>Dudleya Greenei</i> Rose (1903, p. 17)	—	—	×	×	—	—
<i>Dudleya Candelabrum</i> Rose (1903, p. 17)	—	—	—	×	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
Dudleya candida Britton (1903, p. 18)	—	—	—	—	—	—
Stylophyllum virens Rose (1903, p. 34)	—	—	—	—	—	×
Stylophyllum albidum Rose (1903, p. 34)	—	—	—	—	—	×
Stylophyllum Traskæ Rose (1903, p. 34)Santa Barbara Island	—	—	—	—	—	—
Stylophyllum insulare Rose (1903, p. 34)	—	—	—	—	×	—
Stylophyllum Hassei Rose (1903, p. 35)	—	—	—	—	×	—
Stylophyllum anomalum Dav. (1928, p. 79)	—	—	—	—	—	—
Heuchera maxima Greene (1886, p. 149)	—	—	×	×	—	—
Heuchera micrantha Dougl.	—	—	—	×	—	—
Lithophragma catalinae Rydb. (1905, p. 88)	—	—	—	—	×	—
Lithophragma Cymbalaria T. & G.	—	—	×	×	×	—
Saxifraga californica Greene	—	—	—	×	—	—
Jepsonia Neo-nuttalliana Millsp. (1923, p. 124)	—	—	—	—	×	—
Jepsonia malvæfolia (Greene) Small	×	—	×	×	—	×
<i>Saxifraga malvæfolia</i> Greene (1882, p. 121)						
Ribes viburnifolium Gray (1882, p. 202)	—	—	—	—	×	—
Ribes malvaceum Sm.Anacapa Island	—	—	×	×	×	—
Ribes subvestitum H. & A.	—	—	—	×	×	—
<i>R. Menziesii</i> Pursh var. <i>Thacherianum</i> Jeps. (1936, p. 156)						
Lyonothamnus floribundus Gray (1885, p. 292)	—	—	—	—	×	—
Lyonothamnus asplenifolius Greene (1885, p. 187)	—	—	×	×	—	×
Holodiscus ariæfolius (Sm.) Greene	—	—	—	×	×	—
Adenostoma fasciculatum H. & A.	—	—	×	×	—	×
var. obtusifolium Wats.	—	—	—	×	—	—
Alchemilla cuneifolia Nutt.	—	—	×	×	×	—
Cercocarpus Traskiæ Eastw. (1898, p. 136)	—	—	—	×	×	—
Cercocarpus alnifolius Rydb. (1913, p. 421)	—	—	×	×	×	—
Cercocarpus betuloides Nutt.	—	—	×	×	×	—
var. multiflorus Jeps.	—	—	—	×	×	—
Potentilla glandulosa Lindl.	—	—	—	—	×	—
Potentilla anserina L.	—	×	—	—	—	—
<i>P. pacifica</i> Howell						
Photinia arbutifolia (Ait.) Lindl.	×	×	×	×	×	×
var. macrocarpa Munz (1931, p. 64)	—	—	—	—	×	—
Rosa santa-crucis Rydb. (1917, p. 73)	—	—	—	×	—	—
Rosa Greenei Rydb. (1917, p. 71)	—	—	—	×	—	—
Rosa californica C. & S.	—	—	×	×	×	—
Rubus vitifolius C. & S.	—	×	×	×	×	×
Prunus Lyoni (Eastw.) Sarg.	—	—	×	×	×	×
<i>P. occidentalis</i> Lyon (1886, pp. 202, 333)						
Prunus ilicifolia (Nutt.) Walp.	—	—	—	—	×	×
Lupinus truncatus Nutt.	—	—	×	×	×	×
Lupinus concinnus Agardh	—	—	×	×	×	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
Lupinus gracilis Nutt.	—	—	—	—	×	—
Lupinus umbellatus Greene Anacapa Island	—	—	×	×	×	—
<i>L. micranthus</i> Dougl.						
Lupinus hirsutissimus Benth.	—	—	×	×	×	—
Lupinus succulentus Dougl.	—	×	×	×	×	×
Lupinus Hallii Abrams ×	—	—	—	—	×	—
Lupinus Chamissonis Esch.	—	×	×	×	—	—
Lupinus eminens Greene —	—	—	×	×	—	—
Lupinus arboreus Sims —	×	—	×	×	—	—
Lupinus albifrons Benth. Anacapa Island	×	×	×	×	×	×
Lupinus Douglasii Agardh —	—	—	×	×	×	—
Lupinus bicolor Lindl. ×	—	×	×	—	—	×
Lupinus microphyllus Greene —	×	×	—	—	—	—
Lupinus microcarpus Sims —	—	—	×	—	—	—
Lupinus bicolor Lindl. var. tridentatus Eastw.	—	—	—	×	—	—
Lupinus nanus Dougl. —	—	—	—	×	—	—
Pickeringia montana Nutt. —	—	—	—	×	—	—
Hosackia americana (Nutt.) Piper —	—	—	—	×	×	—
Hosackia grandiflora Benth. —	—	×	—	—	—	—
Hosackia venusta Eastw. (1898, p. 103) (<i>Syrmatium</i>) ×	—	×	—	—	—	—
Hosackia Veatchii Greene (1885, p. 83) (<i>Syrmatium</i>) Anacapa Island	—	—	×	×	—	—
Hosackia Wrangeliana (F. & M.) T. & G. —	—	—	—	×	×	×
Lotus hamatus Greene —	—	×	×	—	—	—
Hosackia brachycarpa Benth. —	—	—	×	×	—	—
Hosackia parviflora Benth. —	—	—	×	×	—	—
Hosackia maritima Nutt. —	×	×	×	×	—	—
Hosackia strigosa Nutt. —	—	×	×	×	—	—
Hosackia rubella Nutt. —	—	—	—	×	—	—
Hosackia subpinnata (Lag.) T. & G. —	—	×	—	×	—	—
Hosackia anthylloides Millsp. —	—	—	—	×	—	—
Syrmatium Ornithopus Greene (1885, p. 185, as <i>Hosackia</i>) Santa Barbara Island	×	—	—	×	×	×
Syrmatium Traskiæ Eastw. (Abrams, 1917, p. 201) —	—	—	—	—	×	×
Syrmatium micranthum (Nutt.) Greene —	—	—	—	—	—	×
Syrmatium glabrum Vogel —	—	—	—	—	×	—
Syrmatium dendroideum Greene (1886, p. 146) —	—	—	—	×	×	—
Syrmatium niveum Greene (1886, p. 148) —	—	—	—	×	—	—
Syrmatium patens Greene (1886, p. 147) —	×	—	—	—	—	—
Vicia americana Muhl. —	×	×	×	—	—	—
var. linearis Wats. —	—	—	—	—	×	—
Vicia exigua Nutt. —	×	×	×	×	×	×
Lathyrus Alefeldii White —	—	—	×	×	×	—
Genista linifolia L. —	—	—	—	—	×	—

	S. Nicolas	S. Miguel	S. Roa	S. Cruz	S. Catalina	S. Clemente
<i>Cytisus canariensis</i> Steud.					X	—
<i>Medicago sativa</i> L.	X	X	X	X	X	—
<i>Medicago hispida</i> Gaertn.	X	X	X	X	X	X
<i>Medicago apiculata</i> Willd.	—	—	X	X	X	X
<i>Melilotus indica</i> All.	—	X	X	X	X	—
<i>Melilotus alba</i> Desr.	—	—	—	—	X	—
<i>Trifolium gracilentum</i> T. & G.	X	—	X	—	—	X
var. <i>inconspicuum</i> Fern.	—	X	X	—	—	—
<i>Trifolium Palmeri</i> Wats. (1876, p. 132)	X	—	—	—	X	X
<i>Trifolium ciliolatum</i> Benth.	—	—	X	X	—	—
<i>Trifolium depauperatum</i> Desv.	—	—	—	X	—	—
<i>Trifolium repens</i> L.	—	—	—	—	X	—
<i>Trifolium exile</i> Greene (1887, p. 6)	—	—	—	X	—	—
<i>Trifolium catalinae</i> Wats. (1890, p. 128)	—	—	—	—	X	—
<i>Trifolium Macraei</i> H. & A.	—	—	X	X	X	—
<i>Trifolium Traskæ</i> Kennedy (1913, p. 19)	—	—	—	—	X	—
<i>Trifolium brachyodon</i> Greene (1903, p. 107)	—	—	—	—	X	—
<i>Trifolium fucatum</i> Lindl. var. <i>Gambelii</i> (Nutt.) Jeps.	—	—	X	X	—	—
var. <i>flavulum</i> (Greene) Jeps.	—	X	X	X	—	—
<i>Trifolium dichotomum</i> H. & A. var.	X	—	—	—	—	—
<i>Trifolium insularum</i> Kennedy (1913, p. 29)	—	—	—	—	X	—
<i>Trifolium variegatum</i> Nutt.	—	—	—	X	—	—
<i>Trifolium tridentatum</i> Lindl.	—	X	X	X	—	X
var. <i>aciculare</i> (Nutt.) McDer.	—	—	X	X	—	X
<i>Trifolium microcephalum</i> Pursh	—	X	X	X	X	X
<i>Trifolium alborpurpureum</i> T. & G.	—	—	X	X	X	—
<i>Trifolium microdon</i> H. & A.	—	—	—	X	X	—
var. <i>pilosum</i> Eastw. (1898, p. 100)	X	—	—	X	—	—
<i>Trifolium stenophyllum</i> Nutt.	X	X	X	X	X	X
<i>T. amplexans</i> of Brandegee						
<i>Trifolium barbigerum</i> Torr.	—	X	X	—	—	—
<i>Astragalus didymocarpus</i> H. & A.	X	X	—	X	X	—
<i>A. catalinensis</i> Nutt. (1847, p. 152)						
<i>Astragalus Gambelianus</i> Sheld.	—	—	—	X	X	—
<i>A. nigrescens</i> Nutt.						
<i>Astragalus Nevinii</i> Gray (1886, p. 412)						
.....Santa Barbara, Anacapa islands	—	—	—	—	X	X
<i>Astragalus leucopsis</i> (T. & G.) Torr.Santa Barbara Island	—	—	—	—	X	—
var. <i>brachypus</i> Greene	—	X	X	—	—	—
var. <i>curtipes</i> Gray	—	X	X	—	—	—
<i>Astragalus fastidiosus</i> Greene	—	—	—	—	X	—
<i>Phaca fastidia</i> Kell. (1860, p. 145)						
<i>Astragalus trichopodus</i> (Nutt.) Gray	—	—	—	—	X	—
<i>Astragalus miguelensis</i> Greene (1887, p. 33)....Anacapa Island	—	X	X	X	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Astragalus capillipes</i> Jones (1923, p. 117)	—	—	—	—	×	—
<i>Astragalus Traskiæ</i> Eastw. (1898, p. 102)Santa Barbara Island	×	—	—	—	—	×
<i>Geranium carolinianum</i> L.....	—	—	×	×	×	—
<i>Erodium moschatum</i> (L.) L'Her.Santa Barbara Island	×	—	×	×	—	×
<i>Erodium cicutarium</i> (L.) L'Her.	×	—	×	×	×	×
<i>Erodium macrophyllum</i> H. & A.	—	—	—	×	—	—
<i>Erodium Botrys</i> Bertol.	—	—	×	—	—	—
<i>Oxalis cernua</i> Thunb.	—	—	—	—	×	—
<i>Oxalis corniculata</i> L.	—	—	—	×	—	—
<i>Oxalis pilosa</i> Nutt.	—	—	—	×	—	—
<i>Tropæolum majus</i> L.	—	—	—	—	×	—
<i>Ruta graveolens</i> L.	—	—	—	—	×	—
<i>Eremocarpus setigerus</i> (Hook.) Benth.	—	—	×	×	×	×
<i>Ricinus communis</i> L.	—	—	—	×	×	—
<i>Euphorbia dictyosperma</i> F. & M.	—	—	—	—	×	—
<i>Euphorbia crenulata</i> Engelm.	—	—	—	—	×	—
<i>Euphorbia misera</i> Benth.	—	—	—	—	×	×
<i>Euphorbia serpyllifolia</i> Pers. var. <i>rugulosa</i> Engelm. (Mills., 1890, p. 85)	—	—	—	—	×	—
<i>Polygala californica</i> Nutt.	—	—	—	×	—	—
<i>Rhus diversiloba</i> T. & G.	—	×	×	×	×	—
<i>Rhus integrifolia</i> (Nutt.) B. & W.Anacapa Island	—	×	×	×	×	×
<i>Rhus ovata</i> Wats.	—	—	—	×	×	×
<i>Rhus laurina</i> Nutt.	—	—	×	×	×	×
<i>Rhamnus insularis</i> Greene	—	—	—	×	—	—
<i>Rhamnus insulus</i> Kell. (1859, p. 20)	—	×	×	×	×	×
<i>Rhamnus pirifolia</i> Greene (1896, p. 15)	—	—	—	×	—	—
<i>Rhamnus californica</i> Esch.	—	—	—	×	—	—
<i>Rhamnus catalinæ</i> Dav. (1917, p. 47)	—	—	—	—	×	—
<i>Ceanothus arboreus</i> Greene (1886, p. 144)	—	—	×	×	×	—
var. <i>glaber</i> Jeps.	—	—	×	—	—	—
<i>Ceanothus insularis</i> Eastw. (1927, p. 362)	—	×	×	×	×	×
<i>Vitis Girdiana</i> Munson	—	—	—	—	×	—
<i>Lavatera insularis</i> Wats. (1877, p. 249)Coronado Islands	—	—	—	—	—	—
<i>Saviniona clementina</i> Greene (1911, p. 160) (Lavatera)	—	—	—	—	—	×
<i>Saviniona reticulata</i> Greene (1911, p. 161)	—	—	—	—	×	—
<i>Saviniona dendroidea</i> Greene (1911, p. 161)	—	×	—	—	—	—
<i>Lavatera assurgentiflora</i> Kell. (1854, p. 14)Anacapa Island	—	×	×	×	×	×
<i>Malva pusilla</i> Sm.	×	×	×	×	×	—
<i>Malva parviflora</i> L.Santa Barbara Island	—	×	×	×	×	×
<i>Malvastrum catalinense</i> Eastw. (1936, p. 215)	—	—	—	×	×	—
<i>Malvastrum clementinum</i> Munz & Jtn. (1924, p. 296)	—	—	—	—	—	×
<i>Malvastrum exile</i> Gray	—	—	—	×	—	×

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Malvastrum nesioticum</i> Rob. (1897, p. 312)	—	—	—	×	—	—
<i>Sidalcea malvaeflora</i> (DC.) Gray	—	×	×	×	×	—
<i>Viola pedunculata</i> T. & G.	—	—	×	×	×	×
<i>Acer macrophyllum</i> Pursh	—	—	—	×	—	—
<i>Helianthemum Greenei</i> Rob. (1895, p. 191)	—	—	—	×	—	—
<i>H. occidentale</i> Greene						
<i>Helianthemum scoparium</i> Nutt.	—	—	×	×	×	—
<i>Frankenia grandifolia</i> C. & S.Anacapa Island	—	×	×	×	×	—
<i>Mentzelia gracilentata</i> T. & G.	—	—	—	—	—	×
<i>Mentzelia affinis</i> Greene	—	—	—	—	×	—
<i>Mentzelia micrantha</i> T. & G.	—	—	×	×	×	×
<i>Acrolasia catalinensis</i> Millsp. (1923, p. 177) (<i>Mentzelia</i>) ...	—	—	—	—	×	—
<i>Opuntia occidentalis</i> Engelm. & Bigel.	×	×	×	×	×	×
<i>Opuntia littoralis</i> (Engelm.) Ckll.Santa Barbara Island	×	—	×	—	—	×
<i>Opuntia prolifera</i> Engelm.Anacapa, Santa Barbara islands	×	—	×	—	×	×
<i>Opuntia megacarpa</i> Griff.	—	—	—	—	×	—
<i>Cereus Emoryi</i> Engelm.	—	—	—	—	×	×
<i>Lythrum californicum</i> T. & G.	—	—	—	×	—	—
<i>Zauschneria villosa</i> Greene (1887, p. 27)	—	—	×	×	×	×
<i>Zauschneria cana</i> Greene (1887, p. 28)Anacapa Island	—	—	—	×	×	—
<i>Zauschneria californica</i> Presl	—	×	—	×	×	—
<i>Epilobium coloratum</i> Muhl.	—	—	—	×	×	—
<i>Epilobium adenocaulon</i> Hausskn.	—	—	—	×	—	—
<i>Epilobium holosericeum</i> Trel.	—	—	—	—	×	—
<i>Eulobus californicus</i> Nutt.	—	—	×	×	×	—
<i>Oenothera Hookeri</i> T. & G.	—	—	×	×	×	—
<i>Oenothera bistorta</i> Nutt.	—	×	×	×	×	—
<i>Oenothera micrantha</i> Hornem.	—	×	×	×	×	×
<i>Oenothera contorta</i> Dougl. var. <i>epilobioides</i> (Greene) Munz	—	×	×	—	—	—
<i>Oenothera strigulosa</i> (F. & M.) T. & G.	—	—	×	—	—	—
<i>Oenothera cheiranthifolia</i> Hornem.	×	×	×	×	×	—
<i>Oenothera guadalupensis</i> Wats.	—	—	—	—	—	×
<i>Oenothera nitida</i> Greene (1887, p. 70)	—	×	×	—	—	—
<i>Clarkia elegans</i> Dougl.	—	—	×	×	—	—
<i>Godetia quadrivulnera</i> (Dougl.) Spach	—	—	×	×	×	—
var. <i>tenella</i> (Wats.) Jeps.	—	—	—	—	×	—
<i>Godetia epilobioides</i> (Nutt.) Wats.	—	—	×	×	×	—
<i>Godetia purpurea</i> G. Don	—	—	—	×	—	—
<i>Godetia Bottæ</i> Spach	—	—	—	—	×	—
<i>Sanicula Menziesii</i> H. & A.	—	—	—	—	×	—
<i>Sanicula bipinnatifida</i> Dougl. var. <i>Hoffmannii</i> Munz (1932, p. 110)	—	—	×	×	—	—
<i>Sanicula arguta</i> Greene	×	—	—	×	×	×
<i>Conium maculatum</i> L.	×	—	—	×	×	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Daucus pusillus</i> Mx.	×	×	×	×	×	×
<i>Caucalis microcarpa</i> H. & A.	—	—	—	×	×	—
<i>Foeniculum vulgare</i> Hill	—	—	×	×	×	—
<i>Apiastrum angustifolium</i> Nutt.	×	×	×	×	×	—
<i>Bowlesia septentrionalis</i> C. & R.	—	—	×	×	×	×
<i>Berula angustifolia</i> (L.) Mert. & Koch	—	×	—	×	—	—
<i>Lomatium caruifolium</i> (H. & A.) C. & R.	—	×	×	×	—	—
<i>Lomatium insulare</i> (Eastw.) Munz	×	—	—	—	—	—
<i>Peucedanum insulare</i> Eastw. (1898, p. 106)						
<i>Torilis nodosa</i> (L.) Gaertn.	—	×	×	×	—	—
<i>Svida catalinensis</i> Millsp. (1923, p. 189) (Cornus)	—	—	—	—	×	—
<i>Comarostaphylis polifolia</i> (HBK.) Zucc.	—	—	—	—	×	—
<i>Comarostaphylis diversifolia</i> (Parry) Greene	—	—	×	×	×	—
<i>Xylococcus bicolor</i> Nutt.	—	—	—	—	×	—
<i>Arctostaphylos insularis</i> Greene (Parry, 1887, p. 494)	—	—	×	×	—	—
var. <i>pubescens</i> Eastw. (1933, p. 62)	—	—	×	×	—	—
<i>Arctostaphylos subcordata</i> Eastw. (1933, p. 61)	—	—	—	×	—	—
<i>Arctostaphylos pechoensis</i> Dudley var. <i>viridissima</i> Eastw. (1933, p. 62)	—	—	—	×	—	—
<i>Arctostaphylos tomentosa</i> Pursh	—	—	×	×	×	—
<i>Arbutus Menziesii</i> Pursh	—	—	—	×	—	—
<i>Vaccinium ovatum</i> Pursh	—	—	×	×	—	—
<i>Dodecatheon Clevelandii</i> Greene	—	—	×	×	×	—
<i>Dodecatheon Hendersoni</i> Gray	—	—	—	—	×	—
<i>Anagallis arvensis</i> L.	—	×	×	×	×	—
<i>Samolus Valerandi</i> L. var. <i>americanus</i> Gray	—	—	—	×	—	—
<i>Centunculus minimus</i> L.	—	—	×	—	—	—
<i>Centaurium venustum</i> (Gray) Rob.	—	—	—	×	×	—
<i>Centaurium Muhlenbergii</i> (Griseb.) Wight	—	—	—	×	—	—
<i>Centaurium exaltatum</i> (Griseb.) Wight	—	—	×	×	—	—
<i>Vinca minor</i> L.	—	—	—	—	×	—
<i>Statice arctica</i> (Cham.) Blake var. <i>californica</i> (Boiss.) Blake	—	—	×	—	—	—
<i>Asclepias mexicana</i> Cav.	—	—	—	×	—	—
<i>Philibertia hirtella</i> (Gray) Parish	—	—	—	—	×	—
<i>Dichondra repens</i> Forst.	—	—	×	×	×	—
<i>Cressa truxillensis</i> HBK.	—	×	×	×	×	—
<i>Ipomoea hederacea</i> Jacq.	—	—	—	—	×	—
<i>Convolvulus Soldanella</i> L.	—	×	—	×	×	—
<i>Convolvulus arvensis</i> L.	—	—	—	×	—	—
<i>Convolvulus californicus</i> Choisy	—	—	—	—	×	—
<i>Convolvulus macrostegius</i> Greene (1885, p. 208)Santa Barbara, Anacapa islands	×	×	×	×	×	×
<i>Convolvulus cyclostegius</i> House	—	—	—	—	×	—
<i>Convolvulus simulans</i> L. M. Perry	—	—	—	×	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Convolvulus Sepium</i> L.	—	—	—	—	×	—
<i>Cuscuta californica</i> Choisy	—	—	×	—	—	—
var. <i>graciliflora</i> Engelm.	—	—	—	—	—	×
<i>Cuscuta occidentalis</i> Millsp.	—	—	—	—	×	—
<i>Cuscuta subinclusa</i> D. & H.	—	—	—	×	—	—
<i>Cuscuta salina</i> Engelm.	—	—	×	—	—	—
<i>Heliotropium Curassavicum</i> L. Anacapa Island	×	×	×	×	×	—
<i>Harpagonella Palmeri</i> Gray	—	—	—	—	×	—
<i>Pectocarya linearis</i> DC.	×	—	—	×	×	—
<i>Pectocarya penicellata</i> (H. & A.) A. DC.	—	—	×	×	×	—
<i>Plagiobothrys canescens</i> Benth.	—	—	×	×	×	×
<i>Plagiobothrys arizonicus</i> (Gray) Greene var. <i>catalinensis</i> Gray (1886, p. 431)	—	—	—	—	×	—
<i>Plagiobothrys Cooperi</i> Gray	—	—	—	×	×	—
<i>Plagiobothrys californicus</i> (Gray) Greene var. <i>gracilis</i> Jtn. Anacapa Island	—	×	—	×	×	×
var. <i>fulvescens</i> Jtn. Anacapa Island	—	×	×	—	×	—
<i>Cryptantha muricata</i> (H. & A.) Nels. & Macbr. var. <i>Jonesii</i> (Gray) Jtn. Anacapa Island	—	—	—	×	—	—
<i>Cryptantha Traskæ</i> Jtn. (1925, p. 77)	×	—	—	—	—	×
<i>Cryptantha micromeres</i> (Gray) Greene	—	—	×	×	×	—
<i>Cryptantha maritima</i> Greene Santa Barbara Island	×	—	—	—	×	×
<i>Cryptantha intermedia</i> (Gray) Greene	—	—	×	—	×	×
<i>Cryptantha microstachys</i> Greene	—	—	—	—	×	—
<i>Cryptantha ramossissima</i> (Gray) Greene	—	—	—	—	×	—
<i>Cryptantha Clevelandii</i> Greene var. <i>florosa</i> Jtn.	—	×	—	×	×	—
<i>Cryptantha Brandegei</i> Jtn. (1925, p. 53)	—	—	×	—	×	×
<i>Cryptantha ambigua</i> (Gray) Greene	—	×	—	×	×	—
<i>Amsinckia Evermannii</i> Suks. (1931, p. 78)	—	—	—	—	×	×
<i>Amsinckia microsperma</i> Suks. (1931, p. 100)	—	—	—	—	×	—
<i>Amsinckia nesophila</i> Suks. (1931, p. 93)	—	—	—	—	×	—
<i>Amsinckia congesta</i> Suks. (1931, p. 82)	—	—	—	—	×	—
<i>Amsinckia catalinensis</i> Suks. (1931, p. 53)	—	—	—	—	×	—
<i>Amsinckia attenuata</i> Eastw. (Suksdorf, 1931, p. 79)	—	—	—	—	×	—
<i>Amsinckia insularis</i> Suks. (1931, p. 75)	—	—	—	—	×	×
<i>Amsinckia Swainiæ</i> Suks. (1931, p. 72)	—	—	—	×	×	—
<i>Amsinckia St. Nicolai</i> Eastw. (1898, p. 109)	×	×	—	×	—	×
<i>Amsinckia maritima</i> Eastw. (1898, p. 109)	×	×	—	—	—	×
<i>Nemophila aurita</i> Lindl.	—	—	—	×	×	—
<i>Nemophila erodiifolia</i> Millsp. (1923, p. 205)	—	—	—	—	×	—
<i>Nemophila racemosa</i> Nutt.	—	—	—	×	×	×
<i>Nemophila parviflora</i> Dougl.	—	×	×	×	—	—
<i>Nemophila insularis</i> Eastw. (1935, p. 282)	×	—	—	—	—	—
<i>Ellisia chrysanthemifolia</i> Benth.	—	×	×	×	×	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Phacelia grandiflora</i> (Benth.) Gray	—	—	×	×	×	—
<i>Phacelia Parryi</i> Torr.	—	—	—	×	—	—
<i>Phacelia viscida</i> (Benth.) Torr.	—	×	×	×	×	—
<i>Phacelia hispida</i> Gray Santa Barbara Island	—	—	—	×	×	—
<i>Phacelia distans</i> Benth. Anacapa Island	—	—	—	×	×	×
<i>Phacelia suffrutescens</i> Parry (1884, p. 38)	—	—	—	×	—	—
<i>Phacelia ramosissima</i> Dougl.	—	—	×	×	—	—
<i>Phacelia floribunda</i> Greene (1885, p. 200)	—	—	—	—	—	×
<i>Phacelia Lyoni</i> Gray (1885, p. 303)	—	—	—	—	×	—
<i>Phacelia insularis</i> Munz (1931, p. 113)	—	×	×	—	—	—
<i>Phacelia scabrella</i> Greene (1887, p. 35)	—	×	×	—	—	—
<i>Phacelia phyllomanica</i> Gray (1876, p. 87)	—	—	—	—	—	×
<i>Emmenanthe penduliflora</i> Benth.	—	—	—	×	×	—
<i>Eriodictyon Traskiæ</i> Eastw. (1898, p. 131)	—	—	—	—	×	—
<i>Gilia Traskiæ</i> Eastw. (Milliken, 1904, p. 26)	—	—	—	—	×	—
<i>Gilia glutinosa</i> (Benth.) Gray	—	—	—	—	×	—
<i>Gilia millefoliata</i> F. & M. Anacapa Island	—	×	×	×	×	—
<i>Gilia Nevinii</i> Gray (1886, p. 335)	×	×	×	×	×	×
<i>Gilia multicaulis</i> Benth.	—	—	—	×	×	—
<i>Gilia micrantha</i> Steud.	—	×	—	—	—	×
<i>Gilia dianthoides</i> Endl.	—	—	—	×	×	—
<i>Gilia androsacea</i> (Benth.) Steud.	—	—	×	×	—	—
<i>Gilia bicolor</i> (Nutt.) Brand	—	—	×	×	×	×
<i>Gilia tenuiflora</i> Benth.	—	—	×	—	×	—
<i>Navarretia foliacea</i> Greene	—	—	—	—	×	—
<i>Navarretia atractyloides</i> (Benth.) H. & A.	—	—	×	×	×	—
<i>Navarretia hamata</i> Greene	—	—	—	—	×	×
<i>Navarretia viscidula</i> Benth.	—	—	—	—	×	—
<i>Navarretia filifolia</i> (Nutt.) Brand	—	—	—	×	×	—
<i>Solanum Wallacei</i> (Gray) Parish (1901, p. 166)	—	—	×	×	×	—
<i>Solanum Clokeyi</i> Munz (1932, p. 115)	—	—	—	×	—	—
<i>S. arborescens</i> Clokey (1931, p. 60)	—	—	—	—	—	—
<i>Solanum Douglasii</i> Dunal	—	×	×	×	×	×
<i>Nicotiana Bigelovii</i> Wats.	—	—	—	—	×	—
<i>Nicotiana Clevelandi</i> Gray	—	—	—	×	×	—
<i>Nicotiana glauca</i> Grah.	—	—	—	—	×	—
<i>Datura meteloides</i> DC.	—	—	×	×	×	—
<i>Petunia parviflora</i> Juss.	—	—	×	—	—	—
<i>Lycium Richii</i> Gray	—	—	—	—	×	×
<i>Lycium Hassei</i> Greene (1888, p. 222)	—	—	—	—	×	—
<i>Lycium verrucosum</i> Eastw. (1898, p. 111)	×	—	—	—	—	—
<i>Lycium californicum</i> Nutt. Santa Barbara Island	×	—	—	—	×	×
<i>Lycium Fremontii</i> Gray	—	—	×	—	—	—

	S. Nicolas	S. Miguel	N. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Linaria canadensis</i> (L.) Dum.-Cours. var. <i>texana</i> (Scheele) Pennell	—	×	×	×	×	—
<i>Gambelia speciosa</i> Nutt. (1847, p. 149) (<i>Antirrhinum</i>)	—	—	—	—	×	×
<i>Antirrhinum Nuttallianum</i> Benth.	—	×	×	×	×	×
<i>Antirrhinum glandulosum</i> Lindl.	—	—	—	×	—	—
<i>Antirrhinum strictum</i> (H. & A.) Gray	—	—	—	×	×	—
<i>A. Hookerianum</i> Pennell						
<i>Scrophularia villosa</i> Pennell (in Millspaugh & Nuttall, 1923, p. 223)	—	×	—	—	×	×
<i>Penstemon cordifolius</i> Benth.	—	—	×	×	×	×
<i>Diplacus linearis</i> (Benth.) Greene	—	—	×	—	×	—
<i>Diplacus arachnoideus</i> Greene (1885, p. 210)	—	—	×	×	—	—
<i>Diplacus parviflorus</i> Greene (1887, p. 36)	—	—	×	×	—	—
<i>Mimulus Flemingii</i> Munz (1935, p. 477)						
<i>Mimulus floribundus</i> Dougl.	—	—	×	×	×	—
<i>Mimulus guttatus</i> DC.	—	—	×	×	×	×
<i>Mimulus latifolius</i> Gray (1876, p. 95)Guadalupe Island	—	—	—	×	—	—
<i>Mimulus cardinalis</i> Dougl.	—	—	—	×	×	—
<i>Mimulus Traskiae</i> Grant (in Millspaugh & Nuttall, 1923, p. 226)	—	—	—	—	×	—
<i>Mimulus moschatus</i> Dougl.	—	—	×	—	×	—
<i>Orthocarpus purpurascens</i> Benth.	×	×	×	×	×	—
var. <i>pallidus</i> Keck	—	—	—	×	—	—
<i>Orthocarpus densiflorus</i> Benth.	—	×	×	×	—	—
<i>Castilleja Douglasii</i> Benth.Anacapa Island	—	—	×	—	×	—
<i>Castilleja latifolia</i> H. & A.	—	—	×	—	—	—
subsp. <i>insularis</i> Eastw. (1936, p. 238)	—	—	—	×	—	—
<i>Castilleja foliolosa</i> H. & A.	—	—	—	×	×	—
<i>Castilleja hololeuca</i> Greene (1887, p. 38)Anacapa Island	—	×	×	×	—	—
<i>Castilleja affinis</i> H. & A.	—	×	×	×	—	—
<i>Castilleja californica</i> Abrams	—	—	×	×	—	—
<i>Collinsia bicolor</i> Benth.	—	×	×	—	×	×
<i>Verbena robusta</i> Greene	—	×	×	×	×	×
<i>V. prostrata</i> of authors.						
<i>Lippia nodiflora</i> Mx.	—	—	—	—	×	—
<i>Micromeria Chamissonis</i> (Benth.) Greene	—	—	—	—	×	—
<i>Sphacele fragrans</i> Greene (1887, p. 38)	—	—	×	×	×	—
<i>Mentha piperita</i> L.	—	—	—	—	×	—
<i>Marrubium vulgare</i> L.	—	×	×	×	×	×
<i>Lamium amplexicaule</i> L.	—	—	—	×	—	—
<i>Nepeta Cataria</i> L.	—	—	—	—	×	—
<i>Salvia Columbarie</i> Benth.	—	—	×	×	×	×
<i>Salvia mellifera</i> GreeneAnacapa Island	—	—	×	×	×	×
var. <i>Jonesii</i> Munz	—	×	—	—	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Specularia biflora</i> (R. & P.) F. & M.	—	—	×	×	×	—
<i>Specularia perfoliata</i> A. DC.	—	—	—	×	—	—
<i>Githopsis specularioides</i> Nutt.	—	—	—	×	—	—
<i>Lactuca virosa</i> L.	—	—	×	×	×	—
<i>Sonchus tenerrimus</i> L. Anacapa Island	×	×	×	—	×	×
<i>Sonchus asper</i> L.	×	×	×	×	×	—
<i>Sonchus oleraceus</i> L. Santa Barbara Island	×	×	×	×	×	×
<i>Malacothrix saxatilis</i> (Nutt.) T. & G. var. <i>tenuifolia</i> (Nutt.) Gray..... Anacapa Island	—	×	×	×	×	—
<i>Malacothrix Clevelandii</i> Gray Anacapa Island	—	—	—	×	—	—
<i>Malacothrix californica</i> DC.	—	—	—	×	×	—
<i>Malacothrix Coulteri</i> Gray var. <i>cognata</i> Jepson (1925, p. 1001)	—	—	×	×	—	—
<i>Malacothrix incana</i> (Nutt.) T. & G. (1841, p. 435)	—	×	×	×	—	—
<i>Malacothrix insularis</i> Greene (1885, p. 194)	—	—	—	×	—	—
<i>Malacothrix foliosa</i> Gray (1886, p. 455)	—	—	—	×	—	×
..... Santa Barbara Island	—	—	—	×	—	×
<i>Malacothrix indecora</i> Greene (1886, p. 152)	×	×	—	×	—	—
<i>Malacothrix squalida</i> Greene (1886, p. 152)	—	×	—	×	—	—
<i>Malacothrix implicata</i> Eastw. (1898, p. 113) .. Anacapa Island	×	×	×	×	—	—
<i>Malacothrix Blairii</i> Munz & Jtn. (as <i>Stephanomeria</i> , 1924, p. 301)	—	—	—	—	—	×
<i>Agoseris apargioides</i> Greene	—	—	×	—	—	—
<i>Agoseris heterophylla</i> (Nutt.) Greene	—	—	×	×	—	—
<i>Agoseris grandiflora</i> (Nutt.) Greene	—	×	—	×	—	—
<i>Stephanomeria virgata</i> Benth.	—	×	×	×	×	—
<i>Stephanomeria exigua</i> Nutt.	—	—	×	—	—	—
<i>Stephanomeria tomentosa</i> Greene (1886, p. 152)	—	—	×	×	—	—
<i>Stephanomeria paniculata</i> Nutt.	—	—	—	—	×	—
<i>Hieracium argutum</i> Nutt. Santa Barbara Island	—	—	×	×	—	—
<i>Hieracium Grinnellii</i> Eastw.	—	—	—	×	—	—
<i>Microseris linearifolia</i> (DC.) Schultz	×	—	×	×	×	—
<i>Microseris aphantocarpa</i> Gray	—	—	—	—	×	×
<i>Microseris platycarpa</i> Gray	—	—	—	—	×	×
<i>Microseris Lindleyi</i> (DC.) Gray	—	—	×	×	×	×
<i>Microseris anomala</i> Wats.	—	—	—	×	—	—
<i>Microseris elegans</i> Greene	—	×	×	×	—	×
<i>Calais plurisetata</i> Greene (1887, p. 34) (<i>Microseris</i>)	—	—	—	×	—	—
<i>Taraxacum officinale</i> Web.	—	—	—	×	×	×
<i>Rafinesquia californica</i> Nutt.	—	—	×	×	×	×
<i>Tragopogon porrifolius</i> L.	—	—	—	×	—	—
<i>Cichorium Intybus</i> L.	—	—	—	×	—	—
<i>Hypochaeris glabra</i> L.	—	—	×	×	—	—
<i>Ambrosia californica</i> Rydb.	—	—	—	×	×	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Franseria bipinnatifida</i> Nutt. Anacapa Island	—	×	×	×	×	×
var. <i>dubia</i> Eastw. (1898, p. 117)	×	—	—	—	—	—
<i>Franseria Chamissonis</i> Less.	—	×	—	×	—	—
var. <i>viscida</i> Eastw. (1898, p. 117)	×	—	—	—	—	—
<i>Xanthium pennsylvanicum</i> Wallr. Santa Barbara Island	—	×	—	×	—	—
<i>Brickellia californica</i> (T. & G.) Gray Anacapa Island	—	—	—	×	×	—
<i>Heterotheca grandiflora</i> Nutt.	—	—	—	—	×	—
<i>Pentachæta Lyoni</i> Gray (1886, p. 446)	—	—	—	—	×	—
<i>Solidago californica</i> Nutt.	—	—	×	×	×	—
<i>Corethrogyne lavandulacea</i> Greene (1910, p. 27)	—	—	—	—	×	—
<i>Corethrogyne filaginifolia</i> (H. & A.) Nutt.	×	—	×	—	—	—
var. <i>robusta</i> Greene	—	×	×	×	—	—
var. <i>virgata</i> (Benth.) Gray	—	×	×	×	—	—
<i>Haplopappus ericoides</i> (Less.) H. & A.	—	×	—	—	—	—
<i>Haplopappus venetus</i> (HBK.) Blake var. <i>furfuraceus</i> (Greene) Munz	—	—	—	×	×	×
<i>Bigelovia furfuracea</i> Greene	—	—	—	—	—	—
<i>Haplopappus Traskiæ</i> Eastw. (1931, p. 156)	—	—	—	—	—	×
<i>Hazardia squarrosa</i> (H. & A.) Greene	—	—	×	×	—	—
<i>Hazardia cana</i> (Gray) Greene	—	—	×	×	—	—
<i>Hazardia detonsa</i> Greene	—	—	×	×	—	—
<i>Hazardia serrata</i> Greene	—	—	×	×	—	—
<i>Isocoma vernonioides</i> Nutt.	×	×	×	×	×	×
<i>Isocoma sedioides</i> Greene	—	—	×	×	—	—
<i>Isocoma latifolia</i> Greene (1906, p. 172)	—	—	×	×	—	—
<i>Grindelia latifolia</i> Kell. (1873, p. 36) Anacapa Island	—	×	×	×	—	—
<i>Grindelia perennis</i> A. Nels.	—	—	—	—	×	—
<i>Grindelia arenicola</i> Steyermark	—	—	×	×	—	—
<i>Grindelia robusta</i> Nutt. var. <i>platyphylla</i> Greene Anacapa Island	—	—	×	—	—	—
<i>Aster chilensis</i> Nees	—	—	×	×	—	—
<i>Aster exilis</i> Ell.	—	—	—	×	×	—
<i>Aster radulinus</i> Gray	—	—	×	×	—	—
<i>Erigeron stenophyllus</i> Nutt. Anacapa Island	—	×	×	×	—	—
<i>Erigeron canadensis</i> L.	—	—	—	×	×	—
<i>Erigeron linifolius</i> Willd.	—	—	—	—	×	—
<i>Erigeron sanctarum</i> Wats.	—	—	×	—	—	—
<i>Erigeron glaucus</i> Ker. Anacapa Island	—	×	×	×	—	—
<i>Baccharis viminea</i> DC.	—	—	—	×	×	—
<i>Baccharis Douglasii</i> DC.	—	—	×	×	×	—
<i>Baccharis Plummeræ</i> Gray	—	—	—	×	—	—
<i>Baccharis consanguinea</i> DC.	×	—	×	×	×	×
<i>Conyza Coulteri</i> Gray	—	—	×	×	—	—
<i>Anthemis Cotula</i> L.	—	—	×	×	—	—

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Achillea lanulosa</i> Nutt.Anacapa, Santa Barbara islands	X	X	X	X	X	X
<i>Chrysanthemum Coronarium</i> L.	-	-	-	-	X	-
<i>Chrysanthemum frutescens</i> L.	-	-	-	-	X	-
<i>Matricaria suaveolens</i> Buch.	-	-	X	X	-	-
<i>Artemisia californica</i> Less. var. <i>insularis</i> (Rydb.) MunzSanta Barbara, Anacapa islands	X	X	X	X	X	X
<i>Crossostephium insulare</i> Rydb. (1916, p. 244)						
<i>Artemisia heterophylla</i> Nutt.	-	-	X	X	X	-
<i>A. Douglasiana</i> Besser						
<i>Artemisia dracunculoides</i> Pursh	-	-	-	-	X	-
<i>Artemisia Ludoviciana</i> Nutt.	-	-	X	X	-	-
<i>Cotula australis</i> (Sieb.) Hook. f.	-	-	X	X	X	-
<i>Cotula coronopifolia</i> L.	-	X	X	X	X	-
<i>Jaumea carnosa</i> (Less.) Gray	-	X	X	X	X	-
<i>Venegasia carpesioides</i> DC.	-	-	X	X	-	-
<i>Helenium puberulum</i> DC.	-	-	-	-	X	-
<i>Helianthus annuus</i> L.	-	-	-	X	X	-
<i>Bæria hirsutula</i> Greene	-	X	X	X	X	-
<i>Bæria Palmeri</i> Gray var. <i>clementina</i> Gray (1886, p. 452)	X	X	X	X	X	X
<i>Lasthenia glabrata</i> Lindl.	-	-	X	X	-	-
<i>Amblyopappus pusillus</i> H. & A.Anacapa Island	X	X	X	X	X	X
<i>Perityle Greenei</i> Rose (1890, p. 117)Anacapa, Santa Barbara islands	-	-	X	X	X	X
<i>P. Emoryi</i> of authors						
<i>Chaenactis tenuiflora</i> Nutt.	-	-	X	-	-	-
<i>Eriophyllum Nevinii</i> Gray (1886, p. 452)	-	-	-	-	X	X
<i>Eriophyllum confertiflorum</i> (DC.) GrayAnacapa Island	-	X	X	X	X	X
var. <i>laxiflorum</i> Gray	-	-	X	-	-	-
var. <i>trifidum</i> (Nutt.) Gray	-	-	X	X	-	X
<i>Eriophyllum stæchadifolium</i> Lag.Anacapa Island	-	-	X	X	-	-
var. <i>depressum</i> Greene (1887, p. 404)	-	-	-	X	-	-
<i>Euceelia californica</i> Nutt.	-	-	-	X	X	X
<i>Coreopsis gigantea</i> (Kell.) HallAnacapa Island	X	X	X	X	X	X
<i>Leptosyne gigantea</i> Kell. (1873, p. 198)						
<i>Thelesperma gracile</i> (Torr.) Gray	-	-	-	-	X	-
<i>Madia sativa</i> Mol.	-	-	X	-	X	-
<i>Madia dissitiflora</i> (Nutt.) T. & G.	-	-	-	X	X	-
<i>Madia exigua</i> (Sm.) Greene	-	-	-	X	X	-
<i>Hemizonia clementina</i> Brandg. (1899, p. 70.)Anacapa, Santa Barbara islands	X	-	-	-	X	X
<i>Hemizonia paniculata</i> Gray	-	-	X	X	X	-
<i>Hemizonia floribunda</i> Gray	-	-	-	-	X	-
<i>Hemizonia fasciculata</i> (DC.) T. & G.	-	X	X	X	X	X
var. <i>ramosissima</i> (Benth.) GraySanta Barbara Island	-	-	-	-	X	X

	S. Nicolas	S. Miguel	S. Rosa	S. Cruz	S. Catalina	S. Clemente
<i>Layia glandulosa</i> (Hook.) H. & A.	—	—	—	×	—	×
<i>Layia platyglossa</i> (F. & M.) Gray	—	×	×	×	×	—
<i>Achyraea mollis</i> Schauer	—	—	×	×	×	—
<i>Stylocline gnaphalioides</i> Nutt.	—	—	×	×	×	—
<i>Psilocarphus tenellus</i> Nutt.	—	—	×	×	×	—
<i>Filago californica</i> Nutt.	—	×	×	×	×	—
<i>Filago arizonica</i> Gray	—	—	—	×	×	×
<i>Micropus californicus</i> F. & M.	—	—	×	×	—	—
<i>Evax caulescens</i> Benth. var. <i>humilis</i> Jeps.	—	—	×	×	—	—
<i>Gnaphalium palustre</i> Nutt.	—	—	—	×	×	×
<i>Gnaphalium purpureum</i> L.	—	—	×	×	—	—
<i>Gnaphalium bicolor</i> Bioletti	—	—	×	×	×	—
<i>Gnaphalium californicum</i> DC.	—	—	×	×	×	×
<i>Gnaphalium Wrightii</i> Gray	—	—	—	×	—	—
<i>Gnaphalium microcephalum</i> Nutt.	—	—	—	×	×	—
<i>Gnaphalium ramosissimum</i> Nutt.	—	—	—	×	—	—
<i>Gnaphalium chilense</i> Spreng. Anacapa Island	—	×	×	×	×	×
var. <i>confertifolium</i> Greene	—	×	×	—	—	—
<i>Gnaphalium beneolens</i> Dav. (1918, p. 17)	—	—	×	—	—	—
<i>Anaphalis margaritacea</i> (L.) B. & H.	—	—	—	—	×	—
<i>Pluchea camphorata</i> (L.) DC.	—	—	—	×	×	—
<i>Pluchea sericea</i> (Nutt.) Cov.	—	—	—	—	×	—
<i>Senecio Douglasii</i> DC.	—	—	—	×	×	—
<i>Senecio Lyoni</i> Gray (1886, p. 454)	—	—	—	×	×	×
<i>Senecio aphanactis</i> Greene	—	—	×	×	×	—
<i>Senecio vulgaris</i> L.	—	—	—	×	—	—
<i>Lepidospartum squamatum</i> Gray	—	—	—	×	—	—
<i>Cirsium occidentale</i> (Nutt.) Jeps.	—	—	—	×	×	—
<i>Cirsium occidentale</i> var. ?	—	×	—	—	—	—
<i>Cirsium californicum</i> Gray	—	×	×	×	—	—
<i>Cirsium Coulteri</i> Harv. & Gray	—	—	×	×	—	—
<i>Cnicus lilacinus</i> Greene (1887, p. 404)	—	—	×	×	—	—
<i>Silybum Marianum</i> Gaertn.	—	—	—	×	×	—
<i>Cynara Scolymus</i> L.	—	—	—	×	—	—
<i>Centaurea melitensis</i> L.	×	×	×	×	×	×
<i>Centaurea solstitialis</i> L.	—	—	×	×	×	—
<i>Perezia microcephala</i> (DC.) Gray	—	—	×	×	×	—

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PLANTS NEW TO CALIFORNIA

BY JOHN THOMAS HOWELL

In June, 1940, Miss Eastwood and I took a collecting trip to Modoc County, and on our return to San Francisco we visited both the Carson and Ebbetts passes in Alpine County. Five specimens from our collections seem to represent plants not reported heretofore for the flora of California, two introduced and three indigenous.

PHALARIS TUBEROSA L. var. *STENOPTERA* (Hack.) Hitchc. This grass was collected from large vigorous clumps that grew along the highway at Williams, Colusa Co. (*Eastwood & Howell No. 7875*). It is noted in Hitchcock, *Man. Grasses U. S.*, p. 534, as a cultivated grass in California. In 1938, I collected specimens of it near Loleta, Humboldt Co., which were determined by Mrs. Agnes Chase, who wrote that, to her knowledge, the collection was the first from plants growing spontaneously in the United States (*Howell No. 13721*). The determination of the present collection was verified by Dr. J. R. Swallen.

MULLA TRANSMONTANA Greene. Along the road that traverses Hope Valley, Alpine Co., and ascends the east slope of Carson Pass, this liliaceous plant was quite common (*Eastwood & Howell No. 8477*). It was originally described from near Reno, Nevada, and has been found along the east slope of the Sierra Nevada beyond Lake Tahoe, so this report of its occurrence in California is scarcely startling.

ALISMA GEYERI Torr. This water-plantain, too, is a plant the occurrence of which in California was to be anticipated. It is a widely distributed plant of wet places through the northern United States and by us was collected at Likely, Modoc Co. (*Eastwood & Howell No. 8037*). The small rosy-pink flowers of the short inflorescence are attractive and not like the flowers in other *Alismaceæ* in California.

CRYPTANTHA WATSONI (Gray) Greene. On high subalpine slopes adjacent to both the Carson and Ebbetts passes, this borage was found (*Eastwood & Howell No. 8435* and *No. 8556*). It is

widespread in the western states and yet no record of its occurrence in California has been seen by us in the literature.

SALVIA ÆTHIOPIS L. This exotic mint, a native of southern Europe and the Near East, was found along the Eagle Lake road near Susanville, Lassen Co. (*Eastwood & Howell 8330*). Other Californian collections in Herb. Calif. Acad. Sci. have been made in Plumas County by Mrs. Clemens in 1919 and 1920 and by Miss Eastwood in 1927. Several collections in the Dudley Herbarium from the vicinity of Lakeview, Lake Co., Oregon, would seem to indicate the prevalence of this weed near the northeast corner of California.*

NOTES ON *POLYCARPON*. The indigenous Californian species of *Polycarpon*, *P. depressum* Nutt., is occasional in southern California; but in central California it has been known in the literature from only a single collection from the Pajaro Hills, Monterey County (cf. Jepson, Fl. Calif. 1:496). In Herb. Calif. Acad. Sci., there are specimens from two other stations that may be recorded: dunes, Monterey, Monterey County, *Clemens in 1919*; burn in chaparral near the Pinnacles, San Benito County, *J. T. Howell in 1931*.

The introduced species of *Polycarpon* in California, *P. tetraphyllum* L., is not uncommon about habitations in central California, but for southern California it is listed by Munz (Man. S. Calif. Bot., 165) as "reported from Santa Barbara." The following two collections from Los Angeles County are in Herb. Calif. Acad. Sci.: Sawtelle, *Walther in 1926*; Redondo Beach, *L. S. Rose in 1940*. It is interesting that Mr. Rose found both *P. tetraphyllum* and *P. depressum* growing together on sandy flats near the beach. What a long and varied evolutionary history these two plants have experienced since genetic divergence first appeared in their common progenitor, a divergence that resulted in their differentiation and initiated those prolonged migrations that now bring them together again on the beach at Redondo!—
John Thomas Howell.

* Since writing this paragraph, I have found that T. S. Brandege reported *S. Æthiopsis* as "established along roadsides in Susanville, July, 1892" (*Zoe* 4:158). But since the plant is not listed in the floras nor in Robbins' treatment of "Alien Plants Growing without Cultivation in California" (Univ. Calif. Agric. Exper. Sta. Bull. No. 637, 1940), the plant is "new" to most of us and should be noted anyway.

LEAFLETS *of* WESTERN BOTANY

CONTENTS

	PAGE
A New Species of <i>Cymopterus</i> from Nevada	81
R. C. BARNEBY	
Interesting Western Plants—VI	83
PHILIP A. MUNZ	
New Species of <i>Castilleja</i>	87
ALICE EASTWOOD	
Lupinus Studies—II	92
A. A. HELLER	
Studies in <i>Phacelia</i> —I	95
JOHN THOMAS HOWELL	

SAN FRANCISCO, CALIFORNIA

NOVEMBER 6, 1941

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as

LEAFL. WEST. BOT.



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A NEW SPECIES OF CYMPTERUS FROM NEVADA

BY R. C. BARNEBY

Cymopterus Ripleyi Barneby, spec. nov., *C. deserticolæ* Bdg. a quo fructus adeo minoris obovato-cuneati indumento magis copioso facieque commissurali profundius excavata et præsertim foliis palmatim 3-ternatis, segmentis latis congestis nec 2-3-pinnatifidis satis diversus, affinis.

Herba perennis acaulescens demissa late lutescenti-viridis ovario fructuque exceptis glaberrima: foliis pedunculisque cæspitosis e collo subterraneo caudicis verticalis validi orientibus, inferne petiolis fibrosis persistentibus laxiuscule vaginatis: pseudoscapo nullo: foliis patulis crassis lucidis lævissimis (in herbario exsiccatione corrugata epidermis subscaberula videtur), superne pallide viridibus subtu discoloribus vel glaucescentibus, petiolo striato 5-9 cm. longo suffultis; lamina ambitu suborbiculari-cordata diametro 2-4 (5) cm. lata et æquilonga in segmenta 3 primaria late flabellato-cuneata palmatim ternata, segmentis lateralibus sessilibus mediano in petiolulum rachin simulantem sensim attenuato, omnibus iteratim 1- vel 2-ternatis laciniis ultimis 3-7 mm. longis fere æquilatis integris vel sæpius 3-dentatis dentibus late ovalibus ad apicem truncatis vel abrupte acutis mucrone cartilagineo albido 0.5 mm. longo apiculatis: pedunculis validis striatis ad anthesin suberectis folia mox excedentibus demum fructibus onustis procumbentibus sub umbella purpurascens: bracteis involucri (vel involucelli unici) dimidiati paucis lineari-acuminatis 1-3 mm. longis scariosis 1-nerviis floribus occultis: floribus numerosissimis sterilibus fertilibusque commixtis subsessilibus vel pedicello vix 1 mm. longo insidentibus radiis primariis umbellularum omnino abortis in capitulum globosum ca. 1 cm. fructiferum ad 1.5-2.0 cm. accrescentem latum artissime congestis; dentibus calycinis evidentibus deltoideis persistentibus; petalis supra unguiculum tenuissimum abrupte expansis apice longe acuminatis inflexis viridibus vel plus minusve brunneo-tinctis, marginibus pallide membranaceis leviter undulatis reflexis: staminibus exsertis: antheris flavis: ovario iam statu juvenili pubescente: fructu dorsaliter valde compresso 6-7 mm. longo, 3-4 mm. lato; mericarpiis obovatis basin versus plus minusve cuneato-angustatis olivaceis, facie interna profundiuscule excavatis fibroso-lepidotis carina filiformi alba percursis, ala crassa obtusa spongioso-suberosa e costis lateralibus constituta cinctis, costis intermediis et dorsali albis filiformibus vel rarius parum incrassato-productis basin versus plerumque confluentibus, omnibus pilis filamentosis multicellularibus (præsertim superne) conspicue pubescentibus; vittis minutis in quoque intervallo 2, secundum commissuram 4.

NEVADA: in deep sand-dunes seven miles south of Callaway, in northeast Nye County, alt. 5150 ft., 26 May 1941. *Ripley & Barneby No. 3626*. Type in Herb. Calif. Acad. Sci., No. 290392. Also in drifting sands of the plateau north of Cactus Peak, about twenty miles southeast of Tonopah, Nye County, alt. 5250 ft., 3 June 1941, *No. 3728*.

Cymopterus Ripleyi var. *saniculoides* Barneby, var. nov. A typo, cui habitu foliorumque forma persimilis, pedunculis longioribus folia iam ad anthesin excedentibus, capitulis sæpissime minoribus 0.5—0.9 cm. tantum latis, floribus antherisque atro-purpureis et præsertim mericarpiis brevioribus 3—6 mm. longis pro rata latoribus nunc et suborbicularibus purpurascenscentibus facie externa undique pube crebriore necnon longiore pulcherrime sericeo-villosis differt. Transitum ad *C. deserticolam* fortasse præbet.

NEVADA: denuded white alkaline-calcareous gravel hills at the base of the Spotted Range towards Frenchman Flat, southern Nye County, alt. 3200 ft., 13 May 1941. No. 3429, type, Herb. Calif Acad. Sci. No. 290391.

Cymopterus Ripleyi is rather abundant in the type locality where it grows scattered among shrubs in deep sand with *Rumex venosus* Pursh, *Oenothera pallida* Lindl., an apparently undescribed *Astragalus* and annual species of *Gilia* and *Lupinus*. Later it was seen to occur over a much larger area of the high sandy plateau southeast of Tonopah, but here the individual plants were less frequent. The peduncles and petioles are largely buried beneath the surface of the soil and the globose heads of apple-green flowers stand erect among the lucent leaves which are expanded to lie flat on the sand. In the structure of the fruit, in which the lateral ribs are conspicuously thickened, spongy in texture and very obtuse, it comes close to *C. deserticola* Bdg., a rare species known from two very restricted localities in the southern Mohave Desert of California, and it seems to find much more distant affinities in *C. megacephalus* Jones, *C. globosus* Wats., or the high montane *C. cinerarius* A. Gray, the other species with globose inflorescence. The form of the leaves, however, is quite characteristic and distinct. While in *C. deserticola* the triangular leaf-blade is finely bipinnatifid into small remote lobes with an elongated rachis, *C. Ripleyi* has suborbicular leaves with the blade 2—3-ternate, the segments broadly cuneate and often overlapping, in this respect much resembling the foliage of *C. (Aulospermum) basalticus* Jones.

The two collections cited are remarkably constant, though in both the fruit is somewhat variable in size. Owing to the congestion of the flowers, there is little space for the development of perfect fruits and they are often asymmetrical, dwarfed or twisted at maturity.

The proposed variety *saniculoides*, while closely resembling *C. Ripleyi* in habit, appears to represent a distinct race. The

black-purple coloration of the flowers, a character which is shared by *C. deserticola*, suffuses alike the petioles, peduncles and fruit; moreover the heads are usually smaller and on longer stems while the very small mericarps are strikingly silky-pubescent, the long silvery indument showing to great advantage against the purplish body of the seed. The variety seemed to be much rarer than the type, being confined to a small area of low alkaline hills denuded of vegetation save for a scattering of a very glaucous form of *Polygala subspinosa* Wats. and *Phacelia Parishii* A. Gray, and even here the individuals were few. The station is two thousand feet lower than the sandy plateau inhabited by the typical form and some fifty miles farther south.

Cymopterus Ripleyi is named for Mr. H. D. Ripley, an authority on the flora of Spain and an enthusiastic collector in the Southwest, who first found and recognized this remarkable little umbellifer as an undescribed species.

INTERESTING WESTERN PLANTS—VI*

BY PHILIP A. MUNZ

Pomona College, Claremont, California

STIPA ARIDA Jones, Proc. Calif. Acad. Sci., ser. 2, 5:725 (1895). Collected June 1, 1938, at 4000 ft. in Echo Canyon, Funeral Mts., Inyo Co., California, *M. French Gilman No. 3006*. Known heretofore from "southwestern Colorado, Utah, and Arizona" (Hitchcock, Man. Grasses U. S., 437,—1935). The Gilman collection matches the type (*Jones No. 5377* from Marysvale, Utah) in every detail except in greater height of culms and length of leaves, but does not much exceed the measurements given by Hitchcock.

BETULA FONTINALIS Sarg., Bot. Gaz. 31:239 (1901). This species has been known in California from the Sierra Nevada of Inyo Co. and from the White Mts. (cf. McMinn, Illus. Man. Calif. Shrubs, 74,—1939), but the first collection from the Panamint Mts. seems to be that by *M. French Gilman No. 3111*, from "Birch" Spring, near the head of Jail Canyon which runs down from the north side of Telescope Peak, June 13, 1938, at 8500 ft.

* Unless otherwise indicated, the plant specimens cited in this paper are in the Herbarium of Pomona College. Those cited as (Sac) are from the U. S. Dept. of Agriculture Herbarium at Sacaton, Arizona; those as (US) are from the United States National Herbarium.

Mr. Gilman reports that one of the trees measured 54 inches in diameter and over 25 feet in height.

MOLLUGO CERVIANA (L.) Sér. in DC. Prodr. 1: 392 (1824). During the winter of 1939—40, this plant was abundant in the southern part of the Mohave Desert in the region of Twenty-nine Palms, California, for example, one mile east of Twenty-nine Palms, *Munz No. 15898*. Previously reported for Southern California from the San Jacinto Mts., *R. Hoffmann* (Leafl. West. Bot. 1: 39,—1933).

PETALOSTEMUM SEARLSIÆ Gray, Proc. Amer. Acad. 8: 380 (1873). Reported for Southern California from Pahrump Valley and Providence Mts. (Munz, Man. So. Calif. Bot., 263,—1935) and New York Mts. (Wolf, Occas. Papers Rancho Santa Ana Bot. Gard. 2: 65,—1938). Collected June 4, 1940, in North Branch, Emigrant Canyon, Death Valley, at 5000 ft., *M. French Gilman No. 4252* and *No. 4253*.

ASTRAGALUS MINTHORNIAE (Rydb.) Jepson, Fl. Calif. 2: 374 (1936). *Hamosa Minthornia* Rydb., Bull. Torr. Bot. Club 54: 15 (1927); No. Amer. Fl. 24: 420 (1929). Originally described from Pioche, Lincoln Co., Nevada, and maintained by Jepson as distinct from *A. malacus* Gray and cited by him from Barnwell, New York Mts., eastern San Bernardino Co., Calif., *T. S. & K. Brandegee*, as well as from Gold Mt., Nevada, *Purpus No. 3439*. I agree in the distinctness of this species, with its ascending, almost straight pods and strigose herbage, as opposed to the spreading arcuate pods and spreading hairs of *A. malacus*. I cite the following additional collections for *A. Minthornia*: NEVADA: Goose Springs, May, 1915, *T. S. Brandegee*; Kyle Canyon, Charleston Mts., *Clokey No. 7575*; Potosi Mts., *Jaeger*, May 28, 1930. CALIFORNIA: San Bernardino Co., 5 miles south of Barnwell, at 4500 ft., *Munz No. 13711* (reported as *A. malacus*, Munz, Leafl. West. Bot. 2: 69,—1938); east side of Clark Mt., at 6000 ft., *Jaeger in 1933*; south side of Clark Mt., at 5000 ft., *Munz No. 12986*.

TETRACOCCLUS HALLII Brandg., Zoe 5: 229 (1906). Under various synonyms (cf. Wheeler, Contr. Gray Herb. 127: 52, 1939) this species has been reported largely from the Cottonwood Mts., Eagle Mts., and Chuckwalla Mts. of the Southern California deserts, as well as from 10 miles south of Ivanpah, San

Bernardino Co., California, and Yuma Co., Arizona (McMinn, *Illus. Man. Calif. Shrubs*, 249,—1939). Other Southern California stations, both in San Bernardino Co., are: 15 miles west of Needles, *Jaeger*, March 27, 1940, and Carson's Wells, Turtle Mts., *Jaeger*, March 27, 1940.

GAURA ODORATO Sessé ex Lagasca *Gen. & Sp. Pl.*, 14 (1816). Native from Texas to Oaxaca, this species has established itself widely in Southern California: Somis, Ventura Co., *E. Johnson*, Oct., 1940; North Whittier Heights, Los Angeles Co., *Johnson*, Aug. 19, 1939; Sunset, Puente, Los Angeles Co., *Johnson*, Aug., 1939; Brea, Orange Co., *Johnson*, Aug. 5, 1939; Escondido, San Diego Co., *Johnson*, May 1, 1939; Otay, San Diego Co., *Johnson*, Oct., 1939; Twin Oaks, near Escondido, San Diego Co., *Johnson*, Oct., 1939.

GAURA SINUATA Nutt. ex Séringe in *DC. Prodr.* 3:44 (1828). Native from Oklahoma to northern Mexico, this species has been repeatedly reported from California. Since 1935, the date of my *Manual of So. Calif. Bot.*, p. 345, Gander has reported a number of stations in San Diego Co. (*Madroño* 4:34,—1937). Robbins (*Univ. Calif. Agric. Exp. Sta. Bull.* 637:73,—1940) reports other stations. Additional ones are: 1.5 miles northeast of Somis, Ventura Co., *E. Johnson*, Oct., 1940; San Dimas, Los Angeles Co., *L. Wheeler No. 947*; West Covina, Los Angeles Co., *E. Johnson*, Aug., 1939.

GAURA VILLOSA Torr. var. *TYPICA* Munz, *Bull. Torr. Bot. Club* 65:214 (1938). Native from Kansas to New Mexico and Texas, this plant was taken in August, 1939, in the Galleano Orchard near Walnut, Los Angeles Co., by Ethelbert Johnson.

GAURA VILLOSA var. *McKELVEYÆ* Munz, l. c., was collected June 10, 1936, by Garrettson in a beet field east of Puente, Los Angeles Co.

PETALONYX GILMANII Munz, *Leafl. West. Bot.* 2:69—70 (1938). Mr. Gilman has called my attention to the fact that there has occurred an error in the type label (probably mine) which should be No. 2468 instead of No. 1568 as reported, the latter belonging to a collection of *Cymopterus panamintensis* var. *acutifolius* (C. & R.) Munz. He has sent me additional material of the *Petalonyx*, all from Death Valley: slopes of Ubehebe Crater, at 3000 ft., Nov. 3, 1935, *Gilman No. 2101*;

Ubehebe Crater Wash, 2500 ft., Sept. 1, 1938, *Gilman No. 3377*, Aug. 4, 1937, *No. 2681*; Ryan Wash, at 2000 ft., June 8, 1935, *Gilman No. 1679*, May 20, 1937, *No. 2469*. Of these, the Ryan Wash plants are most typical, those from Ubehebe Crater having a leaf-shape more like that of *P. Thurberi*, but retaining the softer pubescence and apparently smaller flowers described for *P. Gilmanii*.

ANGELICA LINEARILOBA Gray, Proc. Am. Acad. 7:347 (1868). Known heretofore from the Sierra Nevada. Collected near Telescope Peak Trail, Panamint Mts., Inyo Co., Sept. 1, 1937, at 10,500 ft., *M. French Gilman No. 2691*.

POLIOMINTHA INCANA (Torr.) Gray, Proc. Amer. Acad. 8:296 (1870). *Hedeoma incana* Torr., U. S. & Mex. Bound. Bot., 130 (1859). This plant of the states to the east of California was found on July 12, 1938, growing in boggy soil at Cushenbury Springs, southern Mohave Desert, San Bernardino Co., at 5400 ft., by Edmund C. Jaeger.

MARTYNIA PARVIFLORA Wooton, Bull. Torr. Bot. Club 25:453 (1898). A species of Arizona, New Mexico, western Texas. Collected in a citrus grove in Thompson Creek Wash, 3 miles northeast of La Verne, Los Angeles Co., Sept. 12, 1933, *L. C. Wheeler No. 2111*; in Johnson Canyon, Panamint Mts., Inyo Co., at 3000 ft., Oct. 30, 1937, *M. F. Gilman No. 2718*.

CORDYLANTHUS PARVIFLORUS (Ferris) Wiggins, Contrib. Dudley Herb. 1:174 (1933). *Adenostegia parviflora* Ferris, Bull. Torr. Bot. Club 45:409, pl. 10, f. 8, pl. 11, f. 4 (1918). Some recent collections of *Cordylanthus* from the New York Mts. in the eastern part of the Mohave Desert of California have puzzled me. At first I referred them to *C. eremicus* (Cov. & Morton) Munz. But as more material has become available, it would seem they should be placed in *C. parviflorus*. The original description of *C. parviflorus* was based on a single specimen from Arizona and measurements given seemed entirely too small for the California plants, but through the kindness of Mr. R. H. Peebles of Sacaton, Arizona, and of Dr. William R. Maxon of the U. S. National Herbarium, I have been able to examine a series of specimens as well as the type. I find myself forced to the same conclusion apparently reached by Dr. Kearney and Mr. Peebles in their examination of many of these sheets, namely,

that the type happened to be somewhat depauperate and that *C. parviflorus* is a species of some geographical extent. I refer here: NEVADA: Pioche, Lincoln Co., *M. E. Jones*, Aug. 31, 1912 (POM). ARIZONA: Coconino Co., Grand Canyon of the Colorado River, near the San Francisco Mt., Sept., 13, 1889, *Knowlton No. 270*, type (US); Kaibab Trail to Roaring Springs, Grand Canyon, Sept. 22, 1938, *Eastwood & Howell No. 7108* (US); Williams to Grand Canyon, 6400 ft., Sept. 25, 1935, *Kearney & Peebles No. 12802* (Sac, US); Fredonia to Kanab, at 4750 ft., Aug. 16, 1937, *Kearney & Peebles No. 13765* (Sac, US); Mohave Co., Peach Springs, *M. E. Jones*, Oct. 13, 1884 (POM); 80 miles southeast of Kingman, Sept. 17, 1935, *Kearney & Peebles No. 12585* (Sac, US). CALIFORNIA: San Bernardino Co., near Barnwell, New York Mts., Aug. 25, 1937, *J. Roos No. 1* (POM); Keystone Spring, at 5500 ft., Oct. 10, 1935, *Munz No. 13886* (POM); 5 miles south of Barnwell, at 4500 ft., Oct. 12, 1935, *Munz No. 13839* (POM).

Specimens vary considerably in glandulosity (*Roos*, *Munz No. 13839*, and collections from Pioche and Peach Springs being more glandular than the others cited), in length of "calyx-leaves" (the upper varying from 10—14 mm. in length, the lower from 12—15 mm.), in length of corolla (14—18 mm. long), and in whether the subtending bracts bear apical callosities or whether they are rounded. Ferris described the latter condition, but in *Munz No. 13886* and *Kearney & Peebles No. 12585* they may be either way on the same plant. In the other collections they are mostly callose. This species seems to grow on limestone.

NEW SPECIES OF CASTILLEJA

BY ALICE EASTWOOD

PL

Castilleja adenophora Eastwood, spec. nov. Caules multi ex radice lignea, 1.5—2 dm. alti, omnino glanduloso-villosi; foliis inferioribus plerumque lineari-oblongis, apice obtusis, circa 2 cm. longis, 2—3 mm. latis, integris vel crispo-undulatis; foliis superioribus interdum 2- vel 5-lobatis, plerumque trilobatis, medio lobo longiore et latiore lateralibus; bracteis inferioribus similibus sed lobis saepe latioribus, bracteis supremis coccineis, approximatis floribus vel superantibus flores, medio lobo 5 mm. lato, apice mucronato; floribus strictis, sessilibus in spicis capitatis, in fructu elongatis; calyce circa 15 mm. longo, basi 5 mm. lato, fisso ex æquo, tubo 5 mm. longo, membranaceo, subinflato, segmentis linearibus obtusis, 3—4 mm. longis,

1—2 mm. latis, coccineis; corolla 15 mm. longa, galea 6 mm. longa, basi 2 mm. lata, dorso viridi, glanduloso-puberula, ventro coccinea, glabra.

Type: Herb. Calif. Acad. Sci. No. 290385, collected on Mono Pass Trail at about 11,000 ft. altitude, Inyo County, California, July 22, 1941, by John Thomas Howell, *No. 16400*. This belongs to what has been included in *C. pinctorum* Fernald, a name which in California has been applied to many plants that appear quite distinct. This is one which is more closely related to *C. disticha* Eastwood, a much taller, more slender, divaricately branching plant.

Castilleja Barnebyana Eastwood, spec. nov. Caules non nulli ex radice lignea, nani, circa 1 dm. alti, simplices, canescentes villis deflexis et adpressis et divarticatis, basibus subterraneis, flavescentibus, squamosis; foliis divaricatis et divaricate 3—5-partitis, rhachide 1—5 mm. lata, trinervata, segmentis prope filiformibus; bracteis flabelliformibus, 3—7-partitis, segmentis angustissimis, coccineis, inferioribus 15 mm. longis, superioribus 5 mm. longis, rhachide lanceolata, basi circa 5 mm. lata, segmento terminali oblongo-obovato, acuto; floribus 3.5 cm. longis, erectis, breviter pedicellatis in racemis divaricate villosis, subcapitatis; tubo calycis 1 cm. longo dorso, 2 cm. longo ventro, laciniis lanceolatis, acuminatis, 5 mm. longis, labium superantibus; galea superante bracteas, 1 cm. longa, brevior tubo, dorso viridi puberulente, ventro rosea, labio brevissimo, protuberante, 3 dentibus incurvis, acuminatis, duobus exterioribus longioribus interioribus, infra bisulcatis.

Type: Herb. Calif. Acad. Sci. No. 290858, collected May 13, 1941, in clefts of calcareous rocks at Connors Pass, White Pine County, Nevada, *Eastwood & Howell No. 9368*. It was collected at the same place by H. D. Ripley and R. C. Barneby eight days later and is named in honor of Mr. Barneby, who has given our herbarium many valuable specimens.

What color the plants gave to the steep calcareous cliff where their woody roots penetrated wherever clefts in the rock gave them room! Of all the castillejas collected on our trip to Utah and Nevada in 1941, this was the loveliest. The gray foliage enhanced the beauty of its brilliant flowers.

Castilleja dolichostylis Eastwood, spec. nov. Caules non nulli, graciles, simplices ex basi, circa 3 dm. alti, omnino glanduloso-puberuli et glanduloso-pilosi; foliis viridibus, inferioribus plerumque integris, lanceolatis, divaricatis, circa 4 cm. longis, 2—5 mm. latis; foliis superioribus latioribus et plerumque 3-lobatis; bracteis inferioribus viridibus, similibus foliis superioribus, bracteis superioribus coccineis, trilobatis, interdum superantibus flores; floribus sessilibus in spicis terminalibus brevibus et latis; calycis fisso posteriore profundiore, segmentis integris, curvatis

prorsus oppositis labio inferiori corollæ; tubo corollæ 1.5 cm. longo, circa 4 mm. lato, in fructu curvato, galea erecta, posteriore puberula, anteriore coccinea membranacea, labio inferiore protuberante, atro in siccate obtuse trilobato; stylo longe exserto, rubescente, stigmatē clavato; antheris albis, longe caudatis.

Type: No. 290387, Herb. Calif. Acad. Sci., collected near Government Flat on the Log Spring Ridge, Mendocino National Forest, Tehama County, California, July 9, 1941, by Eastwood and Howell, No. 9837. It is uncertain to what group this should be referred. It has somewhat the habit of the *C. miniata* group, but that is not glandular. The long-exserted style, the long-tailed, exserted, white anthers, and the peculiar calyx mark it as distinct from any described species. It is quite different from *C. pinetorum* Fernald, another glandular species, a form of which was collected July 10, 1941, by Eastwood and Howell, No. 9863, on Anthony Peak, the highest point on these mountains.

Castilleja Ewani Eastwood, spec. nov. Ramosa ex radice lignea, circa 10—15 cm. alta, divaricate albo-pilosa, viscida; foliis erectis, infimis linearibus, 2—3 cm. longis, 2 mm. latis, trifidis, segmentis linearibus, 1 mm. latis, medio longissimo; bracteis foliis supremis similibus, segmentis latioribus, rubris, æquilongis calyci; calyce tubum corollæ superante, albo-piloso et viscido, fisso posteriore magis anteriore, lobis rubris, obtusis, 2 mm. longis, tubo corollæ 15 mm. longo, galeæ æquali, puberulente dorso; stylo exserto, inflexo, stigmatē obscure bilobo.

Type: No. 180797, Herb. Calif. Acad. Sci., collected June 11, 1930, by Joseph A. Ewan, No. 1990, on "east shore of Baldwin Lake, San Bernardino Mountains, 6674 ft. altitude, among rocks on sandy slopes under pinyons." It is related to *C. Martini* Abrams. It is a low plant with leaves hugging the stems, the lowest linear or lanceolate, the others 3-cleft, with erect acuminate linear divisions. The spike is densely flowered with red-tipped bracts similar to the upper leaves, the segments broader but all acute; the calyx is cleft deeper at the back than at the front and each part has two obtuse erect red-tipped lobes. The red galea is conspicuously exserted 1 to 1.5 cm. The whole plant is clothed with white spreading rather stiff hairs, but is green from the viscid underlying pubescence.

Castilleja Howellii Eastwood, spec. nov. Caules porphyrei graciles, circa 3 dm. alti, glabri, ramosi ex radice lignea, supra paucis ramis brevibus; foliis inferioribus anguste linearibus, divaricatis, circa 4 cm. longis, 1 mm. latis, porphyreis, minutissime albo-puberulis et vestitis pilis brevibus deflexis, margine ciliatis; foliis superioribus trisectis, segmentis anguste

linearibus; bracteis similibus foliis superioribus, apice rubris, floribus rubris, puberulis, distichis, supremis subcapitatis, infimis remotis, in longitudine variantibus, maximis 3 cm. longis; pedicellis 1—5 mm. longis, rhachidibus albo-pilosis, pilis deflexis vel crispis; calyce circa 2 cm. longo, tubo infra labium 8—12 mm. longo, inflato, curvato, rubescenti-nervato, posteriore parte tubi ex galea divaricata circa 1 cm. longa, bisecta 4 mm., apice integra vel bidentata; corolla exserta prorsus, galea 8—10 mm. longa, basi 4 mm. lata, dorso viridi, ventre rubra, labio protuberante, tridentato, dentibus exterioribus acuminatis, dente medio brevior, lato et obtuso.

Type: Herb. Calif. Acad. Sci. No. 290389, collected Aug. 8, 1941, at Agnew Pass, Madera County, California, John Thomas Howell, *No. 16884*, in whose honor it is named. It is related to *C. linariaefolia* Benth., differing in the pubescence, low very slender stems, and in the parts of the flower. It comes near *C. salticola* Eastwood from Ebbett's Pass. It differs in the almost imperceptible puberulence, the very slender purple stems, the purplish leaves which curl downwards, the almost or quite entire segments of the calyx, and the more open racemes. On the mountain pass where it grew, it presented a lovely, airy, graceful appearance quite unlike the coarse aspect of *C. salticola*. Other collections in Herb. Calif. Acad. Sci. are the following from California: Tioga Grade, Mono Co., by Ynez W. Winblad; and by J. T. Howell, *No. 14479*, near Devil's Postpile, Madera Co., and *No. 14489*, Minaret Summit, Mono Co.

Castilleja inornata Eastwood, spec. nov. Suffrutescens, ramosa ex radice et infra inflorescentia, foliosa, viridis, omnino hispidula pilis albis patentibus; foliis scabro-hispidulis, divaricatis vel declinatis, oblongis, integris, apice obtusis, 3-crenatis vel obtuse lobatis, 1—3 cm. longis, circa 1 cm. latis; spicis primo densis, deinde elongatis, distichis, 1—2 dm. longis, 1.5 cm. latis; floribus brevi-pedicellatis et divaricatis; bracteis circa æqualibus calyci, 3- ad 5-nervatis, obtuse lobatis, 5—10 mm. latis; calyce 1—5 cm. longo, fisso 5 mm., laciniis obtusis, 2 mm. longis; corolla exserta 7—10 mm., galea tenui, 1 cm. longa, posteriore hispidula, anteriore membranacea, labio inferiore protuberante, tecto calyce, tridentato, dentibus mucronatis, medio latiore et brevior.

Type: Herb. Calif. Acad. Sci. No. 271474, collected on the Sonoma coast north of Bodega, April 2, 1939, by Eastwood and Howell, *No. 7367*. It is related to *C. latifolia* H. & A. of which it might be considered a subspecies. It is a dull green throughout, with a stiff pubescence of short, spreading hairs mixed with some longer hairs. The distichous spikes have the flowers pointing outwards, dense at first but later separating on the elongating spike. Its appearance is quite different from any of the varieties

of *C. latifolia*. It is an unattractive species with even the flowers dull green.

Castilleja ochracea Eastwood, spec. nov. *Ramosa ex radice lignea, supra ramosa, circa 3 dm. alta, cinerea, hispida pilis longis divaricatis et scabrida pilis brevibus; foliis inferioribus linearibus, 4—5 cm. longis, 1—2 mm. latis; foliis superioribus pectinatis, segmentis 3 ad 7, linearibus, circa 1—2 mm. latis, rhachide angusta; spicis 6—15 cm. longis, floribus confertis, erectis, prope imbricatis; bracteis inferioribus pectinatis, rhachide ovata 3-nervata, lacinia suprema oblonga obtusa, 2—3 mm. lata, otis prope filiformibus, supremis brevissimis; calyce fisso ex æquo, piloso, laciniis filiformibus circa æquilongis, tubo membranaceo, piloso, nervato, circa 7 mm. longo; corolla tenui, ochracea, circa 18 mm. longa, galea erecta, 4 mm. longa, dorso villosa, labio subbreuiore, laciniis linearibus, erectis, 2 mm. longis, infra obscure saccato.*

Type: Herb. Calif. Acad. Sci., No. 280638, collected June 11, 1940, 7 miles southwest of Canby, Modoc County, California, by Alice Eastwood and John Thomas Howell, No. 8016. This belongs in the perplexing group which connects *Castilleja* and *Orthocarpus*. It seems more closely allied to Rocky Mountain species than to those of the Pacific Coast. The harsh pubescence due to the short stiff hairs separates it from *C. pilosa* (Wats.) Greenm., though both belong to the same group. The name comes from the color of the corolla, yellow turning brown.

Castilleja zionis Eastwood, spec. nov. *Caules non nulli ex radice lignea, nani 1—1.5 dm. alti, vestiti villis albis tenuibus divaricatis, vix canescentes sed sæpe purpurascetes, basibus subterraneis, flavescentibus, remote squamosis; foliis divaricatis et subfalcatis, sæpe purpurascensibus, vestitis villis albis tenuibus et puberulis, prope scabridis, foliis infimis linearibus, circa 2 cm. longis, 2—3 mm. latis, foliis superioribus trisectis, non numquam 5-sectis, segmentis lateralibus divaricatis, anguste linearibus, ultimis circa 2 mm. latis, multo longioribus lateralibus, obtusis, rhachide circa 5 mm. longa et lata; bracteis villosis 3—5-sectis, segmentis prope basi rhachidis, longissimis et filiformibus, divaricatis, coccineis, ultimis circa 2 mm. latis, acutis vel breviter acuminatis; inflorescentia albo-villosa, coccinea, floribus breviter pedicellatis, primo capitatis, demum racemosis; calyce 2 cm. longo, tubo villosa, dorso 12 mm. longo, ventre 9 mm. longo, basi subsaccato, laciniis 5 mm. longis, 2 mm. latis, acuminatis, coccineis; corolla 3 cm. longa, galea curvata prorsus, æquilongis tubo, exserta 1 cm., dorso viridi, puberula, ventre membranacea, rubescente, basi 2 mm. lata, apice 3-dentata; capsula oblonga, circa 12 mm. longa, 4 mm. lata, uninervata, compressa; testa seminum arilliformi, membranacea alveolata.*

Type: Herb. Calif. Acad. Sci. No. 290862, collected May 11, 1941, in Clear Creek Canyon, Zion National Park, Washington County, Utah, by Eastwood and Howell, No. 9227. It grew in

the sand washed down from the cliffs, forming masses of bright red. The conspicuous galea, green on back and pink in front, projects and is exerted beyond the bright red bracts and calyx divisions.

LUPINUS STUDIES—II

BY A. A. HELLER

Sect. **Formosi**, sect. nov. Caules plerumque multi decumbentes, sæpe in latis glebis, omnino albo-velutini vel sericei villis patentibus vel adpressis; flores magni et belli, floridi in æstate. Typus: *Lupinus formosus* Greene.

While closely related to plants of section *Albicaules* in floral structure, the differences in habit and pubescence of *L. formosus* Greene and its relatives seem to warrant a distinctive sectional name. Its many usually decumbent stems form a spreading plant often several feet broad. It blooms later than other perennial species and loves the hot valleys and foothills of California. The flowers are large and lovely, the pubescence white-hairy, velvety, silky-spreading, or appressed, or more often spreading and appressed. The sides of the banner are strongly reflexed, the face narrow, the wings are narrow, never covering the back of the keel nor generally the tip; the keel is always smooth and falcate, verging from strongly curved to the upper acuminate part perpendicular to the lower. Some of the roots extend a long distance underground.

The following key refers to the species described in this paper:

- A. Plants noticeably pubescent with white, usually spreading hairs..... B
 A. Plants with appressed hairs; corollas 15 mm. long; pedicels 7 mm.
 long.....*L. lutosus*
 B. Inflorescence 2 dm. or more in length..... C
 B. Inflorescence less than 2 dm. in length; corollas 15 mm. long;
 pedicels 8 mm. long.....*L. caruleus*
 C. Corollas 20 mm. long, pedicels 10 mm. long.....*L. albopilosus*
 C. Corollas 15 mm. long, pedicels 5 mm. long.....*L. navicularius*
 C. Corollas 12 mm. long, pedicels 3 mm. long.....*L. sonomensis*

Lupinus albopilosus Heller, spec. nov. Perennis, 6 dm. altus, omnino albopilosus et velutinus; foliolis 7—9, oblanceolatis vel oblongo-ellipticis, 3—4 cm. longis, latissimis 10 mm. latis, apice mucronatis; racemis 7 cm. longis, laxifloris, subverticillatis; bracteis linearibus, acuminatis, 13 mm. longis, caducis; pedicellis 10 mm. longis; calyce 15 mm. longo, labiis lanceolatis, acuminatis, integris; corolla lilacina, 20 mm. longa, 15 mm. lata; marginibus vexilli recurvatis, medio adnatis, facie vexilli angusta, apice

2 mm. lata, rubescente et purpureo-maculata; alis 8 mm. latis, marginibus superioribus prope inventientibus, marginibus inferioribus separatis; carina glabra, medio 5 mm. lata, falcata, apice acuminata, rubescente infra, purpurea supra; leguminibus 3.5 cm. longis, 10 mm. latis; seminibus applatis, 7 mm. longis, 5 mm. latis, brunneo-maculatis.

The type, in the Heller Herbarium, is *Heller No. 15543*, collected April 21, 1940, along U. S. Highway No. 99W, 2 miles south of Williams, Colusa County, California. Isotype in the Herbarium of the California Academy of Sciences. It has been noted in this neighborhood for a number of years, occurring as far south as a eucalyptus grove just north of Dunnigan. *Lupinus formosus* var. *robustus* C. P. Smith, in Jepson, Manual 529, is probably the same, based upon my *No. 5573*, which is no longer in my possession for comparison. It was collected in the same general region but farther east, near College City.

Lupinus cæruleus Heller, spec. nov. Perennis, 3—4 dm. altus, infra simplex, brevi-ramosus supra, omnino vestitus villis albis adpressis et patentibus; foliolis 7 vel 8, oblanceolatis, 3—5 cm. longis, 8 mm. latis, adpresse sericeis; stipulis lineari-aristatis, 2 cm. longis; racemis 1—1.5 dm. longis; pedunculis brevissimis; bracteis tenuissimis, æqualibus floribus, caducis; pedicellis gracilibus, circa 8 mm. longis; calyce 12 mm. longo, minute bracteolato, labiis lanceolatis, integris; corolla pallido-lilacina, in siccate cærulescente, 15 mm. longa, 12 mm. lata, marginibus vexilli prope apice recurvatis, expansis infra, facie 2 mm. lata, albescente, purpureo-maculata; alis 6 mm. latis supra medio; carina 4 mm. lata medio, curvatissima, apice purpurea.

The type, in the Heller Herbarium, is *Heller No. 15561*, collected April 28, 1940, along the roadside between the radio station and Hooker Oak, east of Chico, Butte County, California. Isotype in the Herbarium of the California Academy of Sciences. This well-marked species occurs in considerable numbers in a neighboring field, but has not been seen at any other place. It occurs in the *Quercus lobata* belt. It is remarkable in the section for its very short peduncles and inflorescence and bluish rather than violet corollas.

Lupinus lutosus Heller, spec. nov. Perennis, 3—4 dm. altus, simplex vel nonnumquam ramosus basi, omnino adpresse sericeus; foliolis 5—9, oblongo-ellipticis, apice cuspidatis, basi acuminatis, longissimis 5 cm. longis, 8 mm. latis supra medium; racemis circa 2 dm. longis, inæqualiter verticillatis, internodiis æqualibus verticillis; bracteis gracilibus, linearibus, purpurascensibus, superantibus flores juniores, caducis; pedicellis 7 mm. longis; calyce 10 mm. longo, labiis lanceolatis, labio superiore bidentato, dentibus parallelis; corolla pallido-violacea, 15 mm. longa, in latere 13 mm.

lata, basi 6—7 mm. lata; vexillis margine reflexis, medio contractis, facie pallido-violacea, purpureo-lineata; alis 6 mm. latis medio; carina 4 mm. lata medio, apice acutissima purpurascens, alis et vexillo separatim 4 mm.

The type, in the Heller Herbarium, is *Heller No. 15546*, collected April 22, 1940, in Anderson Valley, Sonoma County, California. Isotype in the Herbarium of the California Academy of Sciences. It was common in a field in clay soil in the *Quercus lobata* belt. The specific name refers to its occurrence in clay soil.

Lupinus navicularius Heller, spec. nov. Perennis, 6—7 dm. altus, omnino vestitus villis albis patentibus; foliolis 7, oblongo-spatulatis, apiculatis, circa 3.5 cm. longis, 6 mm. latis, viridioribus supra; racemis 2.5 dm. longis; pedunculis robustis, circa 1 dm. longis; bracteis anguste linearibus, circa 1 cm. longis, caducis; floribus subverticillatis, verticillis 15 mm. separatim, pedicellis 5 mm. longis; calyce 10 mm. longo, labiis lanceolatis, acuminatis, superiore labio bidentato, dentibus parallelis; corolla 15 mm. longa, circa 12 mm. lata medio, navicularia, variicolorata, marginibus vexilli adnatis dorso, facie angusta, atro-purpurea; alis 6 mm. latis medio; inferiore parte carinae verticali ad superiore, apice purpurea.

The type, in the Heller Herbarium, is *Heller No. 15572*, collected May 1, 1940, in a grain field on the Cone Ranch along U. S. Highway No. 99E, several miles east of Red Bluff, Tehama County, California. Isotype in the Herbarium of the California Academy of Sciences. It has been observed in this field for a number of years. Its nearest relative is *L. albopilosus*. Some plants show two or three short branches near the ground. The specific name was suggested by the decidedly boat-shaped fresh flowers.

Lupinus sonomensis Heller, spec. nov. Perennis, 3—4 dm. altus, nonnihil, gracilis, omnino vestitus villis albis adpressis et patentibus, villis brevioribus supra quam infra; stipulis 7 mm. longis, 1 mm. latis; foliolis 6 vel 7, lineari-lanceolatis, 2—5 cm. longis, 3 mm. latis, viridioribus supra; petiolis circa 14 mm. longis; racemis 2 dm. longis; pedunculis circa 5 cm. longis; bracteis brevioribus floribus, caducis; pedicellis 3 mm. longis; calyce 10 mm. longo; labiis lanceolatis, acutis, superiore bidentato, dentibus parallelis; corolla violacea vel pallido-purpurea, 12 mm. longa, 4 mm. lata, marginibus vexilli reflexis et medio adnatis, facie 2 mm. lata, purpurea vel lilacina; alis 5 mm. lata supra medium, marginibus adnatis supra, apice 4 mm. ex vexillo; inferiore parte carinae verticali ad superiore, apice brunnescente vel flavescens, carina 5 mm. lata medio; leguminibus vestitis villis albis patentibus, 3 cm. longis, 8 mm. latis, seminibus plerumque 3, 5 mm. longis, 3 mm. latis, nitidis, brunneo-maculatis et punctatis.

The type, in the Heller Herbarium, is *Heller No. 15638*, collected May 17, 1940, in stiff clay soil on a steep grassy bank 2 miles east of Shellville, Sonoma County, California. Isotype in the Herbarium of the California Academy of Sciences.

STUDIES IN PHACELIA—I

BY JOHN THOMAS HOWELL

Phacelia laxiflora J. T. Howell, spec. nov. Herba laxe ramosa, perennis, sordide viscido-pubescent omnino; caulibus lignosis tantum basi subgracili, paucis, patentibus, 1—4.5 dm. longis; foliis orbicularibus, 0.5—3.5 cm. diametro, et hirsutulibus et glandulosis, dentatis ad dentato-lobatis, cordatis basi, petiolis ad 3.5 cm. longis; inflorescentia laxiflora floribus subdistantibus, pedicellis plerumque 1—3.5 cm. longis, crassiusculis; segmentis calycis ad anthesin 3.5—6 mm. longis, oblanceolatis, in fructu 5.5—7.5 mm. longis, apice recurvatis vel rectis; corolla tubulato-campanulata, limbo patente, 1 cm. lato, lobis rotundatis, ca. 3 mm. longis, albis, tubo 10 cm. longo, dilute violaceo, plus minusve glanduloso-pubescente; staminibus paullo inaequalibus, 4—5 mm. longis, filamentis glabris, antheris 1 mm. longis; squamis minimis, circa 1 mm. longis, angustissime semilanceolatis, reductis supra ad linea circa 1 mm. longa; stylo ramisque 4 mm. longis, hirsutulibus et glandulosis, ramis 1 mm. longis; ovario 1 mm. longo, hirsuto supra, ovulis plurimis, plus quam 100 ad quamque placentam; capsula oblongo-ovata, durescente, 5.5—6 mm. longa, basi styli conspicue apiculata; seminibus atris, subnitentibus, tenuiter reticulato-foveolatis, 0.5—0.75 mm. longis, oblongis, subtruncatis apicibus.

Type, Herb. Calif. Acad. Sci. No. 290831 and 290832, collected at a spring near Toroweap Point on the north rim of the Colorado River canyon, Mohave County, Arizona, by Martha Hilend, June 20, 1932. Only four other collections have been seen, all from Arizona: Hermit Trail in the Grand Canyon, Coconino County, *Eastwood No. 5823*, June 18, 1916; Grand Canyon, alt. 4000 ft., *McDougal No. 198*, June 14, 1891 (U. S. Nat. Herb.); lower end of Toroweap Valley, alt. 4200 ft., Mohave County, *Miss A. M. Alexander*, May 29, 1933 (Herb. Univ. Calif.); forming large pendent masses with *Adiantum* and *Petrophytum* in dripping water on perpendicular cliffs, wall of the Colorado River canyon near the head of Lake Mead about 0.5 mile above Emery Falls, Mohave County, Arizona, *R. S. Ferris No. 9871*, June 28, 1940 (Dudley Herb.; Calif. Acad. Sci.). The spring where the type was collected is 2 or 3 miles northwest of Toroweap Point, at which a road running southerly from Short Creek, Arizona, ends.

Phacelia laxiflora is closely related to *P. perityloides* Cov., but from that remarkable endemic of the Death Valley region of California it differs in the coarser habit and the larger size of nearly all the parts, and particularly in the hirsutulous and glandular style and style-branches and in the absence of the

white velvety pubescence of the older stems. It is also related to *P. geraniifolia* Brand, which has been found in the Sheep Mts. of southern Nevada and in the Clark Mts. of southeastern California, but from both *P. perityloides* and *P. laxiflora* that species differs in the densely cespitose basal cushion of reduced stems and leaves from which elongate floriferous stems arise each year and in the much smaller number of ovules (about 35 to 45) to each placenta.

' ' '

The following notes will place on record range-extensions in the distribution of several species of *Phacelia*.

PHACELIA ANELSONI Macbr., heretofore reported only from southern Nevada, has been collected in Utah and California: western slopes of Beaverdam Mts. near Castle Cliff, Washington Co., Utah, alt. 4400 ft., *R. C. Barneby No. 2937*, Apr. 14, 1940; east side of Mountain Pass, eastern San Bernardino Co., California, *Eastwood & Howell No. 8922*, May 7, 1941.

PHACELIA CÆRULEA Greene, a widely distributed species that has been known from Texas and adjacent Mexico westward to southern Nevada, has been collected on Clark Mt. near Mountain Pass, eastern San Bernardino Co., California, alt. 5500 ft., by H. D. Ripley and R. C. Barneby, *No. 3361*, May 8, 1941.

PHACELIA SAXICOLA Gray, one of the rarer desert species of northern Arizona and southern Nevada, has been collected three times, to my knowledge, in California: Teufel Canyon, 17 miles north of Darwin on the Saline Valley road, Inyo Co., alt. 5200 ft., *E. C. Jaeger*, May 20, 1938 (Herb. Pomona College); near the summit of Sherwin Grade, Mono Co., alt. 6200 ft., *Peirson No. 12418*, July 8, 1938; above Scotty's Castle, Grapevine Canyon, Inyo Co., alt. 3400 ft., *Ripley & Barneby No. 3683*, May 31, 1941.

LAMIUM PURPUREUM L. The so-called Red Dead-Nettle of the Old World has been reported by St. John from Pullman, Washington (Fl. S. E. Wash., 354), and by Gilkey as "locally abundant" (Hand. N. W. Fl. Pl., 286), but I have seen no record of its occurrence in California. In 1937, I found it as a garden weed at M. S. Baker's home near Kenwood, Sonoma County. An Oregon collection in Herb. Calif. Acad. Sci. is from Eugene, Lane County (*Henderson No. 15966*).—John Thomas Howell.

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CONTENTS

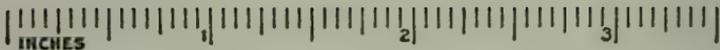
	PAGE
Pugillus Astragalorum Nevadensium	97
R. C. BARNEBY	
Observations on Californian Plants—II	114
ROBERT F. HOOVER	
New Species of Castilleja	116
ALICE EASTWOOD	
Studies in Phacelia—II	117
JOHN THOMAS HOWELL	

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A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as

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PUGILLUS ASTRAGALORUM NEVADENSIMUM

BY R. C. BARNEBY

The following notes are based primarily on collections made during the spring and summer of 1941 in southern Nevada by Mr. H. D. Ripley and the author. Types of all species and varieties described below have been deposited in the Herbarium of the California Academy of Sciences together with material of all collections cited. Duplicates, where they exist, will be sent to the herbaria at Kew Gardens, the New York Botanical Garden, and Pomona College.

The author wishes to put on record his appreciation of facilities most courteously extended by Dr. Philip Munz of Pomona College. Without the opportunity to study the unrivalled collections of *Astragalus*, largely gathered by Marcus Jones and rich in type material, which are preserved in the Pomona College Herbarium, these notes could not have been written.

ASTRAGALUS CARLTONII Macbr. *Homalobus humilis* Rydb. (1907), non *A. humilis* Geyer (1847).

NEVADA: north slopes and ridges of Ward Mt., Egan Range, White Pine Co., alt. 9500—10,050 ft., 21 July 1941, No. 4019.

A new record for Nevada. The specimens showed great variation in length of stems, size of leaflets, and general luxuriance according to the depth of shade and quality of soil in which they grew. The smaller, depauperate plants, from exposed limestone ridges at about ten thousand feet have very abbreviated, slender, procumbent stems, short, acute leaflets not exceeding a centimeter in length and seem to be a good match for Utah material considered typical of *A. Carltonii*. These, however, vary at all points into the tall, leafy, erect plants, with broad, thin, obtuse leaflets up to two centimeters in length, which were common in rich humus under firs and aspens on the northerly slopes. The latter specimens are frequently found to have the pods strigulose with black as well as white hairs and seem to approach *Homalobus Hitchcockii* Rydb., a species described from Duck Creek in the adjacent Schell Creek Range. It is likely that *H. Hitchcockii*, when further investigated, will prove to be a shade form of *A. Carltonii* with rather longer pods, but as the type has not been available for study a definitive pronouncement is not possible.

ASTRAGALUS HAYDENIANUS A. Gray (?) var. NEVADENSIS
M. E. Jones.

NEVADA: gypsum flats by the White River near Sunnyside, northeastern Nye Co., alt. 5000 ft., 25 May 1941, flor., No. 3612, and 20 July 1941, fruct., No. 4003.

A puzzling collection: the deep tawny yellow flowers and inconspicuously reticulate pods suggest passage towards the rare *A. haydenioides* Porter (*Diholcos micranthus* Rydb.), but the dimensions of leaflets, flower, and fruit are exactly as found in *A. Haydenianus* from Utah and Colorado and as elaborated by Porter (1939, passim) in his revision of the group. From the locality, it was to be expected that our plants would agree with the type of the var. *nevadensis* from Palisade, in northern Eureka Co., but this was described from immature specimens, and Jones' remark "pods not evidently rugulose" is therefore without value, while both in color of the flowers, evidently of small value in this alliance, and in shape of leaflets no agreement is to be found. Comparison of the two, however, brings to light a curious floral peculiarity in both collections from Nevada: the banner, instead of being held erect at anthesis as in *A. Haydenianus*, is arcuate-reflexed through a double right angle, finally lying parallel and contiguous with the calyx and thereby giving a highly characteristic aspect to the flower. This is of little importance in itself, but if it were found to be correlated with the nearly smooth pods of the Sunnyside plants it might support the restitution of Jones' varietal name. Unfortunately it has not been possible to study Greene's collection, also from the vicinity of Palisade, from which he described his *A. demissus* (*A. Jepsoni* Sheld.), or to determine the degree of corrugation in the pods. The point is omitted from the type description, but presumably Porter has verified it before reducing all Nevada plants to *A. Haydenianus*, as particular emphasis is laid on the value of this character in his revision. However, as no material is there cited as seen from the state, I would prefer to know more of the western phases of this variable species before following his reduction unreservedly.

ASTRAGALUS CONFERTIFLORUS A. Gray.

NEVADA: in colonies on the gypsum near Crystal, Clark Co., alt. 2000 ft., 13 Apr. 1940, No. 2929.

No record of this species from the state has been seen in the literature, but as it is a conspicuous feature of the roadside

flora along U. S. 91 in the vicinity of Crystal it must surely have been collected. The flowers in this station are bluish-white, fading to ochroleucous when dry, and were noted as being agreeably fragrant.

Astragalus pseudiodanthus Barneby, spec. nov. affinitatis subdubiæ, leguminis forma ad *Iodanthos* Rydb. generis *Xylophaci* ejus seu *Astragali Argophyllos* Jones juxta *A. iodanthum* S. Wats. et *A. cibarium* Sheld. addenda sed calyce breviter campanulato indumentoque copioso aberrans et his notis potius *Villosis Batidophacæ* Rydb. a quibus verosimiliter remota vel *Malacis Hamosæ* ejus inter quas præter habitum persimilem legumine omnino 1-loculari anomala referenda.

Perennis undique molliter villosa-pubescentia cinerea e collo radicis verticalis prælongæ pluricaulis: caulibus diffusis prostratis vel demum adscendentibus leviter striatis plerumque infra medium pauciramosis valde flexuosis 1—4 dm. longis pilis brevibus griseolis nunc stricte appressis nunc patulis strigoso- et villosulo-pubescentibus: stipulis deltoideis acutis vel superioribus acuminatis brevi spatio connatis 1.5—3 mm. longis membranaceis glabris ciliatis mox plus minusve scariosis deflexis: foliis patentibus petiolo brevi incluso 3—5 cm. longis, 7—9-jugis, foliolis articulo gracillimo vix 0.5 mm. longo gestis late obovatis obtusis truncatisve basi cuneatis 5—9 mm. longis 3—6 mm. latis sæpissime conduplicatis superne glaberrimis inferne ut rachis petiolusque indumento villosa e pilis griseis patulis plus minusve crispatis constituto crebre vestitis: pedunculis numerosis rectis validis 2—3 cm. longis striatis in racemum (7—) 10—20-florum subæquilongum fructiferum adeo elongatum jam ad anthesin folium suffulcans dimidio superantem abeuntibus: floribus rubro-violaceis 8—9 mm. longis primo confertis mox laxiuscule dispositis pedicello ca. 1 mm. longo fructifero deflexo bracteæque æquilonga setaceo-subulata suffultis: calycis præsertim albo-villosi (rarius pili nonnulli atrii adsunt) tubo breviter campanulato ca. 2 mm. longo latoque admodum membranaceo inferne gibbo, ore leviter obliquo, dentibus anguste deltoideis acutis vix 1 mm. longis omnino herbaceis coronato: vexillo late obovato obtusissimo apice profunde emarginato basi cuneato ca. 9 mm. longo infra medium leviter arcuato macula elliptica pallida plus minusve striata instructo, marginibus reflexis: alarum carinæque petalis æquilongis ca. 7 mm. longis, limbo unguiculos filiformes superanti, illarum oblanceolato obtuso recto vel parum lunulato 1.5 mm. lato anguste auriculato, hujus duplo latiore de visu laterali oblique obovato brevissime auriculato, margine inferiore apicem obtusum versus abrupte arcuato: legumine sessili deflexo vix turgido, ca. 2 cm. longo ambitu horizontali ovato-lanceolato basi cuneato apice longiuscule acuminato stylo persistente cuspidato, dorsiventraliter conspicue compresso, sutura ventrali filiformi carinulata inferne recta sed infra medium abrupte arcuato-recurvata in annulum fere completum vel saltem dimidium retroflexo, septo omnino destituto valvulisque nihilominus inflexis 1-loculari sed sutura dorsali sulco profundo aperto ad leguminis apicem haud producto fere ad ventralem usque impressa quasi bilocu-

lari, sectione per mediam partem anguste reniformi-compressa 5—6 mm. lata, 2—3 mm. alta, valvulis coriaceis in sicco parum rugulosis undique indumento patulo crispo sparse villosis viridibus, pericarpio tenuiter reticulato: seminibus ca. 10 ovalibus compressis ad hilum emarginatis 2 mm. longis lævibus ochraceis.

NEVADA: in deep sands of the plateau north of Cactus Peak, about twenty miles southeast of Tonopah, Nye Co., alt. 5500 ft., 3 June 1941, fl. and fr., *Ripley & Barneby No. 3725*. Type in Herb. Calif. Acad. Sci., No. 290405. Plate 1, fig. B.

According to my interpretation of Rydberg's genera (1929, p. 251), *A. pseudiodanthus* "keys out" to *Batidophaca*, a segregate distinguished from *Xylophacos* chiefly by the shortly campanulate calyx. In spite of the diversity of elements contained in this group, however, there is no species closely allied to ours, and the true relationship is to be sought elsewhere. In the structure of the fruit there is a marked resemblance to Rydberg's series *Iodanthi* of *Xylophacos*, and although the proportions of the calyx, in ours very short and broad, and the softly villous indument of the whole plant are at variance with all members of that series, *A. pseudiodanthus* is placed here provisionally. In addition to the characters just named, the prostrate, abruptly zigzag stems will serve to distinguish it from *A. iodanthus* S. Wats. and *A. cibarius* Sheld., the only species with which it might be confused.

Of the greatest interest is the extraordinary morphological similarity between *A. pseudiodanthus* and *A. chamæmeniscus* nob. described below. Both are plants of a sandy habitat, from the same geographic area and life-zone, and although similar ecological stimuli are known to produce similar facies in plants of totally unrelated ancestry and even of widely separated orders, the sum of characters shared by these species, including the imponderabilia of coloring and habit, are suggestive of a real affinity. *Astragalus chamæmeniscus* has been placed next to *A. malacus* A. Gray, having the two-celled, falcate, coriaceous pod characteristic of Rydberg's *Hamosa*, but without the fruit it would be difficult, except for the rather larger flowers and more deeply campanulate calyx, to distinguish it from small individuals of *A. pseudiodanthus*. The width of the septum in the *Malaci* varies from the total partition in *A. malacus* to a narrow inflexion of the valves in *A. Layneæ* Greene, and it is

not difficult to imagine a species, derived from an identical source, in which the valves fail to become adnate along the sulcate dorsal suture, the pod thus remaining essentially one-celled. This condition is, in fact, known in the case of *Hamosa imperfecta* Rydb., and *A. pseudiodanthus* may well have arisen along similar lines.

If this hypothetical view proves correct, the line of demarcation between the *Iodanthi* and the *Malaci* will be invalidated to a point where there is a direct sequence of variation from one to the other, and the question of relationship between these two groups, hitherto regarded as remote (although Jones has suggested an affinity between *A. malacus* and his *Argophylli*), will have to be reconsidered. As this raises the much larger question of the value of the septum as a criterion in *Astragalus* as a whole, a subject quite outside the scope of this paper, it is preferable to refer *A. pseudiodanthus* at least temporarily to the *Iodanthi* of *Xylophacos* until a more natural expression of the complex interrelations within the genus has been proposed.

Astragalus pseudiodanthus was found in some quantity at the foot of a low hill which stands up out of the plateau north of Cactus Peak, at a point where the wind has piled up a dune of deep yellow sand. It is a strong perennial with a deep root and prostrate stems, the whole plant ashy with a soft, spreading indument. The flowers are of a clear reddish-violet, except for the banner which has a paler eye, while the racemose pods, green at first but yellowing at maturity, are somewhat variably compressed and arcuate, now spreading and claw-like, now deflexed and arched to a full circle.

Astragalus uncialis Barneby, spec. nov. inter *Cyaneos* Rydb. generis *Xylophaci* ejus seu *Astragali Argophyllos* A. Gray quorum leguminis structuram omnino præbet *A. amphioxys* A. Gray forsân maxime affinis sed ab eo consociisque omnibus foliis 3—5-foliolatis, racemo depauperato aliisque notulis diversissima adnumeranda.

Perennis cæspitosa acaulescens e radice verticali prælonga gracili omnibus fere partibus indumento crebro sericeo laxiuscule appresso strigosocanescens: caulibus annotinis subnullis, foliis pedunculisque ad summos ramulos caudicis multicipitis perbrevis validi dense congestis, caudice ipso stipulis pedunculisque persistentibus confertim vestito: stipulis ovatis vel late lanceolatis acutis petiolo adnatis 3—4 mm. longis hyalinis 1-nerviis glabratis ciliatis arctissime imbricatis: foliis petiolo 1—3.5 cm. longo gracili præsertim erecto gestis nunc subpalmatis 3-foliolatis nunc imparipinnatis 2-jugis, foliolis brevissime articulatis lineari-lanceolatis vel anguste ellipticis acutis 6—13 mm. longis pilis crebris adscendentibus utrinque

strigoso-sericeis. 3 summis plerumque valde approximatis (terminali alia superanti) inferioribus 2. ubi adsunt, rachii ca. 5 mm. longa ab aliis distantius semetis: pedunculis gracilibus 0.5—1 cm. longis rarissime ad 2 cm. usque productis inter folia sepultis plerumque 2-floris (1—3) primum erectis demum fructibus onustis patentibus: bracteis fibrilibus pedicello subæquilongis vel paullo brevioribus lineari-setaceis ca. 3 mm. longis structura cæterius stipulas simulantibus: floribus magnis ca. 2.8 cm. longis folia vix superantibus verosimiliter purpureis vel saltem purpureo-suffusis ad anthesin ignatis: calycis membranacei pilis præcipue albis vel nonnullis brevissimis atris adpersis appresse sericei tubo elongato angusto ca. 1 cm. longo 0.3 cm. lato ad basin plus minusve obconicam dorsaliter gibbo sæpissime leviter arcuato legumine accrescenti mox rupto ore paululum obliquo dentibus subulato-setaceis ca. 2.5 mm. longis conspicue ciliatis coronato: vexillo oblanceolato supra medium 6 mm. lato parum arcuato marginibus reflexis: alarum carinæque subæquilongarum (2.2 cm.) limbo tenuissime unguiculato illarum anguste lunulato sublineari obtuso iere recto 10—12 mm. longo vix 2 mm. lato auriculo minuto obtuso reflexo instructo, hujus (de latere viso) oblique obovato vel oblanceolato plus minusve falcato obtusiusculo 8—9 mm. longo 3 mm. lato margine superiore leviter concava inferiore inferne recta sensim supra medium convexe recurva, auriculo in dentem minusculum triangularem reducto: legumine patulo sæpissime solo accumbenti sessili (calyci ut videtur brevissime articulo sed minime stipitato) 1-loculari 2.5—3 cm. longo, ambitu longitudinali ovato-lanceolato e basi rotundato-truncata sensim acuminato, præter rostrum triangularem cuspidatum vacuum valde compressum sursumque arcuatum conspicue dorsoventraliter obcompressa, sutura ventrali carinata præeminenti circa medium leviter arcuata concava dorsali filiformi nisi apicem versus ubi plerumque acuta tota longitudine depressa sed nunquam sulcata, sectione per mediam partem 1 cm. lata angustissime elliptica vel transverse lineari suturis obcompressione approximatis 2 mm. tantum alta, valvulis tenuiter coriáceo-membranaceis firmis, pericarpio pulchre reticulato undique pilis adscendentibus basifixis crebre strigoso: seminibus compressis oblique reniformibus emarginatis in utraque leguminis valvula numerosis, funiculo nunc longo nunc abbreviato gestis subbiseriatim dispositis.

NEVADA: forming depressed tufts in alkaline-adobe soil on a low hill in the vicinity of Currant, northeastern Nye Co., alt. 5300 ft., 22 May 1941, fruct., Ripley & Barneby No. 3563. Type in Herb. Calif. Acad. Sci., No. 290407. Plate 1, fig. E.

Astragalus uncialis stands out as a notably distinct species in a group famed for puzzling intergrades. The structure of the pod is typical of *Xylophacos*, with the rather thinly coriaceous, reticulated valves found in *A. amphioxys* A. Gray, but less arcuate than is usual in that species and abruptly truncate-rounded, not gradually narrowed, at the insertion. In shape alone the fruit is perhaps most like that of forms of *A. argo-*

phyllus Nutt., but in ours the indument is closely appressed and the endocarp is scarcely pulpy when fresh and not at all woody in the dry state. The 3—5-foliolate leaves seem to be quite characteristic: with their slender petiole and narrow, acute, densely sericeous leaflets they are less suggestive of the plant's true affinity than of the rare *A. detritalis* Jones or perhaps a species of *Orophaca* Britt. Trifoliate leaves do occur in the *Eriocarpi* and *Pygmaei* series of *Xylophacos*, but are there combined with either the long-shaggy pods of *A. Nereberryi* A. Gray or the peculiar fibrous-corky ones of *A. musiniensis* Jones, neither of which is closely allied.

Astragalus uncialis was, unfortunately, not collected in bloom, so the description of the flowers was prepared from the many perfectly preserved but faded corollas collected in a dry state from among the leaves, and their color thus remains somewhat doubtful. However, from the ample traces of purple pigment found in all the petals it appears probable that the fresh flowers are of a lively shade. The plants were seen but once, in a small scattered colony on a bare knoll of stiff, alkaline clay where they made silvery depressed mats scarcely an inch high and but three to four inches in diameter. The leaves, peduncles, and stipules are closely congested upon the many crowns of a densely caespitose and very short caudex, or in the youngest plants rosulate upon a single sessile crown: true stem is very obscure or wanting. The large erect flowers must be extremely handsome at anthesis, but the pods, in spite of their relatively enormous size are not conspicuous, being soon reflexed or recumbent on the ground and largely hidden by the leaves.

Astragalus callithrix Barneby, spec. nov. inter *Glarcosos* Rydb. generis *Xylophaci* ejus sive *Astragali Argophyllos* A. Gray emend. Jones verosimiliter juxta *A. utahensem* T. & G. necnon *A. nudisiliquum* A. Nels. adnumeranda, sed ab eo legumine tenuius comoso, ab hoc calyce multo brevior et floribus saturate purpureis, ab ambobus vero præter caules erectos laxius caespitosos leguminis pericarpio pertenui subchartaceo satis superque absimilis.

Perennis sed semper primo anno fructifera nec longe perdurans, e collo radice prælongæ verticalis simplicis laxè caespitosa paucicaulis: caulibus brevibus plerumque ad medium breviter ramosis flexuosis 2—6 cm. longis, indumento e pilis rectis patule adscendentibus appressisque basifixis constituto densissime tomentosocanis: stipulis membranaceis 1—3-nerviis deltoideo- vel triangulari-acuminatis 2—4 mm. longis petiolo breviter adnatis

sparsiuscule villosis ciliatisque: foliis substrictis patulisve 3—6 cm. longis, internodiis ca. 5 mm. longis semotis, 7 (4—10) -jugis, petiolo rachique gracilibus strigoso-canescens æquilongis vel eo paullo brevioribus: foliolis brevissime articulatis late obovatis vel suborbicularibus apice rotundatis vix ne vix emarginatis 2—6 mm. longis utrinque appresse sericeo-canis sursum secus rachin sensim decrescentibus: pedunculis erectis striatis 2—4 cm. longis gracilibus, fructiferis sæpe patulis vix elongatis rigidioribus, in racemum 5—12-florum ad anthesin 1—2 cm. longum post anthesin mox elongatum demum duplo longiorem abeuntibus: floribus erectis speciosis saturate purpureis 1.7—1.8 cm. longis: bracteis floralibus lanceolato-acuminatis hyalinis 1-nerviis longe villosis pedicellum gracillimum 1—1.5 mm. longum saltem 2-plo superantibus: calycis membranacei purpurascens tubo sparsiuscule albo-villoso 5—6 mm. longo, vix 2 mm. lato, post anthesin ovario accrescente paullulum inflato demum ruptili, ad basin positæ gibbo, ore conspicue obliquo, dentibus subulatis 1—1.5 mm. longis ciliatis coronato: vexillo purpureo oblanceolato porrecto versus medium leviter arcuato conduplicato marginibus reflexis, plica pallida plus minusve lineolata instructo, ad apicem sæpissime declinatum bidentato, dentibus acutis: alis ca. 1.5 cm. longis, limbo unguiculum filiformem fere 2-plo superanti lineari-lanceolato acutiusculo subrecto purpureo, auriculo obtuso reflexo ca. 1 mm. longo prædito: carinæ 12—13 mm. longæ limbo de latere viso oblique oblanceolato-falcato valde obtuso ca. 2 mm. lata, marginibus arcuatis inferiore ultra medium gradatim convexa superiore per longitudinem totam leviter concava: legumine erecto sessili (revera articulo brevissimo insidenti) 1-loculari parum inflato e basi truncato-rotundata oblique ovoideo fere in anulum dimidium arcuato-inflexo et visu laterali lunato, 1—1.3 cm. longo, 0.6 cm. lato, præter apicem adeo compressum abrupte acutum cuspidatum dorsoventraliter obcompressum 2—3 mm. alto, secus suturam dorsalem filiformem sulco aperto haud profundo nec longe supra leguminis medium producto percurso, sutura ventrali angustissime carinata prominente valde concava, sectione late cordata, valvulis tenuiter coriaceis subchartaceis undique indumento e pilis patulis albis nitidis ca. 2 mm. longis flexuosis sed haud intertextis constituto crebriusculo sed inter affines sparso nec pericarpium tenuiter reticulatum viridem obscuranti pulcherrime sericeo-comosis: seminibus numerosis suborbicularibus compressis emarginatis 1—2 mm. latis lævibus ochraceis.

NEVADA: in deep sands of the valley seven miles south of Callaway, northeast Nye Co., alt. 5150 ft., 26 May 1941, fl. and fr., *Ripley & Barneby No. 3631*. Type in Herb. Calif. Acad. Sci., No. 290401. Plate 1, fig. C.

Astragalus callithrix is somewhat anomalous in *Xylophacos*, having an unusually slender growth and delicate pods for a member of this section. Nevertheless the indument of the whole plant and particularly of the fruit, the long narrow flowers, and tubular calyx are all typical of the group. Its immediate affini-

ties are less evident than its position in the genus as a whole. Possibly it is derived from *A. utahensis* T. & G., but may be easily separated from that species by the longer internodes, more slender root and by its smaller, much less villous pods which are borne in elongated racemes. The same characters, excluding the indument of the fruit, serve to distinguish it from *A. nudisiliquus* A. Nels., which, moreover, has the calyx-tube a half longer and ochroleucous flowers. The small, thin-walled pods invite comparison with *A. desperatus* Jones, a rather isolated species included by Jones in his *Argophylli* but which was referred by Rydberg to the segregate genus *Batidophaca*: this, however, has narrow leaflets, campanulate calyx, short flowers, a wholly diverse indument, and the characteristic wiry stems of a crevice-plant.

Owing to the porous nature of the soil and the sharp drainage of the upper levels, dune-plants have a marked tendency to develop either an exceptionally deep and heavy root-system or a truly annual habit, and it is doubtless in response to these same factors that *A. callithrix* is adapted to a short life-cycle. Many individuals collected in flower and fruit were clearly in their first year of growth and did not appear likely to outlast the summer. Examination of a range of specimens, however, reveals traces of at least two seasons' growth in the larger plants and *A. callithrix* must therefore be regarded as a very short-lived perennial.

In the type locality *A. callithrix* does not occur outside a very restricted area of deep yellow sand. With its white herbage and contrasting racemes of brilliant purple flowers it forms a striking feature of a specialized dune-flora which includes the widespread *Rumex venosus* Pursh, a quantity of *Oenothera pallida* Lindl., the recently described *Cymopterus Ripleyi* Barneby, and a sparse cover of low shrubs.

Astragalus chamæmeniscus Barneby, spec. nov. inter *Malacas* Rydb. generis *Hamosæ* Medic. sensu Rydb. *A. malaco* A. Gray et verosimiliter *A. feensi* Jones affinis adnumeranda, sed ab eo caulibus prostratis, pedunculis folio superatis, indumento brevioribus aliisque notulis diversissima, ab hoc (cujus habitum simulare videtur) foliolis superne glabris, pube aliena et præsertim legumine majore patule villosa nec appresse strigulosa satis distincta.

Perennis undique molliter villosa-pubescentia e collo radice lignosa pluricipitis verticalis multicaulis, caulibus plerumque simplicibus prostratis

parum flexuosis ca. 7 cm. longis albo-villosulis fere e basi arcte foliatis et racemigeris: stipulis inferioribus conspicuis late ovato-ellipticis obtusiusculis scariosis 5 mm. longis circa caulem breviter connatis in superiores angustiores acuminatas subliberas 3—4 mm. longis margine tantum scariosa cinctas sensim decrescentibus: foliis breviter petiolatis 3—5 cm. longis 7—9-jugis, foliolis confertis vix contiguis sæpe conduplicatis petiolulo 0.5 mm. longo croceo articulatis obovatis vel oblanceolatis basi cuneatis apice rotundatis truncatis vel leviter retusis 5—8 mm. longis 2—4 mm. latis, imis sæpe alternis sursum decrescentibus superne omnino glabris inferne pallidis rachique pilis mollibus griseis arcuatis plus minusve intertextis patule villosa-canescens: racemis paucis 3—7-floris subcapitatis: pedunculis gracilibus rectis folio suffulcranti superatis fructiferis immutatis: bracteis floralibus subulato- vel deltoideo-acuminatis 2—4 mm. longis subscariosis pedicello nunc æquilongis nunc fere duplo longioribus: calycis tubuloso-campanulati pilis longiusculis crispis præsertim albis vel paucis nigris commixtis villosa-hirsutuli tubo ca. 6 mm. longo 2—2.5 mm. lato ovario accrescenti demum rupto dentibus subulatis 1.5—2 mm. longis villosis ciliatisque coronato: floribus rubro-violaceis (in sicco omnino exsanguibus) 10—13 mm. longis: vexillo supra basin angustatam late ovato retuso macula pallida striata instructo medium versus arcuato marginibus reflexis; alis brevioribus tenuissime unguiculatis lamina anguste lunulata obtusa auriculo suborbiculari 1 mm. lato prædita: carina et brevior obtusa oblique truncata: legumine patulo sæpissime solo accumbenti ambitu lanceolato utrinque abrupte acuto apice cuspidato ad basin in stipitem validum 1—2 mm. longum angustato valde compresso fere tricarinato sutura ventrali concave arcuata leviter falcato 2.5—3.5 cm. longo 5—6 mm. alto latoque dorsaliter late sed haud profunde sulcato, septo membranaceo valvulis inflexis adnatis efformato ad suturam ventralem usque sed vix in leguminis apicem producto fere omnino biloculari, coriaceo firmo transverse reticulato pilis sparsis crispis villosa, sectione per mediam partem anguste deltoideo-cordata: seminibus compressis oblique reniformibus ad hilum emarginatis ca. 2.5 mm. latis levibus olivaceis.

NEVADA: in deep somewhat alkaline sands on a low hill in the valley of the White River near Sunnyside, Nye Co., alt. 4900 ft., 25 May 1941, fl. and fr., *Ripley & Barneby No. 3614*. Type in Herb. Calif. Acad. Sci., No. 290398. Plate 1, fig. A.

The affinities of this species are fairly straightforward, the structure of the pod placing it in close relation to the *Malacæ* of Rydberg's genus *Hamosa* or the *Malaci* of the earlier revisions. The falcate, rather thinly villous legume, wholly two-celled except at the tip by the intrusion of the lower suture, is strongly reminiscent of that of *A. malacus* A. Gray, but the pubescence in ours is shorter, finer, and more sparse, the sulcus is wider and less deep, while the texture of the valves is firmer, becoming

almost woody in age. In both, however, the pods are narrowed at base to a short but strong stipe obscured by the calyx, a character well-described by Jones but which Rydberg (1929, p. 417) by implication denies to *A. malacus*, one of the generic criteria of his *Hamosa* being the strictly sessile fruit. In vegetative characters *A. chamæmeniscus* differs conspicuously from *A. malacus* by its slender, prostrate, and abbreviated stems, by the lack of pubescence on the upper surface of the leaves, and by the shortly pedunculate, few-flowered racemes. Superficially more similar, at least in gross habit, is the caespitose *A. fecensis* Jones, an obscure New Mexican species which does not appear to have been seen since 1847 when Fendler collected some fragments, in fruit only, in the vicinity of Santa Fe. From the description and from a photograph of the type preserved with a single leaf in the Herbarium of Pomona College, this seems to be amply distinct in its smaller stipules, in the appressed and rather coarse silvery-strigose pubescence not confined to the lower surface of the leaflets as in *A. chamæmeniscus*, and in the smaller, stigulose and not spreading-villous pods.

Astragalus chamæmeniscus was seen but once, growing with *A. toanus* Jones in deep, somewhat alkaline sands on a dry knoll by the lower waters of the White River.* It was extremely rare, prolonged search revealing only about a dozen plants. In habit it resembles *Dalea mollis* Benth.: the short, prostrate branches, closely set with softly villous herbage, radiate from the summit of a stout tap-root and form depressed, circular mats from one to almost two decimeters in diameter. The flowers are of a bright reddish-violet with a pale, striate, diamond-shaped blotch on the banner and are produced in small clusters among the leaves on very short peduncles, while the heavy, crescent-shaped pods, disproportionately large for the plant and often half-hidden by the extremities of the leaves, are spread out in a ring upon the sand.

***Astragalus calycosus* Torr. var. *monophyllidius* (Rydb.) Barneby, comb. nov. *Hamosa monophyllidia* Rydb., N. Amer. Fl. 24:421 (1929).**

* Also collected by Miss Alice Eastwood and Mr. J. T. Howell in the upper valley of the White River in adjacent White Pine Co., about 35 miles north of the type station (*Eastwood & Howell No. 9379*, 25 miles southwest of Ely). In these specimens the calyx is found to be somewhat variable in length, being sometimes only 4 mm. long with the teeth proportionately shorter.

The unifoliolate condition of the leaves, used by Rydberg as a major character, is not constant. While specimens collected along Currant Creek (*No.* 3550), in the vicinity of the type locality, show the majority of the leaves reduced to a single leaflet, in nearly all some trifoliolate ones occur. The same is true of isotypic material in Herb. Pomona, which exactly matches our collection. A few miles to the west, near Callaway, a further gathering was made (*No.* 3624) on the bare, rocky foothills below the pinyon-belt, which, although still referable to *H. monophyllidia*, shows an even more marked tendency to multiplication of leaflets. Moreover, in typical *A. calycosus* the lowest leaves are often simple. In view of this variation, and as I have been unable to find any feature in the flower or pod which does not occur elsewhere in the range of *A. calycosus*, it seems proper to reduce *H. monophyllidia* to a variety of that species. In spite of a very close resemblance to the type, it does appear to be a small race with the inherited character of large, predominantly simple leaves and, in so far as it is readily recognizable, worthy of a name.

It may be that further study will show that several micro-species are contained in *A. calycosus* sens. lat., particularly towards the periphery of its area of distribution. Among these are *A. chromoseminus* Greene MS. ex Jones in syn. and the robust plant which Jones cited as *A. scaposus* A. Gray from

FIGURES OF ASTRAGALUS

Fig. A. *A. chamæmeniscus*. 1, pod $\times \frac{4}{5}$; 2, pod $\times \frac{4}{5}$; 3, cross-section of pod $\times 2\frac{1}{2}$; 4, flower $\times 2\frac{1}{2}$; 5, wing-petal $\times 2$; 6, keel $\times 2$; 7, lower stipules $\times 1\frac{1}{2}$; 8, leaf $\times \frac{4}{5}$.

Fig. B. *A. pseudiodanthus*. 1, pod (lateral view) $\times 1\frac{1}{2}$; 2, pod (front view) $\times 1\frac{1}{2}$; 3, cross-section of pod $\times 2\frac{1}{2}$; 4, flower $\times 2\frac{1}{2}$; 5, wing-petal $\times 2\frac{1}{2}$; 6, keel $\times 2\frac{1}{2}$; 7, leaf $\times \frac{4}{5}$.

Fig. C. *A. callithrix*. 1, pod $\times 2\frac{1}{2}$; 2, cross-section of pod $\times 2\frac{1}{2}$; 3, flower $\times 2$; 4, wing-petal $\times 1\frac{1}{2}$; 5, keel $\times 1\frac{1}{2}$; 6, leaf $\times \frac{4}{5}$.

Fig. D. *A. toquimanus*. 1, pod $\times 1\frac{1}{2}$; 2, cross-section of pod $\times 2\frac{1}{2}$; 3, flower $\times 2\frac{1}{2}$; 4, wing-petal $\times 2\frac{1}{2}$; 5, keel $\times 2\frac{1}{2}$; 6, leaf $\times \frac{4}{5}$.

Fig. E. *A. uncialis*. 1, pod (lateral view) $\times \frac{4}{5}$; 2, pod (seen from above) $\times \frac{4}{5}$; 3, flower $\times \frac{4}{5}$; 4, wing-petal $\times \frac{4}{5}$; 5, keel $\times \frac{4}{5}$; 6, leaves $\times \frac{4}{5}$; 7, cross-section of pod $\times 1\frac{1}{2}$.

Fig. F. *A. Nuttallianus* vars. 1—3, var. *piliferus*: 1, pod $\times 1\frac{1}{2}$; 2, cross-section of pod $\times 2\frac{1}{2}$; 3, leaf $\times 1\frac{1}{2}$. 4 and 5, var. *imperfectus*: 4, pod $\times 1\frac{1}{2}$; 5, cross-section of pod $\times 2\frac{1}{2}$. 6, var. *trichocarpus*: cross-section of pod $\times 2\frac{1}{2}$.

Owens Valley. These are not sufficiently known to warrant description at the present time.

Astragalus Nuttallianus DC. var. *imperfectus* (Rydb.) Barneby, comb. nov. *Hamosa imperfecta* Rydb., Bull. Torr. Club 54:329 (1927).

NEVADA: calcareous hills near Garnet, Clark Co., alt. 2300 ft., 6 May 1941, *Ripley & Barneby No. 3338*; arid slopes near Searchlight, Clark Co., alt. 4100 ft., 8 May 1941, *No. 3355* (forma leguminibus strigulosis). CALIFORNIA: calcareous gravel hills on Darwin Mesa, Inyo Co., alt. 5200 ft., 6 June 1941, *No. 3771* (leguminibus strigulosis). Plate 1, fig. F, 4 and 5.

The first collection cited is exactly *Hamosa imperfecta* as from the type locality at Rhyolite, Nevada, and differs from the common form of *A. Nuttallianus* with glabrous pods and acute leaflets (*Hamosa Emoryana* Rydb. sens. strict.) only by the lack of septum. The other two collections differ from typical *H. imperfecta* by having strigulose pods, and except for the wholly one-celled legume are indistinguishable from *A. Nuttallianus* var. *trichocarpus* T. & G. (*H. austrina* Small), at least as that plant occurs in the far western states (plate 1, fig. F 6). This variation in pubescence of the fruit does not appear to have great significance and is not correlated with distribution. The very full series of *A. Nuttallianus* forms in the Herbarium of Pomona College shows that the var. *imperfectus* occurs in the glabrous form in northern Arizona (Mohave Co., *Pebbles No. 13145*; Yucca, *Jones*), in southern Nevada (Good Springs, *Jones in 1905*), and in southeast California (Panamint Mts. *Hall & Chandler No. 6939*; Old Woman Mts., *Jaeger*; Whipple Mts., *Peirson No. 11494*), while the strigulose form has been found, in addition to the collections of this year, in the Providence Mts. (*Munz, Johnston & Harwood No. 4231*) and Old Dad Mts. (*Jones*) of the eastern Mohave Desert of California and in southern Utah (St. George, *Jones*). Rydberg also records the glabrous form from Baja California. In view of the lack of geographic segregation, it seems proper to regard all forms destitute of partition within the pod as representative of a single entity, but in so doing the varieties *trichocarpus* T. & G. and *canescens* T. & G. ex Wats. sens. restrict. auct. calif. (*Hamosa Emoryana* Rydb., *i. e.*, the form with glabrous pods), which are divided only by this same character of indument, are automati-

cally invalidated, and both will have to be referred to a single variety of *A. Nuttallianus*, separated from the typical race of the southeastern states by the narrow, acute, and more canescent leaflets, but not distinct from one another. In this case the varietal name *trichocarpus* must be used for the aggregate, as the more appropriate *canescens* which, as shown by Rydberg (1927, p. 327), technically includes both forms, is unfortunately a later synonym. The only alternatives are either to create a forma *imperfecta* for both the glabrous and the strigulose varieties, thereby subordinating a point of structure to one of indument, or a forma *canescens* for the varieties with and without septum, a logical classification but more elaborate than is justified by the current treatments of the genus.

In all the collections of var. *imperfectus* cited the unilocular condition of the fruit is constant, and examination of many individuals in the field has led me to the conclusion that it is an hereditary character. While intimately connected with var. *trichocarpus* and occurring sporadically throughout the western range of that variety, it does not intergrade or hybridize, and the two races, even when found in the same vicinity, do not seem to grow in immediate association.

Astragalus Nuttallianus DC. var. **piliferus** Barneby, var. nov. A typo et præsertim a var. *trichocarpo* T. & G. caulibus robustis nec filiformibus plerumque prostratis, foliolis truncatis conspicue retusis, pedunculis brevissimis firmis, legumine paulo latiori magis compresso maturo inter semina aliquantulum constricto per longitudinem totam (nec præcipue basin versus) arcuato et præterea foliorum leguminumque indumento e pilis canis validis constituto multo crebriori patulo satis distincta videtur. A var. *acutirostri* (S. Wats.) Jeps., cui foliolis retusis approximatur, leguminis numquam resupinati forma, indumento alieno, floribus minoribus carinaque obtusa nec rostrata et distantius recedit.

NEVADA: alkaline gravelly slope in the foothills of the Spotted Range, Nye Co., alt. 3200 ft., 14 May 1941, *Ripley & Barneby No. 3430*. Type in Herb. Calif. Acad. Sci., No. 290399. Plate 1, fig. F, 1—3.

The proposed variety falls well within the specific limits of *A. Nuttallianus* sens. lat. as treated by Jepson (1936, p. 379), but seems to be distinct from anything described hitherto. The indument of rather long, stiff, spreading hairs, the rigid branches, broad, retuse leaflets, and very short (1—2 cm.) peduncles combine to give the plant an aspect altogether unlike that of *A. Nut-*

tallianus var. *trichocarpus*, while the minute flowers with their obtuse keel and the much flattened, slightly torulose pod, regularly arched throughout its entire length to the fourth part of a circle, are quite at variance with the variety *acutirostris*. Usually the plants branch from the root-crown and have a short, erect central stem, the few lateral branches being quite prostrate and considerably longer. A collection made by Marcus Jones at Indian Springs (15 May 1916, in Herb. Pomona) some fifteen miles southwest of our station, possibly belongs here, but the fruit is not mature; otherwise nothing similar has been seen.

This interesting little plant was observed very locally on the white alkaline-gravel hills which fall away northward from the Spotted Range towards Frenchman Flat. It grew with *Phacelia Parishii* A. Gray, *Cymopterus Ripleyi* var. *saniculoides* Barneby, and *Polygala subspinosa* S. Wats., and seemed to form part of the curious arid-saline flora dominant in this locality.

In summary I append a key to the varieties of *A. Nuttallianus* as known from the desert region of California, Nevada, and western Arizona. *Astragalus pertenuis* Greene, recorded by Rydberg (1927, l. c. sub *Hamosa*) from Goffs in the eastern Mohave Desert, is not included: this scarcely differs from var. *trichocarpus* except in the cuneate, retuse leaflets of the lower leaves, and is probably confined to Baja California. Rydberg himself omitted the record from his final revision (1929, p. 431).

- A. Pod (glabrous or strigulose) sulcate dorsally but wholly 1-celled, septum obsolete.....var. *imperfectus*
- A. Pod 2-celled by inflexion of the sulcate dorsal suture.
 - B. Leaflets at least of upper leaves acute; pod strigose or glabrousvar. *trichocarpus*
 - B. All leaflets retuse or at least truncate; pod not glabrous.
 - C. Keel acute; pod appressed-strigose, often resupinate.....var. *acutirostris*
 - C. Keel obtuse; pod long strigose-hirsute with curved hairsvar. *piliferus*

Astragalus toquimanus Barneby, spec. nov. inter *Misella* generis *Tii* sensu Rydb. seu *Astragali Hamosos* Jones juxta *A. misellum* S. Wats. a quo caulibus strictis carina acutirostri et praesertim legumine membranaceo maculato glaucescenti glaberrimo differt adnumeranda.

Perennis erecta multicaulis e radice lignescenti valida praeter fructus petalosque undique pilis brevibus adscendentibus sparsis appresse strigulosa viridis vel partibus junioribus cinerascens: caulibus simplicibus numerosis striatis saepe purpurascens strictis ca. 2 dm. longis e caudice brevi multi-

cipite ortis inferne denudatis rectis supra medium flexuosis crebre foliatis racemigerisque: stipulis herbaceis petiolo breviter adnatis 2—3 mm. longis imis deltoideis acutis in superiores angustiores acuminatas gradatim decrescentibus: foliis adscendentibus petiolo brevi gracili incluso 6—8 cm. longis, (4—) 6—8-jugis, foliolis conspicue articulatis sæpe alternis remotiusculis 5—8 mm. longis foliorum imorum haud raro late oblongis truncatis apice retusis cæterius oblanceolatis conduplicatis plus minusve retrorsus arcuatis emarginatis tantum utrinque pilis griseis brevissimis appresse strigulosis viridibus vel primum adeo cinereis, facie superiore rarius glabrescenti: pedunculis gracilibus patule adscendentibus 3—5 cm. longis in racemum 10—20-florum ad anthesin confertiusculum mox valde elongatum fructiferum laxissime secundum abeuntibus: floribus patulis parvis ca. 6 mm. longis ochroleucis plus minusve purpureo-lineolatis vel -suffusis: bracteis floralibus subulatis 1.5—2 mm. longis membranaceis pedicellos plerumque 2-plo superantibus calyceque pilis nigris albisque paucis commixtis strigoso-pubescentibus: tubo calycino campanulato basin versus leviter obliquo 2.5—3 mm. longo dentibus lineari-subulatis 1 mm. longis sinu obtusissimo separatis coronato: petalis in sicco hyalinis subæquilongis; vexillo late obovato apice profunde emarginato ad medium abrupte retroarcuato, lamina conduplicata ca. 3 mm. longa angulum fere rectum cum axi primario efformanti: alarum limbo ca. 1.5 mm. lato, auriculo angusto reflexo incluso 4 mm. longo, leviter lunulato obtuso: carinæ æquilongæ margine inferiore abrupte angulata nec sensim arcuata, lamina (de visu laterali) oblique 3-angulari in apicem valde acutum erectum subrostriformem purpureo-tinctum acuminata: legumine pendulo (e calyce haud rupto demum recurvato dependenti) stipitato compresso adeo inflato glaberrimo, stipite gracillimo 3—4 mm. longo excluso fere 2 cm. longo, ambitu oblique lanceolato lunulato utrinque acuto ca. 4 mm. alto latoque stylo persistenti apiculato, sutura ventrali acute carinata concave arcuata sensim falcato, dorsaliter fere tota longitudine profunde sulcato, septo saltem 2 mm. alto sutura inferiori valvulisque inflexis adnatisque efformato ad suturam ventralem usque sed vix ad leguminis apicem producto subperfecte 2-loculari, sectione per mediam partem inverse Y-formi, pericarpio tenuiter coriaceo præsertim translucido levissimo glaucescenti pulchre purpureo-maculato: seminibus ca. 12 subquadratis compressis 2—2.5 mm. latis ad hilum emarginatis brunneis nitidis.

NEVADA: in a canyon of the Toquima Range about six miles east of Manhattan, Nye Co., alt. 7000 ft., 1 June 1941, fl. and fr., Ripley & Barneby No. 3692. Type in Herb. Calif. Acad. Sci., No. 290403. Also *ibid.*, 19 July 1941, fruct., No. 3996. Plate 1, fig. D.

Astragalus toquimanus has the somewhat scoparious habit and small ochroleucous flowers of the group of loco-weeds allied to *A. diversifolius* Sheld. (the series *Campestres* of Rydberg's *Homalobus*), but the gently falcate, long-stipitate pod, almost

two-celled by intrusion of the dorsal suture, reveals a close relationship to *A. Howelli* A. Gray and *A. misellus* S. Wats., both species of interior southern Oregon which are not known to extend south into Nevada. From these two, which may not be specifically distinct, and particularly from the latter which has similarly small yellowish flowers, *A. toquimanus* differs by its strictly erect stems, different pubescence, and perfectly glabrous pod, with the valves thinner in texture and beautifully mottled. The peculiarly acute, almost beaked and "oxytropidoid" keel is constant in our specimens and is a character unique among species closely allied, although it occurs in the neighboring *Hamosa*. *Astragalus myocensis* Sheld., also of this group but ranging farther west along the California-Nevada border, may be quickly distinguished by its diffuse, zigzag stems, purplish flowers, and strigose pod abruptly inflated above the stipe.

Astragalus toquimanus is not uncommon locally in the pinyon-belt between Belmont and Manhattan, where it is found growing up through sagebrush on gravelly slopes in the canyons, and it probably occurs under similar conditions throughout the Toquima Range. The stems are typically erect and very numerous, almost fastigiate below but spreading a little upwards to form dense, flat-topped, dome-like plants, very leafy and floriferous. The elegant pods, pendant and secund along the lax racemes, are notably glaucescent when fresh, but this character, like the mottling, is less evident in the dry state.

ASTRAGALUS SHOCKLEYI M. E. Jones.

NEVADA: foothills of the Toquima Range, seven miles south of Belmont, Nye Co., alt. 6800 ft., *Ripley & Barneby No. 3673* (flor.), *No. 4000* (fruct.).

This is one of the rarest species, described by Jones from fruiting material only, and afterwards confused by him with the very closely allied *A. Serenoi* (Kze.) Sheld. As the flowers were unknown even to Rydberg, a description is appended here.

Calyx much as in *A. Serenoi*, conspicuously black-strigose (in one specimen mostly white-strigose), the tube tapering at base, 7—8 mm. long, the teeth subulate 1—2 mm. long. Corolla deep tawny yellow, paler within the calyx, the banner striate with purple veins and the keel broadly purple-tipped. Banner oblanceolate, emarginate at apex, 12—15 mm. long, moderately arched. Wing-petals a little shorter, exceeding the keel by about 2 mm., the blade narrowly oblong, somewhat falcate, including the reflexed auricle 6 mm. long. Keel-petals broadly lunate, the blade about 5 mm. long,

the upper margins a little concave, the lower (adnate) straight below, abruptly arched at the middle towards the obtuse summit.

Astragalus Shockleyi was found on the last, gentle slopes of the Toquima Range, where the mountains gave way to a broad sagebrush valley and where the soil, although not noticed at the time, was probably of alkaline composition. It grew in colonies, pushing up through bushes of *Artemisia*, and was locally abundant. In addition to the characters enumerated by Rydberg (1929, p. 399) in his key to *Brachyphragma*, the coloring and smaller size of the flowers, as described above, will be of service in separating the species from *A. Serenoi*.

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OBSERVATIONS ON CALIFORNIAN PLANTS—II

BY ROBERT F. HOOVER

EPHEDRA CALIFORNICA Wats. has been known to extend in the inner South Coast Ranges as far north as Fresno and San Benito counties, but has not been reported as occurring in western Merced County, where it is notably plentiful on barren rocky hills in the watershed of Ortigalita Creek. Collected in Piedra Azul Canyon, *Hoover No. 4371*.

SCHISMUS BARBATUS (L.) Thell. is introduced in Arizona and in Kern and Riverside counties, California. Of the collections reported by me under that name (*Madroño* 3:229 and *Leafl. West. Bot.* 2:273), only the one from Bena, Kern County, *Hoover No. 936*, actually represents *S. barbatus*. The others, all of which are from the vicinity of the Kettleman Hills in

Fresno and Kings counties, apparently belong to *S. arabicus* Nees. In any event, they are indistinguishable from a collection made near Jericho, Palestine, by Meyers and Dinsmore, distributed by A. Kneucker as *S. arabicus*. On the basis of specimens now available, the two species can be distinguished as follows:

Glumes 4—5 mm. long; lemmas rounded and emarginate at apex, hairy only near margins or sparsely so on the back; palea equalling lemma.....*S. barbatus*

Glumes 5—6 mm. long; lemmas parted into two acute lobes, densely long-hairy over the back; palea shorter than lemma.....*S. arabicus*

Schismus arabicus has never, to my knowledge, been reported as introduced in America, although in the restricted area where it occurs in California it is abundant and has the appearance of having been established for many years.

MIRABILIS LEVIS (Benth.) Curran is similar to *Ephedra californica* in geographical distribution and grows with that species in western Merced County, where its occurrence seems not to have been previously known.

JUSSIEA REPENS L. apparently has not been recognized as a member of the Californian flora, but has been collected between Warnerville and Knights Ferry Stanislaus County, *Hoover No. 2390*, and one mile west of Chinese Camp, Tuolumne County, *Hoover No. 2557*. A collection from Jamestown, Tuolumne County, *Mrs. W. J. Williamson No. 320*, is represented in the herbarium both at Stanford University and at the University of California, and one from Yosemite Junction, Tuolumne County, June 5, 1931, *Mrs. E. C. Van Dyke*, is in the herbarium of the California Academy of Sciences.

From *J. californica* (Wats.) Jepson, the only other Californian species of the genus, *J. repens* usually can be readily distinguished by its hairy herbage, which is somewhat glandular. Of more importance, however, are the large firm dark green stipules, which are very conspicuous in living plants and easily visible even after drying. In *J. californica* the herbage is rarely somewhat hairy on the young parts, but the stipules are invariably minute and soft.

There may be some doubt as to whether the plants under discussion are correctly referred to *J. repens*. In herbarium material the name is applied to more than one kind of plant, but

several specimens from South America in the University of California herbarium and one from Australia in the herbarium of the California Academy of Sciences, which are labelled as *J. repens*, seem identical with the specimens cited above. The species has all the appearance of a native plant where it grows in California. This occurrence is not surprising in view of the fact that the species is widely distributed over the warmer parts of the earth.

NEW SPECIES OF CASTILLEJA

BY ALICE EASTWOOD

Castilleja Hoffmanni Eastwood, spec. nov. Caules ramosi ex radice lignea, simplices vel interdum ramosi supra, 2—4 dm. alti, omnino glandulosi; foliis plerumque integris, lineari-lanceolatis, 2—4 cm. longis, 2—4 mm. latis; racemis glanduloso-pilosis, primo capitatis, deinde elongatis; floribus coccineis sessilibus vel brevipedicellatis, curvatis prorsus, circa 3—4 cm. longis; bracteis trilobatis, segmentis linearibus rubris; calyce coccineo bisecto posteriore profundiore, circa 2 cm. longo, superanti labium vel brevior tubo calycis, segmentis breviter lobatis; galea coccinea, gracili, circa 2 cm. longa; labio protuberanti, breviter tridentato, dentibus æqualibus brevibus.

Type: Herb. Calif. Acad. Sci. No. 168558, collected May 26, 1928, on Mt. Pinos, Ventura County, California, by John Thomas Howell, No. 3840, between Chula Vista Camp and summit of the mountain.

It is named in honor of the late Ralph Hoffmann, who also collected it on Mt. Pinos, elevation 8700 ft., on a rocky slope. Mr. Howell's specimen was the better one to take as the type. A tall branching specimen, apparently the same, was collected on the same mountains at an elevation of 8000 ft., July 27, 1931, by Epling and Dunn. The type specimen and that of Ralph Hoffmann are about 2 dm. high and the stems simple.

Castilleja pannosa Eastwood, spec. nov. Caules ramosi ex basi lignea, simplices, erecti, 3—4 dm. alti, vestiti omnino pilis albis, brevibus et longioribus, articulatis, divaricatis; foliis oblongis, obtusis vel acutis, circa 5 mm. latis, 3 cm. longis, 3—5-sectis, rhachide lata, nervata, segmentis angustis, medio latiore; bracteis inferioribus similibus foliis superioribus; bracteis supremis lineari-oblongis, obtusis, strictis, pallido-carneis vel pallido-ochroleucis; floribus nonihil separatis, brevipedicellatis circa 2.5 cm. longis; calyce attingenti vel superanti galeam, segmentis oblongis, apice obtusis vel lato-crenatis; corolla ochroleuca, gracillima, 2.5 cm. longa, galea

superanti labium 2—3 mm., dorso puberula, apice acuta; labio paulo saccato, segmentis erectis, obtusis, circa 2 mm. longis; stigmatibus exserto ex anteriore parte galeæ.

Type: Herb. Calif. Acad. Sci. No. 235585, collected June 25, 1936, near Anatone, Asotin County, Washington, near the south-eastern corner of Washington close to the border of Idaho, by Eastwood and Howell, No. 3241.

This differs from its relatives which are related to *C. pilosa* (Wats.) Greenm. in the more loosely flowered spike, the longer, more slender flowers, and the peculiar fine jointed hairs most abundant in the inflorescence. It is nearest to *C. lutea* Heller differing in the pubescence of jointed hairs, the broad leaves, the more loosely flowered spike, and the more slender corolla. The name describes the ragged appearance of the inflorescence.

Castilleja uliginosa Eastwood, spec. nov. Caules perennes, simplices, 3—5 dm. alti, tenuiter villosi, villis non æquis et paululum glandulosi; foliis oblongis vel oblongo-lanceolatis, circa 4 cm. longis, 8—12 mm. latis, apice obtusis, basi sessilibus, infimis foliis imbricatis, scabro-hispidulis; spicis 10—15 cm. longis, 3 cm. latis, ochraceis; bracteis infimis similibus foliis, bracteis supremis trifidis, segmentis acuminatis; floribus infimis occultis bracteis, floribus superioribus superantibus bracteis, floribus superioribus circa 3 cm. longis; calyce circa 23 mm. longo, segmentis plerumque brevioribus tubo, apice bidentato vel bisecto, glanduloso-villoso; galea circa æquilonga tubo, dorso scabro-hispida; labio parvo, protuberanti, segmentis exterioribus acuminatis, 1 mm. longis, interioribus minimis.

Type: Herb. Calif. Acad. Sci. No. 252047, collected at Pitkin Marsh,* Sonoma County, California, June 6, 1937, by John Thomas Howell, No. 13031. It resembles *C. pallida* Kunth in general appearance, but the character of the lower lip of the corolla is that of the *C. miniata* group.

STUDIES IN PHACELIA—II

BY JOHN THOMAS HOWELL

Phacelia (§ EUTOCA) *Peirsoniana* J. T. Howell, spec. nov. Annua, glanduloso-villosa vel -puberula, 1—4 dm. alta, erecta, æquabiliter folifera, pauciramosa ex basi et ramosa supra; foliis vel late ovatis vel orbicularibus vel etiam latioribus quam longa, plerumque 1—3.5 cm. longis et latis, obtusis, basi cordatis reniformibus truncatis vel etiam rotundatis, glandulosis et scabrido-hirsutulis, dentatis crenatis vel fere repando-crenatis, petiolis 1—4 (—6) cm. longis; racemis sessilibus vel breviter

* See article by Milo S. Baker, Leaf. West. Bot. 1: 103 (1934), "Pitkin Marsh, a floral island at Vine Hill, Sonoma County, California."

pedunculatis, laxifloris, floribus inferioribus distantibus, confertioribus supra, pedicellis plerumque 1—5 mm. longis vel raro infimis 10 mm. longis; sepalis ad anthesin 3—4 mm. longis, 0.5—0.75 mm. latis, lineari-oblongis vel oblanceolato-oblongis, valde accrescentibus, in fructu 7—8 mm. longis et 1—3 mm. latis, oblanceolato-spathulatis; corolla tubulato-campanulata, dilute violacea vel albescenti, 5 mm. longa, 3.5—4 mm. lata, lobis vix patentibus, 1—1.5 mm. longis; squamis variabilibus, angustis et oblongis vel latioribus et semiovalibus et semiovatis, 1—1.5 mm. longis, non ad filamenta adnatis; staminibus paululum inæqualibus, 2.5—3.3 mm. longis, filamentis sparse pilosis basi, antheris minutis, 0.3—0.5 mm. longis; stylo et ramis 2—3 mm. longis, ramis brevibus, 0.25—0.5 mm. longis; ovario 1 mm. longo, hirsutulo, ovulis 40—50; capsula 4—6 mm. longa, oblonga, obtuse truncata, apiculata; seminibus fuscis vel nigrescentibus, oblongis, 1—1.3 mm. longis.

Type: Herb. Calif. Acad. Sci. No. 292778, in crevices of volcanic rocks under *Pinus monophylla* west of Little Round Valley, alt. about 7000 ft., Mono Co., California, Aug. 7, 1938, *J. T. Howell No. 14353*. Duplicates to be distributed.

Other collections. CALIFORNIA: Crooked Creek, 6700 ft., Mono Co., *Peirson No. 8208* (FP¹); summit of Sherwin Hill, 6400 ft., Mono Co., *Peirson No. 11161* (CAS, FP); volcanic tableland north of Bishop, 7000 ft., Mono Co., *Klyver in 1926* (DS); 10 miles northeast of Big Pine on road to Westgard Pass, 6500 ft., Inyo Co., *Keck No. 536* (CAS, DS, P). NEVADA: Big Indian Canyon, Hawthorne, Mineral Co., 5000 ft., *M. E. Jones in 1897* (P); summit of Gold Mt., 8000 ft., Esmeralda Co., *Keck No. 575* (CAS, DS); in calcareous gravel under cliffs, Muddy River Valley, 2 to 3 miles south of Caliente, 4500 ft., Lincoln Co., *Ripley & Barneby No. 3514* (CAS). Of the last collection, Mr. R. C. Barneby has written as follows: "It was a rather coarse ill-smelling glandular plant with a very short fleshy root and very pale mauve corollas largely hidden by the leaves."

Phacelia Peirsoniana is most closely related to *P. mustelina* Cov., but is readily distinguished from that species (which has been found mostly around Death Valley) by the strongly accrescent calyx, small corolla, small anthers, and larger and generally fewer seeds. It may be less closely related to *P. Lemmonii* Gray, but there are differences of indument, foliage, and fruit by which it may be separated. The species is respectfully named for my

¹ The symbols used to designate herbaria where material has been examined are as follows: California Academy of Sciences, CAS; Dudley Herbarium, Stanford University, DS; Frank W. Peirson, Altadena, FP; Pomona College, P.

good friend, Mr. Frank W. Peirson, well-known collector and discriminating student of the California flora.

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The collections noted below will indicate the occurrence of certain species of *Phacelia* in states from which they have apparently not been reported heretofore.

PHACELIA INTEGRIFOLIA Torr., a species widely distributed from Kansas west to southeastern Utah and south to Mexico,² was collected in the southern part of Monument Valley, Navajo Co., northeastern Arizona, in 1938, *Eastwood & Howell No. 6645* (CAS).

PHACELIA PULCHELLA Gray var. *GOODDINGII* (Brand) J. T. Howell,³ an abundant and characteristic plant of alkaline valleys in southern Nevada, has been collected in Inyo Co., California, in Mesquite Valley, about 10 miles north of Kingston, *Abrams No. 14271* (CAS, DS). It has also been collected in northwestern Arizona near Pierces Ferry, Mohave Co., *M. E. Jones No. 5077aj* (P, US), and at the east base of the Virgin Mts. near "Redrocks," Mohave Co., *Munz No. 16666* (CAS, P).

PHACELIA SERICEA (Graham) Gray has been known as far south as Steens Mts. of southeastern Oregon, but the only specimen I have seen from California is one collected by Frances D. Payne, *No. 721*, on the ridge north of Mt. Warren, 8000 ft., Warner Mts., Modoc Co., July 21, 1932 (CAS).

PHACELIA ANELSONII Machr., which I recently reported for California from San Bernardino Co. (*Leafl. West. Bot. 3:96*), may now be reported from a second Californian station: Teufel Canyon, 17 miles north of Darwin on Saline Valley road, 5200 ft., Inyo Co., *Jaeger in 1938* (P).

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While attending to certain bibliographical matters in *Phacelia*, it has been noted that two presently accepted species in the genus are later homonyms of species proposed by S. B. Buckley. These are *P. hispida* (Gray) Gray and *P. pusilla* Torr. For

² No specimen of *P. integrifolia* was cited from Arizona by Voss (A revision of the *Phacelia crenulata* group for North America, *Bull. Torr. Bot. Club 64: 88*,—1937), although Arizona was included in the distributional data for the species by Rydberg (*Fl. Rky. Mts. & Adj. Plains*, p. 704, 1917) and more recently by Tidestrom and Kittell (*Fl. Ariz. & N. Mex.*, p. 556, 1941).

³ *Phacelia pulchella* Gray var. *Gooddingii* (Brand) J. T. Howell, *comb. nov. P. Gooddingii* Brand, *Das Pflanzenr. IV. 251: 120* (1913).

the changes necessitated in replacing the former name, I have followed the recent analytic study by John W. Voss (A revisional study of the *Phacelia hispida* group, Bull. S. Calif. Acad. Sci. 33: 169—177,—1934).

PHACELIA CICUTARIA Greene, Pitt. 5: 20 (1902). *P. hispida* (Gray) Gray var. *genuina* Brand subvar. *cicutaria* (Greene) Brand, Univ. Calif. Publ. Bot. 4: 215 (1912); *P. hispida* (Gray) Gray var. *cicutaria* (Greene) Macbr., Contrib. Gray Herb., n. ser., 49: 28 (1917).

Phacelia cicutaria Greene var. *hispida* (Gray) J. T. Howell, comb. nov. *P. ramosissima* Dougl. var. *hispida* Gray, Proc. Amer. Acad. 10: 319 (1875). *P. hispida* (Gray) Gray, Syn. Fl. 2: 161 (1878), non *P. hispida* Buckley, Proc. Acad. Nat. Sci. Philadelphia 13: 463 (1862). *P. hispida* (Gray) Gray var. *genuina* Brand, Univ. Calif. Publ. Bot. 4: 214 (1912).

Phacelia cicutaria Greene var. *eximia* (Eastw.) J. T. Howell, comb. nov. *P. eximia* Eastw., Bull. Torr. Bot. Club 32: 204 (1905). *P. hispida* (Gray) Gray var. *eximia* (Eastw.) Voss, Bull. S. Calif. Acad. Sci. 33: 172 (1935).

Phacelia cicutaria Greene var. *heterosepala* (Greene) J. T. Howell, comb. nov. *P. heterosepala* Greene, Pitt. 5: 21 (1902). *P. hispida* (Gray) Gray var. *genuina* Brand subvar. *heterosepala* (Greene) Brand, Univ. Calif. Publ. Bot. 4: 215 (1912). *P. hispida* (Gray) Gray var. *heterosepala* (Greene) Voss, Bull. S. Calif. Acad. Sci. 33: 173 (1935).

Phacelia cicutaria Greene var. *Hubbyi* (Macbr.) J. T. Howell, comb. nov. *P. hispida* (Gray) Gray var. *Hubbyi* Macbr., Contrib. Gray Herb., n. ser., 49: 29 (1917).

Phacelia nevadensis J. T. Howell, nom. nov. *P. pusilla* Torr. ex Wats., Bot. U. S. Geol. Explor. 40th Paral. (King's Exped.), 253 (1871), non *P. pusilla* Buckley, Amer. Journal Sci. 45: 172 (1843).

AN ADDITIONAL NOTE ON THE CALIFORNIAN DISTRIBUTION OF *DESCHAMPSIA ATROPURPUREA*. In the summer of 1939, the writer found a rather large colony of *Deschampsia atropurpurea* (Wahl.) Scheele along Squaw Valley Creek on Mt. Shasta, Siskiyou Co., California (cf. W. B. Cooke, Fl. Mt. Shasta, Amer. Midl. Nat. 23: 516,—1940). The plant was growing on the banks of the creek below the second cascade in an opening in the *Tsuga Mertensiana-Abies magnifica* var. *shastensis* forest of the upper Canadian Zone. This grass seems to be well-established in the Canadian Zone of northern California (cf. J. T. Howell, Leaflet West. Bot. 3: 24,—1941), although it was overlooked until the summer of 1939 when it was simultaneously collected in the Marble Mt. region and on Mt. Shasta.—William Bridge Cooke.

LEAFLETS
of
 WESTERN BOTANY

CONTENTS

	PAGE
A Botanical Expedition to Log Spring Ridge	121
ALICE EASTWOOD	
Observations on Cleistogamy in <i>Mimulus</i>	127
JOHN THOMAS HOWELL	
A Suffrutescent <i>Gilia</i> from Southern Nevada	129
R. C. BARNEBY	
Southwest Botanical Odyssey	132
JOHN THOMAS HOWELL	
Two Varieties of <i>Triteleia peduncularis</i>	137
ALICE EASTWOOD	
New Western Plants	138
JOHN THOMAS HOWELL	
The Water Lily, <i>Nymphaea odorata</i> , a Cultivated Plant in the State of Washington	142
HAROLD ST. JOHN	

*This number published with funds from the
 California Botanical Club*

SAN FRANCISCO, CALIFORNIA
 APRIL 21, 1942

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as
LEAFL. WEST. BOT.



Owned and published by
ALICE EASTWOOD and JOHN THOMAS HOWELL

A BOTANICAL EXPEDITION TO
LOG SPRING RIDGE

BY ALICE EASTWOOD

This ridge is a part of the inner Coast Ranges of the California mountain system and extends from Shasta County on the north to the northern edge of where Lake and Colusa counties join. Peaks from 6000 to over 8000 feet altitude rise from an elevation of 5000 to 6000 feet. One road from Round Valley, Mendocino County (elevation about 1300 feet), crosses the ridge at what is known as Low Gap or Mendocino Pass. From there on, one branch passes over Log Spring Ridge and another branch reaches the Sacramento Valley at Willows via Alder Springs in Glenn County. Log Spring Ridge is in Tehama County, but is a part of the Mendocino National Forest. The boundary line separating it from Mendocino County is at the gap not far from Anthony Peak, where there is a lookout station at an elevation of 6903 feet.

I had heard that it was formerly the custom of the people of Round Valley to bring snow down from these mountains in sacks to freeze the ice cream for the Fourth of July celebrations. We crossed the ridge July 8 in 1941 and the snow still lay even down to the road, and many small areas indicated quite recent snow. On one of these near Government Flat a tiny *Dodecatheon* with the root system of *D. Hendersonii* was already in fruit, and on another near the foot of Anthony Peak adjoining a forest of Shasta fir, the tiny seedlings of the fir still bore the little brown caps over the green cotyledons, and pussy-paws (*Spraguea*) and a small *Lewisia* were up but not yet in flower.

The trip was taken to explore an almost unknown region and make a collection of plants for the California Academy of Sciences. Mr. Howell and I looked after the plants, and Dr. Isabel McCracken, retired professor of entomology of Stanford University, collected insects, chiefly species of California bees. We left San Francisco July 8, 1941, going over Highway 101 to Laytonville. From there we climbed up and down a mountain road to Dos Rios where two branches of the lovely Eel River join. Again it was up and down over a mountain road to Covelo in Round Valley. The brown hills and valleys did not tempt

us to stop for any collecting. After passing through Round Valley we again began to climb, and on this hot barren hillside had a flat tire. With no chance to have it repaired until our return, we had an uneasy feeling traveling in this wilderness area over mountain roads without a spare.

We had been told that accommodations could be had at Government Flat where there were cabins and a store, so had planned to make it our headquarters. How appalled we were when we were told by two motorists whom we met near the summit that the camp was not open. We were not prepared for camping, having brought food for two or three lunches only and not even our warmer wraps as in July they seemed unnecessary. Mr. Howell had brought his sleeping bag because he preferred to sleep under the open sky. One man, however, gave us hope that at the Ranger Station we might obtain accommodations. So, on we went.

Mr. Al Smith, the ranger, and his wife were most hospitable. Dr. McCracken and I occupied the cabin where C. C. C. boys had lived the year before, slept on their cots and under their army blankets. Mrs. Smith gave each of us a clean wide sheet. We had to depend on them for breakfasts and dinners. They would take no pay, as it is against the regulations. However, there are other means of compensation.

Rarely have I seen a more beautiful forest of conifers. Over-topping the other trees were the lofty sugar pines, every tree laden with the hanging cones. Yellow pines, incense cedar, Douglas fir and white fir abounded, while near Anthony Peak the Shasta fir became dominant. *Quercus Kelloggii*, the black oak, and *Q. Garryana*, the white oak, were not abundant on the ridge. Here and there were signs indicating the presence of springs. *Ceanothus integerrimus* grew on the main ridge and *C. cordulatus* at greater altitudes. A very white, downy manzanita, several feet in height, related to *Arctostaphylos canescens* grew near the ranger station. It differs from *A. canescens* in habit, large leaves and a denser velvety down. This is found also in the mountains of Lake, Napa, Mendocino and Glenn counties and is an impressive shrub which I am naming *A. candidissima* (see Note 1 at end). Another species, a very green shrub, with smooth, pointed leaves, also grew near the ranger station. From the short bracts and glandular inflorescence and

berries this seemed related to *A. obtusifolia* Piper, a native of Washington and a species I have never seen. This I have named *A. acutifolia* from the most apparently conspicuous difference from *A. obtusifolia* (see Note 2 at end).

Some lovely herbaceous plants grew on this ridge along the road, several that seem undescribed. A form of *Castilleja pincetorum* Fernald was collected, also a new one that I have already described as *C. dolichostylis*. A new yellow *Iris*, *I. citrina*, formed mats of bloom (see Note 3 at end). The blue-purple flowers of *Penstemon Purpusii* were very lovely set off by the pale leaves. Near Government Flat a tall blue forget-me-not was common and Mr. Howell has named it *Hackelia amethystina* from the color of the spines on the nutlets (see Note 4 at end). On Anthony Peak, Mr. Howell found a low-growing *Delphinium*, *D. antoninum*, related to the *D. scopulorum* aggregate (see Note 5 at end). It was only a few inches above the ground, in flower and fruit, and was growing in a scree-like gravel. A very white woolly lupine also came from there, the large, white flowers turning pink in age. *Ribes Lobbii* was in bloom, growing and blooming in a snow bank. The genus was represented in the collection by the following rather rare species, *R. Lobbii*, *R. Hallii*, *R. binominatum*, and *R. amarum*.

We spent two days on the ridge, the second on our return trip to Government Flat and on to Black Butte. Great areas were covered with a shrubby variety of *Quercus Garryana*. Along the side of the road the most luxuriant and brilliantly colored *Dicentra formosa* grew, and every now and then *Phlox speciosa* var. *occidentalis* formed clusters of rosy flowers. A variety of *Penstemon Rattani* was seen in bud. *Penstemon azureus* was also collected in flower. Near where a side road branched off to Black Butte, low-growing lupines belonging to *Lupinus lepidus* group were very white woolly and with flowers both blue and white. It was a surprise to see a low-growing form of *Artemisia trifida* also there.

We had to leave the trip to Black Butte to the future as we had no time. The road down was densely forested, chiefly with conifers similar to those on the ridge, the Shasta fir eventually entirely replaced by the white fir. As we approached Copper City the most perplexing manzanitas appeared. *Arctostaphylos candidissima* was conspicuous, but of the other manzanitas each

bush differed from those adjacent and seemed to be hybrids. We did not have time to make a study of the complex lot, but made notes with the collections. There may be manzanitas on the hills through which the road passes which can explain the puzzle. Near Alder Springs we found *Arctostaphylos candidissima* again, where A. A. Heller (No. 12776) collected it in 1917, and not far from there a rayless variety of *Eriophyllum lanatum* was a common subshrub in the chaparral (see Note 6 at end).

At Willows we had the tire repaired. A nail had been picked up, probably at Covelo where we had stopped for ice cream and had parked the car in an adjoining yard. We came home in the cool of the evening, and consider the Willows-Alder Springs route much better in every way than that by Round Valley, since so much of it is on a forest road and not over dry hills.

We collected 219 numbers, representing 207 species. Among them are eight that are new. There were four species of violets, *Viola purpurea*, *Sheltonii*, *Hallii*, *adunca*; four onions, *Allium Breweri*, *Bolanderi*, *Austinae*, *validum*; *Arabis platysperma* and the rare *A. subpinnatifida*; *Collinsia Greenei* and *C. Rattani*; and in the Lily Family, besides the onions, *Zigadenus micranthus*, *Veratrum californicum* and *Calochortus caeruleus* var. *nudus*. Not so bad for two days!

NOTES

NOTE 1. *Arctostaphylos candidissima* Eastwood, spec. nov. Fruticosa, circa 1—2 m. alta, erecta et diffuse ramosa prorsus densissime albo-velutina; caulibus senioribus glabris, atro-porphyreis, junioribus dense velutinis; foliis oblongis et late ovalibus, 3—4 cm. longis, 2—4 cm. latis, apice plerumque obtusis, basi obtusis truncatis vel subcordatis, petiolis circa 5 mm. longis; floribus in brevibus racemis, sessilibus, bracteis foliaceis, inferioribus bracteis æqualibus pedicellis, superioribus brevioribus, pedicellis et bracteis velutinis et glandulosis, pedicellis post anthesin recurvatis, circa 1 cm. longis; sepalis oblongis, 2 mm. longis, membranaceis, ciliatis, reflexis in fructu; corolla marcida, circa 4—5 mm. longa et lata, evidenter rosea; filamentis 2—3 mm. longis, subglabris; ovario dense velutino.

Type: Herb. Calif. Acad. Sci. No. 294923, collected on Log Spring Ridge near the ranger station, July 9, 1941, by Alice Eastwood and John Thomas Howell, No. 9752; also at Copper City, No. 9911, and Alder Springs, No. 9916.

This species is widely distributed in the mountains of Mendocino, Lake, Napa, Tehama, and Glenn counties, and is always conspicuous from the large snowy leaves which show a pallid indument beneath the velvety

pubescence. It is allied to *A. canescens* Eastw., but so different appearing in its area of distribution as to seem a distinct species as definite as the other allies.

NOTE 2. *Arctostaphylos acutifolia* Eastwood, spec. nov. Fruticosa, divaricate ramosa, circa 5—6 dm. alta; caulibus senioribus glabris, atroporphyreis, caulibus junioribus rubescentibus, glanduloso-villosis; foliis anguste vel late oblongis, acutis, maximis 4 cm. longis, 2 cm. latis, viridibus, glabris, petiolis 5—10 mm. longis, aliquando glandulosis; paniculis glanduloso-pilosis, bracteis brevibus et deltoideis, pedicellis glabris, brevioribus baccis; floribus marcescentibus evidenter albis; baccis glandibus sessilibus, sine villis.

Type: Herb. Calif. Acad. Sci. No. 294924, collected on Log Spring Ridge between Log Spring and Government Flat, July 9, 1941, by Alice Eastwood and John Thomas Howell, No. 9718. In my key to *Arctostaphylos* (Leaf. West. Bot. 1:110), it comes between *A. obtusifolia* Piper and *A. Jepsonii* Eastw.

NOTE 3. *Iris citrina* Eastwood, spec. nov. Cæspitosa ex rhizomate gracili, 5 mm. diametro, densissime vestito basibus foliorum veterum vaginatis, radicibus multis, subcarnosis; foliis radicalibus glaucis, glabris, basi stramineis, superantibus flores, 2—4 mm. latis; foliis caulinis 1 vel 2, attenuatis, floribus sæpe approximatis; caulibus 1—15 cm. altis; floribus 2, bracteis 2, lanceolatis, attenuatis, marginibus albo-membranaceis, exteriore glauca, interiore flavescente, plerumque brevior et angustior exteriore; perianthio citrino, lilacino-venoso, pedicello 1—2 cm. longo, tuba gracili, 3 cm. longa, fauce 10—12 mm. longa; ovario anguste oblongo, circa 2 mm. lato et 1 cm. longo; perianthii segmentis exterioribus spatulatis, 5 cm. longis, 13 mm. latis, basi 4 mm. latis, segmentis interioribus oblanceolatis, angustioribus et sæpe longioribus, 5 mm. latis; styli ramis 3 cm. longis, fissis circa 1 cm., partibus 4 mm. latis, apice fimbriatis vel acutis, stigmate deltoideo, obtuso, 1—5 mm. longo et lato, filamento filiformi, 1 cm. longo, anthera æquilonga, 1—2 mm. lata, straminea, apice obtusa vel emarginata.

Type: No. 290382, Herb. Calif. Acad. Sci., collected July 9, 1941, on Log Spring Ridge between Government Flat and Log Spring, Tehama County, California, *Eastwood & Howell No. 9722*. This is allied to *I. macrosiphon* Torr., differing in the glaucous foliage, the yellow flowers, shorter perianth-tube, longer throat, and general shape of the floral organs.

NOTE 4. *Hackelia amethystina* J. T. Howell, spec. nov. Perennis erecta caulibus nonnullis 5—7 dm. altis, 6 mm. diametro basi, viridulis vel subcanescentibus pilis brevibus subappressis recurvis strigillosis; foliis hirtellis vel breviter subpilosis, inferioribus anguste ellipticis, circa 10 cm. longis, 1.5—2 cm. latis, apice subacutis, basi sensim in petiolum æquilongum attenuatis, foliis superioribus sessilibus, lanceolatis ad late ovatis, basi late rotundatis et semiamplexicaulibus; inflorescentia circa 2 dm. longa et 1—1.5 dm. lata, ramis canescentibus, pedicellis floriferis 2—3 mm., fructiferis ad 1 cm. longis; sepalis ad anthesin 1.5—2 mm. longis, 3 mm. longis

in fructu; corolla cærulea, 9—10 mm. diametro, tubo 2—3 mm. longo, fornicibus carnosis, papillosis, subquadratis, paululum longioribus quam latioribus, circa 2 mm. longis, apice retuso plus minusve foras curvato vel recurvato, basi gibbum rotundatum mammiformem 0.3—0.5 mm. longum ferentibus; nuculis 5—6 mm. longis, facie late ovata, turberculata et minute granulata, sparse hispida et aculeolos paucos brevis crassos ferenti, aculeis marginalibus plerumque 3—5 mm. longis, sæpe usque ad basin liberis vel paulum connatis, in senectute amethystinis.

Type: Herb. Calif. Acad. Sci. No. 294646 and 294645 (fruit), collected July 9, 1941, on Log Spring Ridge between Log Spring and Government Flat, Tehama County, California, by Eastwood and Howell, *No. 9720*. This was chiefly in fruit, but flowering specimens were found at Government Flat, Tehama Co., *No. 9787*, and, on July 10, near Black Butte, Glenn Co., *No. 9884*. It is allied to *H. diffusa* (Lehm.) Johnston, but differs from it in the size of the flowers and fruits; and from the other relatives of that species found in the North Coast Ranges, *H. bella* (Macbr.) Johnston and *H. Rattanii* (Brand) Brand, it differs in the smaller blue flowers and different appendages of the corolla.

NOTE 5. **Delphinium antoninum** Eastwood, spec. nov. Caules et petioli foliorum rubescentes, caules simplices vel ramosi subterranei; lamina supra terram subrosulatis, orbiculatis, trisectis, partibus flabellatis et trilobatis, segmentis terminalibus obtusis, glabris vel glanduloso-villosis, villis brevibus et tenuissimis; pedunculis scaposi vel pauci-foliatis prope basin, glanduloso-villosis, 10—15 cm. altis; racemis brevibus, in fructu elongatis, pedicellis divaricato-ascendentibus, 1—4 cm. longis, glanduloso-villosis, bracteis linearibus, circa 3 mm. longis, bracteolis oppositis, 2—4 mm. ex floribus; floribus indigoticis, circa 2 cm. diametro, calcaribus obtusis, horizontalibus, directis vel paululum curvatis, 15 mm. longis; sepalis glabris, oblongis, 12 mm. longis, 6 mm. latis, apice acutis; petalis superioribus albis azureo-tinctis, apice obliquis, integris vel bilobatis, petalis inferioribus bilobatis, unguibus 4 mm. longis; folliculis 3, conniventibus, 2 cm. longis, glanduloso-villosis; tunica seminorum laxa et membranacea.

Type: Herb. Calif. Acad. Sci. No. 292755, collected July 10, 1941, on Anthony Peak between Mendocino and Tehama counties, *Eastwood & Howell No. 9861*. It is related to *D. scopulorum* Gray and perhaps comes nearest to var. *subalpinum* Gray.

NOTE 6. **Eriophyllum lanatum** (Pursh) Forbes var. **aphanactis** J. T. Howell, var. nov. Herba suffruticosa circa 2.5 dm. alta, foliis pinnatifidis, capitulis eradiatis, acheniis angustis turbinatis 3 mm. longis, squamis pappi ad 1 mm. longis.

Type: Herb. Calif. Acad. Sci. No. 294931, collected near Alder Springs, Glenn Co., by Eastwood and Howell, *No. 9919*, July 10, 1941. This variety seems to differ from *E. lanatum* var. *achillæoides* (DC.) Jepson only in the eradiate heads.

OBSERVATIONS ON CLEISTOGAMY IN MIMULUS

BY JOHN THOMAS HOWELL

The small *Mimulus* with cleistogamous flowers, which I described as *M. cleistogamus* from San Benito County in 1938 (Leaflet West. Bot. 2:79) and reported from the Napa Range in 1941 (Bull. Sierra Club 26:67), is to be regarded merely as a growth phase of the widespread *M. Douglasii*. During the spring of 1941 I observed that the plants which produce the beautiful and showy corollas by which the Douglas monkey-flower has been heretofore recognized produce only cleistogamous flowers a few weeks later. The first collection disclosing this development was made near Deer Park on Mt. Diablo, Contra Costa County, April 6, when I discovered that long withered corollas adhered to the ripening capsules near the base of the plants and that the uppermost flowers were cleistogamous (*J. T. Howell No. 16177*). Plants in the same condition were found near Mt. Bullion, Mariposa County, April 25 (*Eastwood & Howell No. 8773*). The third set of these plants was observed near Rock Spring on Mt. Tamalpais, Marin County, where flowers of March 30 with showy corollas were followed by a series of cleistogamous flowers by May 18 (*J. T. Howell No. 16193*). As a result of these observations, not only does *M. cleistogamus* J. T. Howell become a synonym of *M. Douglasii* (Benth.) Gray, but *Mimulus* sect. *Cleisanthus* J. T. Howell (Leaflet West. Bot. 2:80) becomes a synonym of *Mimulus* sect. *Ænoë* Gray.

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In a small collection of *Mimulus modestus* Eastw. which I made April 5, 1941, in Franz Valley, Napa County (*J. T. Howell No. 16156*), there was apparently every variant from entirely cleistogamous flowers with inconspicuous corollas to those with large expanded corollas. On one plant, the first flower in the axil of the third pair of leaves above the cotyledons was definitely cleistogamous: the corolla was unopened, tiny, and uncolored, and only two stamens were fertile and their anthers were adnate to the stigma. On this plant, the next flower also seemed to have been self-fertilized, but the corolla was better developed and colored and the style was more elongate. Ap-

parently the corolla had never opened and yet the fruit was beginning to enlarge.

In other plants, the corollas varied from 7 mm. long with a pale pink narrowly funnel-form limb to 2 cm. long with a broadly expanded bright rose limb. In the smaller-flowered forms, fertilization was sometimes, if not always, self-fertilization. In one such flower with smaller pink corolla, the two lower stamens were fertile and adnate to the stigma, while the two upper stamens were sterile and consisted of elongate filaments and abortive anthers. I did not find a plant on which an early cleistogamous flower with a tiny unopened corolla was followed by a flower with expanded corolla, nor was there an indication that showy flowers were followed by cleistogamous flowers. But the plants were probably too young to indicate any tendency, one way or the other.

The fruit of the cleistogamous flower in which the corolla was quite abortive was shorter and broader and curved abruptly outward from the top of the pedicel. The fruits of the other flowers varied in shape, but they were straight and erect and did not seem to be so strongly flattened.

Dr. Grant, in her monograph of *Mimulus*, mentions that she observed indications of self-fertilization in *M. modestus* and *M. Kelloggii* (Ann. Mo. Bot. Gard. 11:318), but apparently she saw nothing that suggested cleistogamy.

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On May 5, 1938, at Coarse Gold, Madera County, I collected a series of plants in which at least the uppermost flowers, if not all, were cleistogamous (*Eastwood & Howell No. 5446*). In several of the plants, the lowest flowers have the dried remains of corollas extending beyond the calyx but in only one specimen can I be certain that the corolla had been expanded. Certainly most of the flowers had been cleistogamous and the upper end of the enlarging capsules carried the remains of the unopened corollas like tiny caps. Because there were no expanded corollas on any of the plants at the time they were collected, certain determination of the material is not possible, but all the vegetative and fruiting characters would indicate that the collection should be referred to *M. modestus* Eastw.

A SUFFRUTESCENT GILIA FROM SOUTHERN NEVADA

BY R. C. BARNEBY

Gilia Ripleyi Barneby, spec. nov. inter *Eu-gilia Leptomerias* Rydb. *G. latifolia* S. Wats. a qua radice perenni, foliis confertis brevius petiolatis dentibus minus numerosis spinula duplo longiori valida cuspidatis spinoso-dentatis, panicula nuda, capsulis tertia parte brevioribus anthesique serotina inter alia differre videtur, affinis.

Perennis pluricaulis inferne caudicifera suffrutescens e radice suberosa fragili in calcarearum fissuris rupium profunde evadenti orta, præter flores undique glanduloso-villosa læte viridis graveolens: caulibus annotinis 2—10 (—20) laxè cespitosis e collo caudicis robusti corticosi tortuosi adscendentibus erectisve plus minusve angulatis pilis crispulis griseolis plerumque glanduliferis sparsiuscule villosis primum abbreviatis 8—10 cm. longis valde foliosis herbaceis flexilibus pallide virentibus ad anthesin haud elongatis sed paniculam gracilem longe pedunculatam subnudam (axi primario producto revera efformatam) sero emittentibus, demum desiccatis fragillimis albicantibus cortice tenui exfolianti obtectis cicatricibus foliorum imorum caducorum basin versus nodosis: foliis alternis in plantæ tertiam partem inferiorem valde confertis vel subrosulatis petiolo circa 1 cm. longo firmo superne sulcato gestis primum mollibus herbaceis læte viridibus glanduloso-viscidis villosisque patulis ad anthesin (præsertim inferioribus) omnino exsiccatis spinoso-rigidis discoloribus circacircum incurvis nidulantibus; lamina ambitu læte obovata 3—4 cm. longa 2—3 cm. lata supra basin sensim cuneato-attenuatam profunde serrato-dentata dentibus triangulari-acuminatis utrinque 8—10 circa 4 mm. longis vel intermediis haud raro brevioribus in spinulam validam subæquilongam demum vulnerantem apice exeuntibus, superne plana inferne elevatim penninervia nervis rectis robustis pallidis remotiusculis in dentium spinas productis: inflorescentia creberrime glandulosa: panicula interdum obscure cymosa ambitu obovoidea 4—6 cm. longa adeo conferta ramulis inferioribus abortis pedunculo gracili subnudo vel foliis 1—4 diminutis bracteiformibus lanceolatis sessilibus 3-dentatis integrisve 3—5 mm. longis prædito gesta: bracteis ramealibus florumque subulatis acutissimis inferioribus circa 5 mm. longis in summas vix 1.5 mm. longas sursum decrescens: floribus solitariis secus paniculæ ramulos adscendentes flexuosos graciles separatim dispositis numquam glomerulatis pedicello filiformi divaricatim patulo sub calyce abrupte erecto 2—6 (—8) mm. longo insidentibus: calyce florifero tubuloso-campanulato 3.5—4 mm. longo 1—1.5 mm. lato fere ad medium in dentes conformes lineari-lanceolatas mucronatas herbaceas angustissime scarioso-marginatas erectas 5-partito, fructifero ovario accrescenti extenso rarissime rupto 2—3 mm. lato ad 5 mm. usque elongato tubo infra sinus ad basin scarioso dentibus sæpissime supra capsulam demum conniventibus: corollæ infundibuliformis circa 8 mm. longæ ad medium in limbi lacinias ovato-oblancheolatas acuminatas erosulas vel utrinque ad apicem 1-denticulatas fissæ tubo sursum vix ampliato 4 mm. longo albo limbo

rotato sub sole tantum expanso saturate roseo extus pallidius rosello nec gilvo-suffuso: staminibus inclusis ad tubi corollini basin insertis filamentibus filiformibus valde inæqualibus nunc 1.5 mm. tantum longis nunc tubo subæquilongis: antheris 0.75—1 mm. longis albis: stylo 2.5—3 mm. longo sæpius persistenti: ovario glabro: capsula ovoidea abrupte obtusa membranacea 3.5—4.5 mm. longa dentibus calycinis paullo superata valvulis inconspicue corrugatis: seminibus numerosissimis oblongis vix 0.5 mm. longis lævibus castaneis madefactis spiracula haud emittentibus.

Planta infelix exsul videtur, verosimiliter relicta: *Daturam* redolet.

NEVADA: in fissures of hard, dry, limestone cliffs in the south end of the Specter Range, southwestern Nye Co., alt. 3100 ft., 18 July 1941, fl. & fr., *Ripley & Barneby No. 3992*. Type in Herb. Calif. Acad. Sci., No. 290394; isotypes in herb. Pomona, N. Y. Bot. Gard., Kew. Also *ibid.*, 5 Apr. 1940, (folia tantum), *No. 2873*. Cliffs of Spotted Range, Nye Co., alt. 4100 ft., 14 May 1941, (fol.), *No. 3420*. Pintwater Range, Clark Co., alt. 3500 ft., 12 Apr. 1940, sine num. Cliffs of calcareous ravine in the Desert Range, Clark Co., 4400 ft., 10 Apr. 1940, (fol.), sine num. North end Desert Range, southwestern Lincoln Co., alt. 4000 ft., 5 May 1941, (fol.), sine num.

CALIFORNIA: cliffs of Titus Canyon, near Leadfield Mine, Grapevine Mts., Inyo Co., alt. 4100 ft., 18 Apr. 1940, (fol.), *No. 2951*.

Gilia Ripleyi was first seen in the type locality in the spring of 1940 and was at once recognized as a species of exceptional interest, but although the station was revisited by the author and Mr. Ripley as late as June of that year no flowers were obtainable, the panicles, even at that late season, scarcely having begun to rise from among the leaves. Subsequently during that year and in the early part of 1941 plants were observed in all of the low calcareous ranges lying between the Sheep Mts. to the south and Rose's Well to the north and just over the California line in Titus Canyon. In these localities, where it occurred always in exposed rock-walls of the most harsh and arid canyons, often in close association with *Buddleia utahensis* Cov., it was never met with in a mature state, but the clusters of short, brittle stems, closely set with viscid and prickly holly-leaves, the woody caudex and persistent inflorescences of the preceding year were unmistakable, and only fragmentary collections were made as proof of locality. Finally a special expedition was made in July of 1941, at a period when the flora of southern Nevada, at least

below the coniferous belt of the highest mountains, is almost completely burnt away, and satisfactory material for description was at last obtained.

The affinities of the plant are unquestionably with *Gilia latifolia* S. Wats. which occurs in gravelly washes throughout the same range and far to the southward, and in herbaria it might be taken by a superficial observer for an indurated form of that species. While the characters enumerated in the diagnosis above seem to be of sufficient weight to mark *G. Ripleyi* as a notable taxonomic unit, the behavior of individual plants as observed in the field offers strong evidence of its specific distinctness. Particularly remarkable is the season and manner of anthesis. The short herbaceous stems of the year, arising during the cool months of winter from the summit of a shortly branching, suffrutescent caudex, develop very early, and by the beginning of April, when allied annual species are already breaking into bloom, have reached the limit of their growth. At this point, however, the plants appear to fall into a state of suspended animation, no change in outward aspect (except for a general and very gradual desiccation of leaf and stem) being visible during the season when the vegetation of the region is at its most active. Finally, late in June, a slender, leafless panicle, set with numerous, rather small corollas of bright, clear rose, is produced from the summit of the already withering and rigid stems: this matures rapidly and sets abundant seed and the whole plant goes to rest until the following year.

It seems probable that this odd life-cycle may be explained by the plant's choice of habitat, the driest and most torrid exposures of limestone cliffs, as a rule shared only by the *Buddleia*, *Cryptantha confertiflora* (Greene) Pays. and a few strongly xerophytic shrubs of the *Compositæ*. *Gilia Ripleyi* being perennial, having either lost or more probably not yet attained the rapid vernal development of allied species, is unable to complete the full annual cycle of growth on the limited moisture conserved from the short winter rains. By mid-spring the supply is, in fact, exhausted, and I suspect that a successful flowering depends on the uncertain but considerable cloud-bursts which occur over southern Nevada during the summer months. The stimulus of rain, sufficient to support only a short period of growth, is directed solely to the task of reproduction: no fur-

ther herbage is grown, leaves in the inflorescence being reduced to minute spinescent bracts.

If this explanation is correct, it seems likely that *G. Ripleyi* is a relict species, persisting precariously in a few favored stations on the southwestern limestones, and represents, perhaps, the ancestral type of which *G. latifolia* is the successfully organized adaptation to the changing climate. Certainly it forms part of that deeply interesting calciphile flora endemic to a broad province which (with altitudinal limits of about three and five thousand feet) may be approximately defined by lines drawn from Darwin, California, east to St. George in southwest Utah and south from these points to the Providence Mts. of the Mohave Desert, and which reaches its climax in the fabulous chasms and precipices of Titus Canyon. To this region belong such memorable species as *Penstemon petiolatus* Bdg., *Phacelia perityloides* Cov. and *P. geraniifolia* Brand, *Tetracoccus ilicifolius* Cov. & Gilm. and the beautiful *Maurandia petrophila* Cov., all chasmophytes with broad, toothed leaves, taxonomically isolated and evident relicts of a mesophytic vegetation of immense antiquity, and it is believed that the *Gilia* is an unrecognized member of this august and ancient company.

SOUTHWEST BOTANICAL ODYSSEY

BY JOHN THOMAS HOWELL

In May, 1941, Miss Alice Eastwood, Dr. Isabel McCracken, and I made another of our notable botanical and entomological expeditions, which over a period of years have added such rich scientific collections to the museum of the California Academy of Sciences. This expedition was devoted primarily to the desert and took us by way of Barstow, California, and Las Vegas, Nevada, to St. George and Kanab in southern Utah. On our return, we went north to Beaver, Utah, and west to Ely, Nevada, thence southwest to Tonopah, reëntering California over the White Mts. by way of Montgomery Pass. In the following notes I wish to describe two or three of the places where especially interesting plants were collected.

✓ ✓ ✓

Beyond Barstow the desert was flowering like a garden and along the highway the appearance was that of an herbaceous

border done in the most floriferous manner. Yellow and white and mauve daisies representing several tribes and many genera of the Sunflower Family varied in height from the prostrate rosettes of *Glyptopleura*, the spreading mats of *Monoptilon*, and the gold encrusted dwarfs of *Eriophyllum* to the taller plants of Douglas' *Coreopsis*, Parry's *Calycoseris*, Coulter's *Malacothrix*, and Xantus' *Chenactis*; and all were overtopped by the flowers of the Desert Aster. Adding variety to this impressive array of sunflowers were no fewer than five desert forget-me-nots, six gilies (two kinds each in *Gilia*, *Linanthus*, and *Langloisia*), and several diverse eriogonums. The clay slopes of a small wash were fairly smothered in a green-gold mist of *Eriogonum trichopes* and adjacent slopes were adorned by the beautiful satiny flowers of *Mentzelia tricuspidis*. Two of the rarer species of *Nama*, *N. pusillum* and *N. depressum*, grew in mats not far from each other; and two species of *Nemacladus*, *N. rubescens* and *N. gracilior*, exhibited diverse kinds of flowers although the diffusely branched plants appeared quite alike as they grew together. Then there were lupines and locoweeds, poppies and phacelias, pale blue larkspurs and bright yellow fiddle-necks; and, among the numerous shrubs, the golden-flowered *Cassia armata* and purple-flowered *Dalea Johnstonii* were the most showy and beautiful.

In the midst of this rich and varied floral display, I came upon a small area of about a half acre, which, by contrast, was nearly flowerless. It was that peculiar type of desert terrain known as desert mosaic, where small darkened stones that are all but buried by sun-baked soil cover a nearly level space that is more or less restricted in extent. The only plants that appeared to thrive on this mosaic island were peculiar phacelias and they seemed as confined and restricted to their localized habitat as if it were surrounded by water. A hasty glance at the phacelias convinced me at once that two species were present: the first with violet flowers borne on elongate racemes that far exceeded the leafy part of the plant, the second with cream-white flowers on short racemes that were nearly concealed by the numerous leaves.

Further study has convinced me that my field interpretation was correct and that two very distinct species are represented, although heretofore they have been confused and improperly

understood. Both are rare plants, the violet-flowered one, *P. pachyphylla* Gray, and the white-flowered one, *P. neglecta* M. E. Jones. Both are related to the large- and purple-flowered *P. calthifolia* Brand, one of the common and showy plants of the Death Valley region to the north, and together the three form a compact triad among our desert phacelias.*

Certainly on May 7, 1941, the desert from Barstow to Yermo was a botanist's paradise, the beginning of a colorful flowery paradise that was to extend across southern Nevada and as far east as we went in Utah.

/ / /

On three different occasions Miss Eastwood and I have visited Zion National Park and each time there have been noteworthy plants and new species in the botanical collections we have made. For the most part we have done but little collecting in Zion Canyon itself, although it was from specimens collected at the hanging cliff-gardens in The Narrows that *Dodecatheon sionis* Eastwood was described; and *Eriogonum flicale* Stokes was collected on steep clay slopes in the canyon just outside the park near Springdale. Most of our collections have come from the Clear Creek Canyon that is traversed by the scenic Mt.

* These phacelias, which differ from all others in their broad, roundish, entire to dentate or crenate leaves and transversely corrugated seeds, may be distinguished by the following synopsis which has been prepared from specimens at Pomona College, Stanford University, and the California Academy of Sciences:

- A. Stems mostly 1—3 dm. tall, well-covered by hirsutulous hairs and conspicuous stalked black-headed glands; racemes above the leafy part of the plant; corolla violet or purplish, throat hairy inside; anthers violet, pollen lavender; capsule generally spreading or ascending.
- B. Stems mostly 1—1.5 dm. tall; corolla 5.5—6.5 mm. long; corolla-scales narrowly linear, 1—2 mm. long; stamens 2.5—4 mm. long; style and branches 2—2.5 mm. long; capsule 5—7 mm. long; seeds over 100. Specimens seen only from California in Kern, San Bernardino, Riverside, and Imperial counties.....*P. pachyphylla*
- B. Stems mostly 1.5—3 dm. tall; corolla about 1 cm. long; corolla-scales semi-ovate or semi-lanceolate, 2—3 mm. long; stamens 5—6 mm. long; style and branches 5—6 mm. long; capsule 4—5 mm. long, seeds about 50. Specimens examined from Nevada (Amargossa Desert, Nye Co., *M. E. Jones in 1907*) and from California, chiefly from Inyo Co., one from northern San Bernardino County (37 miles north of Baker, *J. T. Howell No. 3600*).....*P. calthifolia*
- A. Stems 0.3—1 dm. tall, glandular-villous, black-headed glands none; racemes more or less concealed by the leaves; corolla creamy-white, 5 mm. long, throat glabrous inside; corolla-scales linear-lanceolate, 2 mm. long; stamens 3 mm. long, anthers and pollen yellow; style and branches 2 mm. long; at least the lowest capsules in racemes reflexed, capsule 4 mm. long, seeds about 100. Specimens examined from California (San Bernardino, Riverside, and Imperial counties), from Arizona (Mohave, Yuma, and Pima counties), and from Nevada (10 miles northeast of Las Vegas, Clark Co., *Eastwood & Howell No. 8974*).....*P. neglecta*

Carmel Highway in the middle altitudes of the park. This part of the park, which is situated mostly above the massive red sandstone in the region of the white sandstone, lacks the grandeur of Zion Canyon, but it possesses a scenic charm that is quite as unique. Everywhere the pale rocks are enlivened by showy masses of bloom: yellow wall-flowers and forget-me-nots, purple rock-creesses and locoweeds, pink and rose phloxes, red and mauve penstemons, scarlet paintbrushes, lavender sweet peas, and yellow and lavender daisies—these are but a few of the more conspicuous flowers.

Although Clear Creek Canyon has presented the best flower show seen in Zion Park each time we have visited there, this part of the park has apparently not been well explored botanically. Comparing the record of our collections made there in September, 1938, and May, 1941, with the plants listed in the little flora of the park, "Plants of Zion National Park," I find that we have found there more than twenty species (including six genera) not reported before from Zion. It may be thought that our additions to the park flora are inconspicuous little plants in which the general public would not be interested; but this is not entirely so since our list includes such showy plants as a shrubby yellow-flowered *Eriogonum* (*E. effusum* ssp. *durum* Stokes), a purple-flowered *Arabis* (*A. Selbyi* Rydb.), a white-flowered *Saxifraga* (*S. rhomboidea* Greene), a white-flowered *Oreocarya* (*O. multicaulis* Greene), and several yellow-flowered shrubs and herbs in the *Compositae* (*Helianthella microcephala* Gray, *Hesperodoria scopulorum* Greene, and *Hymenopappus lugens* Greene). Second only in importance to the two new species which have been described from our Clear Creek Canyon collections, *Eriogonum zionis* Howell and *Castilleja zionis* Eastwood, are collections of three plants which are not reported for Utah in Tidestrom's "Flora of Utah and Nevada" and which seem to be new to that state. These are *Juncus brachystylus* (Engelm.) Piper, *Eriogonum vimineum* var. *Davidsonii* (Greene) Stokes, and *Cryptantha muricata* var. *denticulata* (Greene) Johnston. The only liverworts I have seen in Zion are two which grew along Clear Creek on moist ledges shaded by sandstone cliffs and which have been determined by Mrs. E. C. Sutcliffe as *Asterella saccata* and *Reboulia hemispherica*.

Is it surprising that I am anxious to collect again in Zion's Clear Creek Canyon to see what further treasures may be discovered?

✓ ✓ ✓

On our expedition in May, 1941, it was our primary purpose to collect in southern Utah along the southwestern borders of the plateau country between the sonoran deserts and montane uplands, a region abounding in interesting and critical problems because of the climatic and geographic character of the country. Moreover this was the region first explored by botanists or botanically minded inhabitants who for a longer or shorter time resided in the early-day Mormon villages of St. George and Kanab. Many plants new to science were described from the collections of Palmer and of Parry, of Captain Bishop and of Mrs. Thompson; and now, after these many years, botanists still return to St. George and Kanab, not only to see the remarkable plants which are found nowhere else, but also to study the relation between these first-described species and their relatives which grow in other parts of the American southwest.

One of the plants which I especially hoped to find in southern Utah was *Phacelia cephalotes*, a remarkable endemic in which small capitate clusters of inconspicuous flowers occur in the forks of prostrate stems. Altogether it had been collected only about five times, and the last-recorded collection was one made by Miss Eastwood when on her adventurous botanical expedition into southern Utah in 1892. I was almost certain that if so rare and specialized a species was to be found, it would be in the most specialized habitat of the region, *i. e.*, on the clay flats or slopes that are left behind as the perpendicular front of massive red sandstone slowly retreats farther and farther north due to erosion. These clay flats are especially common around St. George, and, although we searched them diligently and collected many wonderful and desirable plants, we found no trace of the little *Phacelia*. The older flats in which the soil was highly mineralized were empurpled by a glorious show of *Phacelia pulchella* in fine contrast to the yellow flowers of *Oenothera Parryi*; on clay flats of more recent age we found *Astragalus confertiflorus* and *Cymopterus Newberryi*; while on still younger slopes, right under the sandstone cliffs, we found such choice plants as *Eriogonum insigne*, *E. Parryi*, and *Cordylanthus Parryi*. As we

left St. George for Zion Canyon and Kanab, at least one member of the party was depressed and disappointed because St. George had withheld its rarest and choicest *Phacelia*!

We had gone less than ten miles and had just passed the village of Washington when a change of terrain brought new hope. The highway extended along the crest of a low ridge and to one side we looked out over a series of badlands from the midst of which arose a prominent knoll of lavender-rose clay. Although it appeared entirely sterile, this colorful mound was different from any formation we had explored, so we stopped to see what it might have to offer. There were only three species of plants on its steep, sun-baked, crumbly sides, but what a trio!—*Eriogonum subreniforme* Wats., a rare and little-known endemic; *Astragalus ampullarius* Wats., hitherto known only from the type collection (cf. M. E. Jones, Rev. *Astragalus* p. 154,—1923); and *Phacelia cephalotes* Gray, the first collection, it would seem, in 49 years (cf. J. T. Howell, A Revision of Species Related to *Phacelia pulchella* and *P. rotundifolia*, MS.). The next day, on similar clay knolls southeast of Kanab, we again collected this remarkable trio of plants. Our expedition to southern Utah had been crowned with successes exceeding our fondest hopes, and we still had the riches of our homeward journey before us!

TWO VARIETIES OF TRITELEIA PEDUNCULARIS

BY ALICE EASTWOOD

Triteleia peduncularis was described by John Lindley in Botanical Register, Vol. XX, under plate 1685. Lindley's description is as follows:

"Foliis linearibus scapo erecto bipedali brevioribus, involuero pedicellis quater brevioribus, pedicellis strictis perianthio obconico quarter longioribus, ovario breviter stipitato, limbo perianthii tubo longiore, umbella multiflora.—California. Flowers apparently pale blue. Not yet introduced."

Confusion has arisen between two varieties or species which differ noticeably in the manner of flowering. The typical form is common in wet places in the San Francisco Bay region, while the other seems to be farther north. The former has strict pedicels, the latter has pedicels much longer and more widely spread-

ing. The latter I am naming as var. *longipedicellata*¹; the former unfortunately has been catalogued and distributed by Carl Purdy and named in my honor. As it has never been described, it is a *nomen nudum*.

Last year on Mt. Tamalpais, in a springy place on the Bootjack Trail, the author found a peculiar variety of the same species. It had the rather short, strict pedicels of the type, but each alternate segment of the perianth was trifid. Mr. Howell had collected the same at approximately the same locality. I have named it var. *trifida*.² All of the specimens that are in our herbarium have single corms, but this has smaller corms with many offsets.

NEW WESTERN PLANTS

BY JOHN THOMAS HOWELL

Eriogonum viscidulum J. T. Howell, spec. nov. Annum erectum 2—4 dm. altum, caulibus sæpius solitariis ex basi, 2—8-chotomis supra, flavo-viridibus, omnino præter ramulos ultimos viscidulis, glabris, sursum deorsum minute striatulis, basi usque ad 4 mm. diametro, supremis filiformibus; foliis basalibus rotundis vel paululum longioribus quam latioribus, 1—3 cm. longis, subreniformibus subtruncatisve vel raro etiam late cuneatis basi, floccoso-tomentosis subter, arachnoideis vel subglabris supra, petiolis usque ad 4 cm. longis; bracteis plerumque 3, inferioribus tenuiter tomentosis; pedicellis tenuissimis, 1—1.5 cm. longis, glabris, lævibus; involucris paucifloris (bifloris?), turbinatis, parvulis, 1 mm. longis, basi angustissimis, glabris, 4-lobatis, lobis quadratis vel late subobcordatis, sæpe paululum latioribus quam longioribus, truncatis vel retusis, marginibus superioribus undique membranaceo-hyalinis, bracteolis minimis, minute ciliatis; perianthiis perglabris, citrinis præter costam viridem, in senectute rubiginoso-tinctis, segmentis oblongis, obtusis, interioribus et exterioribus subsimilibus, ad anthesin 1.5 mm., in fructu 2 mm. longis; staminibus glabris; acheniis turgide ovatis, 1 mm. longis, subacutis, lævibus et subnitentibus.

¹ *Triteleia peduncularis* Lindley var. *longipedicellata* Eastwood, var. nov. Pedicellis 15—17 cm. longis, erecto-divaricatis.

Type: Herb. Calif. Acad. Sci. No. 107938, collected by A. A. Heller, No. 12382, June 8, 1916, in "moist places in the oak belt between Hough's Springs and the Colusa county line, the principal shrubs, *Ceanothus* and *Toxicodendron*. The plants grew in moist gravel on a tributary of the Cache Creek."

² *Triteleia peduncularis* var. *trifida* Eastwood, var. nov. Differt: segmentis alternantibus perianthiis trifidis, floribus minoribus.

Type: Herb. Calif. Acad. Sci. No. 256730, collected June 9, 1938, by John Thomas Howell, No. 13909a, on a springy slope east of Bootjack, Mt. Tamalpais, Marin County. The author collected it in the same locality June 6, 1941. Mr. Howell's plants were without corms. The author's collection had small corms furnished with several offsets.

Type: Herb. Calif. Acad. Sci. No. 294932, collected from sandstone bluff at the Virgin River Bridge, 5 miles southwest of Bunkerville, Clark Co., Nevada, by Eastwood and Howell No. 9031, May 8, 1941.

Eriogonum viscidulum, which superficially resembles a form of *E. trichopes* with non-inflated stems, is most closely related to *E. subreniforme* Wats., differing from that species in the glabrous but viscidulous stems, the truncate or retuse involucreal lobes, the yellow perianth, and the much smaller achenes. Sand thickly and firmly adheres to the glutinous coating that covers all of the stem except the uppermost filiform branchlets. The station where this remarkable plant was collected is also the type locality of *E. exaltatum* M. E. Jones, topotypes of which were collected by Miss Eastwood and me in September, 1938 (No. 6316).

Lewisia Cantelovii J. T. Howell, spec. nov. Herba perennis caudice subgloboso; foliis basalibus crassis sed planiusculis, numerosis in rosula plana, oblanceolatis, sensim attenuatis ad basin, vix petiolatis, 2—4.5 cm. longis, 0.5—1.2 cm. latis, prominenter et argute dentatis vel prope basin subintegris, apice obtusis vel subtruncatis plerumque retusis vel subobcordatis; caulibus scapiformibus, 1.5—4 cm. altis, gracilibus (1—2.5 mm. diametro), foliis caulinis multum reductis, sparsis, anguste oblongis vel lanceolatis, 3—10 mm. longis, acutis, denticulatis, denticulis foliorum supremorum glanduliferis; paniculis multifloris aperte ramosis, ad 2 dm. longis, pedicellis gracillimis, 0.5—1 cm. longis; sepalis late ellipticis, 3 mm. longis, 2.5 mm. latis, glanduloso-dentatis; petalis 5 ad 7, 7 mm. longis, albis, carneo-nervatis (carneis et roseo-nervatis in siccitate); staminibus circa 5; stigmatibus 2; fructu ignoto.

Type: Herb. Calif. Acad. Sci. No. 294735, collected by Mr. and Mrs. H. C. Cantelow from wet rocky cliff, 3.2 miles west of Belden in the Feather River Canyon, Plumas Co., California, May 25, 1941.

Lewisia Cantelovii belongs to that part of the subgenus *Oreobroma* in which the many-flowered panicles arise from low rosettes of flattened leaves. It seems most closely related to the rare *Lewisia Congdonii* (Rydb.) J. T. Howell¹ of Mariposa County, differing in its toothed and differently shaped leaves. From *Lewisia Heckneri* (Morton) J. T. Howell,² a rare species in the Trinity-Salmon Alps of northwestern California in which the leaves are also dentate, it differs in its narrower retuse leaves.

¹ *Lewisia Congdonii* (Rydb.) J. T. Howell, comb. nov. *Oreobroma Congdonii* Rydb., N. Amer. Fl. 21:322 (1932).

² *Lewisia Heckneri* (Morton) J. T. Howell, comb. nov. *Oreobroma Heckneri* Morton, Proc. Biol. Soc. Wash. 44:9 (1931).

more graceful inflorescences, and smaller flowers. It is a real pleasure to associate with this distinct and beautiful species the name of Mr. Cantelow, who with Mrs. Cantelow, is responsible for so many rare and choice accessions to the Academy's herbarium.

The following, taken from Mr. Cantelow's diary for May 25, 1941, tells of the discovery of his *Lewisia*: "The ride down the canyon was delightful. Well down the gorge, in the granite section on a wet moss-covered wall we discovered a *Lewisia*—new to us. I took one and placed it in a pot. It seems to have shallow roots—it sits, in fact, where a thin coating of soil has gathered on a tiny ledge or crack and has been covered by a cushion of moss. The flowers are inconspicuous, being white strongly lined with pink. The large flat rosettes send up long slender panicles which bear small leaves here and there, and the flowers appear along the outer edge, being not over three-eighths of an inch in diameter."

Phacelia Quickii J. T. Howell, spec. nov. Annu glanduloso-hirsutula, erecta stricta et pauciramosa supra vel fastigiata ramosa ex basi, 0.5—3.5 dm. alta; foliis interdum rosulatis basi, plerumque caulinis, infimis oppositis 2-jugis, alternis supra, lanceolatis ad oblongo-linearibus, 0.6—4 cm. longis, 0.2—1 cm. latis, integerrimis, plus minusve revolutis, acutis, basi sensim in petiolum marginatum usque ad 1.5 cm. longum attenuatis; racemis densifloris, sæpe elongatis, breviter pedunculatis, pedicellis circa 1 mm. longis; sepalis inæqualibus, ad anthesin 2—4 mm. longis, 0.3—0.8 mm. latis, in fructu plerumque valde inæqualibus, 3.5—7 mm. longis, 0.3—1 mm. latis, anguste linearibus ad oblanceolato-spatulatis, glanduloso-hirsutis; corolla cerulea vel lilicina, tarde decidua, primo campanulata, demum tubulata post anthesin, 3—5 mm. longa, tubo circa 2 mm. longo; squamis 1 mm. longis, anguste oblongis subquadrangularibus, squamis jugorum vicinorum marginibus liberis connatis; staminibus 3—6 mm. longis, plerumque paulum exsertis, filamentis glabris; stylo et ramis 3.5—6 mm. longis, ramis 2.5—4.5 mm. longis, stylo hirsutulo et glanduloso, ramis basi glandulosis; ovario circa 1 mm. longo, glanduloso-hirsutulo, ovulis 4; capsula globoso-ovata, paululum longiore quam latiore, 2—2.5 mm. longa, hirsuta et hirtella, vix glandulosa, rostro perbrevis vel obsolescenti; seminibus 2 vel 3, turgide lateque ovatis, obtusis, 1.3 mm. longis.

Type: Herb. Calif. Acad. Sci. No. 294733, collected by Clarence R. Quick, 3 miles northeast of Strawberry, Tuolumne County, California, June 19, 1931. The species is not uncommon in the main forest belt of the Sierra Nevada from Lake Tahoe south to the region of Yosemite. Specimens are in Herb. Calif. Acad. Sci. from Eldorado, Alpine, Tuolumne, Mariposa, and

Madera counties, five besides the type having been collected by Mr. Quick.

Phacelia Quickii has been confused by Brand and others with *P. humilis* T. & G. It is the plant figured as that species in Jepson, Man. Fl. Pl. Calif. fig. 789; and I reported it as *P. humilis* in my Yosemite plant notes in the Sierra Club Bulletin, vol. 26, p. 69. It is most closely related to *P. marcescens* Eastw. from which it differs in its narrower leaves, markedly unequal sepals, less marcescent corolla, subglobose fruit, and plumper seeds. Both of these species are related to *P. humilis*, but they may be distinguished by their glandular pubescence and glabrous filaments.

Phacelia Quickii is named in honor of my friend and former student, Mr. Clarence R. Quick of the Office of Blister Rust Control of the United States Department of Agriculture. For more than ten years the Herbarium of the California Academy of Sciences has been periodically enriched by gifts of specimens which he has collected, chiefly from middle elevations of the Sierra Nevada.

Senecio Lewisrosei J. T. Howell, spec. nov. Herba perennis suffrutescens, caudicis ramis crassis, ad 12 mm. diametro, patentibus, subligneis, caulibus floriferis erectis annuis, 3—5 dm. altis, arachnoideo-tomentosis vel demum subglabratis; foliis bi- vel tri-pinnatisectis, ad 12 cm. longis, 4 cm. latis, oblongis, incano-tomentosis, divisionibus gracillimis, segmentis ultimis oblongis, acutis, ad 3 mm. latis, foliis superioribus similibus sed reductis, saepe pinnatisectis; capitulis 1.5 cm. longis, radiatis, paucis in cyma corymbosa terminali; involucri campanulato, vix calyculato, circa 1 cm. longo, phyllariis subglabratis, 14 ad 21, lineari-lanceolatis; floribus radii paucis, 1 ad 3 (vel 0?), floribus disci numerosis; acheniis cylindraceo-turbinatis, prominente costatis, 3—4 mm. longis, glabris.

Type: Herb. Calif. Acad. Sci. No. 294928, collected in the canyon of the North Fork of the Feather River at an elevation of about 2000 ft., 3 miles south of Pulga, Butte County, California, June 7, 1939, by Lewis S. Rose, No. 39247.

Senecio Lewisrosei is a member of the Section *Lobati* Rydb. and is most nearly related to *S. eurycephalus* T. & G. as the section is treated by Greenman (Ann. Mo. Bot. Gard. 4: 15—35,—1917). It is to be distinguished from that species by its more extended suffrutescens base, remarkably dissected leaves, few rays, and smaller achenes. The tendency to dimorphism of leaves in *S. eurycephalus* and other related species, in which the lower leaves are less divided than the upper, is entirely lacking in the

present species, in which the leaves on the sterile basal shoots are sometimes even more finely dissected than are the upper leaves of the flowering stems.

It is a distinct pleasure to name this beautiful senecio in honor of its discoverer, Mr. Lewis S. Rose, whose devotion to the botanical department of the California Academy of Sciences has been exemplified in his generous gifts of specimens and herbarium assistance. Since 1931, he has given to the Academy 48,579 specimens received from all parts of the world through his exchange activities, and, in addition, more than 5000 of his own collecting from widespread parts of western North America. Of even greater scientific significance, perhaps, is Mr. Rose's work in the Academy herbarium. Most generously and faithfully he has relieved the curators (especially the writer) of many time-consuming tasks, so that their efforts could be devoted to much of the research that has found publication in LEAFLETS OF WESTERN BOTANY. As floras, monographs, and revisions have appeared, Mr. Rose has competently checked each with the Academy collections, correcting determinations, annotating cited collections, and adding references and synonymy to the species- and genus-covers. I doubt if any herbarium in America has been more solicitously curated than has the Academy's with Mr. Rose's help.

THE WATER LILY, *NYMPHÆA ODORATA*,
A CULTIVATED PLANT IN THE STATE
OF WASHINGTON*

BY HAROLD ST. JOHN

University of Hawaii, Honolulu

Range extensions of plants are always of interest, especially so when they are great extensions of the range of a noteworthy plant.

In 1939 C. W. Sharsmith reported (State College of Washington, Res. Stud. 7:159—160,—1939) *Nymphaea odorata* Dryand. ex Ait. (*Castalia odorata*) from northeastern Washington. It was collected by another person, Roy D. Shenefelt on Aug. 15, 1938, at Newman Lake, Spokane County. Shar-

* New and Noteworthy Northwestern Plants—Part 10.

smith did not reach a final decision, but he suggested as equal possibilities that the water lily at Newman Lake might be a recent introduction, a garden escape, or an indigenous member of the flora. No further investigations seem to have been made by Sharsmith or the succeeding botanists in eastern Washington.

One other water lily of this genus, *Nymphæa tetragona* Georgi subsp. *Leibergeri* (Morong) Porsild, is of rare and local occurrence in the Pacific Northwest. In 1892 J. B. Leiberger first collected it in a pond at Granite Station, Bonner County, Idaho. No other neighboring stations have been found, and in 1929 when Mrs. E. E. Teape sought to make added collections, she found the pond dried up and the exsiccated bottom without any of these water lilies with white flowers that are small (1—1½ inches in diameter) and odorless. Dr. W. C. Muenscher has reported (*Torreyia* 40:167,—1940) another locality, near the Pacific coast at Ferndale, Whatcom County, Washington. The writer, during extensive explorations of the Pacific Northwest, has never encountered any native *Nymphæa* or white water lily. He has fond memories of *N. odorata* from the northeastern United States, where the myriad lakes are fringed with their rounded pads and in season glisten with their white, fragrant, floating blossoms. The species is abundant in the eastern, southern, and midwestern states and the eastern Canadian provinces, and extends as far west as the line from Manitoba to Kansas and eastern Texas. It barely enters the tier of states of the Great Plains. According to the standard floras and the state check lists, it is lacking in North Dakota, South Dakota, and Nebraska. In Kansas there are but three stations, two in the far eastern part, one in the northwestern part. It is recorded in Oklahoma, and in Texas it is reported only from the coastal prairies or the northeastern half of the gulf coast. There are no records for the great expanse of the Great Plains to the westward, or from the Rocky Mountains, or from the Pacific States.

A range extension of *Nymphæa odorata* from its nearest station in Kansas to Spokane County, 1,000 miles westward across plains and mountains, would be really noteworthy, but it needs verification.

Newman Lake is an attractive lake 2½ miles long, occupying the head of a side valley opening out onto the sand and gravel

flats of the Spokane Valley. The lake has no outlet, the water seeping away through the sand plains. It is closely ringed on three sides by the steep, wooded ridges that culminate to the north in Mt. Spokane. It is situated within one mile of the Idaho boundary and about 10 miles northwest by west of the city of Spokane. The lake is a charming one, quiet, sheltered, and largely bordered with an evergreen forest. Naturally it has become a resort for the city dwellers from Spokane, and its shores are closely ringed by camps, cottages, and summer homes.

In an attempt to verify the record of the water lily at Newman Lake, an inquiry was sent to a friend, Warren W. Clarke, who has long had a lake cottage there. On Oct. 2, 1941, he replied:

"I know exactly the location of the water lilies which you mentioned. They are in the back yard, so to speak, of my friend C. A. Bartleson of the Spokane Building Supply Company, who is also a member of our Peninsula Road Association at Newman Lake. They are not, by the way, white water lilies, but have a pinkish tinge. They are, however, the eastern lily. They are large and fragrant and the leaves lie flat on top of the water and they are quite distinct from the yellow blossoms of the tulle (*Nuphar polysepalum* Engelm.) at Newman Lake.

"Mr. Bartleson says these lilies are not native to Newman Lake at all. His wife purchased the roots at one of the florist shops in Spokane and then planted them in the lake in a little inlet or bay just beyond their garage. The muskrats ate the roots or bulbs off all but one. This one, however, survived and has spread until now there are between 50 and 100 plants and they are doing nicely and seem to thrive. They were planted about ten years ago."

This evidence seems complete and final. The water lily was recently planted in Newman Lake, Washington, and is not indigenous. It is possible that it is not *Nymphaea odorata*. Mr. Clarke testifies that the flowers are not white, but have a pinkish tinge. Hence, it is suggested that the plant may be a horticultural variety of that species or even another of the numerous species in cultivation and offered for sale by florists.

LEAFLETS *of* WESTERN BOTANY

CONTENTS

	PAGE
A List of Vascular Plants from Guadalupe Island, Lower California	145
JOHN THOMAS HOWELL	
An Addition to the Genus <i>Swertia</i>	155
R. C. BARNEBY	
New Western Plants—IV	157
ALICE EASTWOOD	
Concerning David Douglas	160
JOHN THOMAS HOWELL	
The Identity of <i>Phacelia humilis</i> var. <i>calycosa</i>	162
JOHN THOMAS HOWELL	
<i>Scirpus criniger</i> Transferred to <i>Eriophorum</i>	164
ALAN A. BEETLE	
A New Californian <i>Polygonum</i>	166
J. F. BRENCKLE	
A New <i>Erigeron</i> from Idaho	167
ARTHUR CRONQUIST	

SAN FRANCISCO, CALIFORNIA

JULY 21, 1942

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as
LEAFL. WEST. BOT.



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A LIST OF VASCULAR PLANTS FROM GUADALUPE ISLAND, LOWER CALIFORNIA

BY JOHN THOMAS HOWELL

In the last published list of Guadalupe Island plants (Eastwood, 1929), 161 vascular plants are listed. On my two visits to the island, as recounted in an earlier paper (Howell, 1941 b), I collected 94 vascular plants of which 20 are new to the flora of the island and 11 are known from only one earlier collection. Most of the new records represent weeds which will probably become increasingly abundant on the island, but several of the new records are undoubtedly of indigenous plants overlooked by earlier collectors. An enumeration of my collections follows, the new records being marked by an asterisk.

LIST OF COLLECTIONS

NOTHOLÆNA NEWBERRYI D. C. Eaton. Under rocks on dry canyon side above the barracks, Northeast Anchorage, *No. 8169*.

POLYPODIUM CALIFORNICUM Kaulf. Rock-crevice in pine grove, *No. 8264*.

PINUS RADIATA Don. The typical form with cones decidedly asymmetrical is not common. *No. 8184, No. 8269*.

PINUS RADIATA Don forma *BINATA* (Engelm.) J. T. Howell. This is the most common form of Guadalupe Island pine with cones only moderately asymmetrical. *No. 8183, No. 8268*.

PINUS RADIATA Don forma *GUADALUPENSIS* J. T. Howell. This form with cones nearly symmetrical and smooth is not common. *No. 8185, No. 8267*. The pines with the three forms of cones grow together on the high narrow ridge at the north end of the island above the Northeast Anchorage. An extended discussion of this pine has already been given (Howell, 1941 a).

CUPRESSUS GUADALUPENSIS Wats. Because of the fastigate manner of branching, the trees are moderately broad with a rounded crown, although occasionally the crown of an individual may tend to be flat and broader. In young specimens the trunk is smooth and is covered with an even unridged bark of grayish-purple mottled or blotched with gray. In older specimens the lower part of the trunk becomes strongly ribbed or ridged longitudinally, probably due to the dying out of certain vascular strands. In color of foliage there is considerable variation, some

specimens being especially green, others noticeably glaucous, while on the whole the trees are moderately glaucous; in density of foliage likewise there is variation, some individuals being quite loosely branched, others closely so. Although the cones varied considerably in size and shape, the several variants were constant for a given tree. An individual specimen about 40 to 50 feet tall which seemed about as large as any, measured $18\frac{1}{3}$ feet in circumference ($5\frac{1}{2}$ feet or 1.67 m. in diameter) about 1 foot above the ground. The diameter of the trunks is usually only about half as large as the one measured but the height is about that of most of the trees. No small trees were seen; seedlings with only their tiny seed-leaves were numerous but unfortunately they will furnish the goats with a wee bit of green pasture in the summer.

The following variations were collected: *No. 8297* (cones large and relatively smooth, leaves only slightly glaucous); *No. 8298* (small cones with horns); *No. 8299* (cones large and relatively smooth, herbage very green and non-glaucous); *No. 8300* (cones with short horns, herbage very glaucous); *No. 8301* (cones furrowed, the cone-scales convex); *No. 8302* (large cones with horns, herbage rather green); *No. 8303* (cones oblongish and horned).

**AVENA BARBATA* Brot. Not common but occurring widely. *No. 8283*.

**BROMUS RUBENS* L. Not common, this collection made near the Northeast Anchorage. *No. 8280*.

**FESTUCA MEGALURA* Nutt. Gravelly slope of pine ridge, *No. 8259*; pine grove, *No. 8263*; slopes above the barracks, *No. 8284A*.

**FESTUCA OCTOFLORA* Walt. Not common in middle part of island, *No. 8309*.

HORDEUM MURINUM L. In 1885 Greene found "only a few tufts . . . near the cabins on the plateau." In 1925 Mason reported it as "very common;" and in 1932 in my field book, I noted it as "the most common plant on the island." I did not collect a specimen.

MUHLENBERGIA MICROSPERMA (DC.) Kunth. Rare; this, the only specimen seen, from the slope of the pine ridge. *No. 8255*.

PHALARIS CAROLINIANA Walt. Rare; only seen in the middle part of the island. *No. 8317*.

**POA ANNUA* L. Pine grove, No. 8260.

JUNCUS BUFONIUS L. On springy slope along trail to the cypress grove, not seen elsewhere. No. 8286.

BRODIAEA sp. Leaves of a species of *Brodiaea* were numerous on the east slope of Mt. Augusta.

QUERCUS TOMENTELLA Engelm. There may be two species of oak on Guadalupe Island; or, with the collection of a number of specimens, it may be possible to show that the two types are extremes of variation in a single species. What I take to be specimens typical of *Q. tomentella* Engelm. were collected on July 15, 1922, by J. R. Slevin, who has told me that they were obtained in the oak grove on the west side of the ridge north of Mt. Augusta between the cypress and pine groves. This is the oak grove figured in Proc. Calif. Acad. Sci., ser. 4, 18: plate 34, figs. 1 and 2. In the specimens collected by Mr. Slevin the twigs and the lower side of the leaves of the current season are densely tomentellous with rather loose buff-colored hairs. The older branches are glabrate or nearly so and the lower side of older leaves are only thinly pubescent and slightly glaucous.

The specimens of oak which I collected came from a few trees clustered near the head of the rocky canyon above the barracks on the east side of the island. Although these specimens are not entirely typical of *Q. chrysolepis* Liebm., they are more like that species than the specimens of *Q. tomentella* described above. In these, the leaves are more coriaceous; the upper side is light green and the lower side is entirely pale and chalky with a scattering of those peculiar glandular trichomes characteristic of the Canyon Live Oak of California. The pubescence on the twigs and petiole is thick and close, quite unlike the relatively shaggy pubescence of typical *Q. tomentella*. I was able to obtain acorns and cups and these resemble the acorns and cups of that form of *Q. chrysolepis* that occurs in the mountains of southern California that has been called *Q. crassipocula* Torr. No. 8173.

PARIETARIA FLORIDANA Nutt. Slope of pine ridge, No. 8252; cypress grove, No. 8296. Occurring throughout the island under rocks.

PTEROSTEGIA DRYMARIOIDES F. & M. Slope of pine ridge, No. 8248. Occurring throughout the island except at the extreme south end.

ATRIPLEX BARCLAYANA subsp. PALMERI (Wats.) Hall & Clements. This is one of the common plants of the desert region at the south end of the island. Although there was observed some variation in habit and vesture and considerable variation in size and shape of fruiting bracts, all are here regarded as belonging to a single variable entity. No attempt has been made to separate *A. Rosei* Standl. from *A. Palmeri* Wats., for both of which Guadalupe Island is the type locality. Staminate plants, *No. 8188*, *No. 8197*; pistillate plants, *No. 8187*, *No. 8198*, *No. 8199*.

*ATRIPLEX CALIFORNICA Moq. Ocean bluff near the barracks, *No. 8174*.

CHENOPODIUM MURALE L. Slope of pine ridge, *No. 8254*. Occurring elsewhere but nowhere common.

*SUÆDA FRUTICOSA (L.) Forsk. According to Standley's treatment in the North American Flora (21:86—92, as *Dondia*), the scraggly glabrous shrub at the south end of the island seems to be this species. *No. 8189*.

MIRABILIS HEIMERLII (Standl.) Macbr. This grew among rocks at the south end of the island, the type locality. It is probably only an insular variety of the widespread and variable mainland species, *M. laevis* (Benth.) Curran, which was originally described from Magdalena Bay. *No. 8333*.

MESEMBRYANTHEMUM CRYSTALLINUM L. Common on rocky slopes at the south end, *No. 8334*.

*MESEMBRYANTHEMUM NODIFLORUM L. South end, *No. 8190*.

CALANDRINIA MENZIESII (Hook.) T. & G. Slope of pine ridge, *No. 8251*; trail to Mt. Augusta, *No. 8288*; near the upper corral, *No. 8299* (petals white).

MONTIA PERFOLIATA (Don) Howell. Pine grove, *No. 8262*. The form on Guadalupe Island, which is rather common throughout the island and almost invariable, has been named *Limnia guadalupensis* Rydb.

TALINUM GUADALUPENSE Dudley. On rocks inaccessible to goat and man near the Northeast Anchorage grew a striking plant with white fleshy leaves and what seemed to be lavender-blue flowers. I took it to be this rare Guadalupe endemic which will be one of those plants discussed at length in a chapter I propose on "Plants I Didn't Collect!"

SILENE GALLICA L. Occasional on trail to the cypress grove but not seen elsewhere. *No. 8284*.

SPERGULARIA MACROCARPA (Hornem.) Heynh. The much-condensed plants I collected from the arid slopes of the south end of the island are what Greene described as *Tissa Talinum*. *No. 8200, No. 8329*.

SPERGULARIA MARINA (L.) Griseb. Seen only on trail to cypress grove, *No. 8287*.

ESCHSCHOLZIA ELEGANS Greene. Following Munz, I am referring the delicate glaucous annual which I collected to this insular species, the type locality of which is Guadalupe Island. However my plants, which are from the south end of Guadalupe Island, are much smaller and more delicate than the type in Herb. Calif. Acad. Sci. and they should perhaps be referred elsewhere. *No. 8323A*.

Eschscholzia frutescens (Greene) J. T. Howell, comb. nov. *Petromecon frutescens* Greene, Pitt. 5:294 (1905). Foliage and stems of this very remarkable poppy were among the botanical specimens collected by Mr. Templeton Crocker from ocean bluffs inaccessible to goats near the Northeast Anchorage. The young stems and leaves are very glaucous while the thickened woody stems from the base of the plant are 1.5 cm. in diameter and are covered with a rather soft corky bark that is a bright golden-brown in color. Certainly in habit and aspect this differs from the usual type of *Eschscholzia* but I do not believe there is sufficient structural divergence to warrant the generic segregation proposed by Greene. *No. 8176*.

ESCHSCHOLZIA PALMERI Rose. *Petromecon Palmeri* (Rose) Greene. Low stout perennial from arid flats at the south end of the island, *No. 8201*.

**CAPELLA BURSA-PASTORIS* (L.) Medic. Occasional on rocky slope below the upper corral on trail to the cypress grove, *No. 8291*.

**CAPELLA PROCUMBENS* (L.) Fries. Gravelly soil at south end of island, *No. 8330*.

DESCURAINIA PINNATA (Walt.) Britt. subsp. *MENZIESII* (DC.) Detling. Occasional in meadow in cypress grove, *No. 8295*.

**SISYMBRIUM IRIO* L. Seen only near the barracks, *No. 8276*.

CAULANTHUS LASIOPHYLLUS (H. & A.) Payson. Occasional in the middle and southern parts of the island, *No. 8304, No. 8326*.

THYSANOCARPUS ERECTUS Wats. Leaves pale and glaucous; sepals purplish; petals white; fruit glabrous or hairy, wing of fruit purple. Not common on rocky slopes between the cypress grove and the broad transverse valley, *No. 8305*.

LEPIDIUM LASIOCARPUM Nutt. Near the barracks, *No. 8275*; middle of the island, *No. 8316* in part.

LEPIDIUM OBLONGUM Small. In pine grove, *No. 8182*; slope of pine ridge, *No. 8249*; middle of island, *No. 8316* in part.

**LEPIDIUM NITIDUM* Nutt. Seen only on trail to cypress grove, *No. 8293*.

OLIGOMERIS LINIFOLIA (Vahl) Macbr. Near the barracks, *No. 8281*, and occasional on dry slopes over all the island.

TILLÆA ERECTA H. & A. Slope of pine ridge, *No. 8253*, and occasional in sandy or gravelly places throughout the island.

HOSACKIA ORNITHOPUS Greene. Ocean bluff near the Northeast Anchorage, *No. 8177*.

**LUPINUS BICOLOR* Lindl. var. *MICROPHYLLUS* (Wats.) C. P. Smith. Seen only on trail to cypress grove, *No. 8289*.

LUPINUS NIVEUS Wats. Ocean bluff near the Northeast Anchorage, *No. 8178*.

**MEDICAGO HISPIDA* Gaertn. Seen only near the barracks, *No. 8279*.

TRIFOLIUM AMPLECTENS T. & G. On trail to the cypress grove, *No. 8285*. Common at higher elevations on the island.

**TRIFOLIUM GRACILENTUM* T. & G. Common clover at lower elevations at north end of island, as on slope on pine ridge, *No. 8247*.

TRIFOLIUM GRACILENTUM T. & G. var. *PALMERI* (Wats.) McDerm. In the middle and southern parts of the island, *No. 8308*, *No. 8332*.

TRIFOLIUM MICROCEPHALUM Pursh. Slope of pine ridge, *No. 8246*.

VICIA EXIGUA Nutt. Near the south end of the island, *No. 8320*.

ERODIUM CICUTARIUM L'Her. Common at higher elevations throughout the island, as in the pine grove, *No. 8266*.

ERODIUM MOSCHATUM L'Her. Throughout the island, especially at lower elevations, *No. 8265*. The two species of *Erodium* are perhaps the commonest plants on Guadalupe Island after *Hordeum murinum* L.

EUPHORBIA PONDII Millsp. *E. guadalupensis* J. T. Howell. Occasional on gravelly flats at the south end of the island, No. 8195, No. 8331.

MALVA PARVIFLORA L. Widespread over the island but not abundant. No. 8261.

SPHÆRALCEA PALMERI Rose. Depressed condensed plants on the rocky mesa at Melpomene Cove at the south end of the island, No. 8328.

SPHÆRALCEA SULPHUREA Wats. Ocean bluffs near the North-east Anchorage, No. 8181. The petals are pale yellowish.

MAMILLARIA GOODRIDGEI Scheer. Arid flats at south end of island, No. 8193, No. 8335. Petals rosy-pink, fading to white on margins; fruit orange-red.

OPUNTIA PROLIFERA Engelm. Near the barracks, No. 8170.

CONVOLVULUS MACROSTEGIUS Greene. Hanging in long masses from crevices of rocks just below the upper corral, No. 8292.

GILIA NEVINII Gray. Occasional at lower and middle elevations throughout the island: near the barracks, No. 8270, No. 8271; middle part, No. 8313; south end, No. 8325.

LINANTHUS sp. Seedlings of a species of *Linanthus* were occasional in meadows in the cypress grove. These may have been either *Gilia guadalupensis* Brand or *Gilia pygmæa* Brand both of which were described from Palmer's Guadalupe Island collection.

ELLISIA CHRYSANTHEMIFOLIA Benth. At lower elevations; fairly common near the barracks, No. 8282; at the south end of island, No. 8322.

NEMOPHILA RACEMOSA Nutt. Near the barracks, No. 8278; middle southern part of island, No. 8319.

PHACELIA FLORIBUNDA Greene. Young plants just beginning to bloom, in the shade of rocks at south end of island, No. 8323.

AMSINCKIA INTERMEDIA F. & M. In the south central part of the island, No. 8321.

CRYPTANTHA FOLIOSA Greene. Slope of pine ridge, No. 8258; near the barracks, No. 8273; middle part of island, No. 8318; south end, No. 8192. This Guadalupe endemic occurs sparingly at the north end of the island, rather commonly at the south.

CRYPTANTHA MARITIMA Greene. Near the barracks, No. 8272; south end of island, No. 8324.

HARPAGONELLA PALMERI Gray. Plants of this monotypic genus, first described from Guadalupe Island, were seen only in the middle part of the island where it was fairly common. *No.* 8306.

PECTOCARYA PENICILLATA (H. & A.) A. DC. Trail to cypress grove, *No.* 8290.

*PLAGIOBOTHRYIS CALIFORNICUS (Gray) Greene. Seen only near the barracks, *No.* 8274.

LYCIUM CALIFORNICUM Nutt. Forming thickets that are one of the conspicuous vegetative features of the south end of island, *No.* 8194. The manner in which this plant spreads and propagates itself vegetatively is noteworthy. The stems grow about a half meter tall and then curve over to the ground. On reaching the ground the stems grow along the ground for several centimeters and then again grow upward to the usual height before bending downwards again. Since the parts in contact with the soil root, broad loose spiny thickets are formed. The sizes of the flower-parts of the present collection are a little smaller than those given by Hitchcock in his monograph.

ANTIRRHINUM NUTTALLIANUM Benth. Middle part of island, *No.* 8314.

ANTIRRHINUM SPECIOSUM (Nutt.) Gray. Above the barracks, *No.* 8171; ocean bluffs near Northeast Anchorage, *No.* 8180.

PLANTAGO INSULARIS Eastw. South end of island, *No.* 8196, *No.* 8324A; near the barracks, *No.* 8275A.

GALIUM APARINE L. Middle of island, *No.* 8307; occasional elsewhere.

AMBLYOPAPPUS PUSILLUS H. & A. Middle part of island, *No.* 8317A.

Bæria chrysostoma F. & M. var. *Palmeri* (Gray) J. T. Howell, comb. nov. *B. Palmeri* Gray, Bot. Calif. 1:376 (1876). Differing from *B. chrysostoma* var. *gracilis* (Gray) Hall in the character of the pappus-paleæ which are firm in texture and lacinate or coarsely denticulate. Occasional from the middle to the south end of island. *No.* 8315.

Bæriopsis J. T. Howell, gen. nov., *Compositarum*. Capitula heterogama, radiata, floribus radii femineis, floribus disci hermaphroditis, omnibus fertilibus. Involucrum late hemisphæricum, phyllariis 7 vel 8, 2-seriatis, subæqualibus, herbaceis, crassis, distinctis, late obovatis, abrupte acutiusculis,

concavo-carinatis, achenia radii basi foveitibus. Receptaculum hemisphaericum, scrobiculatum. Corollae radii ligulae. Corollae disci regulares, limbo breviter 5-fido, faucibus campanulatis, tubo aequalibus vel paulum longioribus. Rami styli apice capitato-truncati, breviter penicillati. Achenia anguste cuneata, paulum compressa, 3- vel 4-angulata, dense resinoglandulosa, angulis sparse hirsuta. Pappus squamellatus parvus, squamellis plus minusve inaequalibus et obliquis, firmis, enerviis, erosulatis. — Herba xerophila perennis depressa glabra, caulibus paucis brevibus dense foliosis ex radice lignea. Folia carnosocylindracea, lineari-oblongata, alterna, sessilia, integra. Capitula mediocres, subterminales, solitariae, pedunculatae, multiflores, floribus flavis.

Bæriopsis guadalupensis J. T. Howell, spec. nov. Caulibus 3—4 cm. longis, foliis omnino vestitis; foliis 1 ad prope 2 cm. longis, circa 1—2 mm. latis, basi paulum attenuatis; capitulis circa 1 cm. diametro, phyllariis 4—5 mm. longis, 3 mm. latis, pedunculis nudis, 0.5—1.5 cm. longis; ligulis 4 mm. longis, 3 mm. latis, apice 3-denticulatis; corollis disci 2.5—3 mm. longis, lobis 0.5 mm. longis, apice penicillato-appendiculatis, faucibus 1—1.5 mm. longis, pilos longos sparsos ferentibus, tubo 1 mm. longo, glanduloso-piloso; acheniis 2.5 mm. longis; squamellis 12—15, circa 0.5 mm. longis, oblongis, subacutis vel obtusis, interdum basi confluentibus.

Type: Herb. Calif. Acad. Sci. No. 280934, collected March 18, 1932, on a rocky flat in the desert region at the south end of Guadalupe Island, Lower California, *J. T. Howell No. 8327A*. Only a single specimen of this peculiar little xerophyte, growing with *Hemizonia Palmeri* Rose and *Sphaeralcea Palmeri* Rose, was found. It carries 5 heads, one each on 3 branches and 2 on yet another.

Although the little plant reminds one of a small condensed *Bæria*, the immediate affinities of the plant are not evident. It belongs to the subtribe *Bæriæ* of the *Helenioideæ* according to Bentham and Hooker (Gen. Pl. 2:200); according to Gray it seems to belong to the "*Bahia* type" of the *Heleniæ* rather than to the "*Bæria* type" (Syn. Fl. 1, pt. 2:72); and it is referable to the *Heleniæ-Heleninæ* according to O. Hoffmann (Engler & Prantl, Die Nat. Pfl. IV. 5:254). The characters of the involucre, achenes, and pappus seem to relate the plant to *Amblyopappus*, a monotypic genus of California and Chile which is referred by Gray to his "*Bahia* type" but by Rydberg to his subtribe *Bæriana* (N. Amer. Fl. 34:2, 75). From *Bæria*, our plant seems further removed by its habit, alternate leaves, rounded receptacle, and pappus, and yet further from such a representative of the "*Bahia* type" as *Eriophyllum*. The extreme xerophytic development in *Bæriopsis* is like that of no other member of the *Heleniæ* with

which I am acquainted and it may bear to the *Bahia* group in that tribe a relation comparable to that of *Kleinia* to *Senecio*.

FILAGO ARIZONICA Gray. Slope of pine ridge, No. 8256; middle part of island, No. 8312.

FILAGO CALIFORNICA Nutt. Slope of pine ridge, No. 8257; middle part of island, No. 8311.

FRANSERIA CAMPHORATA Greene. Middle part of island, No. 8310.

HEMIZONIA GREENEANA Rose. Seen only at the south end of island where it grows with *Atriplex Barclayana* subsp. *Palmeri* and *Lycium californicum*. No. 8186, No. 8191. The young plants have spreading prostrate branches but later as wind-blown sand collects about the plants and more erect central stems arise, the plants develop into large hemispherical mounds quite covered with leafy branchlets. One of the largest of these mounds was 0.6 m. tall and 1.42 m. across. The woody base is covered by a rough bark and attains a diameter of nearly a decimeter. As this plant grows on the open wind-swept slopes back of Melpomene Cove, a dark green mound here and there, it is a distinctive feature of the landscape.

HEMIZONIA PALMERI Rose. Only two plants seen on rocky flats at the south end of island, No. 8327. The depressed shrubby plants of this species with its pale sericeous leaves are very different in appearance from those of *H. Greeneana* which also grow in the vicinity.

HYPOCHÆRIS GLABRA L. Slope of pine ridge, No. 8250. Occasional in canyons near the north end of island.

NESOTHAMNUS INCANUS (Gray) Rydb. Above the barracks, No. 8172; ocean bluff near Northeast Anchorage, No. 8179.

PERITYLE GRAYI Rose. South end of island, No. 8196A.

SONCHUS OLERACEUS L. Near the barracks, No. 8277.

STEPHANOMERIA GUADALUPENSIS Brandegee. An excellent fruiting specimen was obtained by Mr. Templeton Crocker from an ocean bluff near the Northeast Anchorage. This is perhaps the first collection since the original. No. 8175.

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1941b. My visits to Guadalupe Island. Leaf. West. Bot. 3:36—41.

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Reports on the nonvascular cryptogams, collected on the 1931 and 1932 visits of Templeton Crocker to Guadalupe Island, have been published in Proc. Calif. Acad. Sci., Series 4 (unless otherwise noted) as follows:

Algæ. Setchell, W. A., and Gardner, N. L., 22:65—98 (1937); Setchell, W. A., 22:127—158 (1939).

Fungi. Bonar, L., 22:195—206 (1939).

Lichenes. Linder, D. H., 21:211—224 (1934); Darbishire, O. V., 21:285—294 (1935).

Hepaticæ. Howe, M. A., 21:199—210 (1934); Sutcliffe, D., Bryologist 35:41—42 (1932).

Musci. Bartram, E. B., 21:75—86 (1933).

AN ADDITION TO THE GENUS SWERTIA

BY R. C. BARNEBY

Swertia gypsicola Barneby, spec. nov. floribus albis folisque oppositis albomarginatis *Leucocraspedis* Rydb. seu speciebus glabris *S. nitida* (Bth.) Jeps. evidenter affinis sed caudice multicipite valido, foliis angustissime linearibus glanduleque petalinæ structura ab omnibus diversa nec ulla cum specie hucusque descripta arcte comparanda.

Herba perennis undique lævis glaberrima pallide glauco-virens vel albicans e radice simplice verticali crassa caudice breviter ramoso indurato coronata multicaulis: caudicis pluricipitis ramulis arcte confertis 1—4 cm. longis tota longitudine foliorum evanidorum vaginis fibrosis persistentibus imbricatum vestitis cæspitem depressum firmum 1—2 dm. latum efformantibus: caulibus annotinis primariis perbrevis vix 1 cm. longis creberrime foliatis apice sterilibus fertiles herbaceos elongatos radicales 1—4 e foliorum imorum axillis emittentibus: caulibus florigeris erectis gracilibus teretibus striatis nitidis 2—3 dm. longis inferne simplicissimis circa medium in paniculam angustam denudatam rigidam præsertim pauci- atque remotifloram interdum valde depauperatam subracemosam abeuntibus: foliis omnibus oppositis, iis axeos primarii arcte imbricatis infimis in vaginam coriaceam late ovato-acuminatam ca. 1 cm. longam amplexicaulem reductis in terminalia pauca laxè rosulata plus minusve erecta supra basin late vaginantem scariosam anguste linearia obtusiuscula 5—9 cm. longa 1.5—2.5 mm. lata conduplicata obscure 5—7-nervia pulchre sed tenuiter albomarginata abrupte accrescentibus; iis caulium fertiliū (imis approximatis ad vaginam discolorē reductis exceptis) internodiis 2—3 cm. longis semotis e basi breviter connata lineari-filiformibus superne canaliculatis margine angustissima alba nonnumquam minute sinuata præditis præsertim patulis apice falcato-recurvis apiculatis 2—4 cm. longis vix 2 mm. latis sursum in inflorescentiæ bracteas ultimas ovatas minutissimas scarioso-marginatas

gradatim decrescentibus: floribus 4-meris oppositis remotiusculis secus paniculæ ramulos adscendentes singulatim dispositis haud verticillatis pedicello gracili 2—12 mm. longo nudo vel gemmis lateralibus penultimis abortis quasi 2-bracteolato infra calycem paullo clavato insidentibus: calycis laciniis triangulari-ovatis acuminatis 4 mm. longis 1.5—2 mm. latis scarioso-marginatis: petalis ovato-lanceolatis acuminatis integerrimis 6—6.5 mm. longis circa 2 mm. latis albidis vel sæpius candidis superne inordinatim cyaneo-guttulatis -scriptisve infra medium glandula unica lineari-oblonga impressa (inferne bullata) tubulosa viridi 2.25 mm. longa 0.75 mm. lata, ore elliptico subterminali vix 0.75 mm. longo 0.5 lato margine erecta membranacea saltem 1 mm. alta profunde laciniata cincto ad ipsum apicem aperta instructis: appendiculis corollinis (seu laciniis coronæ) erectis circa 2 mm. longis nunc lanceolatis subintegris dentatisve nunc in lacinias 2—4 inæquales filiformes acutissimas ad medium flabellatim fissis: filamentis 3—4 mm. longis compressis sursum angustatis: antheris ovalibus flavis 1.5 mm. longis: capsula oblonga valde compressa superne abrupte acuminata vacua 10—12 mm. longa exserta: seminibus 2—4 ellipticis utrinque obtusis circa 5 mm. longis subtriquetris vel ventraliter excavato-concavis dorsoque carinato cymbiformibus brunneis sub lente minutissime tuberculatis.

NEVADA: locally abundant on gypsum-flats in the valley of the White River near Sunnyside, northeastern Nye Co., alt. 4950—5000 ft., 20 July 1941, fl. & fr., *Ripley & Barneby No. 4002*. Type in Herb. Calif. Acad. Sci., No. 290406. Isotypes at Pomona College, N. Y. Bot. Gard., Kew.

This distinctive species was first collected in the summer of 1941, and being recognized as new to science, was distributed shortly afterwards under a manuscript combination in *Frasera*. Later Mr. J. T. Howell of the California Academy kindly drew my attention to Prof. St. John's monographic revision of the American species of *Swertia* which had appeared in the American Midland Naturalist, vol. 26, in July of the same year, and following the cogent arguments presented there for the final reduction of *Frasera* Walt. to *Swertia* L., it has become necessary to refer our unpublished species to the latter genus. The author's debt to Mr. Howell and Prof. St. John will be apparent.

According to my interpretation of St. John's key to the species of *Swertia*, *S. gypsicola* "runs down" to the last dichotomy (d. d.) and is clearly allied to the glabrous species approaching *S. nitida* (Bth.) Jeps., but may be readily distinguished by the linear, almost filiform, channeled leaves and by the structure of the petaline gland, in ours produced basally within the tissue of the petal into a longer tubular portion than is found in any species but the isolated and amply distinct *S. tubulosa* (Cov.) Jeps. In

view of the great diagnostic importance attached to this organ by all students of the genus, the dimensions may be repeated here.

Gland situated on the lower half of the petal immediately below the middle, linear-oblong, impressed, greenish, 2.25 mm. long, 0.75 mm. broad, tubular-saccate, the orifice nearly terminal, broadly elliptic or suborbicular, scarcely 0.75 mm. long and about 0.5 mm. broad, fringed all round with an erect, white, deeply lacinate membrane 1 mm. high.

The habitat of *S. gypsicola* is also of interest. On the alkaline flats by the lower waters of the White River, where the deep, somewhat sandy, alluvial soil is overlaid with a dazzling rime of mineral salts, the species occurs in abundance over a small area, and the heavy, depressed tufts of pale, grass-like foliage, which erupt towards mid-summer into innumerable slender panicles of blossom, form a striking feature of the sparse but highly interesting saline flora. The plants grow singly or in clumps, sometimes springing from the hemispherical mounds of *Lepidium nanum* Wats., and, like that species, arise from an extremely robust, rather fleshy tap-root, while the flowers, arranged in lax and unusually narrow panicles, are small and nearly white, the petals elegantly freckled with indigo above the greenish gland. The reduction of leaf-surface suggests a high state of evolutionary development within the genus and represents, perhaps, a greater xerophytic modification of the primitive, circumpolar *S. perennis* L. than any hitherto described.

NEW WESTERN PLANTS—IV

BY ALICE EASTWOOD

Lupinus Kerrii Eastwood, spec. nov. Caules robusti, ex caudicibus robustis et radice lignosa, circa 6 dm. alti, ramosi, ramis ascendentibus, caudice densissime vestito stipulis et petiolis marcidis; caulibus et foliis densissime albo-tomentosis et divaricate pilosis; petiolis foliorum radicalium circa 1 dm. longis; foliolis 5 ad 9, late lanceolatis vel oblanceolatis, mucronatis, circa 4 cm. longis, 1 cm. latis; stipulis 4 cm. longis, adnatis 2 cm.; foliis caulinis similibus foliis radicalibus, petiolis brevioribus et stipulis multo minoribus; racemis axillaribus et terminalibus, circa 5—6 cm. longis, dense floriferis, bracteis deciduis, pilosissimis, superantibus gemmas, pedunculis robustis æquilongis vel longioribus petiolis; pedicellis æquilongis calycibus; calyce basi gibboso, tuba 2 mm. longa, labio superiore bisecto, segmentis divaricatis, 4 mm. longis; labio inferiore æquilongo, integro, acuminato; corolla circa 12 mm. longa, violacea; vexillo suborbiculato, basi gibboso, 1 cm. lato, medio albo-maculato; alis 1 cm. longis, 5 mm. latis, ungue 2 mm. longo; carina tecta alis, glabra, curvata, non fal-

cata, apice purpurea; leguminibus circa 3 cm. longis, 1 cm. latis, densissime albo-tomentosis et pilosis; seminibus 4 vel 5, albis, rotundis, 3 mm. diametro.

Type: Herb. Calif. Acad. Sci. No. 277380, collected May 18, 1940, on Mt. Whitney road about 4 miles west of Lone Pine, Inyo County, California, by Mark Kerr, No. 614. It is a pleasure to name this lovely lupine in honor of Mr. Kerr, who has sent most interesting specimens to the Herbarium of the California Academy of Sciences. It is related to *L. magnificus* M. E. Jones and may be the same as var. *glarecola* M. E. Jones, but from the inadequate description it is not possible to determine. Mr. Kerr writes that it grows just within the pinyon belt in clay, gravel, sand, and boulders, and that it forms a clump about 8 inches across and 2 feet high.

Lupinus Whiltonæ Eastwood, spec. nov. Caules elati, cinereo-pubescentes villis tenuibus, brevibus, patentibus; foliis 7 ad 9, oblanceolatis, obtusis, mucronatis, cinereis, adpresso-sericeis, 4—4.5 cm. longis, circa 1 cm. latis, petiolis brevioribus vel longioribus foliis, stipulis disjunctis, lineari-acuminatis, 5 mm. longis; racemis elongatis, circa 2 dm. longis, pedunculis multo brevioribus, tectis foliis; floribus albis, verticillatis, circa 12 mm. longis, 10 mm. latis, pedicellis patentibus, brevioribus calycibus, bracteis caducis, brevioribus gemmis, lineari-acuminatis; tubo calycis 2 mm. longo, 3 mm. lato basi, labiis prope æquilongis, circa 2 mm. longis, superiore bidentato, inferiore obtuso; vexillo glabro, albo, purpureo-punctato, prope marginem fulvo, 12 mm. longo, 6—7 mm. lato, basi sessili; alis albis, 12 mm. longis, 7 mm. latis, ungue circa 0.5 mm. longo; carina alba, falcata, glabra, medio 2 mm. lata, demum exserta.

Type: Herb. Calif. Acad. Sci. No. 292775, collected June 1, 1941, on the Mineral King Road, Tulare County, California, by Mrs. Inez Whilton Winblad in whose honor it is named. She has made a large collection of Californian plants, beautifully preserved and scientifically named and each species framed to decorate the walls of the rooms in Hotel Tulare, owned by her father, Emery Whilton. His large natural history collection has been donated to found a museum at Lebec in Kern County on the Ridge Route to Los Angeles.

This belongs to Section *Formosi* and has undoubtedly the habit of the well-known species in that section, several stems which are generally decumbent in a spreading group. The description is drawn from the upper flowering branches only. The standard is much narrower than that of any species of the group known to me. The keel is not evident in young flowers, but

later is much exerted from the wings. The wings and standard are about 5 to 10 mm. apart.

Lotus intricatus Eastwood, spec. nov. Caules graciles, glabri, torti, intricato-ramosi supra et ex radice annua, 3 dm. alti, 2 dm. diametro; foliis 5 ad 7, oblanceolatis, obtusis, 1—8 mm. longis, 2—3 mm. latis, strigosis, rhachide plano, stipulis brunneis, minimis, squamosis; floribus solis, paucis, axillaribus, pedunculis gracilibus, brevioribus vel longioribus foliis, bracteis squamosis; floribus 5 mm. longis; calycibus 3 mm. longis, segmentis, 1.5 mm. longis, linearibus; vexillo flavo, deinde rubro, 5 mm. longo, obovato, contracto ad ungue; alis 3.5 mm. longis, apice conniventibus, ungue 1 mm. longo; carina 2 mm. diametro, ungue 1 mm. longo; legumine protuberante ex flore post anthesin, strigoso, falcato, circa 8 mm. longo; stipe brevi et crasso.

Type: Herb. Calif. Acad. Sci. No. 292764, collected May 8, 1941, in the Valley of Fire, Clark County, Nevada, by Eastwood and Howell, No. 9015.

This odd-looking lotus has the habit of some tumble weeds, the zigzag stems and branches converging above and forming a roundish plant. The flowers are small and few, solitary on slender axillary peduncles. They apparently are fertilized in the bud as the young pods begin to emerge from the flower while it is still in bloom and the many empty calyces which terminate the peduncles seem to indicate unfertilized flowers soon evanescent. It is a reedy-looking plant and belongs near *Hosackia nudiflora* Nutt.

Cycladenia Jonesii Eastwood, spec. nov. Caules 10—15 cm. alti ex rhizomate ligneo, parte subterranea squamosa; foliis orbicularibus, lato-ovatis vel ellipticis, petiolis brevibus latis amplexicaulibus, lamina 5—6 cm. latis, pallido-viridibus, pedato-nervatis, apice obtusis; floribus 2- vel 3-verticillatis, pedicellis gracilibus, lanatis, 1—2 cm. longis; bracteis lanatis; calycis segmentis inaequalibus, lanceolatis, obtusis, 5—10 cm. longis, lanatis; corolla rosea, infundibulari, lanata interiore et exteriori, 2 cm. longa, lamina 15 mm. lata, segmentis oblongis, obtusis, 5 mm. longis; antheris basi sagittatis, apice acuminatis, 3 mm. longis, filamentis villosis, adnatis 3 mm. supra basin tubi; folliculis glabris, 6 cm. longis.

Type: Herb. Calif. Acad. Sci. No. 154331, collected at San Rafael Swell, Utah, May 19, 1914, by Marcus E. Jones in whose honor it is named.

The species of *Cycladenia* are few and the loveliest representatives of the Dogbane Family in California. The rosy flowers somewhat resemble small morning-glories and have a charm that thrills the beholder. *Cycladenia Jonesii* differs from *C. humilis* Benth. in the woolly covering of the flowers; from *C. venusta*

Eastwood in the shape and size of the corolla, the limb being less broad across and the tube and throat longer. The divisions of the corolla of *C. venusta* are twice as long. Generally the midrib is less prominent in *C. Jonesii* than in the other species. A specimen collected by Mark Kerr in loose sand on a steep slope one half mile south of Seep Hole, Inyo Mts., Inyo County, California, No. 3267, seems to be the same.

The differences in the four species represented in the Herbarium of the California Academy of Sciences are shown in this key:

- | | |
|---|----------------------------|
| 1. Leaves smooth | 2 |
| 1. Leaves tomentose | <i>C. tomentosa</i> Gray |
| 2. Flowers smooth | <i>C. humilis</i> Gray |
| 2. Flowers hairy | 3 |
| 3. Divisions of corolla 1 cm. long..... | <i>C. venusta</i> Eastwood |
| 3. Divisions of corolla about half as long..... | <i>C. Jonesii</i> Eastwood |

CONCERNING DAVID DOUGLAS

BY JOHN THOMAS HOWELL

For a number of years, Mr. A. G. Harvey of Vancouver, British Columbia, has devoted much time to research on the travels of David Douglas in western North America between 1825 and 1833. He has recently published an important historical paper on "David Douglas in British Columbia" in the British Columbia Historical Quarterly (Vol. 4, No. 4, pp. 221—243, October, 1940) in which is given a detailed account of Douglas' arduous and unfortunate journey to Fort St. James in New Caledonia, as the central and northern interior part of British Columbia was then known. The paper is accompanied by an extensive and valuable bibliography which conveniently brings together numerous scattered references to Douglas in the far north. Also of special interest to western American botanists are Harvey's remarks on Meredith Gairdner and William Fraser Tolmie, doctors who arrived at Fort Vancouver in the employ of Hudson's Bay Company in 1833 while Douglas was on his northern journey. Near the end of this able study, Harvey epitomizes the heroic life of David Douglas as follows:

Douglas was a votary of science. From the long, hard days of his youth as a garden boy, his whole life was devoted to scientific pursuits. Strong, enthusiastic, self-reliant, and resourceful, he faced dangers, overcame diffi-

culties, endured hardships, and made sacrifices such as have been the experience of few men. Over and over again he had driven his body beyond the safe limit of human endurance. He became racked with rheumatism, his eyesight was seriously impaired, and his mind confused. So he met his end. His work was done. His devotion to science was so great that he prematurely wore himself out in its service. (Pp. 239, 240.)

* * *

In April, 1938, while I was in the midst of my account of the Russian set of Douglas' western American plants (*A Collection of Douglas' Western American Plants, I—VII, Leaflet West. Bot., Vol. 2, No. 4—10, 1937—1939*), Mr. Harvey sent me a letter giving a series of localities visited by Douglas in California with the dates of the visits. Although these Californian data will be given in the biography of Douglas on which Mr. Harvey is working, he has permitted us to publish them now because of their great scientific importance to California botanists and zoologists. Mr. Harvey wrote as follows:

From a manuscript at the Royal Society, London, I find that Douglas took the longitudes and latitudes of the California missions on the following dates:

1831

Monterey, January 29	Purissima, May 5
Santa Clara, February 20	Santa Ynez, May 6
Monterey, March 2	Monterey, July 15
Monterey, March 27	San Rafael, July 27
Monterey, April 21	San Francisco Solano, July 29
Soledad, April 25	San Jose, August 5
San Antonio, April 27	San Jose, August 9
San Miguel, May 1	Monterey, August 25
San Luis Obispo, May 3	

From other sources I have obtained other dates of his visits as follows:

San Juan Bautista, February 14, 1831	Monterey, late June, 1831
Santa Cruz, February, 1831	Monterey, November 23, 1831
Santa Barbara, middle May, 1831	Monterey, August, 1832

San Francisco (Yerba Buena), November 11, 1833

A letter from Douglas to Dr. W. J. Hooker (ms. Gardens) mentions . . . the Hill of Bonavista sixteen miles from Monterey in June, 1831.

* * *

Yet another recent account of David Douglas should be noted, the biographical memoir by F. R. S. Balfour in the *Journal of the Royal Horticultural Society* (Vol. 67, part 4, pp. 121—128, and part 5, pp. 153—162,—1942). This is enlivened by various anecdotes that have not been seen elsewhere that are taken chiefly from Douglas' correspondence. Further information on

Douglas' Californian journeys is given, probably also from his correspondence, although Balfour does not indicate the source. Concerning Douglas' trips in California, Balfour writes:

For nearly two years he explored the coast as far south as Santa Barbara, the Santa Lucia Mountains as well as the Sacramento Valley. He does not speak of crossing that great plain and exploring any of the lateral valleys which descend from the Sierra Nevada. . . . He went north to within 65 miles of the southernmost point reached in his journey of the autumn of 1826. It would seem that he never saw Mount Shasta or crossed the Siskiyou Range." (P. 156.)

The figure of 65 miles given by Balfour is surely a mistake. In the autumn of 1826, Douglas went south to the valley of the Umpqua River to discover *Pinus Lambertiana* and the southernmost point reached, where the pine was found, was about 80 miles north of the present California-Oregon line in Looking Glass Valley near Roseburg (op. cit., p. 128). In the northern Coast Ranges of California, Douglas is not known to have approached within 200 miles of the California-Oregon line.

Californians will also find of interest the following details recorded by Balfour:

Douglas sailed [from the Columbia] on October 18 [1833] for the Sandwich Islands by way of California, reaching Drake's Bay in 16 days after a boisterous passage down the coast. There the ship remained for three weeks, but Douglas did not do much botanizing. He did, however, climb Mount Tamalpais. . . ." (P. 158.)

It was during these last days in California when Douglas wrote the letter to Hartnell from his "tent on the Hill of Yerba Buena" (Madroño 2:98,—1933).

THE IDENTITY OF PHACELIA HUMILIS VAR. CALYCOSA

BY JOHN THOMAS HOWELL

With only a phrase or two of description and without an indication of collector or locality, Gray appended to the description of *Phacelia humilis* T. & G. in his "Conspectus of the North American Hydrophyllaceae" the new entity, var. *calycosa* (Proc. Amer. Acad. 10:318,—1875). The year following, however, in the Botany of California (1:507), the missing data were supplied together with an illuminating remark on the foliage: "The var. *calycosa*, from near Mono Lake, Bolander. Only in Bolander's specimens have any divided leaves been seen." This information

was just enough to raise doubts as to the specificity of the plant and the correctness of the data. No specimen of *P. humilis* had been seen except with entire leaves, although some of its relatives from the west slope of the Sierra Nevada frequently exhibited lobed or divided leaves. Further weight was given to these doubts when it was learned that the party of the California Geological Survey which Bolander accompanied did not reach Mono Lake until September, 1866 (*Erythea* 6:102), at least a month after an annual *Phacelia* of the *P. humilis* group would be expected on the arid sagebrush flats and slopes of the Basin. Moreover, another specimen of this same set of plants, the type of *Arabis Bolanderi* Wats., had carried uncertain data (*Proc. Amer. Acad.* 22:467) and had been critically discussed by Prof. Jepson in order to ascertain its identity (*Madroño* 1:254).

Through the kindness and coöperation of Dr. L. B. Smith of the Gray Herbarium, I have been able to examine the type of *P. humilis* var. *calycosa*. The label on the sheet carries the data *H. N. Bolander No. 6384*, collected in 1866, and, in Gray's hand, "Towards Mono." The type consists of two slender plants that are entirely typical of *P. Purpusii* T. S. Brandg., a species of the subgenus *Eutoca* not even closely related to *P. humilis* of *Euphacelia*. Gray, however, is not the only one who has confused these plants with *P. humilis*: although Brand recognized *P. Purpusii* from the middle and southern Sierra Nevada (*Pflanzenr.* IV, 251:120), he unaccountably referred to *P. humilis* var. *calycosa* (op. cit., 103) specimens of *P. Purpusii* chiefly from the middle Sierra Nevada northward!

It only remains to note that *Bolander No. 6384* was not collected either "towards Mono" or "near Mono Lake." Miss Marjorie W. Stone, Bibliographer at the Gray Herbarium, writes that, according to Bolander's notes, *No. 6384* was collected in "Yos. [emite] Valley."

NEW FROM EUROPE. Small moss-like plants collected from a clay flat at Ione, Amador County, California, April 23, 1941, have proven to be *Tillæa muscosa* L. (*Eastwood & Howell No. 8682*). This species differs from the indigenous *T. erecta* H. & A., with which it might be confused, by its 3-parted flowers and 2-seeded carpels. No North American record for this European plant has been noted.—John Thomas Howell.

SCIRPUS CRINIGER TRANSFERRED TO
ERIOPHORUM

BY ALAN A. BEETLE

Agronomy Division, University of California, Berkeley

Scirpus criniger was described by Gray in 1867. At that time Gray himself pointed out that this species had "nearly the habit and inflorescence of *Eriophorum virginicum*," but concluded that "the number and serrulation of these bristles refer the species to *Trichophorum*." *Trichophorum* is a genus of Persoon which originally included *Scirpus lineatus*, *cyperinus*, *pumilus* (as *alpinum*), *hudsonianus*, and *cæspitosus*. Palla in 1889 reëstablished *Trichophorum* to include *Scirpus pumilus* (as *alpinum*) and *cæspitosus* on the basis of stem structure. These two species fall into the section *Bæothryon* Ehrh. of *Scirpus* (Beetle, 1941). *Scirpus criniger* has then remained until now as an unchallenged member of *Scirpus*.

In the process of monographing *Scirpus*, an attempt was made to put all the species into natural sections. Soon it became evident that *Scirpus criniger*, having been excluded from the Section *Bæothryon*, for it has not a single terminal spikelet, must stand by itself, that it did not in fact have any natural resting place in *Scirpus*.

A detailed study of seed variation in *Scirpus* brought the first clue as to the proper alignment of *Scirpus criniger*. The elongate bristles of this species superficially suggested that it must fall either near the wool-grasses in the subgenus *Euscirpus* of *Scirpus* or into *Eriophorum*.

A remarkable uniformity is exhibited by the achenes of the sections of *Euscirpus*, *Scirpus sylvaticus*, *atrovirens*, *lineatus*, *cyperinus*, *Eriophorum*, and all their close allies having achenes 1 mm. long, 0.5 to 0.75 mm. broad, smooth, apiculate, light to pale brown or whitish. Surely then, *Scirpus criniger*, with its achene 2 to 2.5 mm. long, 1 mm. broad, and dark brown, should not be placed with these.

Eriophorum, on the other hand, has achenes 2 to 3 mm. long, dark brown, smooth, often apiculate, trigonous. In every point the achenes agree. It then seemed obvious that *Scirpus criniger* with its elongate bristles must fall into *Eriophorum*.

This is not the first case in which the affinities of a species have been confused between *Scirpus* and *Eriophorum*. Fernald

(1905) in transferring *Eriophorum alpinum* L. to *Scirpus* (now treated as *Scirpus hudsonianus* [Michx.] Fernald) discussed the naturalness of the genus *Eriophorum*. He pointed out that "the membranous scales of the spikelets with spreading or loosely ascending tips, and the perianth of many slender ligulate bristles" characterize the genus.

Other points were then checked to see if they bore out the conclusion drawn from the achenes. The following characters possessed by *Scirpus criniger* indicate that it falls naturally into *Eriophorum*: (1) style 3-fid, (2) stigmas woolly, (3) stem and leaves prominently striate, (4) perennial habit, (5) alpine bog habitat, (6) spikelets few, (7) scales membranous, (8) bristles elongate, (9) dry persistent leaf-sheaths at base of culm. In consideration of these points, it is felt that, even though *Scirpus criniger* were put in a section by itself in *Scirpus*, it would fall closer to *Eriophorum* than to any other section of *Scirpus*.

The question remains, then, why was the species put in *Scirpus*? According to Gray, it was because of the serrulation and number of the bristles. The bristles are counted as six in the original description and undoubtedly the number (always variable) is correct in some plants. Morphologically, too, the number is probably correct since the larger number characteristic of *Eriophorum* is derived from the splitting of an original six. However, the number of bristles in *Scirpus criniger* seems more frequently to be 9 to 12 (see illustration in Jepson, Man. Fl. Pl. Calif., 156). It is true that the bristles are not as elongate and often not as silky as those of *Eriophorum*, and they are very strongly antrorsely scabrous. However, in the most mature specimens (e. g., Peirson in 1933 from Inyo County, California, Herb. Univ. Calif.), the bristles lose to a large extent both their rigidity and their serrulation and closely approach in character those of *Eriophorum*.

Since nothing more fundamental than the bristles has kept *Scirpus criniger* out of *Eriophorum*, and, since achene characters are held to be more fundamental, the transfer is here made:

***Eriophorum criniger* (Gray) Beetle, comb. nov.**

Scirpus criniger Gray, Proc. Amer. Acad. Arts & Sci. 7: 392 (1867).

Specimens examined. OREGON: Josephine Co., Henderson No. 5928, Yates No. 5779; Curry Co., Thompson No. 12849.

CALIFORNIA: Del Norte Co., *VanDeventer No. 282, Eastwood & Howell No. 3711*; Humboldt Co., *Tracy No. 7637*; Siskiyou Co., *J. T. Howell No. 13411, Butler No. 1703*; Shasta Co., *W. R. Dudley*; Mendocino Co., *McMurphy No. 595*; Red Mt., *H. N. Bolander* (type collection in Gray Herbarium, part of type collection in University of California Herbarium and in Dudley Herbarium); Sierra Co., *Kennedy in 1929*; Placer Co., *Carpenter in 1892*; Eldorado Co., *Babcock No. 5699*; Tuolumne Co., *Schoof No. 50, Beetle No. 2912*; Mariposa Co., *Schreiber No. 1816*; *J. T. Howell No. 14571*; Madera Co., *J. T. Howell No. 16691*; Fresno Co., *Clemens in 1910*; Tulare Co., *J. T. Howell No. 15887, No. 16013a*; Inyo Co., *Peirson No. 9147*. Specimens cited may be found in the University of California Herbarium, Berkeley, the California Academy of Sciences Herbarium, the Dudley Herbarium, Stanford University, and the author's personal collection.

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A NEW CALIFORNIAN POLYGONUM

BY J. F. BRECKLE
Mellette, South Dakota

Polygonum montereyense Brenckle, sp. nov. Planta annua, pallida viridis; caulis brevis, basi divaricate ramosus, 4—10 cm. longus; internodi foliis brevioribus; nodi crassuli; ocreæ conspicuæ, basi brunnescentes, bipartitæ lobis attenuatis, denique laceratæ, 5—7 mm. longæ; folia lineari-lanceolata, utrinque acuta, sessilia, venis ad tergem prominentibus, 0.5—1.5 cm. longa; inflorescentia congesta ramis terminalis; perianthia petaloidea, exteriore pallide viridia, 2 mm. longa, ex medio 5-partita segmentis rotundatis albo-marginatis; achænia angusta, lævia, nigrescentia, 1.5—1.7 mm. longa.*

* I am grateful to L. H. Shirmer for preparing the Latin diagnosis.

Annual, pale green, stem short, sturdy, profusely branched at the base, spreading, 4—10 cm. long, irregularly bent at the nodes; internodes shorter than the leaves, 10 mm. long or less; nodes somewhat swollen and covered by the dark brown bases of the ocreæ; ocreæ almost transparent above, 2-parted into attenuate lobes or lacerated, 5—7 mm. long, prominent; leaves articulated to the bases of the ocreæ, linear-lanceolate, pointed at each end, sessile, 0.5—1.5 cm. long; inflorescence crowded toward the ends of branches and branchlets, forming short, bracted, capitate spikelets somewhat interrupted below; perianths one to several in the axil of a bract, pale green at the back, petaloid when open, 2 mm. long, 5-parted to the middle, segments rounded, white-margined, limb spreading; stamens 5 or 6, yellow; achenes slender, flattened, rounded at the base, 3-edged at the top, slightly bent at the tip, smooth and shining or minutely punctate, becoming black, 1.5—1.7 mm. long. Exserted achenes are also present.

“On hard dry clay,” Monterey, California, *S. B. Parish No. 11577*, August, 1917. Distributed as *P. Parryi* Greene. Type sheet in the Gray Herbarium, Harvard University.

This species is a member of a closely interrelated group of which *P. prolificum* (Small) Robins. was first described.

A NEW ERIGERON FROM IDAHO

BY ARTHUR CRONQUIST

University of Minnesota, Minneapolis

Erigeron Engelmanni A. Nels. subsp. ***Davisii*** Cronquist, subsp. nov. Planta 10—25 cm. alta quasi erecta, disco 10—18 mm. lato (siccato), involucri 6—8 mm. alto, ligulis 8—14 mm. longis; cetera similis subsp. *typico*.*

Plant 10—25 cm. tall, erect or nearly so, caespitose from a perennial root; stem green, hirsute with appressed or spreading hairs; leaves hirsute on both surfaces with curved ascending but scarcely spreading pubescence, and with spreading septate hairs 1.5—2 mm. long on the margins near their bases; basal leaves numerous, persistent, narrowly linear-oblongate, acute or obtuse, 1-nerved, 3—8 cm. long, 1—4 mm. wide, tapering gradually to the slender petioles or petioliform bases, cauline leaves few and smaller, often linear; heads solitary on terminal nearly naked peduncles mostly about 10 cm. long, these usually with 1 to 3 reduced linear leaves 1—3 cm. long; disk 10—18 mm. wide (when pressed); involucre 6—8 mm. high, phyllaries in about 2 nearly equal series, the inner wider and with more or less prominent scarious margins, all obscurely viscid and moderately villous with flattened septate hairs resembling those of the petioles; ligules white, sometimes turning rose-purple, about 40 to 50, 10—14 mm. long; pappus double, the outer of inconspicuous bristles less than 1 mm. long; akenes 2-nerved, villous, the hairs usually denser and spreading on the nerves.

* ***Erigeron Engelmanni*** A. Nels. subsp. ***typicus*** Cronquist, nom. nov. *E. Engelmanni* A. Nels., Bull. Torr. Bot. Club 26:247 (1899).

Type: *Davis* No. 3254, moist woods, Whitebird Summit, range 2 east, township 29 north, Idaho County, Idaho, June 14, 1941; University of Minnesota Herbarium No. 368670. Cotypes: *Davis* No. 2271, dry ridge, Graves Point Lookout, Idaho County, Idaho, June 24, 1940 (Herb. Univ. Idaho S. Branch); *Davis* No. 2253, open hillside, Graves Point Lookout, Idaho County, Idaho, June 24, 1940 (Herb. Univ. Idaho S. Branch).

Erigeron Engelmanni subsp. *Davisii* is essentially a large edition of subsp. *typicus*, which latter is known to me from southern Wyoming, extreme southeastern Idaho, northern Utah, and western Colorado. Records of *E. Engelmanni* from Montana may be based on another species. So far as is indicated by herbarium specimens, the real homeland of subsp. *typicus* is southern Wyoming, where it grows on sandy or gravelly soils among sagebrush and in open places. Subsp. *Davisii* is recorded by Dr. Davis from open places and moist woods of western Idaho, over 300 miles northwest of the nearest known station for subsp. *typicus*. Prominent morphological characters of the two subspecies may be contrasted as follows:

	subsp. <i>Davisii</i>	subsp. <i>typicus</i>
Ligules	8—14 mm. long	5—8 mm. long
Involucre	6—8 mm. high	4—6 mm. high
Disk	10—18 mm. wide (when pressed)	7—10 mm. wide (when pressed)
Stem	10—25 cm. long, rather stout, erect.	3—12 cm. long, rarely longer, often spreading or decumbent.

Typical *E. Engelmanni* is frequently branched, when well-developed, while all the specimens I have seen of subsp. *Davisii* are monocephalous. The subnaked peduncles of subsp. *Davisii* are usually longer in proportion to the rest of the plant than are those of subsp. *typicus*.

I wish to thank Dr. William R. Maxon, of the United States National Herbarium, for the loan of the National Herbarium material of *E. Engelmanni*.

NOW IN CALIFORNIA. In 1938, *Gifola germanica* (L.) Dumort. was found between Hopland and Cloverdale, Mendocino County, by J. P. Tracy (No. 15848). On the Pacific coast, it has been reported from Roseburg, Oregon (Leaflet West. Bot. 2: 192).—J. T. Howell.

LEAFLETS *of* WESTERN BOTANY

CONTENTS

	PAGE
New Species and Varieties of <i>Lupinus</i>	169
ALICE EASTWOOD	
A New Species of <i>Mirabilis</i> , With Remarks on <i>Hermidium</i> and Related Genera	175
R. C. BARNEBY	
A Short List of Plants From Cedros Island, Lower California	180
JOHN THOMAS HOWELL	
<i>Amaranthus Powellii</i> in California	185
LOUIS CUTTER WHEELER	
Western Plants From Here and There	187
JOHN THOMAS HOWELL	
<i>Solanum lanceolatum</i> in California	189
ALICE EASTWOOD	
Studies in <i>Phacelia</i> —III	190
JOHN THOMAS HOWELL	

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as
LEAFL. WEST. BOT.



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NEW SPECIES AND VARIETIES OF LUPINUS

BY ALICE EASTWOOD

Lupinus cæsius Eastwood, spec. nov. Perennis basi ramosus, circa 4 dm. altus; caulibus erectis, infra sine foliis supra foliosis et ramis brevibus in axillis; foliolis 6—8, anguste oblanceolatis, mucronatis, 2—3 cm. longis, 3—5 mm. latis, viridibus, minutissime atro-punctatis et leviter pubescentibus, densioribus infra; petiolis gracilibus, æquilongis foliolis vel brevioribus; stipulis adnatis circa 2 mm., tenuissimis 3—4 mm. longis; floribus circa 7 mm. longis, cæsiis, 2 mm. inter vexillum et alas, laxifloris in racemis 5—7 cm. longis; pedunculis 3—5 cm. longis, tectis foliis; pedicellis 3—4 mm. longis, gracilibus; bracteis brevioribus pedicellis, nonnumquam persistentibus; calyce basi gibboso, labio superiore 3 mm. longo, divaricate bilobato 1.5 mm., labio inferiore ovato, circa 4 mm. longo, apice bidentato; vexillo reflexo, brevioris alis, orbiculato, circa 4 mm. lato, medio dorsi villosio; alis 7 mm. longis, 4 mm. latis; carina prope tecta alis, medio ciliata, apice obtusa, purpurea.

Type: Herb. Calif. Acad. Sci. No. 217630, collected June 21, 1931, at Diamond Lake, Douglas County, Oregon, *J. T. Howell No. 6862*.

This dainty little lupine is related to *L. silvicola* Heller, differing chiefly in smaller flowers and leaves, calyx merely gibbous, and banner pubescent on the fold at the back. The corolla is lavender, the banner darker and shorter than the wings. It belongs in the *Lupinus laxiflorus* group.

Lupinus klamathensis Eastwood, spec. nov. Caules simplices, ramosi ex radice lignea, circa 4 dm. alti, basi sine foliis, squamosi stipulis, divaricate villosi, villis longis tenuissimis, stipulis infimis adnatis circa 1 cm., parte libera filiformi villosa; foliolis 6—9, incanis, falcatis, conduplicatis, 4 cm. longis, 2—4 mm. latis; anguste oblanceolatis, acutis laxo-adpresse villosis, petiolis circa æquilongis foliolis; floribus purpureis circa 10—12 cm. longis, laxe verticillatis in racemis 6—12 cm. longis, superantibus folia, breviter pedunculatis; bracteis caducis; pedicellis filiformibus, 3—5 mm. longis villosis; calyce basi gibboso, villosio; labio superiore late ovato, 5 mm. lato, labio inferiore anguste ovato; vexillo suborbiculato, circa 1 cm. diametro, margine purpureo, medio aurantiaco, dorso basi pubescenti; alis purpureis, 12 mm. longis, 4 mm. latis, stipite circa 2 mm. longo; carina falcata, glabra, 12 mm. longa, medio 4 mm. lata, stipite 2 mm. longo.

Type: Herb. Calif. Acad. Sci. No. 216317, collected April 20, 1934, at the junction of the Klamath and Shasta rivers, Siskiyou Co., California, *Eastwood & Howell No. 1775*. This beautiful lupine was a mass of bloom from the many stems arising from a woody base. It belongs to the *L. formosus* group, differing in the fine villous spreading pubescence, the many falcate leaflets, and smaller flowers.

Lupinus Kuschei Eastwood, spec. nov. Cæspitosus ex rhizomate ligneo, basi et supra foliosus, circa 2 dm. altus, omnino dense vestitus pilis sericeis, argenteis, adpressis et divaricatis; petiolis foliorum inferiorum longis, gracilibus, longissimis, 1 dm. longis, petiolis foliorum caulinarum brevioribus vel æqualibus foliolis; stipulis 1 cm. longis, filiformibus, longe pilosis, $\frac{1}{2}$ conjunctis; foliolis 6 ad 9, conduplicatis, lineari-lanceolatis, acuminatis, 2—3.5 cm. longis, circa 4 mm. latis, erectis; pedunculis folia vix superantibus, racemis 4—6 cm. longis, 3 cm. latis, dense floriferis et pilosissimis; bracteis persistentibus, æqualibus calycibus, pedicellis filiformibus, circa 3 mm. longis; floribus violaceis, circa 1 cm. longis; calyce bracteolato, 7 mm. longo, labio inferiore 4 mm. longo, tridentato, labio superiore bilobato, 3 mm. longo, vexillo glabro, orbiculato, reflexo, æquali alis, fulvomaculato medio; carina prope tecta alis, parte inferiore alba, superiore purpurea, exserta, inter medium et apicem parce et minute ciliata; legumine circa 2 cm. longo, 5 mm. lato, 5-ovulato; seminibus paucibus, stramineis.

Type: Herb. Calif. Acad. Sci. No. 62472, collected by the author along the shore of Lake Bennett, Carcross, Yukon, July 10, 1914. Specimens of flowering stems were collected by J. August Kusche at Whitehorse, Yukon, May, 1916.

Judging by Rydberg's description this seems nearest to *L. candicans*, Torr. Bull. 28: 35. It grew in patches, with several tufted stems from a rather slender woody root-stock. The whole plant is white and shining with a dense silvery-silky pubescence that is appressed on both sides of the leaves, appressed and spreading on stems, pedicels and peduncles and almost shaggy on bracts, pedicels and calyx. The hairs are so long on the calyx that they surpass the lobes and obscure the apices; the plants are about 2 dm. high, very leafy at base and above; the basal leaves on long slender petioles; the cauline on petioles a little longer than or equal to the leaflets; the racemes of pale violet flowers are 4 to 6 cm. long, 3 cm. wide, densely flowered and shaggy with long hairs on all parts except the corolla; the peduncles are surpassed by the leaves; leaflets generally 9, linear-lanceolate, folded, acuminate, 2 to 3.5 cm. long, 3 cm. broad; the calyx is not saccate at base, the lower lip a little longer than the upper, with a small bracteole in the sinus; the dark purple apex of the keel is conspicuous contrasted with the paler wings and banner.

It is named in honor of the late J. August Kusche to whose zeal and generosity we are indebted for many specimens from the Arctic regions, Arizona, the Hawaiian Islands and other places where his entomological collections were made.

Lupinus ochroleucus Eastwood, spec. nov. Perennis, decumbens, ex basi ramosus, 2—3 dm. altus, circa 6 dm. latus, foliosus et in axillis ramis abortivis, ubique argenteo-sericeus villis adpressis et patentibus; foliolis 5—8, oblanceolatis, apice mucronatis, 3—4 cm. longis, 6—8 mm. latis; petiolis plerumque longioribus foliolis, longissimis 6 cm. longis, gracilibus; stipulis filiformibus, 3—4 mm. longis, breviter adnatis; racemis caules terminantibus, 5—15 cm. longis, breviter pedunculatis, plerumque laxifloris; bracteis caducis, attenuatis, brevioribus alabastris infimis; pedicellis 1—4 mm. longis; floribus ochroleucis, circa 13 mm. longis, 8 mm. latis, 5 mm. inter alas et vexillum; calyce basi subsaccato, tubo 2 mm. longo, bracteolato, labio superiore 6 mm. longo, 2 mm. lato, sublineari, apice bicrenato, labio inferiore æquilongo, lineari-lanceolato; vexillo 12 mm. longo, 5 mm. lato, oblongo, apice breviter acuminato, basi carinato, marginibus conniventibus dorso, glabro; alis 13 mm. longis, 3 mm. latis; carina falcata, 2.5 mm. lata, margine glabra, paululum tecta alis.

Type: Herb. Calif. Acad. Sci. No. 299534, collected June 1, 1941, about midway between Briceburg and Mariposa, Mariposa Co., California, by John Thomas Howell, No. 16244. This is related to *Lupinus formosus* Greene, differing in the much narrower parts and color of the flowers. The silvery-white silky pubescence is much denser and the entire plant more canescent. It differs from *L. albopilosus* Heller (*L. formosus* var. *robustus* C. P. Sm.) in the color of the flowers, narrower parts, and less shaggy pubescence. It is a member of that most variable group blooming in the summer and generally forming spreading clumps of flowering decumbent stems. In this group the keel of the corolla is always falcate and glabrous along the margin and is rarely covered by the wings.

Lupinus oreocharis Eastwood, spec. nov. Cæspitosis ex radice lignea, nanus, 1—2 dm. latus, cinereus, densissime pilosus, pilis longis divaricatis et appressis; caulibus gracilibus, ramis initium fascientibus ad medium, raro nudis; petiolis longis gracilibus; stipulis adnatis $\frac{3}{4}$, libera parte filiformi, 2 mm. longa; foliolis 3—5, oblanceolatis, circa 1 cm. longis, 2 mm. latis, æqualiter pilosis; racemis verticillatis, brevibus, nonnumquam capitatis, superantibus folia; bracteis anguste lanceolatis, longioribus pedicellis, brevioribus calycibus; floribus 7 mm. longis, 3 mm. inter alas et vexillum; vexillo orbiculato, glabro, 4 mm. diametro, basi 2 mm. lato, reflexo, violaceo, prope apice luteo; alis 6 mm. longis, 4 mm. latis, basi auriculatis, breviter stipitatis; carina tecta alis, apice purpurea, in senectute exserta, medio lata et pallida; fructu ignoto.

Type: Herb. Calif. Acad. Sci. No. 299170, collected in Little Five Lakes Basin, Tulare Co., California, July 29, 1942, by John Thomas Howell, No. 17392.

This little mountain beauty suggests the *L. Lyallii* group, but has a different pubescence, more slender stems and petioles, smaller leaflets and flowers. Incipient branches are on the slender stems, generally near the middle. The yellow spot near the top of the violet-blue vexillum is conspicuous on the young flowers and turns orange at first and later dark reddish-purple. These plants form mats 1 to 2 dm. broad. The branching caudex comes from a woody tap-root.

Lupinus pasadenensis Eastwood, spec. nov. Perennis, erectus, ramosus, omnino tomentosovillosus, supra foliosus et in axillis ramis brevibus; foliis circa 8, oblongo-oblancoelatis, 2—3 cm. longis, 5—8 mm. latis, obtusis et mucronatis, pallidis, petiolis longioribus foliolis, stipulis separatis, lanceolatis, villosis 2—3 mm. longis; floribus purpurascensibus, circa 1 cm. longis, verticillatis in racemis circa 15 cm. longis; pedunculis gracilibus folia superantibus; bracteis caducis, brevioribus alabastris; calyce basi gibboso, 3 mm. lato, labio superiore oblongo, breviter bidentato, 3 mm. lato, 4 mm. longo, labio inferiore oblongo, acuto, 4 mm. longo, 3 mm. lato; vexillo glabro orbiculato 1 cm. longo, 9 mm. lato, apice truncato et mucronato, basi lato-stipitato; alis circa 8 mm. longis, 5 mm. latis; carina fere tecta alis, glabra, falcata, prope basin 3 mm. lata.

Type: Herb. Calif. Acad. Sci. No. 299496, collected April 20, 1936, at the end of New York Avenue towards Pasadena Glen, Pasadena, Los Angeles Co., California, by Lester Rowntree. It grew in decomposed granite.

Lupinus pasadenensis is a member of the variable *L. formosus* group. The dull woolly pubescence differentiates it from other related species and the flowers are smaller than those of *L. formosus* Greene. The specimen on which *L. pasadenensis* is founded seems to have been a tall branching leafy-stemmed plant. The lower part is wanting, the part present is more than 4 dm. high.

Lupinus piperitus Davidson var. **sparsipilosus** Eastwood, var. nov. Differt: sparsipilosis stipulis et inferiore superficie foliorum; floribus nonnihil minoribus.

Type: Herb. Calif. Acad. Sci. No. 299172, collected Aug. 5, 1942, between Big Arroyo and Chagoopa Plateau, Tulare Co., California, *J. T. Howell No. 17698*.

This is similar to the type in habit and large leaves, differing in the somewhat smaller flowers and scattered appressed hairs on stipules and lower leaf-surfaces, the hairs somewhat denser on the calyx.

Lupinus pulcher Eastwood, spec. nov. Caules plures ex radice lignea, erecti, circa 3 dm. alti, basi brunneo-squamosi, foliosi supra, ramis abortivis in axillis, omnino argenteo-sericeus villis adpressis; foliolis 5—9, brevioribus petiolis, oblanceolatis, mucronatis, 2 cm. longis, 4 mm. latis, petiolis infimis 5 cm. longis, supremis 1.5 cm. longis, stipulis infimis adnatis, supremis discretis, anguste linearibus, 3—4 mm. longis; racemis sessilibus, 15 cm. longis, multifloris et laxifloris; pedicellis patentibus, circa 2 mm. longis; bracteis caducis; floribus cyaneis, circa 8 mm. longis; labiis calycis subæqualibus, circa 4 mm. longis, 3 mm. latis, superiore bidentato, dentibus approximatis, inferiore tridentato, tubo basi saccato, circa 1 mm. lato; vexillo orbiculato, 8 mm. lato et longo, superante alas, dorso supra glabro, infra pubescenti; alis 7 mm. longis, 4 mm. latis, stipite 1 mm. longo; carina curvata, superiore parte lanato-ciliata, apice purpurea, medio 2 mm. lata, stipite 1 mm. longo.

Type: Herb. Calif. Acad. Sci. No. 299533, collected May 18, 1939, in sandy soil 18 miles south of Cedar City, Iron Co., Utah, alt. 6500 ft., by Fred A. Barkley and Merton J. Reed, No. 4069. It was distributed as *Lupinus meionanthus* Gray. It may be related, but the two species are quite different in appearance. The flowers of *L. meionanthus* are about half as large, circular in outline, and with the banner sessile. The pubescence is denser and more shaggy. This is a beautiful species, with the open-flowered racemes of purplish-blue flowers terminating each stem.

Lupinus rimæ Eastwood, spec. nov. Caulis divaricate ramosus supra basin, circa 4 dm. altus, expansus 3 dm.; ramis gracilibus terminantibus in racemis circa 8 cm. longis, laxe floriferis; pedunculis brevibus, occultis foliis, omnino incanis; foliolis 5—7, oblanceolatis, mucronatis, circa 2 cm. longis, 6 mm. latis, nonnihil adpresse villosis; petiolis gracillimis, multo longioribus foliolis; stipulis inferioribus adnatis, superioribus prope liberis, subulatis; floribus 9—10 mm. longis, violaceis vel purpureis; pedicellis gracilibus, 1—2 mm. longis; calyce basi gibboso, labio superiore ovato, bidentato, 4 mm. longo, basi 4 mm. lato, labio inferiore 5 mm. longo, obtuso; vexillo orbiculato, prope basin villoso et gibboso, 8 mm. diametro, apice plicato; alis 10 mm. longis, 7 mm. latis prope apicem; carina glabra, falcata, parte tecta alis.

Type: Herb. Calif. Acad. Sci. No. 280705, collected August 10, 1938, at Inyo Earthquake Fault near Mammoth, Mono Co., California, J. T. Howell No. 14495.

This is a lupine with a pale green aspect, widely branching from a single stem, each slender branch terminating in a short laxly flowered raceme surpassing the leaves which hide the peduncles. The peculiar very short spreading pubescence becomes more appressed on the leaves. The small flowers with the

strongly falcate glabrous keel allies it to the *L. formosus* group. It differs in the smaller flowers and quite different pubescence.

Lupinus sellulus Kell. var. **elatus** Eastwood, var. nov. Caules elati, supra ramosi; foliolis circa 6, oblongo-linearibus; pubescentia, floribus et racemis similibus typo.

Type: Herb. Calif. Acad. Sci. No. 278848, collected at East Lake, Fresno Co., California, July 31, 1940, by John Thomas Howell, No. 15767. Another similar specimen was collected by Mr. Howell, No. 16074, Aug. 9, 1940, between Junction and Vidette meadows in the same region, Herb. No. 281004.

Other collections, all from California, are as follows: along the highway, 25 miles north of Bishop, Mono Co., July 29, 1938, Y. W. Winblad; Jackass Meadow near Lake Florence, Fresno Co., August 31, 1940, Mrs. H. C. Cantelow; Mammoth, Mono Co., July 13, 1935, L. Rowntree. These last three collections have shorter leaflets than in the type.

Lupinus sublanatus Eastwood, spec. nov. Perennis, herbaceus, ex basi ramosus, circa 2 dm. altus; caulibus sine foliis basi, gracilibus, foliosis, simplicibus, sublanatis et divaricate villosis, foliolis 5—7, oblongo-oblanco-latis, obtusis et mucronatis, sublanatis, circa 2 cm. longis, 3—5 mm. latis, petiolis inferioribus longioribus et petiolis superioribus brevioribus foliolis, stipulis adnatis $\frac{1}{2}$, subulatis, 4 mm. longis; floribus purpureis, 1 cm. longis, 8 mm. latis, circa 4 mm. inter alas et vexillum, verticillatis in racemis subsessilibus circa 5 cm. longis; calyce basi subgibboso, labio superiore 2-crenato, 5 mm. longo, 4 mm. lato, labio inferiore oblongo-lanceolato, obtuso, 7 mm. longo; vexillo orbiculato, circa 8 mm. lato, reflexo, dorso villosio, stipitato; alis 8 mm. longis, 7 mm. latis; carina curvata, tecta alis, medio 2 mm. lata, superiore parte ciliata, stipite 2 mm. longo.

Type: Herb. Calif. Acad. Sci. No. 299537, collected July 16, 1935, between Mammoth and Earthquake Fault, Mono Co., California, by Lester Rowntree.

The affinities of this species are not evident to the author. The dull white woolly pubescence gives it a peculiar appearance. The flowers somewhat resemble those of *L. Grayi* Watson, but are much smaller and in habit the plant is quite unlike that species.

Lupinus wenatchensis Eastwood, spec. nov. Caules ramosi ex radice lignea, erecti, simplices 4 dm. alti, basi squamosi et fere sine foliis, dense adpresse sericei; foliis radicalibus paucis, petiolis circa 1 dm. longis, petiolis foliorum superiorum circa æqualibus foliolis; stipulis infimis 1 cm. longis, $\frac{1}{2}$ adnatis, parte libera filiformi, stipulis supremis brevioribus et fere liberis; foliolis 6—9, conduplicatis, lanceolatis, acutis, 3—4 cm. longis, 4—6 mm. latis, utrimque adpresse pubescentibus; racemis sessilibus, circa 8 cm. longis, dense floriferis, pedicellis circa 3 mm. longis, ascendentibus; floribus

circa 10 mm. longis, inornatis, in juventute atro-purpureis, vexillo flavo vel brunneo-oculato, in senectute rubiginoso; calyce bracteolato, basi calcarato, labio superiore 4 mm. lato et longo, obtuso, labio inferiore lanceolato-ovato, 5 mm. longo, obtuso; vexillo dorso paulo villosa, 9 mm. longo, 5 mm. lato, anguste obovato, basi 2 mm. lato, fere æquilongum alis; alis 4 mm. latis prope apicem; carina paulo curvata, medio 4 mm. lata et ciliata, obtusa, alba, apice purpurea.

Type: Herb. Calif. Acad. Sci. No. 254504, collected on alpine slopes of Wenatchee Mt., alt. 6800 ft., Kittitas Co., Washington, Sept. 13, 1937, by J. William Thompson, No. 14242.

The spurred calyx allies it to the small-flowered *L. laxiflorus* group. The wings and banner are approximate in anthesis and the tip of the keel is exerted. The foliage becomes darker in drying and is perhaps somewhat fleshy. The color of the dried flowers is a dirty brown. However, in the very young flowers the banner seems to be a very dark purple with a yellowish or brownish spot in the middle. This species might be included in the *L. laxiflorus* group, but the small dull colored flowers, the dense racemes, and the general aspect all mark it as distinct from *L. laxiflorus*.

A NEW SPECIES OF MIRABILIS, WITH REMARKS ON HERMIDIUM AND RELATED GENERA

BY R. C. BARNEBY

Mirabilis pudica Barneby, spec. nov. ad subgenus *Quamoclidion* (Choisy) Jeps. involucro plurifloro referenda, *M. Grecni* S. Wats. cui habitu approximatur affinis, sed ab eo involucro rotato deflexo, perigonii dimidio brevioris campanulati albi limbo superne vix ampliato nec infundibuliformi aliisque diversis notulis toto cœlo diversa. *M. triflora* Benth. et *M. Macfarlanei* Const. & Roll. quæ etiam inter *Quamoclidia* involucrum subtrotatum præbent, perigonii purpurei forma, pube, totoque habitu et distantius recedunt.

Perennis herbacea pluricaulis ex ipsa basi ramosa, omnibus partibus pallide glauco-virens albicansve fragilis, præter filamenta atque perigonium obscure puberulum undique glaberrima: caulibus numerosis graciliusculis 3—5 dm. altis e collo radicis lignosæ adscendentibus erectisve, inferne brevi spatio lignescentibus, hinc inde alternatim vel subdichotome ramosis, demum rigidis striatis pallidis, ad nodos incrassatis, supra medium florigeris: foliis oppositis conspicue adscendentibus (sæpissime petiolo torto ad perpendicularium dispositis) breviter petiolatis 2—5 cm. longis plerumque internodio superatis, inferioribus late ovatis obtusis in media angustiora acuta necnon summa lanceolata acutissima sensim decrescentibus, lamina plana crassa

rigida perglauca in sicco rugulosa angustissime albomarginata secus petiolum 1—5 mm. longum anguste alatum decurrenti, nervis pallidis inferne prominulis superne inconspicuis pinnatim paucinervia: involucris solitariis axillaribus et terminali, 6- (rarissime 5- vel 7-) floris, pedunculo gracili circa 1 cm. longo apicem versus clavato abrupte dejecto pendulis, ad anthesin breviter et aperte rotato-campanulatis 12—15 mm. longis, 20—25 mm. latis, basi leviter umbilicatis, gamophyllis sed infra medium in lacinias 5 late ovatas admodum cordatas valde acutas vel apiculatas 1-nervias profunde fissis, fructiferis ad 3 cm. usque latis accrescentibus, primum magis explanato-rotatis demum laxe conniventibus: floribus subsessilibus in involucri basi incrassata receptaculiformi alba insidentibus: ovario ad anthesin suborbiculari 2.5 mm. longo: perigonii utrinque puberuli 13—14 mm. longi tubo viridulo supra basin rotundatam late campanulato, versus medium circa 10 mm. lato, in limbum angustum album lobulis vix 1 mm. longis emarginatis crenulatis 5-lobatum, demum fere 2 cm. latum, sensim ampliato (vix autem tubus a limbo distingui potest), nervis 5 viridibus in lobulorum sinus usque productis percurso: staminibus inaequalibus perigonium superantibus, filamentis 12—16 mm. longis filiformibus inferne breviter concretis, ad medium villosulis, antheris circa 1 mm. latis luteis: stylo 17—19 mm. longo glabro: anthocarpio subsphaeroideo, ovoideo vel ellipsoideo, 5—8 mm. longo, 5—7 mm. lato, exangulato multistriato coriaceo castaneo vel nigrescenti. Noctu floret.

NEVADA: sandy playa three miles west of Crystal Springs, Lincoln Co., alt. 4200 ft., 10 May 1942, *Ripley & Barneby No. 4403*, flor., and *ibid.*, 12 June 1942, *No. 4974*, fruct. Types in Herb. Calif. Acad. Sci. Nos. 298965 & 298957. The following collections may also be noted: east of Crystal Springs, Lincoln Co., *No. 4399*; near Hiko, Lincoln Co., *No. 3478*; alkaline flats near south end of the Spotted Range, Nye Co., *No. 3428*. Also observed in some quantity on alkaline flats at the foot of the Desert Range in both Clark and Lincoln counties and about the Pahrangat Lakes.

Mirabilis pudica has been compared in the diagnosis primarily with *M. Greenei* S. Wats., but it is doubtful whether it is in reality more closely allied to that species than to *M. Macfarlanei* Const. & Roll. or even to *Hermidium alipes* S. Wats. *Mirabilis Greenei*, it is true, has similarly fleshy and glaucous herbage, but the rotate involucre of our species, pendent upon its abruptly recurved peduncle, and the white, campanulate, scarcely exerted perianth are very different and find no counterpart in the subgenus *Quamoclidion*. In *M. Macfarlanei* the involucre is also rotate, but the calyx is a long purple trumpet and the whole aspect of the plant is reminiscent rather of the common Four-o'clocks

of the southwestern deserts, *M. multiflora* A. Gray and *M. Froebelii* (Behr) Greene. Even more remote, both taxonomically and geographically, is the genotype of *Quamoclidion*, *M. triflora*, Benth., with its very narrow perianth and three-flowered involucre. That so remarkable and distinct a species, and one, moreover, that is abundant over quite a large area in southern Nevada, could have been overlooked until the present, can be explained only, it seems, by its quite considerable resemblance to the monotypic *Hermidium*. And herbarium studies have convinced the writer that this is no mere chance resemblance, but betrays, in all probability, a very real and close affinity.

Hermidium is unique among the *Mirabileæ* in that each flower in the head is subtended by a broad, ovate bract attached for a short distance to the pedicel, the flower thus appearing to spring from the midvein of the bract: occasionally the exterior bracts are somewhat adnate at base, but they never form the true gamophyllous involucre of *Mirabilis sens. lat.* and the inflorescence is essentially as in *Bougainvillea* Commers. *Mirabilis pudica*, on the other hand, is a typical *Quamoclidion*, with five flowers seated on the thickened bases of the adnate involucral bracts and one or rarely two central ebracteate flowers. Exceptionally, however, an involucre may be found (among some hundred examined two have been seen by the writer) in which the central flower is subtended by a free bract exactly similar in structure to a division of the involucre proper. Such an abnormality suggests strongly that *M. pudica* has but recently evolved from the primitive "bougainvilleoid" state of the flower-cluster as exhibited by *Hermidium* towards the composite inflorescence of *Mirabilis*. The bowl-shaped perianth of *M. pudica* is exactly as in *Hermidium* and recurs also in *Hesperonia* Standl., another segregate from *Mirabilis* marked by this character, free filaments and a solitary flower. In the reproductive organs there is no appreciable difference between *Hermidium* and *Quamoclidion*, stamens, ovary, and anthocarp being essentially alike. It will thus be seen that *M. pudica*, which combines the campanulate perianth of *Hesperonia* and *Hermidium* with the rotate, polyanthous involucre of *Quamoclidion pro parte*, occupies a highly critical position in the *Mirabileæ* and tends to weaken the lines of differentiation between these genera. In this paper it is proposed to remark only on the position of *Hermidium*.

As has been shown above, the form of the inflorescence is the sole criterion of importance which now remains to distinguish the genus from *Quamoclidion*, and the gap between the two is considerably narrowed by the discovery in *M. pudica* of abnormal involucre bearing a central bracteate flower. Moreover, a comparison of *M. pudica* with the genotype of *Quamoclidion*, *M. triflora*, reveals a much wider divergence in all other details between the two than exists between the former and *Hermidium alipes*, while, if *Hesperonia* and *Quamoclidion* are regarded merely as subgenera of *Mirabilis*, *sens. lat.* (which seems to be the current taxonomic practice), a very much wider latitude of variation will be admitted to *Mirabilis* than exists between *Hermidium* and the subgenus *Quamoclidion*. It appears, in fact, that *Hermidium* should be regarded phylogenetically as a primitive *Quamoclidion*, related at least as closely to *M. pudica* as the latter is to any known species of *Mirabilis*, and the genus can hardly be retained, except on grounds of convenience, without doing violence to the principles of natural classification. In this connection it is not out of place to consider the geographic range of *Hermidium*. Is it not suggestive that this species occupies almost exactly the area enclosed by the more local ranges of *Mm. Greenei*, *pudica*, and *Macfarlanei*? Or conversely that these three highly localized but distinct species are scattered about the periphery of *Hermidium's* wider habitat?

Mirabilis pudica was first encountered in a low, sink-like valley at the foot of the Spotted Range in southeastern Nye County, and here, as at the base of the Sheep Mts., the plants occur in dense colonies on gentle slopes or flats of white alkaline clay, where, over small areas, it is the dominant species in a strongly saline association of chenopodiaceous shrubs. In these localities it had the aspect of such strictly gypsophilous xerophytes as *Asclepias cryptoceras* S. Wats. or *Astragalus asclepiadoides* M. E. Jones, both of which have leaves of similar color and texture. Subsequently, however, it was found to be less eclectic in its habital requirements than those species, appearing to be equally at home on the calcareous gravel foothills of the Hiko Range as in the sandy valleys and playas between Crystal Springs and the Pahranaagat Lakes. In the latter stations, in fact, the individual plants were usually larger and more luxuriant,

though they were never seen to form the almost pure stands already described.

As the species has been seen at all stages of development the following notes may be of interest. The herbaceous shoots, when they first appear in early spring, are sparingly branched, rather tender and often suffused with purple. As the season advances the numerous stems become diffusely and intricately branched, rigid and fragile, and at maturity may form a glaucous, dome-like plant two or three feet in diameter, heavily laden throughout with pendent involucre. The leaves, by torsion of the petiole, are held vertically erect in the manner of the Jojoba, *Simmondsia chinensis* (Link) Schn., a device, one may presume, designed to avoid the extreme insolation of the noonday sun. The membranous perianth, with pale green tube fading insensibly into a narrow white crenate limb, expands with *Linanthus dichotomus* (Gray) Greene towards evening and remains open until about ten o'clock of the following day. On one occasion a hummingbird was observed hovering before the flowers, evidently in search of nectar, but the corollas with their nocturnal anthesis and exerted stamens are so perfectly adapted to pollination by night-flying moths that this occurrence must be regarded as quite accidental. The species occupies a zone intermediate between the Upper and Lower Sonoran, with altitudinal limits, so far as known, of 3200 and 4200 feet.

ANOTHER BINDWEED IN CALIFORNIA. A *Convolvulus* new to the weed flora of California has appeared in the southern part of the state from the Mediterranean region. It is *Convolvulus althaeoides* L., a species which will be readily distinguished among our morning-glories and bindweeds if it becomes widely established because of its dimorphic leaves, the lower being crisped or shallowly lobed, the upper deeply palmately parted. According to Mr. Lewis Brock, Deputy Agricultural Commissioner of Ventura County, the plant was discovered in July, 1942, on the Limoneira Ranch near Santa Paula, where it covers about 700 square feet in a lemon grove and has even climbed into the trees.—John Thomas Howell.

A SHORT LIST OF PLANTS FROM CEDROS ISLAND,
LOWER CALIFORNIA

BY JOHN THOMAS HOWELL

In 1932, the Templeton Crocker Expedition of the California Academy of Sciences, on its homeward voyage from the Galapagos Islands, paused at Cedros Island off the middle western coast of Lower California, and on two days I went ashore near the south end of the island. On August 16, I went inland from the settlement at the abalone cannery, collecting along the desert wash and going as far as a large solitary tree-cactus but not reaching the chief spring in the southern part of the island. Late in the afternoon of the following day, I collected inland from South Bay in a highly desert region where I obtained a few things of great interest. It was at this time when Mr. Crocker collected from marine rocks the beautiful fruticulose lichen that the late O. V. Darbishire described as *Rocella fimbriata* (Proc. Calif. Acad. Sci., ser. 4, 21:287,—1935).

In so short a time, it was not possible to make a very extensive collection, especially since considerable time was taken to prepare specimens of cacti. In all, only 43 specimens were collected, but when compared with the list of Cedros Island plants published by Miss Eastwood (Proc. Calif. Acad. Sci., ser. 4, 18:420—441), this small collection is seen to contain enough of interest to justify a brief report on it. Out of the 41 different plants represented, 6 (indicated in list by an asterisk) apparently have not been recorded before from the island. Of these the most remarkable record is that of the giant tree-cactus, *Cereus Pringlei*. Thirteen of the specimens represent topotypes; and of the remaining 21 plants, 12 are known from the island only from one or two collections.

LIST OF COLLECTIONS

**DISTICHLIS SPICATA* (L.) Greene (?). The only specimens obtained were some sterile fragments from the vicinity of a spring, *No. 10699a*. Although the specimens resemble that form of the Salt Grass that grows in unusually unfavorable places, it is not possible to determine our plant definitely without more adequate material.

JUNCUS ACUTUS L. var. *SPHÆROCARPUS* Engelm. Large clumps in canyon below the spring, *No. 10699*.

AGAVE SEBASTIANA Greene. Rocky wash above the settlement, *No. 10691*. Rosette subglobular, about 1.5—2 feet in diameter, the leaves suberect and pale glaucous-green; peduncle 6—8 feet tall, the inflorescence flat-topped and rather dense. Variations were noted in the size of capsules in different plants.

*ANEMOPSIS CALIFORNICA Hook. Rare in damp soil around bunches of *Juncus* below the spring, *No. 10697*.

ERIOGONUM FASCICULATUM Benth. Common bushy shrub on wash and rocky slopes above the settlement, *No. 10674*. The form collected is subsp. *typicum* Stokes with the outside of the perianth glabrous.

ERIOGONUM INTRICATUM Benth. Abundant on rocky wash above the settlement, *No. 10677*. Stems spreading and sprawling, the largest plants 3—4 feet across; perianth-segments strigillose to subglabrous, the outer segments a little smaller than the inner.

ERIOGONUM PONDII Greene. Low dense bushes on rocky slopes, South Bay, *No. 10708*.¹

HARFORDIA FRUTICOSA (Greene) Greene. A rather common scraggly shrub of rocky slopes above South Bay, *No. 10704*. The fleshy leaves are tinged brownish, giving the plant a colorful appearance amid the extreme desert surroundings.

ATRIPLEX PACIFICA Nels. Rather common on coastal bluff at South Bay, *No. 10711*.

MIRABILIS CEDROSENSIS (Standl.) Jeps. Only a solitary plant found on the wash above the settlement, *No. 10676*.

*DRYMARIA HOLOSTEOIDES Benth. A single plant found in a sandy place in the wash above the settlement, *No. 10680*.

OLIGOMERIS LINIFOLIA (Vahl) Macbr. South Bay, *No. 10709a*.

*ECHEVERIA LINEARIS (Greene) A. Berg. South Bay, *No. 10709*. Stems numerous from stout woody caudex, forming dense cushion-like masses up to a foot across; leaves pale green, not glaucous; branches of the inflorescence and calyx glaucous; corolla very pale yellowish tinged with green, fading brownish.

LOTUS CEDROSENSIS Greene. *Hosackia flexuosa* Greene. Rather common on the sandy wash above South Bay, *No. 10707*. Stems prostrate; flowers yellow at first, becoming brick-red.

¹ This collection may be regarded as an exact topotype of Greene's species. The type in Herb. Greene, bears the following data: "SW. end of the island," Cedros Island, February, 1889, Lieut. Chas. F. Pond, U. S. N.

LOTUS NUDATUS (Greene) Greene. Rocky wash above the settlement, *No. 10673*. Stems subprostrate, forming low intricately branched mounds; corolla yellow, becoming reddish. At the time of our visit, most of the plants were leafless and without flowers.

LOTUS SALSUGINOSUS Greene var. BREVIVEXILLUS Ottley. *L. humilis* Greene. Below the spring, rare, *No. 10698*.

PHASEOLUS FILIFORMIS Benth. Rocky wash above the settlement, *No. 10681*. Corolla pink.

EUPHORBIA MISERA Benth. (Det. L. C. Wheeler.) Rocky wash above the settlement, *No. 10679*. Shrub 2—3 feet tall; gland reddish, the appendages white, creamy-white, or shaded with rose.

EUPHORBIA POLYCARPA Benth. var. TYPICA L. C. Wheeler. Very common on rocky wash above the settlement, *No. 10688*. The following discussion by Dr. Wheeler accompanied his determination:

Howell No. 10688 was first considered a distinct entity closely allied to *E. melanadenia* Torr., but microscopic examination showed it to be pubescent rather than tomentose, which places it nearer *E. polycarpa*. The unusually wrinkled testa appeared distinctive, but *Berry No. 22* (Herb. Calif. Acad. Sci.), Cedros Island, has less wrinkled seeds which form a transition to the slightly wrinkled seeds of the pubescent collection from Point Mugu, Ventura County, California, *Wheeler No. 494* (Wheeler herb.).

It is possible to arbitrarily divide *E. polycarpa* var. *typica* and var. *hirtella* into four groups having the following combinations of characters: (1) glabrous, appendages wide; (2) glabrous, appendages narrow; (3) pubescent, appendages wide; (4) pubescent, appendages narrow. Var. *typica* has been used by Wheeler to designate the first three combinations. No. (4) is var. *hirtella* sensu Wheeler and is a plant of the deserts. Combination No. (3) occurs sporadically in the coastal region, as *Wheeler No. 494*, but is not found well developed in the deserts. Rather than endlessly multiplying names for trivial variants, it seems better to continue to recognize only two groups at most and even these intergrade rather hopelessly. The width of the appendages is suspected (by Wheeler) to be more ecological than genetical and the degree of pubescence varies considerably from one part of an individual plant to another.

Howell No. 10688 approaches *E. bartolomæi* Greene in the character of the seeds. It is quite possible that the specimen collected in 1897 on Cedros Island by T. S. Brandegee and cited as doubtfully *E. polycarpa* var. *hirtella* (Bull. Torr. Bot. Club 63:409,—1936) is identical with *Howell No. 10688* and *Berry No. 22*, but the specimen is not at hand for comparison. It is admitted that the pubescence on the specimens from Cedros Island is extremely dense, but so is it on some specimens from the main-

land of Lower California. The plants from Cedros Island appear somewhat distinct but lack definite characters to separate them from *E. polycarpa* var. *typica*, combination (3).

SIMMONDSIA CHINENSIS (Link) Schn. Common shrub on the wash and rocky slopes above the settlement, No. 10672.

RHUS LAURINA Nutt. The tallest leafy plant on the wash above the settlement, No. 10695. *Rhus Lentii* Kell. was common but was not collected.

FRANKENIA PALMERI Wats. Common on the wash and on rocky slopes above the settlement, No. 10694; common above South Bay, No. 10705. Petals white.

EUCNIDE CORDATA (Kell.) Kell. ex Curran. Common on wash and rocky slopes above the settlement, No. 10685. Plants bushy, the largest 2—3 feet tall, 4—6 feet across; petals pale greenish-yellow.

**CEREUS PRINGLEI* Wats. A single tree, inland from the settlement in the vicinity of the spring, No. 10700. Tree about 35 feet tall; trunk 2 feet in diameter at the ground, decreasing to 1.5 feet upward but increasing to 2 feet again at the point where four branches arise; branches appearing about 1.5 feet in diameter at the base; trunk protected by fascicles of long spines, the ridges on the lower part of the branches bearing long spines also, but the spines becoming very short or disappearing entirely at about 15 feet; fruit just below the top, the spines on fruit white with rose base.

ECHINOCACTUS CHRYSACANTHUS Orcutt. Common on rocky slopes in the vicinity of the spring, No. 10701. Stems to 3 feet tall; spines of young specimens rosy, becoming yellowish on older plants; petals reddish fading to yellowish on the edges, or some petals almost entirely yellow.

ECHINOCEREUS MARITIMUS (M. E. Jones) Schum. On rocky slopes in the vicinity of the spring, No. 10702. Stems numerous, forming cushion-like colonies 1 or 2 feet across; spines white, ranged on 8 ribs; petals yellowish with broad brownish stripe down the middle.

MAMMILLARIA PONDII Greene. On rocky slopes in the vicinity of the spring, No. 10703. Stems clustered or spreading, a foot long, the cottony pubescence varying in amount.

PHACELIA IXODES Kell. Rocky wash above the settlement, No. 10678; rock crevices of marine bluff, South Bay, No. 10712.

Plants 1—2.5 feet tall with widely spreading branches; stems and leaves heavily glandular, the glandular secretion odorous; corolla-limb pale lavender, the throat brownish-tinged. On examination the plant seems definitely an annual, but its bushy habit gives it the appearance of a perennial.

**CRYPTANTHA GRAYI* (Vasey & Rose) Macbr. var. *CRYPTOCHÆTA* (Macbr.) Johnston. Sandy place on wash above the settlement, *No. 10690*. In Lower California this plant has been reported heretofore only from the extreme southern part.

HELIOTROPIUM CURASSAVICUM L. var. *XEROPHILUM* (Ckll.) Nels. & Macbr. Occasional in the upper part of the wash above the settlement. *No. 10682*.

PHYSALIS GREENEI Vasey & Rose. Rocky wash above the settlement, *No. 10692*. Stems prostrate; herbage glandular; corolla greenish-yellow.

GALVESIA JUNCEA (Benth.) Gray. Shrubby plants 3 feet tall on the wash above the settlement, *No. 10693*.

PENSTEMON CERROSENSIS Kell. Occasional on rocky slopes near the spring, *No. 10696*. Fruiting specimens with gray-green leaves.

BEBBIA JUNCEA (Benth.) Greene. Common shrub on the wash above the settlement, *No. 10675*. The plants are densely branched and form mounds 4—6 feet tall and 10 feet or more across.

FRANSERIA CHENOPODIIFOLIA Benth. Common shrub on the wash above the settlement, *No. 10687*. The stems and leaves are sticky-glandular and odorous.

GUTIERREZIA SAROTHRÆ (Pursh) Britt. & Rusby. Common bushes on the wash above the settlement, *No. 10689*.

ISOCOMA sp. According to my notes a species of *Isocoma* was a common shrubby plant along the wash above South Bay, but I have not been able to locate my specimens collected as *No. 10710*.

PERITYLE GRAYI Rose. Glandular and odorous plants from the wash above the settlement, *No. 10684*.

PERITYLE GREENEI Rose. From the sandy canyon bottom above South Bay, *No. 10706*.

POROPHYLLUM CEDRENSE Rose & Standl. Rocky wash above the settlement, No. 10683. Low, rather rigidly branched plant with odorous glaucous-blue stems and leaves.

SONCHUS OLERACEUS L. Occasional on wash above the settlement, No. 10686.

AMARANTHUS POWELLII IN CALIFORNIA

BY LOUIS CUTTER WHEELER
University of Pennsylvania, Philadelphia

The range given by Standley, North American Flora 21 (2) : 112 (1917) for *Amaranthus Powellii* S. Wats., Proc. Amer. Acad. Arts & Sci. 10: 347 (1875), "Oregon to Wyoming and northern Mexico; . . ." suggests the possibility that the species might occur in California. Examination of the specimens in the United States National Herbarium, where Standley prepared his treatment of the *Amaranthaceae* for the North American Flora, yielded several collections of *A. Powellii* from California: San Bernardino County: San Bernardino, Aug., 1893, S. B. Parish. Los Angeles County: Echo Park, Los Angeles, Oct., 1902, E. Braunton No. 705; Vernon, Los Angeles, Oct., 1902, E. Braunton No. 720. Amador County: New York Falls, alt. 1,500 ft., July 27, 1895, Geo. Hansen No. 1411 in part, rest *A. retroflexus*. Placer County: Auburn, June 24, 1892, Ed. Palmer No. 2402 and 2403. Alameda County: Alameda, Oct. 1, 1894, W. L. Jepson. Contra Costa County: Berkeley, Sept., 1894, W. L. Jepson.

None of these was labeled *A. Powellii*. It appears that Standley sorted the specimens into the right folders, but left most with the original names given them by the collectors.

Any report of this sort calls for a statement of the difference between the species being reported and the species with which it may have been confused. Of the native or naturalized monœcious species of *Amaranthus* occurring in California which have primarily terminal inflorescences and dehiscent utricles there are four species. *Amaranthus fimbriatus* (Torr.) Benth. ex S. Wats. is readily separated from the others by its broadly spatulate pistillate sepals. The others may be distinguished as follows:

Pistillate sepals (at least the longer in each flower) conspicuously exceeding the utricle, all spreading at maturity, oblong-linear, most in each flower obtuse or truncate or emarginate and sub-erose, often aristate; stamens 5.....*A. retroflexus*

Pistillate sepals shorter than, to slightly exceeding, the utricle, erect, lanceolate, entire, tapering gradually to the terminal arista.

Seeds elliptical to broadly ovate in outline, 1.1—1.3 mm. long, brownish-black; stamens 3 in some of the flowers on any plant, sometimes 4 or 5.....*A. Powellii*

Seeds circular in outline; not over 1 mm. in diameter, jet black; stamens 5.....*A. hybridus*

It will be helpful in using the key to know the frequency of flowers with three stamens in *A. Powellii*, as it would be tedious to examine all the numerous staminate flowers on an unknown plant on the chance that one might have only three stamens. Of 37 staminate flowers from 9 plants in the 8 collections definitely referred above to typical *A. Powellii*, 17 had 3 stamens, 6 had 4, and 15 had 5. Flowers with 3 stamens were always encountered within the first 6 examined on any plant and, as will be seen from the above data, nearly half had 3 stamens.

In addition to the characters given in the key to distinguish *A. Powellii* from *A. hybridus*, the former has spiciform panicles thicker, longer, and more conspicuously aristate-spiny-bracted while the latter has spiciform panicles more slender, shorter, and obscurely aristate-spiny-bracted. These latter characters are useful when both species are in hand. In actual practice it is unnecessary to count the stamens if ripe seeds are available since the combination of size, outline, and usually color makes it easy to distinguish the two species. There is one collection of two plants one of which is plain *A. retroflexus* and the other *A. Powellii* with enough characters of *A. retroflexus* to suggest a hybrid: Mendocino County: Kaisen District, Aug., 1903, *Jas. McMurphy No. 3* (U. S. Nat. Herb.). This putative hybrid has the leaves, tomentulose stem, and 5 stamens of *A. retroflexus* but the inflorescence and seeds of *A. Powellii*. A similar combination of the foliage and tomentulose stem of *A. retroflexus* with the inflorescence and pistillate flowers of *A. hybridus* is the following: Blue Ridge Mountains, Rockingham Co., Virginia, *Fosberg No. 17427* (Univ. of Penn.).

A collection of *Amaranthus* from Araquipa Ranch, Vacaville, Sonoma County, California, Oct., 1892, *W. L. Jepson* (U. S.

Nat. Herb.) is worthy of special comment. It is apparently teratological, judging by the few seeds matured. Pistillate flowers are numerous, but on casual dissection only one staminate flower was noted and it had three stamens. One perfect flower with one stamen was found. The prevailingly blunt pistillate sepals suggest an affinity with *A. retroflexus*, but other characters do not. The specimen consists of a leafless terminal panicle 40 cm. long, composed of numerous more or less ascending slender (about 1 cm. thick) panicles mostly 10—15 cm. long made up of very numerous overlapping subtriangular conspicuously bracted spikes about 3 mm. broad and up to 10 mm. long. Similar autumnal phases with elongated spikes which appear as if braided occur in other species.

WESTERN PLANTS FROM HERE AND THERE

BY JOHN THOMAS HOWELL

The following collections (in Herb. Calif. Acad. Sci. unless otherwise indicated) seem to represent new records for the states from which they are being reported. All are indigenous except the first.

SCHISMUS ARABICUS Nees. Near Las Vegas, Clark Co., Nevada, *Eastwood & Howell No. 8954*. (Cf. Hoover, *Leaf. West. Bot.* 3:114, 115.)

CORALLORRHIZA TRIFIDA Chatelain. *C. innata* R. Br. Near Treasure Lake, Snake Range, White Pine Co., Nevada, *Ripley & Barneby No. 4038*.

ERIOGONUM ESMERALDENSE Wats. East slope of Inyo Mts. near the summit south of Seep Hole Spring, Inyo Co., California, *Kerr No. 3276*.

ERIOGONUM VILLIFLORUM Gray. Calcareous gravel slopes in juniper zone near Shoshone, White Pine Co., Nevada, *Ripley & Barneby No. 3537*.

RUMEX UTAHENSIS Rech. f. Hope Valley, Alpine Co., California, *Eastwood & Howell No. 8393*.

CYOPTERUS WATSONII (C. & R.) M. E. Jones. Sagebrush flats, 10 miles south of Beaver, Iron Co., Utah, *Eastwood & Howell No. 9341*.

LINANTHUS MOHAVENSIS H. L. Mason. Alkaline depressions on high mobile dunes, 10 miles south of Callaway, Nye

Co., Nevada, *Ripley & Barneby No. 3634*; slopes southwest of Columbus Salt Marsh, Esmeralda Co., Nevada, *Eastwood & Howell No. 9512a*.

MILTITZIA PUSILLA Gray. Alkaline flats east of Whitmore Tubs, Long Valley, Mono Co., California, *J. T. Howell No. 14382*.

PHACELIA NEGLECTA M. E. Jones. Alkaline flats, 10 miles northeast of Las Vegas, Clark Co., Nevada, *Eastwood & Howell No. 8974*.

PHACELIA CALTHIFOLIA Brand. Amargossa Desert, Nye Co., Nevada, *M. E. Jones in 1907* (Herb. Pomona College).

CRYPTANTHA GLOMERIFLORA Greene. Foothills of Toquima Range near Belmont, Nye Co., Nevada, *Ripley & Barneby No. 3699*; Third Creek at 8500 ft., near Mt. Rose, Washoe Co., Nevada, *J. T. Howell No. 14059*.

SONNEA FOLIACEA Greene. *Plagiobothrys hispidus* Gray var. *foliaceus* (Greene) Johnston. Scree of volcanic rocks, Agnew Pass, Madera Co., California, *J. T. Howell No. 16885*.

MIMULUS PARRYI Gray. West slope of Westgard Pass just above Bachelder Spring, Inyo Co., California *Eastwood & Howell No. 9620*; volcanic flats in pass near south end of Pancake Range, Nye Co., Nevada, *Eastwood & Howell No. 9438*. (Previously reported from Nevada from Lincoln Co. by Maguire, *Leafl. West. Bot.* 3: 13.)

ANTENNARIA SUFFRUTESCENS Greene. Oregon Mt. north of Monumental, Del Norte Co., California, *Eastwood & Howell No. 3753*.

ERIGERON NUDATUS Gray. Oregon Mt. north of Monumental, Del Norte Co., California, *Eastwood & Howell No. 3718*.

VERONICA TRIPHYLLOS L. IN CALIFORNIA. This annual European species, in which the lowest pair of leaves are crenate or subentire and the upper leaves deeply 3-lobed or 3-parted, has been collected in the vicinity of Yreka, Siskiyou County, in March, 1914, by L. E. Smith, and in 1933 by M. S. Baker (*No. 7353*, "Thomas Ranch, 2 miles south of Yreka"). Apparently it has not been reported before from California. Pennell's report of its occurrence in Kansas is the only American record for this plant that I have found in the literature (*Philadel. Acad. Nat. Sci. Monogr.* 1: 333,—1935).—John Thomas Howell.

SOLANUM LANCEOLATUM IN CALIFORNIA

BY ALICE EASTWOOD

Mr. G. R. Gorton, Deputy Agricultural Commissioner in charge of quarantine, Los Angeles County Agricultural Commission, sent me in August, 1939, a *Solanum* for identification. He reported it as "a rampant grower and inclined to spread in volunteer fashion, in fact, it is practically naturalized in portions of the county." As it seemed to be a Mexican species and I was in doubt, I sent it to Dr. P. C. Standley, Field Museum, Chicago, whose book on the "Trees of Mexico" is one of the most important publications of the National Herbarium. Here is his reply:

"The California *Solanum* is *S. lanceolatum* Cav. Of this species we have authentic material from the Madrid Herbarium, also various specimens from southern Mexico. The California specimen shows a greater tendency toward pinnatifid leaves, but this, I think, is only because the branches are comparatively young and vigorous."

Dunal in DeCandolle's *Prodromus* (13, pt. 1:343) under *S. lanceolatum* Cav. adds var. *sinuatum* which describes this plant better than the description in Cavanilles' *Icones* (3:23, tab. 245). In *Herb. Calif. Acad. Sci.*, a specimen resembling the plate in Cavanilles' *Icones* was collected by Paul C. Russell and Max Souviron (*No. 245*) at Molinas, Pueblo, Mexico, and labelled *S. laurifolium* Mill. Another specimen, from the Botanical Museum at Berlin, collected on Monte Alban near Oaxaca, Mexico, *Seler No. 4397*, also labelled *S. laurifolium* Mill., resembles the plant from Los Angeles. In Standley's "Trees of Mexico" under *S. laurifolium*, seven synonyms are listed, *S. lanceolatum* Cav. among them. This seems to indicate great variability as well as a wide distribution.

From the specimens received, the plant seems to be subshrubby and about 1 m. high. The leaves are extremely different on the same plant, those at the upper part lanceolate-acuminate and entire, though some are slightly wavy-margined. The lower and larger leaves are bluntly and irregularly lobed below the middle, the upper part entire, oblong-ovate and obtuse. The base of the leaves is cuneate. Stems, leaves, and flowers are clothed

with a white tomentum. The older stems and leaves become smoother in age and the upper surface smoother and greener than the lower. The tone of the leaves is greenish rather than white and the veins are conspicuous. The main stems are clothed with spines. The inflorescence is a cymose panicle on long peduncles in the upper leaf-axils. The flowers are closely clustered but the fruit is more scattered. The corolla is a light purplish-blue about 15 mm. across and very downy on the back. The orange berries are about the size of a pea on erect secund pedicels.

Solanum lanceolatum probably spreads from the long root-stocks. The birds also may distribute the seeds. In Golden Gate Park and elsewhere in San Francisco, *S. marginatum* L. f. and *S. Gayanum* (Remy) Phil. f. appear spontaneously.

Solanum lanceolatum was formerly in Golden Gate Park where it was known as *S. crotonifolium* Humb. & Bonp.

STUDIES IN PHACELIA—III

BY JOHN THOMAS HOWELL

Phacelia austromontana J. T. Howell, spec. nov. Annuæ caulibus plerumque fastigiatae lateque ramosis ex basi, interdum simplicibus infra et plus minusve ramosis supra, 0.5—2 dm. altis, hirsutulo-glandulosis, pilis capitato-glandulosis paucis vel numerosis; foliis integris prominenter paucidentatis vel pinnato-lobatis, lobis utrinque 1—4, laminis lineari-lanceolatis ad oblongis vel ovatis, præsertim 1—3 cm. longis et 0.2—1.5 (vel 2) cm. latis, hirsutis glandulosisque, apice acutis, basi cuneatis, petiolis ad 2 cm. longis; racemis laxifloris vel densifloris, partem foliosam plantæ paulo excedentibus, in senectute elongatis et usque ad 5 cm. longis, pedicellis 2—3 mm. longis infra, brevioribus supra, vel raro circa 1 cm. longis, pedicellis infimis patentibus vel recurvatis in fructu; lobis calycis inæqualibus in latitudine et longitudine, ad anthesin 2.5—3.5 mm. longis, 0.25—1 mm. latis, in fructu 3.5—5.5 (vel 8) mm. longis, 0.3—1.5 (vel 2) mm. latis, linearibus ad spatulato-oblancoatis, subacutis, hirsutis et plus minusve glandulosis; corolla cæsia, prompte decidua, aperte campanulata, 3—5 mm. longa, tuba 2—2.5 mm. longa; squamis 0.75—1 mm. longis, subquadrangularibus, squamis jugorum vicinorum marginibus liberis connatis; staminibus et corolla subæquilongis vel staminibus paulo longioribus, 2—4 mm. longis, filamentis glabris, lævibus vel processus retrorsos tuberculatos ferentibus, antheris 0.3—0.5 mm. longis; stylo et ramis 3—4 mm. longis, stylo hirsutulo prope basin, ramis 1.25—2 mm. longis, ovario circa 1 mm. longo, ovulis 4; capsulis turgide ovatis, 3—3.5 mm. longis, aliquantum prominenter rostratis,

piloso-puberulis et paulo capitato-glandulosis; seminibus 2—4, 1.5—1.75 mm. longis, oblongis vel oblongo-ovatis, subacutis, spadiceis, crasse foveo-latis.

Type: Herb. Calif. Acad. Sci. No. 188265, collected on the South Fork of Rock Creek at 6000 ft., San Gabriel Mts., Los Angeles Co., California, June 2, 1928, by Frank W. Peirson, No. 7940. *Phacelia austromontana* ranges from the southern Sierra Nevada and Panamint Mts. south to the San Bernardino Mts. in California and it occurs locally in the Pine Valley Mts., Washington Co., Utah.

Phacelia austromontana is closely related to *P. Eisenii* T. S. Brandg., but may be distinguished from it by the usually more robust habit, the connate corolla-scales, the less deeply parted style, and the markedly unequal lobes of the fruiting calyx. It is also related to *P. Quickii* J. T. Howell, but in that species the corolla becomes tubular-contracted after flowering and is tardily deciduous. *Phacelia austromontana* is related to *P. inconspicua* Greene, which has been collected only by Greene in the West Humboldt Mts., Nevada, but it differs from that rare species in its open corolla and glandular pubescence.

There is considerable variation in the material of *P. austromontana* that has been examined, but most of the variation seems to result from environmental factors and the fluctuating differences in leaf-form have not seemed worthy of nomenclatural recognition. *Phacelia humilis* var. *lobata* Davidson (Bull. S. Calif. Acad. Sci. 5:61,—1906) is to be referred to *P. austromontana* although on examination the type (Herb. Mus. Los Angeles County) was found to be a mixture of *P. austromontana* and *P. Davidsonii* Gray.

Phacelia Barnebyana J. T. Howell, spec. nov. Herba annua elegans gracillima erecta 0.4—1.5 dm. alta, purpurascens simplex vel pauci-ramosa prope basin; caulibus hirsutulo-villosis pilis longioribus capitato-glandulosis brevioribus tenuioribus haud glandulosis; foliis plerumque prope basin plantarum elliptico-oblongis ad ovatis, 0.4—1.5 cm. longis, 0.2—0.7 cm. latis, integris vel paulum repandis vel sæpe aliquot serraturas prominentes ferentibus, hirsutulis glandulosisque, apice obtusis subacutisve, basi late cuneatis ad rotundatis, petiolis ad 2 cm. longis; racemis substrictis elongatis, ad 1 dm. longis, floribus distantibus, pedicellis gracillimis, 0.4—1 cm. longis, patentibus vel adscendentibus, calyce maturato longioribus; calyce ad anthesin 2—2.5 mm. longo, lineari-oblongo ad oblanceolato, in senectute 3—4.5 mm. longo, sparse hirsutulo et glanduloso vix capsulam excedenti; corolla dilute lilacina, tubulato-campanulata, (3—) 4.5—5 mm. longa, tenuiter glandu-

loso-pubescenti vel subglabra extra, lobis 0.6—1 mm. longis; squamis linearibus vel obsolescentibus; staminibus subæqualibus, 2 mm. longis, filamentis glabris, antheris rotundis, 0.25—0.33 mm. diametro; stylo 2 mm. longis, glabris, ramis perbrevibus capitellatisque circa 0.2—0.3 mm. longis; ovario 0.75 mm. longo, hirsutulo-barbato supra pubescenti infra, ovulis 18—20; capsula 3—4 mm. longa, elliptico-oblonga ad late ovata, sparse hirsuta pilis longis, apice rotundata et breviter apiculata; seminibus turgide ovoideis, 0.75—1 mm. longis, brunnescentibus vel nigrescentibus, crasse foveolatis.

Type: Herb. Calif. Acad. Sci. No. 293736, collected at 5500 ft. on Clark Mt. near Mountain Pass, eastern San Bernardino Co., California, May 8, 1941, by H. D. Ripley and R. C. Barneby, No. 3362. Two other collections, both from California, are: head of Johnson Canyon, 8000 ft., Panamint Mts., Inyo Co., June 16, 1938, *Gilman No. 3134* (Herb. Pomona College); south of Seep Hole Spring, east side of Inyo Mts. near summit, Inyo Co., July 3, 1941, *Kerr No. 3271*.

Phacelia Barnebyana is related to both *P. incana* Brand and *P. nevadensis* J. T. Howell (*P. pusilla* Torr., not Buckl.), but from both of them it differs in its more slender habit, purple-tinged stem, more glandular indument, frequently toothed leaves, and much smaller calyces. It is both an honor and pleasure to name this attractive little plant for Mr. R. C. Barneby, who with Mr. H. D. Ripley has achieved such brilliant results from critical field studies in the deserts of southwestern United States.

A NOTABLE ACCESSION TO THE CALIFORNIAN CHICKWEEDS. An especially noteworthy extension of range may be reported with the discovery of *Stellaria obtusa* Engelm. in the high inner North Coast Ranges of California at Plaskett Meadow, Glenn County. The specimen that I have examined is *M. S. Baker No. 10186* which was found growing in a box of *Viola Macloskeyi* which Mr. Baker had transplanted to his experimental garden at Kenwood, Sonoma County, from Plaskett Meadow in July, 1941. On a more recent visit to Plaskett Meadow in July, 1942, Mr. Baker found the plant growing in the meadow in a dense turf of grasses and sedges where he had obtained his transplant, but he reports that the chickweed was very rare. The nearest locality where this distinctive little plant has been found heretofore seems to be in the mountains of northeastern Oregon (Peck, Man. Higher Pl. Ore., p. 289).—John Thomas Howell.

LEAFLETS
of
WESTERN BOTANY

CONTENTS

	PAGE
Miscellaneous Diagnoses	193
R. C. BARNEBY	
Further Studies in Eriogonum—V	200
SUSAN G. STOKES	
New Western Lupines	202
ALICE EASTWOOD	
Plantæ Occidentales—III	205
JOHN THOMAS HOWELL	

SAN FRANCISCO, CALIFORNIA

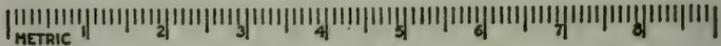
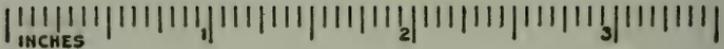
FEBRUARY 18, 1943

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as

LEAFL. WEST. BOT.



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ALICE EASTWOOD and JOHN THOMAS HOWELL

MISCELLANEOUS DIAGNOSES

BY R. C. BARNEBY

The present paper is devoted to the description of several unrecognized novelties collected by Mr. H. D. Ripley and the writer in the Southwest. In the preliminary studies the herbarium of Pomona College has, with the kind permission of Dr. P. A. Munz, been consulted on various occasions. The writer is also especially indebted to Miss Alice Eastwood, who has loaned indispensable and valuable material from the collections at California Academy of Sciences. These are more fully acknowledged in the text. Types of all proposed entities are deposited in the herbarium of the Academy.

Psoralea (PEDIOMELUM) *epipsila* Barneby spec. nov. *P. nephitica* S. Wats. varietatique suae *retrorsae* (Rydb.) Kearney & Peebles proxime affinis, sed ab ea calyce dimidio longiori, ab hac corolla haud exserta dentibus calycinis æquilonga, ab ambabus vero caulibus manifeste caulescentibus, stipulis infimis haud imbricatis, foliolisque superne discoloribus glaberrimis evidentius nigro-punctatis facillime separanda.

Perennis e radice elongato fusiformi farinaceo paucicipite, præter corollas atque superiorem foliolorum paginam undique sericeo-villosa: caulibus haud numerosis erectis simplicibus vel prope basin parce ramosis, 2—7 cm. longis, angulatis, ut pedunculi petiolique pilis brevibus subincurvis crispulis villisque longioribus patulis commixtis molliter strigoso- et villosocinerascentibus; stipulis membranaceis, late ovatis acutis vel acuminatis, 5—11 mm. longis, mox deciduis: petiolis circa 5 cm. longis, horizontaliter patentibus: foliis palmatis (3—) 5-foliolatis, foliolis breviter petiolulatis, obovatis obtusis vel acutiusculis haud raro mucronulatis, basi cuneatis, 1.5—2.5 cm. longis, obscure penninerviis, ciliatis et inferne pilis ascendentibus subappressis sericeo-cinereis, pagina superiori conspicue discolori, saturate viridi glaberrima, glandulis parvis fuscis impressis multipunctata: pedunculis petiolo folii suffulcrantis superatis erectis, in racemum 2—4 cm. longum abeuntibus: bracteis saltem inferioribus latissimis, 10—13 mm. longis, prope apicem sæpe 2—3-dentatis, dente terminali elongato-caudato, superioribus angustioribus plerumque integris, omnibus intus glabratis extus villosis ciliatisque: pedicellis filiformibus, circa 3 mm. longis, longe villosis: calycis intus glabri tubo membranaceo postice valde gibbo, 5—6 mm. longo, dentibus acutis adeo heteromorphis, superioribus 4 subæquilongis 7 mm. longis anguste lineari-lanceolatis, inferiori circa 8 mm. longo latius lanceolato ad medium 1.5—2.5 mm. lato: corolla dilute violacea dentibus calycinis æquilonga, præter magnitudinem ei *P. nephitica* omnibus partibus persimili: semine oblongo 4—5 mm. longo, 2.5 mm. lato, lævi nitido.

UTAH: red clay mesa 17 miles east of Kanab, towards Jepson Spring, Kane Co., alt. 5500 ft., 6 June 1942, *Ripley & Barneby*

* Leaflets of Western Botany, Vol. III, pp. 193-208, February 18, 1943.

No. 4832, type, Herb. Calif. Acad. Sci. No. 300410. ARIZONA: Buckskin Mts., Coconino Co., 19 June 1890, *Marcus E. Jones* (Pomona Coll. Herb. Nos. 27985 and 27986, annotated as "*P. castorea*").

Psoralea epipsila is one of the group of species with enlarged tuberiform roots to which belong the Indian Breadroots or Pommés Blanches of the prairie states, and which were segregated by Rydberg as the genus *Pediomelum*. In general structure it resembles *P. mephitica* S. Wats. rather closely, but differs in being very distinctly caulescent and in the conspicuously bi-colored leaflets which are cinereous beneath but bright green, glabrous and punctate on the upper surface. In the size of the flowers *P. epipsila* is intermediate between *P. mephitica* and its variety *retrorsa* (Rydb.) Kearney & Peebles, but in both of these the corolla is manifestly, though in the former but shortly, exserted from the calyx-lobes, while in ours the banner barely equals the lowest and largest lobe. Jones' ample specimens from Arizona bear both flower and fruit and it is from them only that the character of the seed has been observed. They should perhaps have been regarded as the type, but the vague indication of locality, presumably somewhere in the northern foothills of the Kaibab Plateau south of Kanab, led me to discard them in favor of our own collection.

Polygala subspinoso S. Wats. var. *heterorhyncha* Barneby, var. nov. *P. subspinoso* sensu Munz, Man. S. Calif. Bot. 282 (1935); Jepson, Fl. Calif. 2: 414 (1936); Jaeger, Desert Wildflrs. 123, fig. 267 (1940); Blake, Contrib. Fl. Nev. 18:2 (1941), omn. pro parte quoad loc. calif.; Barneby, Leaf. W. Bot. 3:111 (1942), non S. Wats.

A var. *typica* nob.* carinae rostro longiori ventraliter profunde emarginato nec integro, floribus majoribus, foliis caulinis mediis arcte sessilibus nec breviter petiolatis, praesertim late ellipticis basi cuneatis nec spatulato-oblongeolatis inferne attenuatis diversa.

NEVADA: denuded alkaline calcareous foothills of the Spotted Range towards Frenchman Flat, southeastern Nye Co., alt. 3200 ft., 13 May 1941, *Ripley & Barneby* No. 3427, type, Herb. Calif. Acad. Sci. No. 286840; between Bonnie Clare and Beatty, Nye Co., *M. F. Gilman* No. 2549 (Pomona Coll. Herb.). CALIFORNIA: Chloride Cliff, Death Valley, Inyo Co., *Jaeger* No. 1101 (Pomona).

* *Polygala subspinoso* var. *typica* Barneby, nom. nov. *P. subspinoso* S. Wats., Amer. Nat. 7:299 (1873), sensu stricto.

As will be seen from the bibliography already cited, *P. subspinoso* var. *heterorhyncha* is the plant which in recent years has passed as typical among California botanists, but, while in habit it very closely resembles the type, it may be separated by a number of significant details, chief among which is the structure of the keel. In *P. subspinoso* var. *typica* the keel is terminated by a straight or very slightly declined blunt and entire beak which is 1.5—2 mm. in length: the corresponding organ in var. *heterorhyncha*, on the other hand, is emarginate on the lower side at about the middle with a deep, rounded notch or fold 0.5—0.75 mm. in diameter, the margins of which are elevated and variously undulate. The whole beak is usually longer than in the type (up to 3 mm.) and occasionally a second smaller tooth is produced near the apex. In drying or in age the beak sometimes becomes strongly declined and the notch is thereby closed, but in the fresh flower it is always evident and may be discerned obscurely in Jaeger's figure (1. c.). In addition to this peculiarity the flowers of the variety are larger, 13 mm. long as opposed to a maximum 10.5 mm. in the var. *typica*, and the broadest cauline leaves, particularly those subtending the lower branches of the inflorescence, are perceptibly broader, strictly sessile at the cuneate base, and inclined to be elliptic in outline rather than oblanceolate or spatulate and narrowed to a very short petiole as in all other specimens examined. Also the fresh herbage of var. *heterorhyncha* is glaucescent, a character often lost in the herbarium. The altitude at which the variety occurs is considerably lower.

Through the kindness of Miss Eastwood, who loaned all the material of *P. subspinoso* at the California Academy together with authentic specimens of *P. lasseniana* Heller, it has been possible, in conjunction with the collections at Pomona College, to study the species throughout almost its entire known range, and the following observations have been made. Some variation is evident in the development and persistence of the spines, the former attributable probably to the age of the specimens and the latter to considerations of habitat, for, while plants growing on barren alkaline slopes or mesas (the usual environment) generally spring from a subterranean caudex and are truly herbaceous, those inhabiting stony slopes (e. g., Ripley & Barneby No. 3562) have an aerial caudex and growing stems intricately enlaced by

the persistent spiny branches of the preceding year. The flowers are somewhat variable in length (9—11 mm.) and the sepals may be obtuse, acute or acuminate. The only variation which has been found to be correlated with distribution, however, is that of pubescence on the exterior surface of the outer sepals. In all material from the Navajo Basin, including that from Kanab, Utah, the sepals are entirely glabrous: west of the Wasatch, however, and reaching through middle Nevada into Lassen County, California, occurs a race indistinguishable from the former save for the fact that the fine hirsutulous pubescence of the herbage and pedicels extends upwards along the midvein of the outer sepals, occasionally recurring along the dorsal edge of the upper petals. To this race belongs *P. lasseniana* Hel.

In publishing *P. lasseniana* (Leaflet West. Bot. 2:230,—1940), Mr. Heller gave no diagnosis beyond a brief indication that his species was related to *P. acanthoclada* A. Gray. No mention was made of *P. subspinosa*, but this must surely have been an oversight, for, although the plant is connected with *P. acanthoclada*, the affinity is comparatively remote, while I find that the isotype before me (*Heller No. 15213*) can be distinguished from *P. subspinosa* of New Mexico and Utah only in the puberulence, sometimes very obscure, of the exterior sepals, and not at all, by any detail of significance, from Nevada specimens of the species. It would seem therefore that *P. subspinosa*, as accepted hitherto, should be divided into two varieties, var. *typica* nob. from transmontane northern California, Nevada, Utah, and northern Arizona and New Mexico, and var. *heterorhyncha* which inhabits a much more restricted area in the deserts of southwestern Nevada and the adjacent Death Valley region of California. If it should be found desirable to separate the two races of *P. subspinosa* var. *typica* indicated above, the identity of the type, about which some ambiguity exists in the literature, will have to be established beyond question. That Watson's original specific concept included both forms is evident from the phrase in his description "sepals naked or ciliate" and may also be inferred from the provenance of the three collections (Silver City, Nevada, *Kellogg*; Arizona, *Palmer*; Kanab, *Mrs. Thompson*) from which the characters of the species were drawn. Dr. Jepson (Fl. Calif., l. c.) for unstated reasons took the Ellen Thompson

collection from southern Utah as the type, but, as this is cited last by Watson, the choice of Kellogg's gathering from Nevada as made by Wootton & Standley (Contrib. U. S. Nat. Herb. 19:392,—1915) is probably more correct. None of the three collections has been examined by the writer, but there is little doubt that at least the Kellogg element will prove to belong to the race with hirsutulous sepals, and therefore, that *P. lasseniana* is exactly synonymous with *P. subspinosa* var. *typica* in the most restricted sense.

Additional stations in California, all from Lassen County, are indicated by the following specimens in the herbarium of the Academy: Surprise Valley, *Monnet No. 898*; south of Secret Valley on the road from Susanville to Alturas, *J. Kelly in 1937*. To the distribution of the species in Nevada as elaborated by Blake (1941, l. c.) should be added Lincoln County (Highland Range, *Ripley & Barneby No. 3498*).

Cryptantha (OREOCARYA) **semiglabra** Barneby spec. nov. nuculis acutangulis lævissimis *Jamesianis* Pays. et corolla alba exserta nuculisque contiguis *C. capitata* (Eastw.) I. Jtn. manifeste affinis, sed ab ea caulibus imis sericeo-subtomentosis, foliis superne glabratis nec strigosis-cinereis basalibus brevioribus in caulina æquilata sursum vix decrescentibus, thyrsis fructifero laxo angusto minime capitato demum 4-plo longiori, calyce minus accrescenti limboque corollino permagno diversissima.

Herba perennis cæspitosa e radice lignosa valida caudiceque ramoso petiolis foliorum evanidorum persistentibus inferne induto caules brevissimos steriles crebre foliatis florigerosque elatos numerosos emittenti oris: caulibus validis demum circa 2 dm. altis erectis flexuosis sulcatis ad ipsam basin villis longiusculis sericeis subtomentosis superne strigosis vel inflorescentiam versus setisque horridis pallidis plus minusve dense obsitis: foliis basalibus in apice caudicis ramulorum congestis erectis oblanceolatis, 3—7 cm. longis, 3—6 mm. latis, inferne attenuatis sed imo in petiolum dilatatum vaginantem abrupte expansis, caulinis numerosis in inflorescentiam sursum paulo decrescentibus sessilibus latius lanceolatis, omnibus sæpissime conduplicatis, pilis appressis in pustula demum accrescenti crustacea insidentibus subtus strigosis, pagina superiori saturate viridi omnino glabrata vel ad margines setoso-ciliatas parce strigulosa: racemis numerosis pedunculatis paucifloris, in thyrsis primum adeo congesto mox elongato fructifero angusto laxoque 10—14 cm. longo, circa 3 cm. lato, dispositis, infimis remotiusculis conspicue bracteatis supremis haud raro aliquantulum cymosis: pedicellis circa 3 mm. longis, ut racemorum axis calycesque setis 1.5—2 mm. longis patule urticaceo-horridis strigosisque: calyce ad anthesin circa 9 mm. longo, in lacinas 5 anguste lanceolatas fere ad basin abrupte obconicam fissis, fructifero ad 12 mm. usque longo accrescenti, laciniis erectis vel conniventibus nervo valido prominulo percursis: corollæ

albæ tubo exserto 11—12 mm. longo, 1.75 mm. diametro, sursum vix ampliato, limbi saltem 1 cm. lati lobulis suborbicularibus, fornicibus erectis obtusissimis flavis 1.25 mm. longis obscure papillosis: antheris 1.5 mm. longis, nunc ad medium tubum nunc in faucibus ipsis affixis: nuculis 4 contiguous ovatis obtusis, 4 mm. longis, stylo persistenti multo superatis, undique lævissimis nitidis griseolis, lateraliter acutangulis vel subalatis, faciebus dorsali 3 mm. lata, leviter prorsus inflexa, lateralibus 2 mm. latis, cicatrice arcte clauso 3.25 mm. alto, marginibus haud elevatis.

ARIZONA: on detrital clay hills about 2 miles east of Fredonia, northern Coconino Co., south of Kanab, Utah, alt. 4900 ft., 6 May 1942, flor., *Ripley & Barneby No. 4363*, and *ibid.*, 5 June, fruct, *No. 4829*. Types in Herb. Calif. Acad. Sci., Nos. 300408 and 300409.

Cryptantha semiglabra has the white corolla with tube exserted from the calyx and the smooth and shining, ovate, contiguous nutlets which together characterize *C. capitata* (Eastw.) I. Jtn. (*Oreocarya capitata* Eastw.), a species known only from the Grand Canyon of the Colorado and evidently its nearest relative. Through the generosity of Miss Eastwood the writer has had the opportunity of examining three sheets of the latter, including the type, *Eastwood No. 5969*, and cotype, *Eastwood & Howell No. 1005*, and a careful comparison has shown that, although closely allied, *C. capitata* and *C. semiglabra* differ in several important particulars. The most immediately striking difference lies in the distribution of the pubescence. In *C. semiglabra* the base of the stems and the uppermost parts of the caudex-branches are densely clothed in long, fine, silky hairs which become somewhat matted and hence subtomentose; the stems are strigose and become setose in the inflorescence; the lower surface of the leaves is coarsely strigose with stout trichomes seated upon a pustular, at length enlarged and crustaceous base, while the upper surface is glabrous or bears a few closely appressed filiform hairs toward the hispid-ciliate margins. In *C. capitata*, on the other hand, the base of the stem is not at all tomentose nor more markedly pubescent than the extremities, and the leaves are uniformly canescent-strigose above. The shining green upper surface of the leaves of *C. semiglabra*, as recognized in the specific epithet, gives a characteristic aspect to the plant, but it can scarcely be regarded as of the first importance when it is remembered that the allied *C. Jamesii* (Torr.) Pays. varies in the

same respect into an extreme and similarly glabrate form which has been described as *Oreocarya pustulosa* Rydb., and more reliance has been placed on other criteria.

In *C. capitata* the flowers are loosely congested into an inconspicuously bracteate, head-like, cymose glomerule about 2 cm. in diameter, sometimes with one or two depauperate axillary racemes below, but in any case, even in fruit, the inflorescence does not exceed 3 cm. in length. The fruiting inflorescence of *C. semiglabra*, however, is a long narrow thyrsus of pedunculate, few-flowered scorpioid racemes, reaching a minimum length of 10 cm. at maturity and conspicuously leafy-bracted in the lower half. The leaves of *C. capitata* are linear-lanceolate, the broadest and longest being those clustered on the rootstock, while in ours the lanceolate cauline leaves are quite as broad and nearly as long as the basal, more numerous than in *C. capitata* and scarcely diminishing upwards as in that species. In addition *C. semiglabra* differs in the dimensions of the less markedly accrescent calyx, as well as in the broader limb of the corolla.

The flowers of *C. semiglabra*, as in many species of *Oreocarya*, are dimorphic in respect to the insertion of the stamens. In most of our specimens the anthers are attached at a point on the corolla-tube a little above or nearly at the middle, but in a few they are placed just within the orifice of the throat and immediately below the fornicies. The tube itself is also somewhat variable in length, with limits of about 9 and 12 mm., but this is not correlated with the position of the stamens.

Cryptantha semiglabra was found quite locally in the badlands east of Fredonia where it occurs on sterile red hills, in gullies or on steep clay banks, associated with *C. echinoides* (M. E. Jones) Pays., the common *Oreocarya* of the region, *Asclepias cryptoceras* S. Wats., *Astragalus Pattersonii* A. Gray and *Phacelia Palmeri* Torr. All these species are commonly confined to stiff detrital soils of rather high alkaline content, and the *Cryptantha* is no doubt adapted to the same conditions.

Gilia salticola Eastwood, nom. nov. This name is suggested to replace *G. alpina* Eastwood, Leaf. West. Bot. 2: 282 (1940), which is a later homonym of *G. alpina* (Wedd.) Brand. Das Pflanzenr. IV. 250: 107 (1907).—Alice Eastwood.

FURTHER STUDIES IN ERIOGONUM—V

BY SUSAN G. STOKES

Eriogonum fulvum Stokes, spec. nov. Subhirsutum; caudice ligneo, ramoso, tecto basibus marcescentibus petiolorum; foliis confertis, rosulatis, dense pubescentibus, laminis ovalibus, multo brevioribus petiolis; pedunculis pubescentibus, 1.5—2.5 dm. altis, ferentibus radios paucos et unum sessile involucrem in axillis radiorum; involucri turbinatis, breviter dentatis, dense et persistente fulvo-pubescentibus, non tomentosis; floribus eburneis vel roseis, glabris, sessilibus, basi angustatis, segmentis perianthii late obovatis vel ellipticis, 2—3 mm. longis.

Type: Herb. Calif. Acad. Sci. No. 221423, collected at Bickleton, Washington, June 29, 1930, by M. E. Jones, No. 25225. A duplicate of the same collection is in the Dudley Herbarium, Stanford University. Branching at the base, it is not unlike *E. ovalifolium* Nutt. from which it differs in the character of the pubescence, the shape of the flowers, the divisions of the perianth, and the mode of branching of the rays which curve upward.

Eriogonum chrysocephalum Gray subsp. **bannockense** Stokes, subsp. nov. Perenne, dense cæspitosum ex radice lignea; caudice congesto multis ramis brevibus et foliis erectis; foliis numerosis, lineari-lanceolatis, circa 2—7 cm. longis, petiolis 5—20 mm. longis; pedunculis solis ex ramis caudicum, gracilibus, erectis, 10—15 cm. altis; involucri capitatis, sessilibus, bracteatis, bracteis angustis, acutis, tomentosis, membranaceis, turbinatis longe dentatis; floribus flavescentibus, glabris, in juventute turbinatis, in senectute obtusis et crassioribus.

Type: Herb. Calif. Acad. Sci. No. 300415, collected May 26, 1939, at Pocatello, Bannock Co., Idaho, by Prof. Ray J. Davis, No. 842. Another specimen, *Davis No. 2000*, was collected June 26, 1940, at "dry hill point 7 miles northwest of Pocatello, range 34 east, township 8 south." It is not infrequent in collections from Idaho.

Eriogonum Davisianum Stokes, spec. nov. Caudex perennis, ramosus, tectus basibus marcescentibus petiolorum; foliis 5—6 cm. longis, tomentosis, laminis ellipticis ad ovato-orbiculatis, apice obtusis, basi cuneatis, petiolis gracilibus, 3—6 cm. longis; pedunculis 1 ad pluribus ex ramis caudicum, 1.5—3 cm. altis; involucri capitatis, turbinatis, breviter dentatis, dentibus circa 3 mm. longis, bracteatis, pubescentibus, bracteis 3—6 mm. longis; floribus numerosis, flavescentibus, roseo-tinctis, 2—2.5 mm. longis, glabris, segmentis perianthii elliptico-obovatis, nonnihil gibbosis.

Type: Herb. Univ. Idaho, collected May 24, 1940, by S. Garrett at St. Anthony, Fremont Co., Idaho, and submitted

by Prof. Ray J. Davis of the Southern Branch of the University of Idaho, Pocatello.

This suggests *E. pyrolaefolium* var. *coryphaeum* T. & G., but the pubescence is different and the flowers are glabrous. It appears to be the northern Rocky Mountain representative of that line which has followed a different climatic combination and been well isolated. In other ways it suggests *E. latens* Jepson, in which the flowers are attenuate at base.

Eriogonum nodosum Small subsp. **monoense** Stokes, subsp. nov. Perenne, amplum multis ramis intricatis et divaricatis suberectis, praeter flores omnino dense floccoso-tomentosum; pedunculis multo et obtuse ramosis; bracteis parvis, acutis; foliis late ovatis, 1—3 cm. longis et paulo angustioribus, petiolis brevioribus; involucri sessilibus, solis in axillis, apice ramulorum subcapitatis et dense confertis, dentibus invertis, majoribus 2 mm. diametro; floribus 1.5—2 mm. longis, fere inclusis in involucri, basi obtusis, segmentis perianthii obtusis, pallidis.

Type: Herb. Calif. Acad. Sci. No. 298959, collected Aug. 7, 1938, at the summit of the Sherwin Grade, Mono County, California, by J. T. Howell, No. 14362. It was collected also by Mark Kerr, No. 153, on Mt. Whitney Road, 6000 ft. elev. The subspecies is founded upon the small involucries and flowers and the subcapitate arrangement of the involucries.

Eriogonum saxatile Wats. subsp. **multicaule** Stokes, subsp. nov. Caudex caespitosus robustus, ligneus, multo ramosus ramis validis; foliis dense rosulatis, albo-tomentosis, ovatis, circa 1 cm. longis, longioribus petiolis; pedunculis numerosis (30—40), 6—12 cm. altis, radiis circa 2, virgatis, terminantibus in umbellis sessilibus, tectis bracteis; floribus numerosis, pallidis, stipitatis; segmentis perianthii 7 mm. longis, anguste ovatis, medio rubro-nervatis, anguste alatis vel callosis ad stipitem.

Type: Herb. Univ. Calif., collected by Annie M. Alexander and Louise A. Kellogg, No. 2478A, on Gold Mountain, Esmeralda County, Nevada. It grew with *E. ovalifolium* Nutt. In habit, profuse branching, and low inflorescence it differs from *E. saxatile*; but it exactly resembles the species in leaves, pubescence, bracts, involucries, and flowers.

Eriogonum pratense Stokes, spec. nov. Annum, nanum, diffusum ex basi et supra ramis recurvatis gracilibus; internodiis inferioribus 2—3 cm. longis, superioribus brevissimis; foliis basi confertis, linearilanceolatis, 5—10 mm. longis, tenuibus, villosis; inflorescentia late et multo ramosa; involucri glandulosis, in axillis superioribus brevi-pedunculatis; pedunculis involucriorum inferiorum 5—10 mm. longis; breve tempore floribus apertis, 2 mm. longis, cito floribus clausis, ovatis; segmentis perianthii pubescentibus, involutis, albis, rubiginoso-punctatis; antheris nigris.

Type: Herb. Univ. Calif., collected Aug. 21, 1942, by Annie M. Alexander and Louise A. Kellogg, No. 3357, on Cottonwood Creek, Inyo County, California, elev. 10,200 ft., where it occurred "on the outer edge of meadows growing thickly in small areas." This species is closely related to *E. spergulinum* Gray, but is quite distinct in floral character and short internodes. In outline the individual plants are much wider than high.

NEW WESTERN LUPINES

BY ALICE EASTWOOD

Lupinus antoninus Eastwood, spec. nov. Decumbens, tomentosus et pilosus ubicumque pilis albis et divaricatis; caulibus principibus circa 3—5 dm. longis ramulis pluribus brevibus foliosis; foliolis 5—7 lineari-lanceolatis, conduplicatis, falcatis, inferiore facie densius pilosis, maximis circa 2—5 cm. longis, 4 mm. latis, acutis, petiolis plerumque brevioribus foliolis; racemis terminantibus ramos vix superantibus folia, 1—1.5 dm. longis, dense floriferis, pedunculis 2—3 cm. longis, bracteis persistentibus, longioribus pedicellis, pedicellis circa 3—5 mm. longis; floribus circa 15 mm. longis, albis fulvis breve tempore; calyce basi gibboso, circa 2.5 mm. lato, labio superiore oblongo, 4 mm. longo apice bidentato, labio inferiore lanceolato, falcato, 1 cm. longo, apice obtuso; vexillo paululum brevioris alis, glabro, margine crispo, reflexo, ovato-orbiculato, 9 mm. longo et lato; alis circa 1 cm. longis, 5 mm. latis, stipite brevissimo; carina glabra, medio 4 mm. lata, apice obtusa, dorso et apice non tecta alis.

Type: Herb. Calif. Acad. Sci. No. 300988, collected July 10, 1941, on Anthony Peak, between Mendocino and Tehama counties, California, by Eastwood and Howell, No. 9840.

This is another member of the puzzling *L. formosus* group. The white flowers that become tawny almost as soon as they bloom mark it as distinct.

Lupinus Munzii Eastwood, spec. nov. Caulis basi sine foliis et nudus, perennis, striatus, adpresse sericeus villis tenuibus et sparsis, erecto-ramosus et foliosus; foliolis 7—9, conduplicatis, inæqualibus, oblongo-linearibus, acutis, adpresse tenuiter sericeis supra et infra, maximis 4.5 cm. longis, 8 mm. latis, petiolis gracilibus adpresso-sericeis, inferioribus longioribus foliolis, superioribus brevioribus; stipulis infimis adnatis $\frac{1}{2}$, parte libera filiformi, 5 mm. longa; racemis laxè subverticillatis, brevi-pedunculatis, pedicellis 2 mm. longis, adpresso-sericeis; calyce bracteolato, basi gibboso, 1.5 mm. lato, labio superiore circa 4 mm. longo, basi 3 mm. lato, apice bisecto 2 mm., labio inferiore 4.5 mm. longo, lanceolato, obtuso; floribus circa 1 cm. longis, vexillo circa 10 mm. longo et lato, prope basin sericeo et luteo, supra

pallido-cæruleo; alis pallido-cæruleis, 5 mm. latis, æquilongis vexillo, stipite 1 mm. longo; carina medio 4 mm. lata et ciliata.

Type: Herb. Calif. Acad. Sci. No. 253732, collected July 7, 1937, upper Wild Rose Canyon in Thornydyke's canyon, Panamint Mountains, Inyo County, California, by Philip A. Munz, No. 14818a. This is allied to *L. laxiflorus* Dougl., differing in stems leafless and naked at base, the gibbous base of the calyx, the longer calyx-divisions, and the color of the broader flowers. It is compared with a photograph and notes of the type taken by the author in Lindley's Herbarium, Cambridge University, England.

Lupinus rubro-soli Eastwood, spec. nov. Nanus cæspitosus, omnino laxe adpresse sericeo-pilosus; caudice ramoso ex radice longa, gracili, simplici: foliis totis radicalibus, foliolis 7 vel 8, oblanceolatis, maximis circa 11 mm. longis, 2 mm. latis, æqualiter pilosis supra et infra, superantibus scapos; stipulis adnatis petiolis, gracilibus, 2—7 mm. longis; racemis brevibus et dense floriferis, bracteis linearibus attenuatis brevioribus calycibus, pedicellis 1—2 mm. longis; calyce 4 mm. longo, tubo 1 mm. longo, basi obtuso, labio superiore oblongo, 2 mm. longo et lato, bisecto $\frac{1}{2}$, labio inferiore æquilongo, lanceolato, obtuso; corolla purpurea, 8 mm. longa; vexillo subelliptico, 7 mm. longo, 4 mm. lato, glabro, medio leviter punctato; alis æquilongis, 2.5 mm. latis, stipite 1 mm. longo; carina circa 6 mm. longa, erecta, curvata, dense villosa-ciliata ex medio ad apicem, stipite 1 mm. longo.

Type: Herb. Calif. Acad. Sci. No. 301107, collected June 21, 1937, on Red Mountain, Mendocino County, California, by Eastwood and Howell, No. 4674.

This is the Red Mountain on the boundary between Mendocino and Humboldt counties and so-called because of the red soil that colors every herb that grows thereon. *Lupinus rubro-soli* filled a low meadow near the summit and gave a beautiful color to the area. It seems to belong to the *L. Lyallii* group, but is a distinct entity.

Lupinus salticola Eastwood, spec. nov. Caules ramosi ex basi et supra, omnino dense villosi villis albis tenuibus divaricatis et adpressis; foliolis 6—8, oblanceolatis, maximis circa 2 cm. longis, 4 mm. latis, mucronatis, supra minus villosis, brevioribus petiolis; stipulis filiformibus, 3—5 mm. longis, villosis; racemis fere 2 dm. longis, terminantibus ramos, pedunculis 3—4 cm. longis, plerumque superantibus folia, pedicellis divaricatis, 3—4 mm. longis, bracteis caducis, circa æqualibus pedicellis; floribus verticillatis vel laxis, cæruleo-purpureis, circa 1 cm. longis; calyce basi obtuso, labio superiore 4 mm. longo, oblongo tridentato, labio inferiore paulo longiore, lanceolato, obtuso; vexillo late obovato 10 mm. lato, circa 9 mm. longo,

dorso glabro, prope apicem purpureo-maculato, infra albo, margine crispo, separatim alis 4 mm.; alis lilacinis, 1 cm. longis, 8 mm. latis, exteriore paulo villosis; carina curvata, ventro glabra, dorso paulo villosa, tecta alis.

Type: Herb. Calif. Acad. Sci. No. 293870, collected May 16, 1941, on the west side of Walker Pass near the summit by Eastwood and Howell, No. 9634.

This beautiful lupine is one of the smaller-flowered species belonging to the group with strongly curved glabrous keel and villous pubescence. Generally they grow in clumps and are often somewhat decumbent. They are summer-bloomers. This is perhaps nearest to *L. lilacinus* Heller (Leafl. West. Bot. 2: 280,—1940).

Lupinus uncialis Wats. var. **cryptanthus** Eastwood, var. nov. Differt: floribus occultis foliis.

Type: Herb. Calif. Acad. Sci. No. 301104, collected at Current Creek, Nye County, Nevada, by Eastwood and Howell, No. 9402, May 14, 1941.

We almost missed collecting this tiny lupine, as the flowers were completely hidden by the leaves. The plants resembled the tiny mats or rosulate clusters of leaves of a plant yet to flower.

Lupinus VanDykeæ Eastwood, spec. nov. Caulis basi sine foliis et nudus, supra foliosus, perennis circa 6 dm. altus, simplex vel ramos abortivos ferens, sparse adpresso-pubescentis; foliis 7 vel 8, anguste oblongo-linearibus, acutis, conduplicatis, supra glabris, infra adpresso-sericeis, maximis 3—4 cm. longis, 8 mm. latis, petiolis gracilibus, adpresso-sericeis, infimis longioribus foliolis, supremis brevioribus, stipulis filiformibus, basi adnatis; floribus circa 1 cm. longis et latis cærulescentibus, dense verticillatis in racemis terminalibus, brevi-pedunculatis, pedicellis circa 3 mm. longis; calyce adpresso-sericeo, basi 2 mm. lato, gibboso vel subcalcarato, labio superiore deltoideo, circa 3 mm. longo, apice bidentato, labio inferiore lanceolato, 5 mm. longo, obtuso; vexillo glabro, reflexo, cærulescente, medio aurantiaco, 10 mm. lato et longo, stipite lato 2 mm. longo; alis 11 mm. longis, 5 mm. latis, stipite 2 mm. longo; carina falcata, ciliata supra medium, tecta alis, apice purpurea, 3 mm. lata medio.

Type: Herb. Calif. Acad. Sci. No. 180231, collected June 30, 1930, near the east entrance to Glacier National Park, Montana, by the late Mrs. E. C. Van Dyke in whose honor it is named. Mrs. Van Dyke collected plants for the California Academy of Sciences while Dr. Van Dyke collected insects. I have great pleasure in giving this lovely lupine her name.

PLANTÆ OCCIDENTALES—III

BY JOHN THOMAS HOWELL

Chorizanthe Thurberi (Gray) Wats. var. **macrotheca** J. T. Howell, var. nov. A specie differt: involucris majoribus (ad 9 mm. longis et latis) et conspicue venulosis.

Type: Herb. Calif. Acad. Sci. No. 84941, collected at Alcalde, western Fresno Co., California, by Alice Eastwood, on May 9, 1893. Also known from a collection made in the Griswold Hills, southeastern San Benito Co., by Gregory S. Lyon (*No.* 796), on May 10, 1936.

Although this variety seems to differ only in the larger size of its veiny involucre, it is very different in appearance from the species and is entirely worthy of a name. The species is common enough in the Mohave Desert and has also been collected on the western slope of the mountains at the head of the San Joaquin Valley, but the variety undoubtedly represents a geographic segregate peculiar to the hills bordering the west side of the San Joaquin Valley in one of California's distinctive floristic provinces. That the plant must be rare there, however, is evidenced by the fact that, until now, it has been known in the literature from only a single collection (cf. *Zoe* 4:158).

Eriogonum zionis J. T. Howell var. **coccineum** J. T. Howell, var. nov. A var. *typico** per flores majores (ad 5 cm. longos) et speciosissime coccineo-tintos abluens.

Type: Herb. Calif. Acad. Sci. No. 293860, collected at Point Sublime on the North Rim of the Grand Canyon, Coconino Co., Arizona, by Dr. Harold C. Bryant, Aug. 21, 1941. According to Dr. Bryant, this variety has also been found on the South Rim.

The scarlet flowers of this canyon buckwheat are in startling contrast to the drab greenish-yellow flowers of the typical Zion buckwheat and indicates a distinguished variant that should be recognized by name. The larger flowers of var. *coccineum* might appear at first to connect *E. zionis* too closely with *E. racemosum* Nutt., but the peculiarities of floral structure that were used to distinguish the Zion buckwheat originally are to be found in the flowers of var. *coccineum*. Also the variety has the glabrous upwardly inflated stems that give to the Zion buckwheat its distinctive appearance.

* *Eriogonum zionis* var. *typicum* J. T. Howell, nom. nov. *E. zionis* J. T. Howell, *Leaflet West. Bot.* 2:253 (1940).

Limnanthes Bakeri J. T. Howell, spec. nov. Herba flaccida glaberrima levis erecta plerumque simplex ex basi et supra vel 1- vel 2-ramosa, 1—2 dm. alta, sparse foliosa internodiis elongatis; foliis inferioribus erectis, longe petiolatis et 5-foliolatis, petiolis ad 1 dm. longis, foliolis ellipticis usque ad ovatis, 1—1.5 cm. longis, 0.5—0.7 cm. latis, integerrimis vel rarissime unidentatis, obtusis vel subacutis, basi late cuneatis et interdum breviter petiolulatis, foliis superioribus vel 3-foliolatis vel simplicibus, brevipetiolatis subsessilibusve; floribus axillaribus in pedunculis divaricate patentibus ad 1 dm. longis infra; sepalis ovato-lanceolatis, 5—8 mm. longis, 2—3.5 mm. latis; petalis subcuneiformibus, 6—9 mm. longis, 3—4 mm. latis, subtruncatis vel paulum emarginatis, apice crasse ad sublaciniate denticulatis, angustatis sensim infra sed basibus haud unguiculatis, albis supra dilute citrinis et pellucide venosis infra, intrinsecus pilos dispersos longos (2—3 mm.) ferentibus supra, ad basin sæpe duabus v-formibus lineis pilorum breviorum ornatis; staminibus 2—3.5 mm. longis, antheris prope 1 mm. longis; stylo 2—3.5 mm. longo; nucula obovata, 2—3 mm. longa, apice processis tenuibus subacutis dense tuberculata.

Type: Herb. Calif. Acad. Sci. No. 301275, collected about 3 miles north of Willits, Mendocino Co., California, by Milo S. Baker, No. 9538, Apr. 15, 1940. A second collection, *M. S. Baker* No. 9939, was made on Apr. 8, 1941, "1.2 miles north of Willits High School west of the highway."

Because of the leaves with few broad prevailingly obtuse leaflets (or leaf-divisions), *L. Bakeri* presents an appearance different from any known species and it may be distinguished by this obvious character. From the widespread and variable *L. Douglasii* R. Br., near which it grew according to Mr. Baker, it may be further distinguished not only in the character of its fruit but also in its much shorter stamens and styles, these barely exceeding the top of the nutlets. From the point of view of relationship it seems to be nearer *L. gracilis* Howell and *L. striata* Jeps., other species with relatively short stamens and styles, differing from the former in its brownish more densely tuberculate nutlets and more abundantly hairy petals, and from the latter in its differently shaped flowers and pellucidly nerved petals with broader more sparsely hairy base.

Phacelia Leonis J. T. Howell, spec. nov. Herba annua pumila erecta glandulosa hirsutulaque, 2—12 cm. alta, caulibus sæpe elongatis infra folia prima foliacea pauci-ramosis supra; foliis linearibus ad lineari-oblongis vel lineari-lanceolatis, 0.5—3 cm. longis, 1—4 mm. latis, hirsutulis et capitato-glandulosis, integerrimis, acutis, basi anguste cuneato-attenuatis in petiolum anguste marginatum circa 3 mm. longum; racemis 1—9 cm. longis,

plerumque paulum patentibus non flexuosis, floribus approximatis vel paulum distantibus, pedicellis 1—2 mm. longis vel brevioribus; segmentis calycis circa 2 mm. longis et 0.5—1 mm. latis ad anthesin, in fructu valde inequalibus 4—7 mm. longis, 0.5—1.2 mm. latis, linearibus ad oblaucolatis, glanduloso-hirsutulis; corolla lilacina, aperte campanulata, 2—3 mm. longa, tubo 1 mm. longo, lobis tenuiter crenulatis; squamis minoribus, circa 0.5 mm. longis, marginibus liberis connatisve, interdum obsolescentibus; staminibus 1.75—2 mm. longis, filamentis glabris vel tenuiter et sparse pilosiusculis, antheris circa 0.25 mm. longis; stylo et ramis 2 mm. longis, ramis 1.3 mm. longis vel prope distinctis ad basin, stylo glabro; ovario sparse longe piloso et glanduloso, 0.6 mm. longo, ovulis 6—8; capsula late elliptica, 3—3.5 mm. longa, 2—2.5 mm. lata, obtusa, breviter apiculata, hirsutula et sparse capitato-glandulosa prope apicem; seminibus subovatis, 1.75 mm. longis, paulum grosse foveolatis.

Type: Herb. Calif. Acad. Sci. No. 291857, collected on an open slope at the summit of the Siskiyou Mts. on the Takilma-Happy Camp road, Siskiyou Co., California, alt. 5,500 ft., July 6, 1939, by C. Leo Hitchcock and J. P. Martin, No. 5217. Dupl. in Herb. Univ. Wash.

This little phacelia is known only from the mountains of northern California and is apparently restricted to the geologically significant Siskiyou highland. It is most closely related to *P. Pringlei* Gray but is readily distinguished from that species, which is also a narrow endemic in the same region, by its much smaller and differently shaped flowers. It is a real pleasure to name this interesting little plant for my friend, Prof. C. L. Hitchcock, Chairman, Department of Botany, University of Washington.

Cordylanthus nidularius J. T. Howell, spec. nov. Herba prostrata viscido-glandulosa purpureo-viridis, caulibus ramosis ex basi, gracilibus, 1—4 dm. longis, pubescentibus pilis patentibus viscidulis paululum odoratis et pilis multo brevioribus retosis non glandulosis; foliis caulibus anguste linearibus, 1—5 cm. longis, ad 2 mm. latis, integerrimis vel lobis lineares 1 vel 2 ferentibus, foliis supremis 3-fidis flores subtendentibus et bracteis similibus; floribus plus minusve dispersis in ramulis vel laxe aggregatis apicibus, erectis, bracteis 1.5 cm. longis, 3-fidis, viscidulo-pilosis, segmentis anguste linearibus, apice paulum dilatatis et glanduloso-callosis, 1—1.2 cm. longis, lateralibus medio 1 mm. brevioribus; calyce diphylo, segmentis purpureo-nervatis, 6 mm. longis, 3 mm. latis, segmento superiore lanceolato apiculate acuto, inferiore oblongo-lanceolato, obtuso, 7-nervato; corollâ alba vel lilacino-tincta, 13—15 mm. longis, labiis æquilongis, labio inferiori roseo-purpureo-striato, tubo 5 mm. longo, fauce 4 mm. longa; staminibus 4, filamentis capitellato-ampliatâ apice, antheris 2-locularibus; capsula 7 mm. longa; seminibus triangulari-ovatis, dorso rugulosis.

Type: Herb. Calif. Acad. Sci. No. 300508, collected on the serpentine slope northeast of Deer Flat, north side of Mt. Diablo, Contra Costa Co., California, by J. T. Howell, No. 17044, July 19, 1942.

This striking accession to the so-called "bird's-beaks" is clearly allied to those entities related to *C. pilosus* Gray, and, following Mrs. Ferris' clear straightforward treatment of the group (Taxonomy and distribution of *Adenostegia*, Bull. Torr. Bot. Club 45:399—423, pl. 10—12,—1918), I have accepted it as a species. According to her key to the species of *Adenostegia* § *Euadenostegia* (p. 403), *C. nidularius* is most nearly related to *Adenostegia viscida* Howell [*C. viscidus* (Howell) Pennell]. From that species of northern California and southwestern Oregon, the Mt. Diablo plant differs in habit, in the more densely glandular-pilose pubescence especially in the inflorescence, and in the veining of the calyx-segments, as well as in minor variations of size of parts.

Cordylanthus nidularius was very abundant on the limited serpentine flats where it was discovered and the interlacing branches of the numerous plants formed unbroken mats over much of the area. And what a strange mat it formed with its numerous erect flowers looking like nothing so much as the jowly uplifted heads of hungry nestlings expecting food! Associated with the rare cordylanthus were *Streptanthus glandulosus* Hook., *Linum Breweri* Gray, *Monardella Douglasii* Benth., and *Navarretia mellita* Greene.

A NEW ALIEN IN CALIFORNIA. In a limited area near the Blair Grove on the Redwood Highway in Humboldt County, I collected *Torilis arvensis* (Huds.) Link on July 8, 1942. It was growing vigorously and may become a pest as the seeds are like burs. This is the first record from California. It has probably spread from Oregon, where Mr. Howell and I collected it, June 3, 1936, No. 2826, near Roseburg, Douglas County. Dr. Helen M. Gilkey, in her "Handbook of Northwest Flowering Plants," has reported it as sparingly introduced in Oregon, but it is not in Morton E. Peck's "A Manual of the Higher Plants of Oregon."—Alice Eastwood.

LEAFLETS *of* WESTERN BOTANY

CONTENTS

	PAGE
The Names of the Giant Sequoia	209
WILLIAM A. DAYTON	
Some Veronicas in Golden Gate Park	220
ALICE EASTWOOD	
The Correct Name for the Pacific Involucrate Trifolium	222
JOSEPH EWAN	
Marin County Miscellany—I	225
JOHN THOMAS HOWELL	
Notes on Chorizanthe	230
GEORGE J. GOODMAN	
New Varieties of Western Plants—III	230
JOHN THOMAS HOWELL	

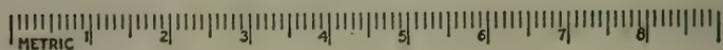
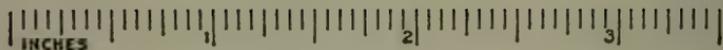
*This number published with funds from the
California Botanical Club*

SAN FRANCISCO, CALIFORNIA
APRIL 30, 1943

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as
LEAFL. WEST. BOT.



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THE NAMES OF THE GIANT SEQUOIA

A Discussion

BY WILLIAM A. DAYTON

*In charge, Dendrology and Range Forage Investigations,
U. S. Forest Service*

The synonymy of the botanical name of the giant sequoia, or bigtree, has been so fully set forth by others (for example, in terminal bibliography see 4, 14, 17, 18, 23) that there is no need to repeat it here. The fact remains, however, that four different Latin names are at present in vogue for this largest, oldest and, in some respects, most remarkable of trees: *Sequoia gigantea* (Lindl.) Dec., *Sequoia Washingtoniana* (Winsl.) Sudw., *Sequoia Wellingtonia* Seem., and *Sequoiadendron giganteum* (Lindl.) Buchh.

The name *Sequoia Washingtoniana* (Winsl.) Sudw. originated with the United States Forest Service, that name having been used by the late George B. Sudworth, Dendrologist of the Forest Service until his death in 1927 (17, 18, 19, 20). Some other authors (3, 6, 7, 22), following the lead of the Federal Forest Service, also use *Sequoia Washingtoniana*. Forest Service regulations require that the nomenclature of Sudworth's Check List (20) be followed in all publications and reports of the Service. However, as a result of recommendations made by the U. S. Department of Agriculture's Committee on Plant Names, the Secretary of Agriculture issued an order on April 30, 1940, requiring that the Department follow International Rules of Botanical Nomenclature. No one, I believe, has disputed Buchholz' statement (4) that the name *Sequoia Washingtoniana* (Winsl.) Sudw. is untenable under International Rules. Also, no one denies that *Sequoia gigantea* (Lindl.) Dec., being a homonym, is untenable under present International Rules. That leaves us with two names valid under Rules: *Sequoia Wellingtonia* Seem., a name I recall having seen in only one American tree or botanical book and that one 47 years old (14), and *Sequoiadendron giganteum* (Lindl.) Buchh., used by Buchholz, Rehder, and Bailey (4, 13, 2). Unfortunately, however, we are not faced alone by a choice between these two names, but by the fact that the name *Sequoia gigantea* not only continues to survive but is, far and away, the generally used scientific name for

* Leaflets of Western Botany, Vol. III, pp. 209-232, April 30, 1943.

this tree. Indeed, the National Park Service, which has almost exclusive custody of this tree, has formally adopted the name *Sequoia gigantea* for it. Abrams, Collingwood, Jepson, McMinn and Maino, and Sargent in their well-known manuals (1, 5, 8, 10, 15) use *Sequoia gigantea*. And to this agree the more popular works, such as those of Whitney (23) and Shirley (16).

In connection with my work on the new edition of "Standardized Plant Names" (9), it seemed desirable to circularize California botanists, using for that purpose the directory of the American Society of Plant Taxonomists, with the following question:

"What are California botanists (presumably following International Rules) *now* calling the Giant Sequoia, or Bigtree:

1. *Sequoiadendron giganteum*
2. *Sequoia Washingtoniana* (very doubtfully tenable)
3. *Sequoia Wellingtonia*
4. *Sequoia gigantea* (a homonym, of course)?"

To the above inquiry, 29 replies were received from the following botanists: Prof. W. E. Allen, Prof. E. B. Babcock, Dr. Rimo Bacigalupi, Prof. Lyman Benson, Mrs. H. P. Bracelin, Dr. Jens Clausen, Mr. Ira W. Clokey, Prof. Lincoln Constance, the late Miss Ethel Crum, Dr. Easter E. Cupp, Miss Alice Eastwood, Prof. Carl Epling, Mrs. Roxana S. Ferris, Dr. Doris Kildale Gillespie, Mrs. Dorothy R. Harvey, Dr. William M. Hiesey, Mr. John Thomas Howell, Prof. W. L. Jepson, Prof. Arthur M. Johnson, Dr. David D. Keck, Prof. H. E. McMinn, Prof. P. A. Munz, Mr. Donald Culross Peattie, Mr. Lewis S. Rose, Miss Beryl O. Schreiber (now Mrs. Holger J. Jespersion), Prof. G. Ledyard Stebbins, Jr., Dr. Louis C. Wheeler, and Prof. Ira L. Wiggins. My warm thanks are extended to these botanists for their gracious and kind coöperation.

I realize fully that scientific truth is not determined by majority votes (alas, human experience demonstrates that the factual is frequently adhered to by the minority only). Nevertheless, the replies received contain so much of interest that it seems desirable to record the results, and particularly so since so many who replied have requested that that be done. To make the record more complete, it is regretted that, even after two requests, no reply was received from nine of the botanists ad-

dressed including, alas, four or five of the most distinguished systematists of the State. The letter addressed to one of these nine people, Miss Florence S. Youngberg, at Pomona College, Claremont, California, was returned by the postal authorities marked "unclaimed" and "moved; left no address." One reply received immersed me in embarrassment, the poor man explaining that he was writing it on a hospital bed. I hereby convey my sincere apologies to any of the botanists I did not hear from if I impertinently insinuated myself under untoward circumstances, such as illness, childbirth, sabbatical leave, or a honeymoon.

Of the 29 replies received:

- 24 state definitely that California botanists generally continue to call this tree *Sequoia gigantea*;
- 10 are definitely opposed to accepting *Sequoiadendron* as a valid genus;
- 8 definitely state that they would like to see the name *Sequoia gigantea* conserved (although that question was not asked);
- 3 favor adoption of *Sequoiadendron*, but 2 of these "provisionally";
- 3 are noncommittal about any of these names;
- 2 express themselves as having "no personal objection" to accepting *Sequoia Wellingtonia*;
- 2 feel unprepared or unqualified to express an opinion.

With the permission¹ of the respective authors, there is quoted below, arranged alphabetically by the authors' surnames, what seem to be the most significant parts of twenty of the letters received:

"I have never seen or heard any name except *Sequoia gigantea*. Two of the younger men here have the same experience" (Prof. W. E. Allen).

"Personally, I have no objection to the binomial *Sequoia Wellingtonia*, rejected for the most part I suspect on chauvinistic grounds, although it is the earliest name that may, beyond the slightest shadow of doubt, stand as tenable. But the specific question seems to be: What are California botanists now calling the Giant Sequoia or Bigtree? As far as my experience goes, they are still calling it by the unlawful name, *Sequoia gigantea*" (Dr. Rimo Bacigalupi).

"In my opinion Buchholz gave apparently ample support for the segregation of *Sequoiadendron* by his list of characters published in the American

¹ With this permission, however, has gone the deletion of the more spicy parts of some of the original communications; this, though understandable enough, is regretted for the sake of the general reader!

Journal of Botany. My interpretation of genera and species is decidedly conservative. However, it seems to me that Buchholz has done a fine piece of research and that he has shown probably a clear need for the segregation proposed. I presume that many botanists, and laymen alike, will stick to the name *Sequoia gigantea* since it has been used so long, but retention of it may be against the best evidence we have concerning the correct classification of the tree. However, this matter is not one for us to attempt to settle in our armchairs, and it is to be attacked not only by study of living material but fossil as well. It is possible that despite the many differences in the two redwoods the gap between them may be bridged completely as more prehistoric material becomes available" (Prof. Lyman Benson).

"California botanists call it *Sequoia gigantea*. It is called thus for sentiment and for botanical reasons. I have not heard one botanist agree to any other name. To anyone who has lived among those trees, the name of our country might as well be changed as to change *Sequoia gigantea* to any of the 3 names suggested. . . . No single species of plant has had its name published so often in every tiny newspaper, magazines, . . . circulars, not to mention books, for all of the years of the history of California. It would run into thousands upon thousands of citations and regardless of what group of botanists decide upon a different name, the tree will go on being called *Sequoia gigantea*. Millions of visitors come to this State to view that tree" (Mrs. H. P. Bracelin).

"We all wish that the rules permitted conserved specific names. There is very little enthusiasm for separating the Giant Sequoia and the Coast Redwood into different genera. Irrespective of Buchholz' excellent embryological investigations, it is felt that the two species are considerably related and of similar origin. The Coniferæ are a relatively primitive group, and their embryological patterns are evidently not as fixed as in less primitive families. In their distribution, ecology and chromosome numbers, the two sequoias follow a very common pattern characteristic of Californian species of one genus. Also, leaf variants of *Sequoia sempervirens* are known, which mimic the leaves of *S. gigantea*, indicating that the former has genic potentialities capable of producing forms which would minimize the differences in respect to the leaves. When selection, as here, has wiped out the intermediate species, then those which remain loom up as very distinct and we are deceived thereby. Scientifically the proper proportions would probably be restored by putting the sequoias back into *Taxodium*, but because of the common usage of these names I would not advocate such a move. Of the two evils I would prefer *Sequoia Wellingtonia* for *Sequoiadendron*, but I suspect that most Californian botanists will continue to use the name *Sequoia gigantea*. It will be very difficult, if not impossible, to change a name in such general, and even public usage" (Dr. Jens Clausen).

"As the question is stated there can be only a single truthful answer, the California botanists are unanimously calling the Big Tree *Sequoia gigantea*. We are all quite aware that this is a specific violation of the International Rules, but I do not think that this will make any difference.

The objection to a name change in conformity with the Rules would impose an artificial change upon a long-established and universally accepted scientific name, known even to many laymen. . . . California botanists will probably work for conservation of the *specific* name. As to what it should be called (under the Rules), the answer is of course entirely different. . . . If the plant remains in the genus *Sequoia*, its correct specific name is *Wellingtonia*. The other problem is a taxonomic one, upon which western botanists are divided" (Prof. Lincoln Constance).

"I don't believe in placing the large-coned *Sequoia* in a different genus, and I also believe that no matter what the nomenclatorial status is nobody will ever call it by any other name than *Sequoia gigantea* which is so suitable" (Miss Alice Eastwood).

"Buchholz, it seems to me, has presented cogent evidence for generic segregation of the Big Tree and the Redwood, and I am willing to follow his lead until other evidence suggests another course. However, the general acceptance of his genus, and hence its validity in a taxonomic sense, will depend upon the composite opinion of a series of botanists over a period of time. The genus is too newly proposed to have received either rejection or acceptance as yet. The implication of this statement is that the scope and content of a given genus is arbitrary and determined by opinion to a much greater degree than that of a given species. I object strongly to employing the epithet *Wellingtonia*, as being meaningless and misleading. If any of the available names had clear and unquestioned priority, then I believe that most botanists would accept that one, regardless of its connotation. Since this is not the case, I believe that usage and fitness should be the determining factors. The name *gigantea* is not only the sole name employed by botanists, foresters and even the general public to some extent or other, it is well chosen and descriptive. You will probably not have immediate and wide acceptance of the generic name *Sequoiadendron*, perhaps in part because of its length, but you will assuredly fail in any attempt to establish either *Wellingtonia* or *Washingtoniana* as specific epithets" (Prof. Carl Epling).

"Although illegal, the name *Sequoia gigantea* is used exclusively in the western floras and manuals, and is one of the few scientific names well-known to the general public and will probably always be so-called by the non-professionals, regardless of rules. Legally the name *Sequoia Wellingtonia* seems to be the one to be used unless some ruling can be made to retain the more well-known name, *gigantea*" (Mrs. Roxana S. Ferris, writing in her own behalf and for Dr. C. Piper Smith).

"In answer to your question, 'What are California botanists now calling the Giant Sequoia?', I feel that the answer certainly is: *Sequoia gigantea*. If you were to inquire as to my own preference in the matter, my reply would be in favor of the same name. I believe that its long established usage justifies conserving it even though outlawed by the present version of the International Rules" (Dr. Wm. M. Hiesey).

"Californians and California botanists in particular are still calling the 'Big Tree' *Sequoia gigantea*, a scientific name that has about as nearly

approached permanence through usage as any I can think of. . . . I have not gone into the claims of *Sequoiadendron* sufficiently to know if it should be accepted. The proper evaluation of the genus *Sequoia* must include a consideration of paleobotanical evidence which I do not believe has been done by the proponents of *Sequoiadendron*" (Mr. John Thomas Howell).

"The scientific name for the Big Tree of the Sierra Nevada, *Sequoia gigantea*, has been in use by botanists for nearly ninety years. During that time the name has spread widely all over the world, not only in scientific writings but in the general literature of all kinds. Some little study has been given the matter and I am prepared to say that a skilled bibliographer working steadily for six hundred years could not compile a complete bibliography of all the literature of every kind published in the United States which has used the name *Sequoia gigantea*. What more should botanists wish than that the general public should accept one of their scientific plant names and make almost universal use of it? It is to the public a definite name applicable only to the Big Tree of the Sierra Nevada. If one add the author to the name and write *Sequoia gigantea* Dec. then one has a name that is to botanists precise, definite and scientifically intelligible, a name which clearly excludes any other species. However, at present, it has no standing under the present International Rules of Botanical Nomenclature, nor under the so-called American Code. Nevertheless, it was a valid name until 1930. I had always used it as the name for the Big Tree and always shall. Some day it may be put on a Nomina Specifica Conservanda list. Such a nomenclatorial category was proposed to the International Botanical Congress when it met in Amsterdam in 1935, mainly by South African delegates, but supported by some English delegates and by a few American delegates, including myself; but the proposal lost on vote of the Congress. Such a measure is, however, certain to come up again and may be expected to gain ground" (Prof. W. L. Jepson).

"The name *Sequoia gigantea* has become almost if not wholly a tradition in California. Any change in the name would produce a distinct shock among 'plant lovers.' *Sequoiadendron giganteum* would be a knockout to these good people. . . . Your Committee has a thankless job, but all power to you. And if you could in some way use your influence towards getting some common sense into this hopeless confusion in names you will perform a most valuable service. And I wish there were some way by which we could 'get at' dealers who seemingly deliberately falsify names of plants for commercial purposes. We do have a pure food law; we should have also a pure plant-name law" (Prof. Arthur M. Johnson).

"I shall continue to call the Big Tree or Giant Sequoia *Sequoia gigantea*. The reasoning I employ is as follows: (1) I reject *Sequoiadendron* as a distinct genus. The two remaining species of *Sequoia* have a considerable number of differences separating them, as Buchholz has painstakingly pointed out, and as coniferous genera go these may now be considered by many as of generic importance. However, no one has demonstrated, I think, that the two sequoias are more like other species than they are

like each other. They surely are products of a common line of evolution, little understood though that may be. They are not more different from each other than a number of unlike species in many of our genera, and because the intermediate species have been lost in *Sequoia*, we are by no means obliged now to cleave the genus in half. If the suggestion had been made and adopted one hundred years ago, we all would probably be happy enough with the situation now, but there is a tremendous confusion introduced into the literature by drawing this unnecessary distinction today. (2) *Sequoia gigantea* has stood as the name for the Giant Sequoia for about 86 years and has been universally adopted in the West. It is used in our three big floras (Jepson 2, Abrams 1), and in our silvas and tree manuals. There are no projected new floras or new editions of old ones in sight that are apt to bring about a change in the name *Sequoia gigantea* in these California reference books within the next twenty years or so, so that most people will continue to use the old name regardless of how botanists legislate.

The name *Sequoia gigantea* was legal under International Rules until the Congress of 1930 upset it by an act of legislation. It is my personal feeling that another piece of legislation is now needed to correct this unfortunate change for this plant. I favor the principle of a conserved list of specific names for those few cases such as the present one that seem justified. Here is a tree that has entered the literature of zoölogy as well as botany, of history, travel, letters, forestry, conservation, etc. The tree, being the outstanding giant of the living world, is well known to many people of all lands, and its name is as commonly used as that of many of the common economic crop plants of the earth. Taxonomists should make every attempt to avoid creating confusion in a now very extensive literature by changing this name. I well realize that the principle of conserved specific names has once been voted down by the International Congress, but I hope it will come up again and then succeed. This case well illustrates the need for it. The zoölogists have such a provision in their rules and the botanists should not be less progressive. I think the whole case hinges upon the fact that extensive common usage in this case creates a law greater than the 1930 amendment to International Rules. I shall look forward expectantly to seeing what your poll of public opinion brings forth" (Dr. David D. Keck).

"I have waited to reply until I had conferred with other botanists of the San Francisco Bay region. From the standpoint of pure science I suppose we should call the Giant Sequoia, *Sequoiadendron giganteum*. However, most of the botanists with whom I have talked, as well as I, will continue to call the Bigtree, *Sequoia gigantea*" (Prof. H. E. McMinn).

". . . All the California botanists to whom I have spoken speak of the Bigtree as *Sequoia gigantea*. I am acquainted with the controversy and still think that *S. gigantea* is the only appropriate name. No one ever confuses the Sierran trees with the coastal ones, which are definitely known as *S. sempervirens*, although the name *S. gigantea* seems to have been

applied to them once, but in error. I do not believe that there is any need of segregating the Bigtree under a new generic name, so as to preserve the specific name *S. gigantea*. In my opinion both the Bigtree and the Redwood belong to the same genus" (Mr. Lewis S. Rose).

"Personally I have been calling the Big Tree *Sequoia gigantea*. However, according to International Rules, I realize this name is invalid. . . . I have not been inclined to place it in a separate genus. Therefore, I presume the name which I will have to follow is *Sequoia Wellingtonia*. Since, however, the name *Sequoia gigantea* has been used over a long period of time it would seem rather difficult to impress a change of name on the public, it being such a well-known tree. In this case I think it is regrettable that specific names cannot be conserved according to International Rules, since it seems to me that the long popular usage of this name would warrant conservation, because not only botanists have been using this name but also the general public" (Mrs. Jespersion, née Miss Beryl O. Schreiber).

"When talking to other botanists or in my classes, I use *Sequoia gigantea* since that is the name people understand, although I realize that it is incorrect according to the rules of nomenclature" (Prof. G. Ledyard Stebbins, Jr.).

"Being both a Californian and a nomenclaturist, I am very much interested in the name of this species. The proper name according to the present Rules of botanical nomenclature is *Sequoia Wellingtonia* Seeman, if *Sequoiadendron* Buchholz is deemed an unnecessary innovation (aside from its apparent anticipation by *Americus*, 1854), which is my view. *Sequoia gigantea* Decaisne was valid until the homonym rule was passed in 1930" (Dr. Louis C. Wheeler).

"Apparently there are two questions involved in the name of the California Bigtree, first, the name which is being used generally by botanists and the lay public, and secondly, the name which can be applied and yet comply with the rules of nomenclature. It is my opinion that the illegal though long-used combination *Sequoia gigantea* (Lindl.) Decn. will probably continue to be used by the majority of people who are not attempting to monograph the conifers. *Sequoia gigantea* has been used by both Abrams and Jepson, and has also been accepted by Rehder, at least in the 1927 edition of the Cultivated Trees, and McMinn has also retained this name in his book. To the non-professional botanists the tree will undoubtedly remain *Sequoia gigantea*, regardless of what the botanical legalists do with the names. . . . It seems to me that the general retention of *Sequoia gigantea* in all save monographic works or technical floras might just as well be made. I believe this simply because the non-botanist is more or less irritated by the rules of nomenclature and the changes made necessary by them, and will be further angered by an attempt to discard a name well known and almost universally applied to a particularly conspicuous tree. At least, the present name might just as well be retained until some kind of definite ruling is made by a large body of botanists" (Prof. Ira L. Wiggins).

From the above, I think the conclusions may fairly be drawn that botanical opinion in California (the region directly concerned) :

- (1) Favors retention and use of the name *Sequoia gigantea* for the Giant Sequoia, or Bigtree.
- (2) Favors amendment of International Rules to conserve this name.
- (3) Is wary of accepting *Sequoiadendron* as a valid genus, at least at this time.

It seems worthwhile also to comment on a suggestion occasionally made that the generic name *Steinhauera* Presl (1838) perhaps synonymizes and renders superfluous Buchholz' genus *Sequoiadendron*. It will be recalled that, in International Rules, *Sequoia* Endl. (1847) is conserved as against the rejected *Steinhauera* Presl. Yet, if *Sequoia* be split into two genera, and *Steinhauera* and *Sequoiadendron* prove synonymous, *Steinhauera* would have to be restored.

Through the kindness of Dr. Roland W. Brown, distinguished paleobotanist of the U. S. Geological Survey and National Museum, I have been able to see the original description of the fossil genus *Steinhauera* Presl. As this book seems to be very rare and represented in very few libraries in this country, it seems desirable to reproduce the original description (12) verbatim below :

"Strobilus ovalis vel oblongus, utrinque rotundato-obtusus, squamis creberrimis imbricatis horizontaliter patientibus cuneato-oblongis spiraliter dispositis demum deciduis et cicatrices suborbiculatos umbilicatus relinquentes. Rudimenta seminum globosorum in squamarum axillis. Rachis cylindrica crassiuscula.

Genus hoc memorizæ reverendi Henrici Steinhauer dicatum prope. Pinites suum sibi vindicat locus et illi nempe speciebus fructu notis, quam maxime affine est. Strobili Steinhaueri inter minutos et minimos numerandi sunt."

In my judgment, neither the above description nor the plates which accompany it (No. 49, *Steinhauera subglobosa* Presl; No. 57, *S. oblonga* Presl) give any inkling whatever as to whether these two fossil Bohemian plants are more nearly related to *Sequoia gigantea* (*Wellingtonia*) than to *S. sempervirens*. International Rules have done well to reject *Steinhauera*, at least so far as living plants are concerned.

A few words should be added concerning a common name for the tree under discussion. It is believed that the common name Giant Sequoia, approved by the National Park Service, U. S. Forest Service, and Standardized Plant Names (9, 21) is less ambiguous and preferable to Bigtree for *Sequoia gigantea*, and that it is as much in common usage in California as is Bigtree. Prof. Emanuel Fritz of the Department of Forestry, University of California, a well-known authority on these trees, a forestry consultant of the California Redwood Association, a councilor of the Save-the-Redwoods League, and compiler of an immense bibliography (unfortunately still unpublished) of the Redwood, writes me, in part, as follows:

"A number of years ago, in a radio address, I proposed Sierra redwood and Coast redwood (as common names for the sequoias) because the generic relationship was thereby preserved . . . and the geographic separation would be cleared up in the minds of those not too familiar with their ranges. Some people think *S. gigantea* is a sequoia, but that *S. sempervirens* is not such, because some of us call the former Giant Sequoia. The name Bigtree is equally inappropriate. All along the Redwood Highway are signs like this, 'Big Tree Camp,' featuring a big eucalyptus; 'The First Big Trees,' featuring Douglas firs; 'Big Tree Park,' featuring coast redwoods. In the Sierra region, *S. gigantea* has been called since earliest times 'redwood' and we have Redwood Creeks there, a Redwood Mountain, etc., and even the lumber is locally called redwood. Incidentally, should you adopt *Sequoiadendron*, the common name, Giant Sequoia, must be dropped. So, please, in the interest of simplicity and usefulness, I beg of you on bended knee, don't accept Buchholz's new genus."

Whether redwood or sequoia be eventually adopted as the common name for the genus *Sequoia* is of less importance than that there should be general agreement on one or the other. The National Park Service, the U. S. Forest Service (21), and Standardized Plant Names (9) have preferred sequoia as an English generic name, chiefly because it agrees with the Latin generic name, and because there is only one genus *Sequoia*, but there are numerous "redwoods." For example, Meyer (11) lists lumber of 19 genera, belonging to 13 families, under the general name "redwood," so that there is bound to be less ambiguity with the name sequoia than with redwood.

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SOME VERONICAS IN GOLDEN GATE PARK

BY ALICE EASTWOOD

Among the many species of *Veronica* cultivated in Golden Gate Park, two that seem related and that differ most noticeably in the color of the flowers have been a puzzle to me. Both are shrubs with broad elliptical opposite leaves, alternately in two ranks so that they form the arms of a cross. One known as *V. elliptica* has white flowers slightly tinged with light purplish-blue and leaves of a pale green. The other which has passed under the name of *V. decussata* has dark lilac-purple flowers in densely flowered racemes, clustered towards the ends of the branches.

Veronica elliptica Forst. f. was originally collected by the Forsters, father and son, who were the botanists on Cook's second voyage in 1772. They found it at Dusky Bay, New Zealand, where later it was collected also by Menzies and Anderson. The true *V. decussata* Moench came to the gardens of Europe from the Falkland Islands, that small group southeast of the coast of South America. While it was introduced into the gardens of England in 1776 under that name, it was not published until 1785, and later was illustrated in several publications, notably Curtis Botanical Magazine, plate 242 (1793). The picture represents a species with few white flowers in short and rather lax racemes. It was described by Moench as a white-flowered shrub.*

In the first part of *Flora Antarctica*, Sir Joseph Hooker discusses the relative status of these two closely related white-flowered veronics and concludes both to be the same, a notable example of the similarities in floras of the different parts of the southern hemisphere. As *V. elliptica* is the earlier published name, he considers *V. decussata* a synonym. Some doubt has existed as to the actual identity of the two, the plants from the Falkland Islands being low shrubs while the New Zealand plants become trees. Sir Joseph Hooker describes one that he saw in the Lord Auckland's group south of New Zealand: "In Lord Auckland's group this species attains a much larger size than it

* Moench, Conrad. *Verzeichniss ausländischer Baume und Stauden*, p. 137 (1785). The description and reference are from Mrs. Janet R. Sellars, Librarian of the Arnold Arboretum.

does in America, there seldom exceeding four feet in height; while Forster describes the Dusky Bay tree as twelve feet and I have seen it as much as thirty on the margins of the woods close to the sea, where it may readily be distinguished by its pale green foliage and erect branches. I saw but one specimen in full flower, growing on an inaccessible rock overlooking Rendezvous Harbour; from a distance it looked powdered with white flowers."

In looking over the lists of trees and shrubs published in the early reports of the Commissioners of Golden Gate Park after Mr. McLaren had become superintendent, I find *V. decussata* in the report of 1889. In that year, 933 were in the nursery. Both it and *V. elliptica* appear in the lists in the report of 1892. In the 1893 report, 320 *V. elliptica* plants were in the nursery and 300 *V. decussata*. In this report 12 veronicas were listed. These lists of plants in the old park reports indicate Mr. McLaren's interest in introducing new species into cultivation and convince me that he introduced more species into California than any other person.

I wrote to Mr. H. M. Butterfield to learn when either one was first advertised in some of the early nursery catalogues. *Veronica elliptica* appears first in the 1884 catalogue of the Santa Clara Nursery of R. D. Fox which after his death in 1881 was taken over by his nephew. *Veronica decussata* appears in none. Where the lilac-purple veronica that has been called *V. decussata* originated I have been unable to learn. When A. L. Cockayne was here several years ago, he said that he had never seen it in New Zealand. He is the son of the eminent New Zealand botanist Leonard Cockayne and was here on an agricultural mission from New Zealand. It seems that this most common of all the cultivated veronicas is really without a name. I suggest that it be named **Veronica franciscana**.* Perhaps it originated in the park.

Veronica franciscana Eastwood is a shrub about 1 m. high, densely branched, leaves elliptic, decussate, sessile, dark green on upper surface, paler on the lower, about 3 cm. long, 2 cm. wide.

**Veronica franciscana* Eastwood, spec. nov. Frutex densus circa 1 m. altus; foliis decussatis, sessilibus, congestis, supra atro-vididibus, infra pallidioribus, ellipticis, circa 3 cm. longis, 2 cm. latis; racemis densifloris nonnullis prope apicem ramorum; floribus lilacino-purpureis, corollae tubo albo, brevissimo, lamina circa 1 cm. diametro, medio alba.

Type: Herb. Calif. Acad. Sci. No. 20685, collected by Alice Eastwood in Golden Gate Park, San Francisco, Oct. 1913.

The densely flowered racemes are clustered toward the ends of the branches, the lilac-purple corolla has a very short white tube which shows in the throat as a white spot.

I am not in sympathy with those taxonomists who would change the name of these shrubby veronicas of the southern hemisphere to *Hebe*. This is one of the seven sections under *Veronica* in Bentham and Hooker's *Genera Plantarum*. Each section might as well be considered a distinct genus; but these eminent botanists whose knowledge of plants was world-wide, one the author of a flora of Australia and the other of New Zealand, did not consider the differences sufficient to separate them. Ever since these shrubby veronicas have been in cultivation they have been known as veronicas and the name is too firmly entrenched in horticultural as well as in strictly scientific literature to be changed on so slight a pretext.

THE CORRECT NAME FOR THE PACIFIC INVOLUCRATE TRIFOLIUM

BY JOSEPH EWAN

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Two names are current for the widespread Pacific Coast "cow clover," but neither *Trifolium involucreatum* nor *T. Wormskjoldii* appears to be tenable. The former name, *T. involucreatum* Ort., has been shown to be inapplicable, since (a) it properly belongs to a Mexican clover not present in the Pacific Coast region, and since (b) it is a homonym, Ortega's use of the epithet (1797) being considerably antedated by Lamarck's (1778). This Mexican species has been lately redescribed by Vaughan (*Amer. Midl. Nat.* 22: 576,—1939). The second name in use, *Trifolium Wormskjoldii* Lehm., is of doubtful application. Jepson says (*Fl. Calif.* 2: 293,—1936) that the type of this binomial is a plant grown from seed collected in California by Wormskjold. "Groenlandia" is given as the source of the seed, however, by both Walpers (*Repertorium* 1: 645) and McDermott (*Monograph of Trifolium*, 40,—1910). Since the Danish navigator, Lt. Wormskjold, is known to have botanized in Greenland, but more questionably in northern California (cf. Lasègue, Musée

botanique de M. Benjamin Delessert, s. v. 1845), there may be some doubt as to the source of Lehmann's seed. An attempt to locate Lehmann's actual type has so far proved unavailing. In a communication from Hans Scheerer, assistant at Botanisches Institut at Kiel, dated 14 July 1939, I am informed that Lehmann's type is not in their collection nor do they possess reliable information regarding its whereabouts.

Our Pacific Coast involucrate clover may be known, however, as:

TRIFOLIUM WILLDENOVII Spreng., Syst. 3: 208 (1826), based on *T. involucreatum* Willd., Sp. Pl. 3: 1372 (1800), this based on a garden grown plant the exact source unknown. Not *T. involucreatum* Lam. or Ortega.

Of the few plant collectors who had visited the Pacific Coast prior to 1800, Haenke and Menzies alone are likely to have been instrumental in collecting the seed of this clover. Haenke, who visited San Diego and Monterey in 1791 with the Malaspina Expedition, may have collected the seed. Safford, however, does not mention that any of Haenke's material reached Professor Karl Ludwig Willdenow at Berlin (Contr. U. S. Nat. Herb. 9: 27,—1905). Furthermore, I fail to discover any mention of seeds having been collected by Haenke, though it seems almost surely that he must have done so. On the other hand, Archibald Menzies, as surgeon and botanist with Vancouver's Expedition, collected seeds apparently throughout the journey.¹ Moreover, Menzies' seeds sometimes reached botanic gardens, were grown anonymously, and the plants subsequently described as of unknown nativity (see *Lupinus arboreus* in Jepson, Fl. Calif. 2: 254,—1936). Sir James Edward Smith may likely have been responsible for distributing Menzies' seeds. Smith was a founder and first president of the Linnean Society of London and an active correspondent with a wide circle of botanists. There is in the Society's herbarium a set of Menzies' plants from "North-west America" and Sir Joseph Banks, who promoted the appointment of Menzies to the expedition, gave the Society his hearty

¹ "The story goes" that Menzies, as a guest at a dinner given by the Viceroy of Chile to Vancouver and his men, "collected" a portion of the nuts served as dessert instead of eating all of his share. He took them on board the *Discovery* and planted them in a box of earth; they sprouted, and thus was brought to England five plants of *Araucaria imbricata*! (Ed. Smith, Life of Sir Joseph Banks, 145,—1911). For blog., see Jepson, Madroño 1: 262—266, port. (1929).

support. In describing the content and organization of the Willdenow Herbarium,² Asa Gray does not give any clue as to the source of the seed in question (Sci. Papers Asa Gray, ed. C. S. Sargent, 2: 19—20,—1889).

Fortunately Willdenow's types have been preserved, and, through the courtesy of Dr. Ludwig Diels, Director Botanischer Garten und Museum, Berlin-Dahlem, I have before me photographs of the two collections constituting the type of *T. involucreatum* Willd. Happily they are both the plant currently recognized on the Pacific Coast as the species in question, that is, "*T. involucreatum* Ort." or "*T. Wormskjoldii* Lehm." Each sheet bears the initial "W" in the lower right-hand corner and each represents, according to Dr. Diels, a plant grown in the Berlin Botanic Gardens. Unfortunately there are no data on the sheets or otherwise recorded at Berlin as to the exact source of the seeds from which these plants were grown. We have, however, in the extant Willdenovian types a precise basis for the binomial *Trifolium Willdenovii* Spreng. It seems desirable, accordingly, to take up Sprengel's name, and to make the following changes in nomenclature:

Trifolium Willdenovii var. *fimbriatum* (Lindl.) Ewan, comb. nov. *T. fimbriatum* Lindl., Bot. Reg. t. 1070 (1827); *T. involucreatum* var. *fimbriatum* (Lindl.) McDerm., *Trifolium* 52 (1910); *T. Wormskjoldii* var. *fimbriatum* (Lindl.) Jeps., Fl. Calif. 2: 294 (1936).

Trifolium Willdenovii var. *Kennedianum* (McDerm.) Ewan, comb. nov. *T. involucreatum* var. *Kennedianum* McDerm., op. cit. 56 (1910); *T. Wormskjoldii* var. *Kennedianum* (McDerm.) Jeps., loc. cit. (1936).

There is in the Herbarium Academy Natural Sciences Philadelphia a collection of the little-known *Trifolium spinulosum* var. *triste* T. & G. This is considered to be a synonym of var. *fimbriatum* by Jepsen (loc. cit.), though it comes from Santa Barbara, a point far beyond the range of that variety. What it represents—local valid phase of the species or of yet another *Trifolium*—is another as yet an unsolved problem.

² Two possibly useful references, not seen, are: Schultes, *Observationes*, 1809 (cf. Pritzels, item 5427), and Willdenow, *Enumeratio*, 1809 (*ibid.* item 10285).

MARIN COUNTY MISCELLANY—I

BY JOHN THOMAS HOWELL

It is now nearly 90 years since John M. Bigelow made the first extensive collection of plants on the Marin County Peninsula in California just to the north of San Francisco and the Golden Gate. From his collections made in 1854 at "Tamul Pass" was described the Fetid Adder's Tongue, *Scoliopus Bigelovii* Torr.; and "near San Geronimo Ranch" he collected the Red Larkspur, *Delphinium nudicaule* T. & G. In all the years that have elapsed since those pioneer days, Marin County has offered a rich and varied flora for the attention of the botanist, and even yet the depth of its botanical resources have not been plumbed. The following notes treat of some of the noteworthy plants, both native and naturalized, that I have recently found in Marin County.

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In the late summer and autumn of 1939, I made several collecting trips to the region on the north side of Mt. Tamalpais, devoting particular attention to the plants growing along the shores of the reservoirs, Phoenix, Lagunitas, and Alpine lakes. At that season as the water is withdrawn for use in near-by communities, a considerable extent of lake bottom becomes exposed and on this dried area an interesting community of plants flourishes. Although most of the plants were found to be sedges and rushes, several members of the population were dicotyledonous plants new to the flora of Marin County and particularly noteworthy since they are rather uncommon in California.

Two such plants growing at Alpine Lake were *Amaranthus californicus* (Moq.) Wats. and *Mollugo verticillata* L., the former indigenous to California but not commonly collected, the latter introduced from the tropics. At Lake Lagunitas below the high water line were three unusual and unexpected plants: *Cypselea humifusa* Turp., *Ammannia coccinea* Rottb., and *Lindernia anagallidea* (Michx.) Pennell. The cypselea, a native of the West Indies, has been known in California heretofore only from Santa Cruz County and from the lower San Joaquin River (cf. Jepson, Fl. Calif. 1: 461). The other two plants are regarded as indigenous to the Californian flora, but they are not particu-

larly common, occurring chiefly in the Sacramento and San Joaquin valleys. The lindernia has been generally reported for California as *Ilysanthes dubia* (L.) Barnh. (i. e., *Lindernia dubia* (L.) Pennell). That species has been collected in California in Siskiyou County, according to Pennell (Philad. Acad. Nat. Sci. Monogr. 1:151), but he refers all the specimens from central California to *Lindernia anagallidea* (i. e., *Ilysanthes anagallidea* (Michx.) Raf.). For a time the Marin County plants were believed to be *Lindernia dubia* because of their cleistogamous flowers, but on the characters of leaves, inflorescence, and seeds they seem definitely *L. anagallidea*, a species in which the flowers are occasionally cleistogamous although Pennell describes them as "all opening" (op. cit., p. 140).

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In a mimeographed key to the shrubby plants of Marin County which I prepared nearly a year ago (Key to the shrubs, subshrubs, and woody vines in Marin County, Sierra Club Nature Notes No. 11), I included several exotic plants which have become naturalized in Marin County and perhaps elsewhere in California. Several of these plants, such as *Cytisus monspesulanus* L., *C. scoparius* (L.) Link, and *Ulex europæus* L., have already been recognized in the botanical literature of California as established weeds, but several others were included which have not yet found place in the floras and weed lists of the state.

One of these, the Common Privet, *Ligustrum vulgare* L., should probably not have been included in my list (p. 10). Although it forms a vigorous thicket at a station in Cascade Canyon in Mill Valley, it has not spread far from where it was originally planted in a hedge and so can scarcely be regarded as naturalized. The same may be said of the occurrence of the Common Privet at a station in San Rafael.

Hedera Helix L. (p. 17), the English Ivy, on the other hand, has become definitely naturalized locally and has been noted as established in several parts of Mill Valley, Sausalito, Ross, and Ignacio. Birds are undoubtedly instrumental in the spread of this plant, since medium-sized passerines have been seen feeding greedily on the berries.

Spartium junceum L. (p. 7), the Spanish Broom, is definitely established on rocky slopes above Mill Valley. Here it forms

thickets with the French Broom (*Cystisus monspessulanus*) and the Scotch Broom (*C. scoparius*), the three producing an Old World brush formation that blends with the native chaparral ecologically but certainly neither floristically nor scenically. The Spanish Broom has also been noted as naturalized at San Rafael and at Fairfax.

Perhaps the most rampant of these neglected woody weeds and the one most widely naturalized is the Himalaya-berry which forms thorny thickets along roads and in waste places in many localities in Marin County. The scientific name for this European bramble differs in the various reference works on cultivated plants, but the name I adopted in my key to the Marin County shrubs (p. 3) is that given by Bailey in *Hortus Second* (1941, p. 645), *Rubus procerus* P. J. Muell. Why this plant has been omitted from the naturalized flora of California is not clear. I have noted infestations in nine localities in Marin County, and the plant is not lacking in other parts of California. In San Francisco abundant seedlings have been seen in the vicinity of fruiting plants, proof that the species does not spread alone by vegetative means.

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Perhaps the rarest shrub in California admitted by Dr. Jepson to his *Flora of California* is *Ribes Victoris* Greene, which he reports as occurring "near Lake Lagunitas, . . . only one or two shrubs known" (2: 157—1936). More recently, while on walking trips through the hills of Marin County, I have located two other stations at which the rare Victor Gooseberry grows, the first in the hills northeast of San Rafael, the second on the north side of Mt. Tamalpais above Lake Lagunitas, and at both stations I have collected both flowering and fruiting specimens. Because the plant has been so rare heretofore, it seems proper to reconsider its specific status in the light of more numerous collections from the three known localities, especially since the plant does not appear sufficiently differentiated from other related gooseberries.

Ribes Victoris is part of that remarkable series of gooseberries that occurs along the Pacific coast from southern California northward to southern Oregon. *Ribes Menziesii* Pursh was the first of this series to be named, but besides that species

about a dozen other entities have been recognized in the variable complex. Two of these entities, *R. Victoris* and *R. Greeneianum* Heller, have been separated from the rest of the complex in keys and floras by the color of their flowers and by the character of the spines on their ovaries. Whereas the color of the flowers is given as green to purple for *R. Menziesii* and its more immediate relatives, the color of flowers in *R. Victoris* and *R. Greeneianum* is given as greenish-white or whitish. In the character of the spines on the ovaries, Coville (N. Amer. Fl. 22:209) states that the ovary is "clothed with gland-tipped hairs, without an admixture of longer glandless bristles," while Jepson (Fl. Calif. 2:145) states that the ovary is covered "with spines and sometimes also with short-stiped glands." There are errors in both these statements: in *R. Victoris* there is a mixture of glandular and glandless spines, but in *R. Greeneianum* there are only gland-tipped spines. Hence the real diagnostic character according to the keys resolves itself into the color of the flower, particularly since the spines of the ovary in *R. Menziesii* and its relatives are even more variable, sometimes entirely glandular, sometimes entirely glandless, and sometimes a mixture.

At the stations on Mt. Tamalpais and in the San Rafael hills where I have studied the gooseberry in the field, the color of the flower does not definitely distinguish it from the other gooseberry of the *R. Menziesii* group which has been described from Marin County, *R. leptosmum* (Cov.) Fedde, one of the purplish-flowered forms which has been known in Marin County from several stations between Mt. Tamalpais and the coast. In the San Rafael hills, the Victor Gooseberry was represented by a dozen or so plants growing together in a wooded canyon and the color of the flowers on the different plants varied from greenish-white slightly tinged with rose to greenish-purple and reddish-purple. Only a single bush was seen with the greenish-white flowers and on it the flowers were frequently tinged with pink or rose. Certainly no botanist seeing all the bushes growing together on that canyon side would regard this one plant as one species and the rest of the individuals as another species! At the station on Mt. Tamalpais, two collections of flowering material have been made, the first on March 3 by Dr. Hans Leschke, the second by me on March 14. In both, the flowers were pale

greenish tinged with rose, but it was evident that the rosy tinge had become more pronounced in the flowers of the second collection and that some of the flowers were then distinctly purplish. Specimens collected by Miss Eastwood at the type locality of *R. Victoris* at Lake Lagunitas demonstrate the same variability in color.

From this I conclude that *R. Victoris* cannot be distinguished from the *R. Menziesii* complex by the color of the flowers but that in the character of the spines on the fruits we have a mark which distinguishes in *R. Victoris* an entity coequal with the other entities of the *R. Menziesii* complex. In the fruit of *R. Victoris* the glandular and glandless spines are short, a little unequal, and pale yellowish or straw-color. In its two nearest relatives, *R. Greeneianum* and *R. leptosmum*, the spines on the fruits are all glandular, in the former equal, yellowish, shorter, and very dense, in the latter unequal, purplish or brownish, longer, and sparse. Moreover in *R. Greeneianum* the flowers are more uniformly greenish and in *R. leptosmum* more uniformly purplish.

Since all the entities of the *R. Menziesii* relationship seem best regarded as varieties in a variable complex, I shall use for *R. Victoris* and *R. Greeneianum* the varietal names proposed by Janczewski, *R. Menziesii* var. *Victoris* (Greene) Jancz. and *R. Menziesii* var. *minus* Jancz. (*R. Menziesii* var. *Greeneianum* (Heller) Jepson).

SIBARA ON CEDROS ISLAND. In my recent account of Cedros Island plants (Leaf. West. Bot. 3:180—185), I overlooked one which should have been listed and which is certainly worthy of the present supplementary notice. This is *Sibara pectinata* (Greene) Greene. My specimen (No. 10688a) was lost among duplicate collections of *Euphorbia polycarpa* Benth., the plant with which it grew on the sandy wash above the abalone cannery on the southeast side of the island. Only two plants were collected and these are without leaves and flowers, but they carry numerous mature siliques which are horizontally divaricate on one plant and arcuate-recurved on the other. The type of the species was collected at San Bartolomé on the west coast of Lower California southeast of Cedros Island; from the island it has apparently been collected only once before (cf. *Arabis pectinata*, Proc. Calif. Acad. Sci., ser. 4, 18:429).—John Thomas Howell.

NOTES ON CHORIZANTHE

BY GEORGE J. GOODMAN

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Chorizanthe chilensis (Remy) Goodman, comb. nov. *Lastarriæa chilensis* Remy in Gay, Fl. Chil. 5: 290 (1849). *Chorizanthæ Lastarriæa* Parry, Proc. Davenp. Acad. Sci. 4: 63 (1884), as to South American specimens.

Chorizanthæ coriacea Goodman, nom. nov. *Lastarriæa chilensis* Remy subsp. *californica* Gross, Bot. Jahrb. 49: 345 (1913). *Chorizanthæ Lastarriæa* Parry, l. c., as to North American specimens. *Chorizanthæ Lastarriæa* Parry var. *californica* (Gross) Goodman, Ann. Mo. Bot. Gard. 21: 33 (1934).

I have recently had opportunity to examine some South American specimens of "*Lastarriæa chilensis*" and find them to be quite as distinct from their North American relatives as the figure in Gay, Hist. Chile, Atlas Bot. 1: pl. 58, fig. 1 (1854), would lead one familiar with our California material to believe. The bracts in *Chorizanthæ chilensis* are hispid on the margins, they are shorter, and commonly retain their width to near the apex. This is then terminated by a very short, hooked awn.

In the North American material (*C. coriacea*) the plants are more diffuse, and the pubescence is much softer. The bracts are longer, and have a gradually tapering distal half which terminates in a relatively long awn.

 NEW VARIETIES OF WESTERN PLANTS—III

BY JOHN THOMAS HOWELL

Ceanothus cuneatus (Hook.) Nutt. var. **dubius** J. T. Howell, var. nov. Frutex robustus latus 1.5—4 m. altus, ramulis arcuatis pilis parvis adpressis subsericeis leviter vestitis; foliis integris vel raro dentatis, anguste obovatis ad late ellipticis, ad 3 (vel 4.5) cm. longis et 2 cm. latis, obtusis vel retusis, basi cuneatis; floribus albis; capsulis subglobosis, 5—6 mm. diametro, fere rugulosis, cornibus parvis apicalibus rugosis, cristis mediis parvis vel subobsoletis, plus minusve rugulosis, hypanthio extrinsecus supra pedicellum plus minusve tuberculato-ruguloso in fructu.

Types from Skyline Boulevard west of Saratoga near Saratoga Gap, 2500 ft. elev., Santa Clara Co., California: for flower,

L. S. Rose No. 39053, April 7, 1939, Herb. Calif. Acad. Sci. No. 300000; for fruit, *J. T. Howell* No. 14751, June 16, 1939, Herb. Calif. Acad. Sci. No. 300001. Other collections in Herb. Calif. Acad. Sci. are: Loma Prieta, *Mexia* in 1926; Mt. Hermon, Santa Cruz Co., *Bolton* in 1929; Ben Lomond, Santa Cruz Co., *Eastwood & Howell* No. 7446, *L. S. Rose* No. 39110 and No. 39285, *J. T. Howell* No. 14766; near Saratoga Gap, Santa Cruz Co., *J. T. Howell* No. 14756; Los Altos, Santa Clara Co., *Campbell & Miere* in 1920.

This is the large-leaved buck brush of the Santa Cruz Mts. treated by McMinn as *C. cuneatus* minor variation No. 6 (*Ceanothus*, 241,—1942). Not only does the Santa Cruz buck brush differ from the historical type of *C. cuneatus* in its subsericeous pubescence and much larger leaves, but also it differs from all specimens examined in *C. cuneatus*, *C. Ferrisiae*, *C. rigidus*, and *C. ramulosus* in the peculiar wrinkled surface on the outside of the fruiting hypanthium. In my variety, I have included only that form with white flowers, but it may prove necessary to enlarge the entity to include the lavender-flowered variant with large leaves in the Santa Cruz Mts. when fruiting specimens from it have been studied. Such an enlarged entity may also come to accommodate the broad-leaved white-flowered *Ceanothus* of the Coast Ranges south to San Luis Obispo County when flowering and fruiting material are properly correlated by a series of detailed field studies. The present variety occupies a position almost equally related to *C. cuneatus* and *C. ramulosus*, and it is doubtful if it will be retained in the former if the latter is eventually defined to include all the coastal buck brushes with arching stems.

***Ceanothus Jepsonii* Greene var. *albiflorus* J. T. Howell, var. nov.**
Frutex erectus plerumque circa 1 m. altus, cortice sublevi pallido-grisea; floribus albis; capsulis subglobosis ad oblongis, 9—12 mm. longis, 6—10 mm. latis.

Types from Napa County, California: for flower, *J. T. Howell* No. 6147, 5 miles from Aetna Springs on road to Middletown, April 3, 1931, Herb. Calif. Acad. Sci. No. 194485; for fruit, canyon of St. Helena Creek, *J. T. Howell* No. 13100, July 18, 1937, Herb. Calif. Acad. Sci. No. 248657. Among numerous collections in Herb. Calif. Acad. Sci., the following may be cited to indicate range: Walters Springs, Napa Co., *J. T. Howell*

No. 14633; between Cobb Mt. and Adams Springs, Lake Co., Jussel No. 313; Putah Creek north of Middletown, Lake Co., J. T. Howell No. 14643; between Knoxville and Lower Lake, Lake Co., J. T. Howell No. 14651; grade between Mud Flat and Bennett Spring, Tehama Co., Heller No. 12999.

From the typical form of the species which is found in the Mt. Tamalpais region of Marin County, var. *albiflorus* differs in its more erect habit, smoother bark, larger and somewhat elongate fruits, and white (instead of violet-blue) flowers. The violet-flowered form of the species which grows in the mountains north of Marin County and west of the area occupied by var. *albiflorus* seems intermediate between the two entities and may represent yet another unnamed variety.

NEW CALIFORNIAN LOCALITIES FOR *PACHYSTIMA*. A most notable and interesting extension of range is to be recorded with the discovery of the Oregon Box, *Pachystima Myrsinites* Raf., on the north side of Mt. Tamalpais, Marin County, where it was discovered by Mr. Robert H. Menzies on Jan. 13, 1941. In the Coast Ranges, it has been reported no farther south than northern Humboldt County (Jepson, Fl. Calif. 2:450); but since the discovery of the plant on Mt. Tamalpais, several intermediate stations for the plant have been brought to my attention. Mrs. Mary L. Courtright has found the Oregon Box at Camp Meeker, Sonoma County; and Milo S. Baker has collected it near Healdsburg, Sonoma County, and near Carl Purdy's place, east of Ukiah, Mendocino County. These stations in Mendocino and Sonoma counties bridge a gap that would otherwise lend to the plant a remarkable distribution pattern.

Concerning the occurrence of *Pachystima* on Mt. Tamalpais, Mr. Menzies has written as follows: "I found it about 1.5 miles north of Rock Spring, well off any trail, in heavy brush beneath scrub oak. There was quite a small colony covering some 25 or 30 feet square. A characteristic distinguishing it from the *Pachystima* I found on Mt. Rainier is that on Tamalpais it is very prostrate and grows in extended fan-like branches . . . and does not attain anything like the size it does in the north. . . ."—John Thomas Howell.

LEAFLETS
of
WESTERN BOTANY

CONTENTS

	PAGE
The Genus <i>Habenaria</i> in Western North America DONOVAN S. CORRELL	233
Variations in <i>Castilleja plagiotoma</i> ALICE EASTWOOD	248
The Varieties of <i>Astragalus decumbens</i> ARTHUR CRONQUIST	250
Observations on Californian Plants—III ROBERT F. HOOVER	254

SAN FRANCISCO, CALIFORNIA

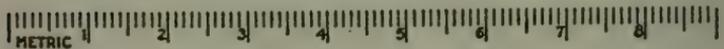
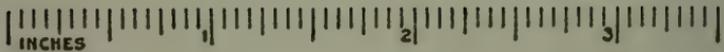
JULY 7, 1943

LEAFLETS
of
WESTERN BOTANY

A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as

LEAFL. WEST. BOT.



Owned and published by

ALICE EASTWOOD and JOHN THOMAS HOWELL

THE GENUS HABENARIA IN WESTERN
NORTH AMERICABY DONOVAN S. CORRELL
Botanical Museum, Harvard University

The species of *Habenaria* here treated occur in North America north of Mexico and west of the 102nd meridian. Space does not allow a statement of the general distribution of each species. Therefore, the distributional data are limited to the above region. The species in the section *Limnorchis* which occur in this area comprise the most difficult problem existing today in the *Orchidaceæ* of North America, north of Mexico. The following tentative key, with some additional information, is offered in the hope that those who may be interested will use the key and send their criticisms to me. In this way it is hoped that a serviceable key to this perplexing group of plants may finally be constructed for a forthcoming Orchid Flora of North America.

The vast area under consideration includes many complex ecological regions, extending from the Lower Sonoran Zone of southern California to the Arctic, and comprises such formations as the Rocky Mountain, Sierra Nevada, and Pacific Conifer Forest complexes, as well as large tracts of desert, semi-desert, and tundra. The ecological conditions of these complex regions have a tremendous influence upon plant life and often cause extreme variations within a given species. Endemism, not uncommon in many plant families in this region, does not play a prominent part in the *Orchidaceæ*. A species may, however, assume different vegetative aspects and growth habits throughout its area of distribution as the result of the complicated ecological factors, but when the flowers are compared they may be found to vary only slightly, if at all.

In the genus *Habenaria* the general aspect of the various species is often greatly affected by age. This is particularly true in regard to the inflorescence. In bud, anthesis, beginning of capsule enlargement, and finally in fruit maturity, each stage in the same species often appears to be separable from the preceding or following stage. The various phases of growth often determine the density and size of the inflorescence. Because of these superficial and minor differences the various growth forms of

some of the species have been segregated by some authors as distinct species. There is little doubt that in most of the species spur development, especially as to length, is also greatly affected by age. However, in several of the species this does not seem to be the case. In working with such variable plants, it seems best to allow for extreme variations within a species. This has been the guiding factor in the preparation of this work.

Several authors have contributed materially toward the understanding of this genus within our area; namely, Ames [Orch., fasc. 4 (1910)], Kränzlin [Orch. Gen. et Sp., vol. 1 and 2 (1897-1903)], and Rydberg [Bull. Torr. Bot. Club 28: 605-643 (1901)]. The present contribution follows essentially the conservative treatment offered by Ames.

In most cases, only the essential synonymy current in our area is given for a segregate. In the citation of distribution, counties are given where a species or variety is found, or, in some cases, other information concerning local distribution has been inserted after the states.

This study has been based primarily upon specimens in the following herbaria: Herbarium of Oakes Ames, Harvard University; University of Arizona, Tucson; California Academy of Sciences, San Francisco; Dudley Herbarium, Stanford University; Gray Herbarium, Harvard University; Herbarium of W. L. Jepson, Berkeley; University of Nevada, Reno; New York Botanical Garden, New York.

KEY TO WESTERN SPECIES AND VARIETIES OF HABENARIA

1. Leaves 1 or 2, rarely 3, basal or essentially so; stem ebracteate or provided with a solitary bract (rarely more) about the middle.
2. Spur scrotiform; lip suborbicular to obovate, deeply concave2. *H. Chorisiana*
2. Spur elongated, cylindrical, tapering at the apex or somewhat thickened; lip linear to linear-lanceolate, not concave.
3. Leaves 2 or rarely 3, large, orbicular to broadly oval, spreading on the ground; spur more than 1.4 cm. long.....7. *H. orbiculata*
3. Leaf solitary or rarely 2, small, broadly obovate to linear-oblancoate, erect-spreading; spur 1.2 cm. or less long.
4. Lip linear to linear-lanceolate; spur tapering from a rather broad base, about as long as the lip.....6. *H. obtusata*
4. Lip elliptic; spur cylindrical, usually thickened near the apex, about twice as long as the lip.....1. *H. behringiana*

1. Leaves several, cauline or sub-basal; stem leafy or conspicuously bracteate.
 5. Lip unequally tridentate at the apex, with the middle tooth minute; spur always scrotiform.....11. *H. viridis* var. *bracteata*
 5. Lip entire at the apex; spur slender to scrotiform.
 6. Leaves always clustered at or near base of stem, usually withering before or during anthesis; stem provided with numerous scale-like bracts; lip somewhat truncate at the base or angled on each side at the base; sepals 1-nerved.
 7. Spur about equal to or a little longer than the lip; raceme laxly flowered, wand-like, usually about 1 cm. or less in diameter.....10. *H. unalascensis*
 7. Spur twice or more longer than the lip; raceme rather densely flowered, cylindrical to pyramidal, rarely less than 1.5 cm. in diameter.
 8. Plant entirely coastal, typically short and stout; flowers whitish, congested in a dense thick raceme; raceme often pyramidal, 2 cm. or more in diameter.....10b. *H. unalascensis* var. *maritima*
 8. Plant widely distributed, typically slender and tall; flowers greenish, in a lax or dense raceme, not conspicuously congested, often distant; raceme cylindrical, usually less than 2 cm. in diameter.....10a. *H. unalascensis* var. *elata*
6. Leaves scattered on the stem or sometimes clustered at or near base of stem, usually persisting after anthesis; stem provided with a few foliaceous bracts; lip not truncate or angled at the base; sepals 3-nerved.
 9. Lip rhombic-lanceolate, prominently and rather abruptly dilated at the base; flowers usually white, rarely greenish.
 10. Spur one and one-half times as long as the lip or longer.....3b. *H. dilatata* var. *leucostachys*
 10. Spur about equal to or shorter than the lip.
 11. Spur about equal to or only slightly exceeding the lip.....3. *H. dilatata*
 11. Spur usually one-half to two-thirds the length of the lip, often clavate....3a. *H. dilatata* var. *albiflora*
 9. Lip linear to broadly lanceolate, not prominently dilated at the base; flowers usually greenish, sometimes marked with purple.
 12. Spur twice or more longer than the lip.

13. Plant dwarf; lip pendent, fleshy, ecallose; distribution Aleutian Islands.....1. *H. behringiana*
13. Plant tall; lip strongly arcuate at the base, with a small tubercle or cushion-like callus in the center at or near the base; distribution southwestern.....5. *H. limosa*
12. Spur never more than one and one-half times as long as the lip.
14. Spur usually less than two-thirds the length of the lip.
15. Spur scrotiform or strongly saccate; lip linear to lanceolate; raceme usually laxly flowered, elongated, often with the flowers scattered.....8. *H. saccata*
15. Spur cylindrical, sometimes thickened or only slightly clavate; lip elliptic to lanceolate; raceme usually short and congested.....4. *H. hyperborea*
14. Spur about as long as or longer than the lip.
16. Column large, with a broad connective, usually about one-half as long as the dorsal sepal, 2 mm. or more long.
17. Leaves very short, ovate, less than 9 cm. long, usually reduced to clasping tubular sheaths.....
.....9a. *H. sparsiflora* var. *brevifolia*
17. Leaves ample, elliptic to lanceolate, variable in length, never reduced entirely to sheaths.
18. Lip linear to linear-elliptic, up to 1.3 cm. long, often with a fleshy ridge in the center below the middle; raceme usually elongated and laxly flowered.....
.....9. *H. sparsiflora*
18. Lip elliptic to lanceolate, rarely more than 8 mm. long, ecallose; raceme usually short and densely flowered.....4. *H. hyperborea*
16. Column small, usually without a broad connective, one-third or less as long as the dorsal sepal, less than 2 mm. long.
19. Raceme usually densely flowered and short; spur cylindrical or somewhat thickened; lip elliptic to lanceolate.....4. *H. hyperborea*
19. Raceme usually laxly flowered and elongated; spur slender or clavate; lip linear to lanceolate.
20. Spur slender, usually exceeding the lip; leaves variable, scattered along the stem or clustered near the base of the stem, elliptic to linear-lanceolate.....
.....9b. *H. sparsiflora* var. *laxiflora*
20. Spur scrotiform or clavate, shorter than the lip; leaves cauline, typically elliptic.....8. *H. saccata*

1. *HABENARIA BEHRINGIANA* (Rydb.) Ames, Orch., fasc. 4: 91, pl. 60 (1910); *Limnorchis behringiana* Rydb., Bull. Torr. Bot. Club 28: 620 (1901).

This species is characterized by its dwarf habit and elongated spur (about 1 cm. long), which is about twice as long as the lip. The flowers are said to be purplish, and, judging from their appearance in the dried state, it is quite possible that the petals, lip and spur are suffused with this color. The plant averages about 12 cm. in height and the typically solitary basal leaf and single foliaceous bract on the stem are distinctive.

Habenaria behringiana is a very rare species. So far as I know, there has been but one collection definitely known from North America, specimens of which are available in the California Academy of Sciences and the Dudley Herbarium. This collection was obtained by Hultén and bears the following data: "Aleutian Islands: Attu, July 26, 1932, Eric Hultén 6831."

2. *HABENARIA CHORISIANA* Cham., Linnaea 3: 31 (1828).

This is our smallest habenaria. The plant seldom exceeds 10 cm. in height and the floral segments are about 1 mm. long. The pair of sub-basal leaves and the few-flowered, scapose inflorescence are distinctive.

This species and *H. behringiana* are doubtless the rarest orchids in our range, if not in North America. So far as I know, there are but two really serviceable collections in the herbaria of North America. The collection from Atka in the Aleutian Islands (*Eric Hultén No. 6540*) is represented by specimens in the California Academy of Sciences and the Dudley Herbarium. A previously unidentified collection of this species in the New York Botanical Garden was collected on Vancouver Island. The specimen consists of two flowering plants and one sterile plant and bears the following data: Ucluelet, Vancouver Island, B. C., in the swamp near Cranberry Patch, July 20, 1909, *John Macoun No. 82,473*. So far as I know, this is the first report of this species from continental North America. The Chamisso specimen in the Gray Herbarium is in a poor state of preservation.

3. *HABENARIA DILATATA* (Pursh) Hook., Ex. Fl. 2: pl. 95 (1824); *Orchis dilatata* Pursh, Fl. Am. Sept. 2: 588 (1814); *Limnorchis dilatata* Rydb. in Britton, Man. Fl. North. States & Can., ed. 1, 294 (1901); *L. foliosa* Rydb., Bull. Torr. Bot., Club

28: 622 (1901); *L. graminifolia* Rydb., loc. cit., 627; *L. gracilis* Rydb., loc. cit., 627, in part; *L. convallariæfolia* Rydb., loc. cit., 628, in part; *L. leptoceratitis* Rydb., Bull. N. Y. Bot. Gard. 2: 162 (1901), as to type specimen and description only; *Habenaria graminifolia* Henry, Fl. South. B. C. 92 (1915).

The usually white or occasionally yellowish or greenish white flowers provided with a rhombic-lanceolate lip which is conspicuously dilated at the base and tapers to the apex are characteristic of this species. The spur is about equal in length to the lip which typically projects outward from the rest of the flower. The floral bracts are usually incurved against the rachis, causing the raceme to appear slender and wand-like in contrast to the raceme of *H. hyperborea* with its more or less spreading floral bracts. *Habenaria dilatata* is often associated with *H. hyperborea*. Some specimens of *H. dilatata* which were collected in Washington have lips which are extremely dilated at the base and give to the lip a 3-lobed aspect.

Nearly always in moist situations in meadows, swamps, bogs, marshes, coniferous forests, canyons, tidal flats, on moist seepage slopes and in or along streams, bordering lakes, rarely on dry open slopes, from sea level up to 10,000 ft. in Colorado, Idaho and Utah, 5000 ft. in British Columbia; blooming from April to September throughout its range. Colo. (Gilpin), Utah (Salt Lake), Nev. (Elko, Mineral), Calif. (Humboldt, Placer, Siskiyou), Wyo. (Sublette, Yellowstone Pk.), Idaho (widespread), Ore. (mostly Cascade Mts.), S. Dak. (Pennington), Mont. (Flathead), Wash. (western half), Sask., Alta., B. C., N. W. Terr., Yukon, Alaska, Aleutian Islands.

3a. *Habenaria dilatata* var. *albiflora* (Cham.) Correll, comb. nov.; *H. borealis* Cham. var. *albiflora* Cham., Linnaea 3: 28 (1828); *H. dilatatiformis* Rydb., Bull. Torr. Bot. Club 24: 189 (1897); *Limnorchis dilatatiformis* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 105 (1900); *L. borealis* Rydb., Bull. Torr. Bot. Club 28: 621 (1901), exclude syn. in part.

This is a short-spurred form which usually has a short, dense inflorescence of rather large flowers. However, it is represented in the Rocky Mountains by a plant, segregated by Rydberg as *H. dilatatiformis*, which has a rather slender, lax raceme of smaller flowers. Some forms of typical *H. dilatata* approach var.

albiflora. Such forms, however, have a slender, terete spur instead of the somewhat inflated, clavate spur characteristic of this variety.

Moist rocky slopes, meadows, wet woods, bogs and marshes, usually at high elevations in the Rocky Mountains, up to 12,000 ft. in Wyoming, 10,000 ft. in Utah and Colorado, 4000 ft. in British Columbia; blooming from June to September throughout its range. Colo. (Gilpin, Grand, Larimer), Utah (Salt Lake, Summit), Wyo. (Albany, Teton, Yellowstone Pk.), Idaho (Nez Perces), Mont. (Glacier, Meagher, Park, Teton), Ore. (Baker), Wash. (Pierce), Alta., B. C., Alaska.

3b. *HABENARIA DILATATA* var. *LEUCOSTACHYS* (Lindl.) Ames, Orch., fasc. 4: 71 (1910); *Platanthera leucostachys* Lindl., Gen. & Sp. Orch. Pl. 288 (1835); *Habenaria pedicellata* S. Wats., Proc. Am. Acad. 12: 276 (1877); *H. leucostachys* S. Wats. in Brewer & Watson, Bot. Calif. 2: 134 (1880), exclude syn. *H. Thurberi*; *H. flagellans* S. Wats. in Brewer & Watson, Bot. Calif. 2: 483 (1880); *Limnorchis leucostachys* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 106 (1900); *L. leucostachys* var. *robusta* Rydb., Bull. Torr. Bot. Club 28: 626 (1901); *Habenaria leptoceratitis* Henry, Fl. South. B. C. 92 (1915).

This superficial variety is identical to the typical form, except for the long spur which is 1 to 2 cm. long and varies from about one and one-half times to more than twice as long as the lip. It is apparently confined to the western United States and Canada, although some northeastern specimens approach it closely. There seems to be a rather definite delimitation in the length of the spur between var. *leucostachys* and the typical form which corresponds to a similar condition existing between *H. unalascensis* and its varieties. Although the lip is often narrower and longer than in typical *H. dilatata*, the shape is fundamentally the same in both. Variety *leucostachys* is often confused with *H. limosa* which it superficially resembles.

Habitat similar to that of the typical form but usually at higher elevations, frequent in alpine meadows and about mountain springs, from 2000 ft. in Idaho and Montana up to 11,000 ft. in California and Nevada; blooming from April to September throughout its range. Utah (Mt. Ipabah), Nev. (northern half), Calif. (common, widespread), Idaho (western half), Ore. (wide-

spread), Mont. (western part), Wash. (Clallam, Pierce, Snohomish), B. C. (Vancouver Isl.).

4. *HABENARIA HYPERBOREA* (L.) R. Br. in Aiton, Hort. Kew., ed. 2, 5: 193 (1813); *Orchis hyperborea* L., Man. Pl. 121 (1767); *Habenaria borealis* Cham., Linnaea 3: 28 (1828); *Habenaria borealis* var. *viridiflora* Cham., loc. cit., 28 (1828); *Limnorchis hyperborea* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 104 (1900); *L. brachypetala* Rydb., Bull. N. Y. Bot. Gard. 2: 161 (1901), in part; *L. viridiflora* Rydb., Bull. Torr. Bot. Club 28: 616 (1901); *Platanthera hyperborea* var. *dilatoides* Hult., Fl. Aleut. Isls. 141 (1937); *Habenaria septentrionalis* Tidestrom in Tidestrom & Kittell, Fl. Ariz. & N. Mex. 731 (1941).

In typical material of *H. hyperborea* the lip is lanceolate and not conspicuously dilated at the base. The flowers are greenish or yellowish green, rarely whitish green, and are usually in a rather dense, cylindrical, spicate raceme. The lanceolate lip often passes gradually into forms with a linear or linear-elliptic lip. The spur is commonly shorter, or occasionally only slightly longer, than the lip which is usually upcurved or projecting forward.

The more northern and northwestern plants are often small and have a rather compact, short raceme, whereas the more southern and eastern plants are usually tall and have a slender, elongated raceme. Nevertheless, the flowers of this species are remarkably constant throughout its distribution. However, some of the specimens found in Alaska, described as *Habenaria borealis*, and in the Rocky Mountains have larger flowers and the spur is shorter and more clavate than in typical *H. hyperborea*. The Rocky Mountain and western form, segregated as *Limnorchis viridiflora* by Rydberg, approaches the form found in the Great Lakes region and New England, segregated as *Orchis huronensis* by Nuttall. Both of these forms differ somewhat from the type in their characteristically lax, few-flowered inflorescence. Some forms are found which apparently represent an intermediate condition between this species and *H. saccata* and *H. dilatata*. Many of the southwestern Rocky Mountain plants grade almost imperceptibly into *H. sparsiflora* and its variety. *Habenaria hyperborea* is doubtless the most perplexing species of *Habenaria* within our range and it is here treated as an extremely polymorphic species.

Moist or wet soil in meadows, bogs, thickets, swamps, coniferous forests, canyons, marshes, on open slopes and along streams and rivers, usually at high elevations in the Rocky Mountains, up to 12,500 ft. in Colorado, 9000 ft. in California, Utah and New Mexico; blooming from June to September throughout its range. N. Mex. (Otero, San Miguel), Ariz. (White Mts.), Colo. (mostly in the Rocky Mts.), Utah (north-central part), Calif. (Inyo, Mono), Neb. (Dawes), Wyo. (widespread), Idaho (widespread), Ore. (Coos, Josephine, Wallowa), S. Dak. (Black Hills Nat'l. Pk.), Mont. (western part), Wash. (Okanogan), Sask., Alta., B. C., N. W. Terr., Yukon, Alaska, Aleutian Isls.

5. *HABENARIA LIMOSA* (Lindl.) Hemsl. in Godm. & Salvin, Biol. Centr.-am., Bot. 3: 305 (1884); *Platanthera limosa* Lindl., Ann. & Mag. Nat. Hist. 4: 381 (1840); *Habenaria Thurberi* A. Gray, Proc. Am. Acad. 7: 389 (1868); *Limnorchis Thurberi* Rydb., Bull. Torr. Bot. Club 28: 264 (1901), as to name only; *L. arizonica* Rydb., loc. cit., 629.

This species is characterized by the somewhat mammillate, cushion-like callus on the lower part of the lip and the elongated, slender spur which is usually more than twice as long as the lip. It differs from *H. sparsiflora* primarily in these characters as well as in its smaller column. The raceme is usually very long, slender and cylindrical. The lip is characteristically linear and arcuate-decurved below the middle with the small callus in the bend. This character distinguishes it from such forms as *H. dilatata* var. *leucostachys* (with which it has been confused), especially when the inflorescence approaches that variety in habit.

Usually in boggy soil about springs in gulches and canyons, commonly between 7000 and 8000 ft. altitude; blooming from June to September throughout its range. N. Mex. (Socorro), Ariz. (Cochise, Pima).

6. *HABENARIA OBTUSATA* (Banks ex Pursh) Richards. in Franklin, Narr. Journ. to Polar Sea, Bot. Appen., quarto ed. 1. 750 (Separate, p. 22) (1823); *Orchis obtusata* Banks ex Pursh, Fl. Am. Sept. 2: 588 (1814); *Lysiella obtusata* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 104 (1900).

The typically obovate or oblanceolate, solitary (rarely 2), basal leaf and the tapering, subequal spur and lip are character-

istic of this species. The small, few-flowered plants are usually less than 25 cm. tall.

Damp or wet soil in open or dense coniferous forests, bogs, swamps, and along stream banks, at high elevations, up to 10,500 ft. in Colorado, 9000 ft. in Utah, 4500 ft. in Alberta; blooming from June to August throughout its range. Colo. (mostly north-central part), Utah (Summit), Wyo. (Sublette), Idaho (Custer), Mont. (Flathead, Glacier, Meagher), Sask., Alta., B. C., N. W. Terr., Yukon, Alaska, Aleutian Isls.

7. *HABENARIA ORBICULATA* (Pursh) Torr., Comp. Fl. North. & Middle States 318 (1826); *Orchis orbiculata* Pursh, Fl. Am. Sept. 2: 588 (1814); *Habenaria Menziesii* Macoun, Cat. Can. Pl., pt. 4: 17 (1888); *Lysias orbiculata* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 103 (1900).

The pair of large, succulent, lucid, basal leaves spreading upon the ground and the erect, scapose inflorescence characterize this species.

Moist or dry places in forests, swamps and bogs, up to 4000 ft. in Montana, 2000 ft. in Idaho and Washington; blooming from June to September throughout its range. Idaho (Bonner, Kootenai, Latah), Mont. (Flathead, Lake), Wash. (King, Snohomish, Stevens, Whatcom), B. C., Alaska.

8. *HABENARIA SACCATA* Greene, *Erythea* 3: 49 (1895); *H. gracilis* S. Wats., Proc. Am. Acad., 12: 277, in text (1877), not Colebrook nor Lindley; *H. stricta* Rydb., Bull. Torr. Bot. Club 24: 189 (1897), not A. Rich. & Gal. nor Ridley; *Limnorchis stricta* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 105 (1900); *L. brachypetala* Rydb., Bull. N. Y. Bot. Gard. 2: 161 (1901), in part; *L. gracilis* Rydb., Bull. Torr. Bot. Club 28: 627 (1901), in part; *L. purpurascens* Rydb., loc. cit., 269, 615, as to type specimen and description only; *Habenaria hyperborea* var. *purpurascens* Ames, Orch., fasc. 4: 90 (1910); *H. purpurascens* Tidestrom in Tidestrom & Kittell, Fl. Ariz. & N. Mex. 731 (1941); *H. neomexicana* Tidestrom, loc. cit., 731.

The inflorescence of *H. saccata* is typically an elongated, laxly or remotely flowered, cylindrical or subsecund raceme. In this character, this species strongly resembles some forms of *H. sparsiflora*. The typically linear lip is conspicuously pendent and the petals as well as the lip and sometimes the sepals are

often marked or suffused with purple or greenish purple. The typically scrotiform or saccate spur, which is occasionally didymous and purplish, varies from one-third to two-thirds (rarely longer) the length of the lip. The column is characteristically small, although some forms approach the large column of *H. sparsiflora*. The scrotiform or saccate spur of *H. saccata*, however, easily separates such forms from that species. The form possessing a linear-lanceolate or elliptic-lanceolate lip and somewhat denser inflorescence, described as *Limnorchis purpurascens*, has been included here. This form doubtless represents an approach to *H. hyperborea*. However, its saccate spur is more typical of *H. saccata* than of that species.

Moist or wet soil in meadows, fields, bogs, thickets, swamps, marshes, canyons, coniferous forests, on open seepage slopes, ledges and in or along streams, from sea level up to 12,500 ft. in Colorado, 9500 ft. in Arizona and Washington, 3500 ft. in Unalaska; blooming from May to September throughout its range. N. Mex. (Santa Fe: Lake Peak), Ariz. (Graham and White Mts.), Colo. (Clear Creek, El Paso, Jefferson), Nev. (Elko), Calif. (Del Norte, Humboldt, Modoc, Siskiyou, Trinity), Wyo. (Lincoln, Yellowstone Pk.), Idaho (widespread), Ore. (widespread), Mont. (western part), Wash. (mostly northwestern), Alta., B. C., Alaska, Aleutian Isls.

9. HABENARIA SPARSIFLORA S. Wats., Proc. Am. Acad. 12: 276 (1877); *Limnorchis ensifolia* Rydb., Bull. Torr. Bot. Club 28: 629 (1901); *L. sparsiflora* Rydb., loc. cit., 631; *Habenaria aggregata* Howell, Fl. Northwestern Am. 628 (1902); *Limnorchis aggregata* Frye & Rigg, Northwest Fl. 114 (1912); *Habenaria leucostachys* var. *virida* Jepson, Fl. Calif. 1, pt. 6: 331 (1921).

This species is represented by two characteristic forms. One form, as exhibited by the type, approaches *H. saccata* in that the rather short, elliptic, bluntly obtuse leaves are scattered along the stem and the inflorescence has the elongated, lax aspect of that species. Another form, described as *Limnorchis ensifolia*, has linear-lanceolate leaves which are clustered at or near the base of the stem and the inflorescence is rather short and densely flowered. Intermediate conditions are common. Nevertheless, the essential floral characters are so similar in all of these forms that it seems unwise to attempt their segregation.

Some forms of *H. sparsiflora* approach *H. limosa*. Both are characterized by a fleshy-thickening near the base of the lip. In *H. sparsiflora*, however, the thickening tends to extend to near the middle of the lip. The shorter spur and much larger column of *H. sparsiflora* also aid in the separation of this species from *H. limosa*. The typically elongated raceme and general habit of *H. sparsiflora* are often quite similar to *H. saccata*. However, the large flowers with their large column and slender, elongated spur easily separate this species from *H. saccata*. The lip is usually linear or linear-elliptic but may occasionally be linear-lanceolate.

Moist or wet soil in mountain meadows, marshes, swamps, bogs, open or dense forests, on stream banks and open seepage slopes, frequent about springs, from near sea level up to 11,500 ft. in Utah, 9500 ft. in California, Colorado and Nevada; blooming from April to September throughout its range. N. Mex. (Lincoln), Ariz. (Oak Creek, Navajo Mt.), Utah (Iron, Piute, Salt Lake, Utah), Nev. (Washoe), Calif. (widespread), Ore. (Curry, Josephine), Wash. (Skamania).

9a. *Habenaria sparsiflora* var. *brevifolia* (Greene) Correll, comb. nov.; *Habenaria brevifolia* Greene, Bot. Gaz. 6:218 (1881); *Limnorchis brevifolia* Rydb., Bull. Torr. Bot. Club 28: 631 (1901).

Variety *brevifolia* is distinguished from the typical form primarily by its abbreviated leaves which are often only clasping sheaths. The reduced leaves are usually more ovate than in the typical form and are rarely as much as 9 cm. long. The flowering habits of both are similar, although the raceme of var. *brevifolia* may be somewhat more congested and may extend further down the stem. Florally, *H. sparsiflora* and var. *brevifolia* are almost identical. However, the sepals of var. *brevifolia* are sometimes more acuminate and the spur, which varies from 1 to 2 cm. in length, is always (but usually only slightly) exceeding the lip and is often longer than that of typical *H. sparsiflora*. The column is large, as in the typical form, and is one-half to two-thirds the length of the dorsal sepal.

Dry mountain slopes in open pine forests, about 7000 ft. altitude in New Mexico; blooming in August and September. N. Mex. (Lincoln, Socorro, Otero).

9b. *Habenaria sparsiflora* var. *laxiflora* (Rydb.) Correll, comb. nov.; *Limnorchis laxiflora* Rydb., Bull. Torr. Bot. Club 28: 630 (1901), as to type specimen and description only; *Habenaria laxiflora* S. B. Parish, Pl. World 20: 209 (1917).

This is a small-flowered variety of *H. sparsiflora*. It includes two rather distinctive vegetative types. The form so common in the Charleston Mountains of Nevada, characterized by having the linear-elliptic to lanceolate leaves clustered at or near the base of the stem and an elongated, cylindrical raceme, is closely allied to *H. limosa* and some forms of *H. hyperborea*, and it might well be considered as a variety of either of those species. However, the flowers of this plant appear to be most closely allied to *H. sparsiflora*. The form most frequent on the Pacific Coast with the elliptic to elliptic-oblong, obtuse leaves scattered on the stem and the remotely placed flowers, as represented by the type collections of *Limnorchis laxiflora*, superficially resembles a slender-spurred *H. saccata* and it seems to grade imperceptibly into that species. There is little doubt that most of the species included in the section *Limnorchis* freely hybridize with one another, thus creating for the taxonomist a most perplexing hybrid population with which to work.

Moist or wet soil in or around springs, in bogs, marshes, ravines, meadows, swamps, woods, along stream banks, usually at high elevations, up to 11,000 ft. in California and Nevada; blooming from June to August throughout its range. Ariz. (Coconino, Navajo Indian Res.), Colo. (Rio Blanco), Utah (Salt Lake, Utah), Nev. (Clark, Esmeralda), Calif. (widespread), Ore. (Klamath).

10. HABENARIA UNALASCENSIS (Spreng.) S. Wats., Proc. Am. Acad. 12: 277, in text (1877); *Spiranthes unalascensis* Spreng., Syst. Veg. 3: 708 (1826); *Habenaria Cooperi* S. Wats., Proc. Am. Acad. 12: 276 (1877); *Montoliva unalascensis* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 107 (1900); *Piperia unalascensis* Rydb., Bull. Torr. Bot. Club 28: 270, 635 (1901); *Piperia Cooperi* Rydb., loc. cit., 636.

This species varies considerably in habit. The leaves, when present, vary in shape from linear-lanceolate to oblanceolate or rarely obovate and the inflorescence may consist of only a few

scattered flowers or a rather densely flowered, cylindrical raceme. However, the flowers, except for minor variations, are similar in all of the forms examined.

This species is almost ubiquitous, being found under various ecological conditions. Dry or moist soil on grassy open slopes, in forests, chaparral, brush-lands, meadows, sandy or gravelly soil along rivers and streams, in leafmold or coniferous or mixed coniferous-hardwood forests, usually at low elevations, from sea level up to 8000 ft. in California and Nevada; blooming from April to August throughout its range. Colo. (S. Boulder Peak), Utah (Summit, Weber), Nev. (E. Humboldt Mts.), Calif. (common, widespread), Wyo. (Lincoln, Teton, Uinta, Yellowstone Pk.), Idaho (mostly north-central part), Ore. (mostly Cascade Mts.), Mont. (western part), Wash. (Cascade and Olympic Mts.), Alta., B. C., Alaska, Aleutian Isls.

10a. *Habenaria unalascensis* var. *elata* (Jepson) Correll, comb. nov.; *H. elegans* Bolander, Cat. Pl. Vicinity San Francisco 29 (1870); *H. Michaelii* Greene, Bull. Calif. Acad. Sci. 1: 281 (1885); *Montolivca elegans* Rydb., Mem. N. Y. Bot. Gard. 1 (Fl. Mont.): 106 (1900), not Reichb. f.; *Piperia elegans* Rydb., Bull. Torr. Bot. Club 28: 270, 638 (1901); *P. elongata* Rydb., loc. cit., 270; *P. lancifolia* Rydb., loc. cit., 637; *P. leptopetala* Rydb., loc. cit., 637; *P. multiflora* Rydb., loc. cit., 638; *P. longispica* Rydb., loc. cit., 639; *P. Michaelii* Rydb., loc. cit., 640; *Habenaria multiflora* Blankenship, Mont. Coll. Agric. & Mech. Arts, Sci. Stud., Bot. 1: 45 (1905); *H. longispicata* S. B. Parish, Pl. World 20: 209 (1917); *H. elegans* var. *elata* Jepson, Fl. Calif. 1, pt. 6: 330 (1921).

Variety *elata*, except for its elongated spur, is florally identical to the typical form. However, the floral segments are often slightly larger and the spur, which is 8 to 18 mm. long, is about twice as long as the lip, or longer. The plant is usually stouter and taller and the leaves larger, being typically oblong-elliptic. Also, the raceme, which may be as much as 6 dm. long, is usually more densely flowered than in the typical form.

Usually in dry woods, also in dry or moist soil in canyons, brush-lands, open slopes, barrens, sandhills and on rocky ridges, usually at low elevations, from sea level up to 8000 ft. in Cali-

ifornia, 6000 ft. in Idaho; blooming from May to September, rarely April, throughout its range. Calif. (common, widespread), Idaho (mostly northern part), Ore. (mostly Cascade Mts.), Mont. (Flathead), Wash. (widespread), B. C. (southwestern corner).

10b. *Habenaria unalascensis* var. *maritima* (Greene) Correll, comb. nov.; *H. maritima* Greene, Pittonia 2: 298 (1892); *Piperia maritima* Rydb., Bull. Torr. Bot. Club 28: 641 (1901); *Habenaria elegans* var. *maritima* Ames, Orch., fasc. 4: 113 (1910).

Variety *maritima* apparently represents a robust form of var. *elata*. However, it is here segregated as a distinct variety of *H. unalascensis*. This form is a short, stout plant with large, broad leaves and a conspicuously congested, often pyramidal, raceme. The flowers are more nearly white than in the typical form and are said to be quite fragrant.

Sandy soil of slopes, fields, pastures, bluffs, cliffs and terraces facing the sea, near or at sea level along the coast; blooming from July to September. As Ames noted, this variety is found only under the influence of salt air in the littoral region of California (Del Norte, Marin, Mendocino, Monterey, San Francisco, San Mateo) and Oregon (Coos, Curry, Lincoln, Tillamook).

11. HABENARIA VIRIDIS (L.) R. Br. var. BRACTEATA (Muhl. ex Willd.) A. Gray, Man. Bot. North. U. S., ed. 5, 500 (1867); *Orchis bracteata* Muhl. ex Willd., Sp. Pl. 4: 34 (1805); *Habenaria bracteata* R. Br. in Aiton, Hort. Kew., ed. 2, 5: 192 (1813).

The rather large, pendent lip which is unequally tridentate at the apex and the scrotiform spur are characteristic of this species. The lowermost floral bracts always greatly exceed the flowers.

Moist or wet soil in dense hardwood or mixed coniferous-hardwood forests, occasionally in meadows and prairies, up to 9000 ft. in Colorado, 6000 ft. in Wyoming; blooming from May to August, rarely earlier, throughout its range. Colo. (Gilpin, Jefferson, Larimer), Utah (Iron), Neb. (Dawes), Wyo. (Sheridan), S. Dak. (Custer, Lawrence), Mont. (Gallatin, Lake, Wheatland), Wash. (rare in Cascade Mts.), Sask., Alta., B. C., N. W. Terr., Yukon, Alaska, Aleutian Isls.

VARIATIONS IN *CASTILLEJA PLAGIOTOMA*

BY ALICE EASTWOOD

Of all the species of *Castilleja* this is the most distinctive and once seen is always immediately recognized. In the Synoptical Flora (vol. 2, pt. 1, p. 452), Gray describes the peculiar calyx which separates this species from all others: "normally bilabiate, i. e., cleft at the sides deeper than before or behind, upper lip emarginate, lower obcordately 2-cleft." The type was collected by C. G. Pringle in the Mohave Desert, California. I have not seen the type but from other specimens collected in various parts of the Mohave Desert which in general agree, I find that the upper lip consists of two lobes that in some are so united by the dense white tomentum that they seem to be one and the emargination is where they are separable. In others the lobes are quite distinct. The longer division of the calyx is adjacent to the lower lip of the corolla and its lobes are generally oblong, though in some there is a slight broadening upwards. The shorter division is at the back of the galea and the two parts are separated by a sinus broad and rounding or almost acute.

Since I have already studied the variations in the parts of the flowers in *C. latifolia* H. & A. and *C. affinis* H. & A. (Leaflet West. Bot. 1:235—238), a study of specimens of a species so well marked as this induced the examination of specimens from the Herbarium of the California Academy of Sciences and those from the University of California Herbarium.

The specimen from Oil Canyon, western Fresno County, collected by Eastwood and Howell differs somewhat in appearance from those from the Mohave Desert. The leaves have more linear divisions and in general the bracts are five-cleft instead of three-cleft. The difference in the teeth of the lower lip of the corolla seemed very distinct in some flowers examined, not discernible in others. I am in doubt as to the value of the descriptions of the lower lip of the corolla since it is very thin and inconspicuous and the teeth very small. The spike is yellowish-white from the color of the corolla and the dense wool on the divisions of the calyx and bracts. The specimen collected by the author on the white hills separating the Cuyama Valley from the Carrizo Plain resembles the plants from the Mohave Desert rather than those from Oil Canyon, though it is out of its general range and in a region more like the oil country of Fresno County.

CASTILLEJA PLAGIOTOMA

Specimen	Flower	Calyx, long lip	Calyx, short lip	Corolla, upper lip	Corolla lower lip
<i>S. R. Parish 11986</i> , Mohave Desert at Cajon Summit.	15 mm. long, galea surpassed by calyx.	Laterally 11 mm. long, lobes united by wool, 5 mm. long, broadening upwards, 2 mm. wide.	Sinus acute, lobes 2 mm. long, 1 mm. wide at base, lanceolate, acute.	Galea 7 mm. long, equaling tube in length.	3 short teeth.
<i>Eastwood & Howarth 2056</i> , Oil Canyon, Fresno Co.	15 mm. long, galea slightly surpassing calyx.	Laterally 6 mm. long, lobes separate, 5 mm. long.	Sinus broad rounding, lobes 4 mm. long, lanceolate, acute.	Galea 10 mm. long, longer than tube.	2 outer teeth filiform.
<i>Eastwood & Howarth 3972</i> , Palmdale, Los Angeles Co.	13-14 mm. long, galea surpassing calyx.	Laterally 4 mm. long, lobes 2 or in 1 flower 3, 2.5 mm. long, 1 mm. wide, obtuse.	Sinus deltoid, lobes 2 mm. long.	Galea 7 mm. long, about same as tube.	3 short teeth.
<i>Dr. Davidson, Lancaster</i> (U. C.)	13-14 mm. long, galea surpassing calyx.	Laterally 3 mm. long, 2 mm. wide, united by wool, lobes 2 mm. long.	Sinus acute, lobes 1.5 mm. long, 1 mm. wide at base.	Galea 7 mm. long, longer than tube.	3 short teeth.
<i>Munz 10826</i> , Hesperia, San Bernardino Co. (U. C.)	20 mm. long, galea surpassing calyx.	Laterally 5 mm. long, lobes 4 mm. long, 2 mm. wide, one part lower.	Sinus broad, lobes sublance, 1 mm. long.	Galea 10 mm. long, longer than tube or equal.	3 short teeth.
<i>Eastwood, Cayama</i> (U. C.)	15 mm. long, galea surpassing calyx a little.	Laterally 5.5 mm. long, lobes 3.5 mm. long, 1.5 mm. wide.	Sinus broad, lobes sublance, 1 mm. long.	Galea 10 mm. long, longer than tube.	3 short teeth.
<i>Munz 6878</i> , Big Rock Creek, San Gabriel Mts. (U. C.)	16 mm. long.	Laterally 6 mm. long, lobes 3.5 mm. long, 2 mm. wide.	Sinus acute, lobes sublance, 2 mm. long, 1 mm. wide at base.	Galea 6 mm. long.	3 short teeth.
<i>Ripley & Barnaby 3277</i> , Teemler Mts., San Luis Obispo Co.	20 mm. long, galea surpassing calyx a little.	Laterally 8 mm. long, lobes 4 mm. long, 3 mm. wide.	Sinus acute, lobes sublance, about 3 mm. long, 2 mm. wide at base.	Galea 10 mm. long.	2 elliptical teeth, 0.5 mm. long.

THE VARIETIES OF *ASTRAGALUS DECUMBENS*

BY ARTHUR CRONQUIST

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There has been much confusion, both in the nomenclature and in the taxonomic interpretation, of the species which Marcus E. Jones (1923) treated as *Astragalus campestris* (Nutt. ex T. & G.) A. Gray. After observing some of the varieties in the field, and working with herbarium specimens at intervals for several years, I am convinced that Jones' taxonomic interpretation was nearly correct. His treatment did not help the confused nomenclature, however. He listed *A. campestris* (typical), and the varieties *decumbens*, *hylophilus*, *crispatus*, and *serotinus*. As a synonym of var. *decumbens* he listed *A. convallarius* Greene, a name which was founded on *A. campestris* Gray. (Greene pointed out, quite correctly, that the name *A. campestris* Gray is untenable because of the earlier *A. campestris* L.). Furthermore, Jones made a most peculiar interpretation of how the name *A. campestris* Gray should be applied. His *A. campestris* (typical) is the low hairy form having narrow but well-developed leaflets, which he says has the "stems mostly flat on the ground." This is difficult to reconcile with the original description, which reads, in part, "nearly erect, stout, with rigid rush-like branches . . . [leaves] bearing 3-5 pairs of rigid linear-subulate leaflets, the upper ones 3-foliolate or simple." The description of *Homalobus campestris* Nutt. ex T. & G. (i. e., *A. campestris*) indeed indicates a plant very similar to the species which Jones treated as *A. junceus*, also an untenable name.*

Macbride (1922) considered *A. campestris* Gray to be inseparable from *A. junceus*, but quite distinct from the other units grouped under Jones' *A. campestris*. In that respect I agree with Macbride, that the names *A. campestris* and *A. junceus* properly apply to a rush-like species which is related to, but readily distinguishable from, the species which Jones treated as *A. campestris*. Since both the names *A. campestris* and *A. junceus* are preoccupied, the oldest available name for the unit to which they belong is *A. diversifolius* A. Gray, Proc. Am. Acad., 6:230 (1864).

**Astragalus junceus* Ledeb. in Spreng., Syst. Veg., 3:297 (1826), is validly published, and antedates by many years *A. junceus* (Nutt. ex T. & G.) A. Gray, Proc. Am. Acad., 6:230 (1864).

Tidestrom (1937), without giving any reasons, has recently made the combinations *A. convallarius diversifolius* and *A. convallarius hylophilus*, while apparently regarding *A. decumbens* as a distinct species. Aside from the taxonomic questions involved, his procedure is quite indefensible, since the name *A. diversifolius* (1864) antedates *A. convallarius* (1893).

The nomenclature is thus seen to be badly confused. On the taxonomic side, it might be pointed out that Rydberg (1929) was able to see 14 species in what Jones treated as one polymorphic species.

The oldest available name for the species which Jones treated as *A. campestris* is *A. decumbens* (Nutt. ex T. & G.) A. Gray, Proc. Am. Acad., 6:229 (1864), which has clear priority over *A. decumbens* Boiss., Fl. Orient., 2:429 (1867). This name, in the restricted sense, applies to the low, narrow-leaved, usually hairy form of the species, which Jones treated in part as *A. campestris* proper. Inasmuch as he had seen the type collection of *A. campestris*, which his photograph shows to be the rush-like plant described by Torrey and Gray, it is difficult to see how he arrived at his interpretation. His *A. campestris* var. *decumbens* appears to be this phase also, at least in part, although his comments are contradictory and confusing. The oldest epithet that has been applied to typical *A. decumbens* as a variety is also *decumbens* (*A. campestris* var. *decumbens* Jones), so that it may be known as **A. decumbens** (Nutt. ex T. & G.) A. Gray var. **decumbens** (Nutt.) Cron. (*Homalobus decumbens* Nutt. ex T. & G., Fl. N. Am., 1:352,—1838).

Jones' *A. campestris* var. *crispatus* is represented in his herbarium by a single collection (Jones, Alta, Montana). It is similar to var. *decumbens* but rather loosely silvery-pubescent, the hairs on the pods fine and somewhat twisted. It may be a good variety, but at least until more is collected and it is shown to be reasonably constant, I prefer to regard it as an extreme form of var. *decumbens*, which is sometimes closely silvery.

Similar to the variety *decumbens*, and having about the same range, but less pubescent, and with broad obtuse leaflets, is the plant which has usually been called *A. hylophilus* (Rydb.) A. Nels. The oldest epithet that has been applied to it as a variety is *oblongifolius* (*A. hylophilus* var. *oblongifolius* Macbr., Contr. Gray Herb., n. ser., 65:37,—1922), so that it may be known as

A. decumbens (Nutt. ex T. & G.) A. Gray var. **oblongifolius** (Rydb.) Cron. (*Homalobus oblongifolius* Rydb., Bull. Torr. Club, 34: 50,—1907). This is Jones' *A. campestris* var. *hylophilus*.

Similar to the variety *oblongifolius*, but taller, with longer relatively narrower leaflets, the terminal one sometimes not distinctly articulated to the rachis, is the phase which has been called *Homalobus decurrens* Rydb. Jones reduced this to *A. campestris* var. *hylophilus*, but on the basis of five collections known to me I think it distinctive enough to warrant varietal recognition. It may be known as **A. decumbens** (Nutt. ex T. & G.) A. Gray var. **decurrens** (Rydb.) Cron. (*Homalobus decurrens* Rydb., Bull. Torr. Club, 31: 563—1904.)

Occupying a range mostly to the northwestward of the other varieties is a phase which is commonly tall (2—5 dm.), only moderately pubescent, and with fairly narrow and acute leaflets. In one of his earlier papers Jones called this *A. decumbens* var. *serotinus*, which stands as the correct name.

To recapitulate, the varieties of *Astragalus decumbens*, as I understand them, and their probable synonyms, as indicated by descriptions and cited specimens, are:

1. **ASTRAGALUS DECUMBENS** VAR. **DECUMBENS** (Nutt.) Cron.

Homalobus decumbens Nutt. ex T. & G., Fl. N. Am. 1: 352 (1838);

Homalobus tenuifolius Nutt. ex T. & G., loc. cit.;

Astragalus divergens Blankinship, Mont. Bot. Stud. 1: 73 (1905);

Homalobus camporum Rydb., Bull. Torr. Club 32: 666 (1906);

Homalobus divergens Rydb., loc. cit. 34: 417 (1907);

Homalobus humilis Rydb., loc. cit. 34: 417 (1907);

Homalobus microcarpus Rydb., loc. cit. 34: 417 (1907);

Homalobus paucijugus Rydb., loc. cit. 34: 418 (1907);

Astragalus Carltonii Macbride, Contr. Gray Herb. n. ser. 65: 36 (1922);

Astragalus Garrettii Macbride, loc. cit.;

Astragalus campestris var. *decumbens* Jones, Rev. N. Am. Sp. Astr. p. 74 (1923);

? *Astragalus campestris* var. *crispatus* Jones, op. cit. p. 75;

? *Homalobus Hitchcockii* Rydb., N. Am. Fl. 24 (part 5): 271 (1929).

Plant low, tufted, mostly 15 cm. high or less; leaflets mostly narrow, often folded, usually acute, seldom over 1 cm. long, strigose on the lower surfaces, usually also strigose above, but sometimes glabrate, the terminal one sometimes an elongated scarcely expanded continuation of the rachis; inflorescence usually compact and short, at least in flower; pod moderately

to densely pubescent, sometimes only sparsely so. Colorado, Wyoming, Montana, Idaho, Utah, and probably Nevada.

2. *ASTRAGALUS DECUMBENS* var. *SEROTINUS* (A. Gray) Jones.

- Astragalus serotinus* A. Gray, Pac. R. R. Rep. 12: 51 (1860);
Astragalus Palliseri A. Gray, Proc. Am. Acad. 6:227 (1864);
Astragalus strigosus Coult. & Fish., Bot. Gaz. 18: 299 (1893);
Astragalus griseopubescens Sheld., Minn. Bot. Stud. 1:24 (1894);
Homalobus serotinus Rydb., Mem. N. Y. Bot. Gard. 1: 248 (1900);
Astragalus decumbens var. *serotinus* Jones, Contr. West. Bot.
 no. 10:58 (1902);
Homalobus strigosus Rydb., Bull. Torr. Club 40: 53 (1913);
Astragalus serotinus var. *strigosus* Macbr., Contr. Gray Herb.
 n. ser. 65: 37 (1922);
Astragalus serotinus var. *Palliseri* Macbr., loc. cit.;
Astragalus campestris var. *serotinus* Jones, Rev. N. Am. Sp. Astr.
 p. 75 (1923).

Plant mostly 2—5 dm. high, often rather straggly; leaflets mostly lance-linear to linear, acute, strigose below, strigose or glabrate above, seldom over 2.5 cm. long; inflorescence rather loose and elongate; pod sparsely to moderately strigose, rarely densely strigose or glabrate. Alberta and British Columbia to Washington, Idaho, Montana, and northern Wyoming.

3. *ASTRAGALUS DECUMBENS* var. *OBLONGIFOLIUS* (Rydb.) Cron.

- Homalobus hylophilus* Rydb., Mem. N. Y. Bot. Gard. 1: 247
 (1900);
Homalobus oblongifolius Rydb., Bull. Torr. Club 34: 50 (1907);
Astragalus hylophilus A. Nels. in Coult. & Nels., Man. Ry. Mt.
 Bot. p. 291 (1909);
Astragalus hylophilus var. *oblongifolius* Macbr., Contr. Gray
 Herb. n. ser. 65: 37 (1922);
Astragalus campestris var. *hylophilus* Jones, Rev. N. Am. Sp.
 Astr. p. 75 (1923);
Astragalus convallarius hylophilus Tidestrom, Proc. Biol. Soc.
 Wash. 50: 20 (1937).

Plant mostly 1—3 dm. high; leaflets rather closely set, broad, lanceolate to elliptic or oblong, mostly 2 cm. long or less, mostly obtuse, sparingly strigose below, glabrous above; inflorescence mostly short and compact, sometimes loose and elongate; pod sparsely strigose or more commonly glabrous. Montana, Utah, Idaho, Wyoming, South Dakota, and Colorado.

4. *ASTRAGALUS DECUMBENS* var. *DECURRENS* (Rydb.) Cron.

- Homalobus decurrens* Rydb., Bull. Torr. Club 31:563 (1904);
Astragalus Rydbergii Macbr., Contr. Gray Herb. n. ser. 65:37
 (1922).

Plant mostly 3—4 dm. high; leaflets lanceolate, acute, mostly 2—5 cm. long, rather distantly set, strigose below, glabrous above, the terminal one often larger than the others and not distinctly articulated to the rachis;

inflorescence mostly somewhat loose, occasionally compact; pod glabrous or sparingly strigose. Colorado and apparently Nevada; perhaps elsewhere.

I wish to thank Dr. P. A. Munz, of Pomona College, for the loan of Marcus E. Jones' material of *Astragalus decumbens*.

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3. Tidestrom, I. 1937. Notes on *Astragalus* [Tournef.] L. Proc. Biol. Soc. Wash. 50: 17—22.
4. Rydberg, P. A. 1929. *Homalobus*. N. Am. Fl. 24 (pt. 5): 256—280.

OBSERVATIONS ON CALIFORNIAN PLANTS—III

BY ROBERT F. HOOVER

The present notes deal exclusively with certain plants of the Sweetwater Mountains northwest of Bridgeport in Mono County, where I was able to spend two days in the summer of 1941. There is no published record indicating that any other botanist has collected in this mountain range. The most notable fact concerning the flora of the Sweetwater Mountains is, perhaps, the common occurrence there of certain species which are rare in the Sierra Nevada to the west. Here are mentioned only species of particular interest, which are rare or which represent range extensions.

POA LEPTOCOMA Trin. is rare in California, where it has been known to occur only in the central Sierra Nevada. It is locally abundant in wet places in the upper watershed of Deep Creek in the Sweetwater Mountains, *Hoover No. 5560*.

ELYMUS SCRIBNERI (Vasey) Jones. *Agropyron Scribneri* Vasey. Mt. Patterson, *Hoover No. 5553*. I have found no previous reference to the occurrence of this species in California, or any other specimens indicating such occurrence.

Although this is hardly the place for a complete discussion of generic limits, an explanation of my listing this species as *Elymus* rather than *Agropyron* may be called for. After a careful study of the species occurring in California, it does not seem that any of the native North American species customarily referred to *Agropyron* are generically separable from *Elymus*. The original species of *Agropyron* belongs to a distinct Old-World group having crowded compressed spikelets, and I believe that

the generic name should be restricted to that group of species. It has been customary to include in *Agropyron* those species of *Elymus* which have usually solitary spikelets, but the occurrence of both paired and solitary spikelets in several species, including such common ones as *E. glaucus* and *E. triticoides*, constitutes a strong argument against such a course. If the number of spikelets at a node is taken as a generic character, then it is found that two different genera very frequently occur on a single plant!

Elymus Saundersii Vasey var. ***californicus*** Hoover, var. nov., aristis glumarum 5—16 mm. longis, aristis lemmarum 7—30 mm. longis.

Upper Cottonwood Creek, *Hoover No. 5568* (type). Other collections: Patterson Flat, Lassen Co., *Fischer & Johnson No. F233*; north side of Pigeon Flat, Alpine Co., *Hoover No. 5480*; Eagle Meadow, Tuolumne Co., *Hoover No. 5495*; Tuolumne Meadows, *Sharsmith No. 390* in part; trail from Bullion Flat to Mineral King, Tulare Co., *Dudley No. 2562*.

This plant appears to differ from *E. Saundersii*, a Colorado species, only in the shorter awns, so that it seems best regarded as a variety. In typical *E. Saundersii* the awns of the glumes are 2 to 4 cm. long and those of the lemmas 2.5 to 5 cm. long. Like the typical form of the species, the variety here described has most of the spikelets solitary but there are often a few paired ones in each spike. It may be noted that *Elymus Hansenii* Scribner (*Sitanion Hansenii* J. G. Smith), which is widely distributed in California, is also closely related to *E. Saundersii* and may not be specifically distinct, but it appears always to have two spikelets (though one of them may be reduced and sterile) at each node.

STIPA PINETORUM Jones in the Sierra Nevada occurs only at high altitudes. In the Sweetwater Mountains it grows from about 7000 to 9000 feet, but was not seen on the higher mountains. A form having pubescent foliage was collected in the hills along Hot Creek near the base of the Sweetwater Mountains, *Hoover No. 5443*.

CAREX VALLICOLA Dewey. Common in dry places in the upper basin of Deep Creek, *Hoover No. 5562*. The collection was identified by Dr. F. J. Hermann, who states that this species has not previously been found in California.

CLAYTONIA NEVADENSIS Watson, which had been found only in a restricted area in the central Sierra Nevada, was collected along upper Deep Creek, *Hoover No. 5561*.

ASTRAGALUS INEPTUS Gray has been collected several times in the Sonora Pass region of the Sierra Nevada. It is locally common at relatively low altitudes in the Sweetwater Mountains: upper Cottonwood Creek, *Hoover No. 5537*.

CYMOPTERUS CINERARIUS Gray is a rare species originally collected near Sonora Pass. In the Sweetwater Mountains it was found growing on rock-slides near Mt. Patterson, *Hoover No. 5545*.

ANDROSACE SEPTENTRIONALIS L. var. SUBUMBELLATA A. Nelson. Mt. Patterson, *Hoover No. 5559*. Rarely collected in California.

POLEMONIUM CHARTACEUM Mason. Mt. Patterson, among rocks above timberline, *Hoover No. 5548*. I have seen no reference to any other collections except from the White Mountains of Mono County.

CRYPTANTHA GLOMERIFLORA Greene. Along upper Cottonwood Creek, *Hoover No. 5540*, locally very abundant and unusually large for this species. It is not common in the Sierra Nevada, where it never grows thickly nor luxuriantly.

Senecio revolutus Hoover, spec. nov. Perennis caulibus erectis ramosis floriferis ex rhizomatibus gracilibus patentibus, caulibus 7—10 cm. altis, prorsus et dense foliosis, purpurascens prope basin; foliis ascendentibus, 10—35 mm. longis, linearibus, sinuatis dentatis vel integris, valde revolutis margine; phyllariis 12—18, scariosis margine, nigris vel viridibus apice, 7—8 mm. longis; floribus luteis, radii circa 8, 5—6 mm. longis; acheniis (immaturis) pallide fuscis, 3.5 mm. longis.

Plant with slender creeping rhizomes and erect branching flowering stems; stems 7 to 10 cm. tall, densely leafy throughout, purplish near the base, each branch terminating in a head; leaves ascending, 10 to 35 mm. long, linear, sinuate, dentate, or apparently entire, the margins strongly revolute; involucre bracts 12 to 18, scarios-margined, with or without black tips, 7 or 8 mm. long; flowers yellow; rays about 8, 5 or 6 mm. long; achenes (immature) light brown, 3.5 mm. long.

Mt. Patterson, above timberline, *Hoover No. 5550*. One other collection, also from Mono County, has been seen: south of Emma Lake, *French No. 855*.

The only species which seems closely related to the one here described is *S. Fremontii* T. & G., which has very different leaves. *Senecio Fremontii* apparently never develops true creeping rhizomes, although the stems may root near the base. The stout woody main roots of *S. Fremontii* are lacking in *S. revolutus*.

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CONTENTS

	PAGE
Two New Species from Baja California ALICE EASTWOOD	257
Notes on the Distribution of California Grasses A. A. BEETLE	258
Some Weedy Californian Bedstraws JOHN THOMAS HOWELL	260
A New Californian Rose ALICE EASTWOOD	262
Notes on Calyptridium JOHN THOMAS HOWELL	262

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A publication on the exotic flora of California and on the native flora of western North America, appearing about four times each year. Subscription price, \$1.00 annually; single numbers, 40c. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco, California.

Cited as

LEAFL. WEST. BOT.



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ALICE EASTWOOD and JOHN THOMAS HOWELL

TWO NEW SPECIES FROM BAJA CALIFORNIA

BY ALICE EASTWOOD

Hypericum peninsulare Eastw., spec. nov. Suffruticosum, erectum, stricto-ramosum, glabrum, circa 2—3 dm. altum; caulibus senioribus periphyreis, decorticatis, junioribus viridibus, tenuibus, nonnihil 4-angulatis; foliis anguste lanceolatis vel linearibus, marginibus revolutis, apice acutis, basi sessilibus, 5—20 mm. longis, 1—3 mm. latis, supra et infra densae atropunctatis, sæpe papillosis, supra viridibus, infra glaucis; floribus prope sessilibus in cymis terminalibus, ramis sæpe elongatis; sepalis lanceolatis vel oblongis, acutis, striatis, circa 3 mm. longis, 1—2 mm. latis, prope æqualibus; petalis luteis, bis longioribus sepalis; staminibus 15—20, distinctis; capsula acuminata, superante calycem; stylis 3.

Type: Herb. Calif. Acad. Sci. No. 294479, collected October 13, 1941, by Betty J. Hammerly, No. 382, on Sierra de la Laguna, elev. about 5000 feet, Baja California. It was abundant on dry rocky margins of the meadow.

This is closely related to *Hypericum Eastwoodianum* Johnston from the Revillagigedo Islands and resembles it in general habit of growth and leaves. The sepals are different in shape, the stamens are fewer, and the ripe capsule surpasses the calyx with the spreading styles conspicuous.

Ipomœa odorata Eastw., spec. nov. Caules tenues, glabri, dense volubiles; foliis basi reniformibus, apice acutis acuminatisve, 2—3 cm. latis, 2—4 cm. longis, petiolis gracilibus, brevissimis ad 4 cm. longis; pedunculis 2—4 cm. longis, prope basin articulatis; floribus solitariis, odoratis; sepalis membranaceis, glabris, 3 interioribus anguste oblongis, obtusis, apiculatis, circa 15 mm. longis, 5 mm. latis, sepalis 2 exterioribus circa 1 cm. longis, 4 mm. latis, apice obtusis; corolla rosea, infundibulari, 6—7 cm. longa, limbo circa 7 cm. lato, tubo 2 cm. longo, æquilongo calyci; stylo et staminibus ex fauce exsertis, brevioribus corolla; filamentis adnatis basi corollæ, aliquando pilosis; antheris linearibus, 4 cm. longis, acutis; stylo glabro, stigmatate capitato.

Type: Herb. Calif. Acad. Sci. No. 294296, collected Oct. 30, 1941, by Betty J. Hammerly, No. 172, 5 miles north of Comondú, Baja California. "It grew on open plateau thickly strewn with lava boulders. Flowers pink with heavy sweet odor."

This is related to *I. tastensis* Bdg., differing in smaller flowers with shorter corolla-tube, the limb obtusely undulate. Another collection is Hammerly No. 104, south end of Viscaïno Desert, about 15 miles north of San Ignacio, in a rocky, shallow, dry arroyo; flowers light pink with heavy sweet odor; Herb. No. 294297.

NOTES ON THE DISTRIBUTION OF
CALIFORNIA GRASSES

BY A. A. BEETLE

Division of Agronomy, University of California, Davis

In spite of the relatively short time during which the grasses of California have been studied, it cannot be said that they are poorly known. The first comprehensive list of these grasses was made by Bolander (Grasses of the State in Transactions of the State Agric. Soc. for 1864-65, pp. 131-145). At this time he knew 112 grasses growing without cultivation, of which 31 were introductions. Three hundred ninety are now known in the state, 282 native, and 108 introduced. Only 45 of the names used by Bolander have successfully survived the scrutiny of botanists and changes in nomenclature.

The following notes, accumulated during a two-year period of intensive collecting and study of the California grasses, are intended to round out the knowledge of the distribution of California grasses as given at present in manuals and periodicals. Unless otherwise stated the specimens cited are in the Grass Herbarium of the Agronomy Division, College of Agriculture, University of California, Berkeley.

ÆGILOPS CYLINDRICA Host., as revealed by a thorough search of California herbaria, has been collected only once in this state, namely, by A. E. Martin in 1939, Siskiyou Co. (Herb. State Dept. Agric., Sacramento). Since annual weeds frequently appear for only a season, arising as impurities in seed mixtures, it seems illogical to give this species a place in the California flora.

ÆGILOPS OVATA L., like *A. cylindrica*, is known in California from a single collection. Although it has usually been reported from Mendocino Co. it was actually collected in 1928 at Two Rock Ranch, Willows, Glenn Co. (Herb. State Dept. Agric., Sacramento).

AGROSTIS HENDERSONII Hitchc. has been collected in Shasta Co., 5 miles south of Ingot, *Beetle No. 3277*. This is the third recorded collection of the grass, and the second collection in California. It has previously been known from the type collection, *Henderson No. 12387*, Jackson Co., Oregon, and *Hoover No. 532a*, Merced Co., California, as reported by R. F. Hoover (Notes on California Grasses, *Madroño* 3: 230,—1936).

BROMUS TRINII Desv. is reported by Hitchcock (*Manual of the Grasses of the United States*, 57,—1935) as introduced from Chile. The occurrence of a described variety in the Panamint Mountains would lead one to suppose that it is native and in its limited California occurrence on wooded slopes it hardly simulates other weedy bromes. Robbins (*Alien plants growing without cultivation in California*, Univ. of Calif. College of Agric. Exper. Sta. Bull. 637,—1940) includes this species to the neglect of such obvious introductions as *Phalaris minor* Retz., *Koeleria phleoides* (Vill.) Pers., *Poa bulbosa* L., *Setaria geniculata* (Lam.) Beauv., *Setaria italica* (L.) Beauv., *Aira præcox* L., *Andropogon saccharoides* Swartz, *Agrostis palustris* Huds., *A. stolonifera* L., and *A. tenuis* Sibth. It is possible that *Bromus Trinii* may, along with *Poa secunda* Presl, form a natural link between the Californian and Chilean floras.

EHRHATA ERECTA Lam., escaping from the Agronomy Division Grass Garden, Berkeley, has established itself locally. It has been collected by *Beetle No. 1744* and *Stebbins No. 3063*.

FEŠTUCA ARIZONICA Vasey has been collected on Clark Mt. in San Bernardino Co. by *Munz No. 12913* (Herb. Pomona College).

HELEOCHLOA SCHÆNOIDES (L.) Host. has been collected a few miles east of Davis, Yolo Co., by Raynor in 1940 and by Tofsrud in 1942. Tofsrud found the same plant in 1942 on the road between Rio Vista and Fairfield in a drainage ditch. This species is introduced from the Mediterranean region.

MUHLENBERGIA REPENS Hitchc. was collected by Johnston in 1916 on Red Hill near Claremont in southern California (Dudley Herb., Stanford Univ.).

NEOSTAFFIA COLUSANA Davy has been collected near Merced, Merced Co., according to a specimen collected by H. R. Guilbert, June 8, 1938 (Herb. Bot. Dept., Davis). If the plant is extinct at the type locality as has been reported, then this is the only locality known at present besides those reported by Hoover in Stanislaus Co. (*Leaf. West. Bot.* 2: 273).

PHOLIURUS INCURVUS (L.) Schinz & Thell. has been collected 12 miles north of Williams, Colusa Co., *Beetle No. 3271*. Previously this species was thought to be confined to coastal marshes from the San Francisco Bay region southward.

SCHISMUS BARBATUS (L.) Thell. Santa Barbara, Santa Barbara Co., *Beetle No. 3225*; 28 miles north of Travis, San Bernardino Co., *Beetle No. 3198*; 13 miles south of Pasadena, Los Angeles Co., *Beetle No. 3085*. Other recent California collections are: Imperial Co., *Hastings in 1941*; Riverside Co., *Yates No. 6415*; and Kern Co., *Yates No. 6515*.

SCHISMUS ARABICUS Nees. South side of Tulare Lake, Kings Co., *Beetle No. 2989*; 3 miles east of Lost Hills, Kern Co., *Beetle No. 2990*. This introduced annual has also been found recently by Hoover: Kings Co., *No. 3321*, and Fresno Co., *No. 443*. *Schismus arabicus* and *S. barbatus* although superficially similar are easily separated as indicated by Hoover (Leafl. West. Bot. 3: 114—115,—1942).

STIPA PARISHII Vasey is so readily distinguishable from *S. coronata* by its once geniculate awn and small dense panicle that there seems no reason to omit it from the California flora as Hitchcock consistently does. It occurs in Inyo Co., *Duran No. 3466* (Dudley Herb., Stanford Univ.); Los Angeles Co., *Elmer No. 4165*; San Bernardino Co., *Beetle No. 3667*; Riverside Co., *Jaeger in 1922* (Dudley Herb., Stanford Univ.); and San Diego Co., *Abrams No. 3637* (Dudley Herb., Stanford Univ.).

SOME WEEDY CALIFORNIAN BEDSTRAWS

BY JOHN THOMAS HOWELL

On a field trip in San Anselmo Canyon above Fairfax, Marin County, on June 7, 1942, I found the two kinds of *Galium* that I have been calling *G. parisiense* L. and *G. parisiense* var. *anglicum* Huds. (*sic*), as they are given in Jepson, Man. Fl. Pl. Calif. 958. The plants were very unlike in habit and fruit, and a study of them seems to indicate that two specific entities are involved. Following Boissier (Fl. Orient. 3:72), I shall call the coarser plant with stems retrorsely aculeolate and with fruits densely hispidulous *G. parisiense* L., and the more delicate plant with stems nearly or quite smooth and with half smaller granulate fruits *G. divaricatum* Lam. Those who may prefer to follow more conservative European workers may call the latter plant *G. parisiense* var. *divaricatum* (Lam.) Koch. An English collec-

tion of *G. anglicum* Huds. (*G. parisiense* var. *leiocarpum* Tausch) in Herb. Calif. Acad. Sci. seems to differ from *G. parisiense* only in the hairless, granulate fruit.

Galium divaricatum is in Herb. Calif. Acad. Sci. from the following counties of California: Yuba, Mendocino, Lake, Sonoma, Napa, and Marin. Collections of *G. parisiense* are from Butte, Calaveras, Tuolumne, Humboldt, Mendocino, Napa, and Marin counties.

• • •

On April 26, 1942, I found *Galium murale* (L.) All. very common on the east side of the Oakland Hills near Redwood Peak in Contra Costa County (No. 16953). Heretofore it has been known in California only from Santa Clara County near Stanford University (Stacey, Leaflet West. Bot. 1:69, where the specific name is attributed to DeCandolle in error).

• • •

Galium Mollugo L. is another Old World bedstraw which has been found growing spontaneously in California but which has not been listed for the state. The plant first came to my attention in a specimen from Mr. Joseph P. Tracy (*Parks & Tracy No. 11451*) which was collected in a pasture near Trinidad, Humboldt County, in the summer of 1937. Also in Herb. Calif. Acad. Sci. is a specimen of a plant which grew spontaneously in a ploughed orchard at Menlo Park, San Mateo County, collected by Mrs. Joseph Donahoe in July, 1922. It is not known if the species has persisted in either of these localities. In Oregon, Peck (*Man. Higher Pl. Oreg.* p. 685) reports *G. Mollugo* as "sparingly established in lawns in the Willamette Valley"; and in eastern North America it is widely naturalized along roadsides and in fields (cf. Gray's Manual, ed. 7, p. 749).

Among our native species of bedstraw, *G. Mollugo* most closely resembles *G. asperrimum* Gray, but from that species which usually has bristly-hairy fruits, *G. Mollugo* can be distinguished by its more floriferous appearance, somewhat swollen nodes, and glabrous fruits.

A NEW CALIFORNIAN ROSE

BY ALICE EASTWOOD

Rosa Lesteræ Eastwood, spec. nov. Procumbens et prostrata, caulibus radicanibus glabris, setis paucis divaricatis non curvatis, 5 mm. longis infra stipulas; foliolis 3—5, rotundatis glabris serratis vel biserratis, dentibus apice obtusis vel acutis et glandulosis, supra viridibus, infra pallidioribus; petiolis et rachidibus stipitato-glandulosis; stipulis adnatis circa 3 mm., parte libera acuta vel acuminata margine stipitato-glandulosa; floribus 1—3, pedunculis glabris, brevissimis tectis bracteis; hypanthio glabro orbiculato; sepalis ovato-lanceolatis apiculatis, circa 6 mm. longis, 3—4 mm. latis, exteriore glabris vel paucis stipitatis glandibus dorso et margine. interiore tomentosus post anthesin reflexis; corolla rosea, petalis obcordatis, circa 1.5 cm. longis, 1 cm. latis.

Type: Herb. Calif. Acad. Sci. No. 290633, collected May 14, 1941, along the road between Dobbins and Camptonville, Yuba County, California, by Lester Rowntree. She reported it as growing amid *Chamæbatia* and *Iris Hartwegii* and as having very fragrant flowers.

It belongs with the *R. spithamea* Watson group and is nearest to *R. sonomensis* Greene. It differs from both in the smooth leaves and hypanthium, also in the very short and smooth peduncles. It is a great pleasure to name this rose in honor of this writer who has done so much to make known by her writings and distribution of plants, some of the lovely plants of California not previously cultivated. She has recently given her valuable herbarium, representing the plants collected on her extensive explorations in California and Mexico, to the California Academy of Sciences.

NOTES ON CALYPTRIDIUM

BY JOHN THOMAS HOWELL

On July 31, 1942, in the high southern Sierra Nevada in Tulare County, California, I collected a tiny annual portulacaceous plant (*J. T. Howell No. 17427*) which grew on a sandy flat on the floor of Big Arroyo at an elevation of 9900 ft. (cf. Howell, 1942, p. 13). In the field I thought it might be *Calyptridium roseum* Wats., a rather rare but widely distributed plant of the Great Basin from eastern California and Oregon to Wyoming, but a subsequent study of the material revealed that it was probably *C. pygmaeum* Parish ex Rydb. (Rydberg, 1932,

p. 320), a plant known only from the type collection from the San Bernardino Mountains of southern California. Since there were several minor points in which my plants seemed to differ from Rydberg's description, I have compared it with the type of the species which is in the Dudley Herbarium, Stanford University. I have concluded that the two plants are specifically the same although there is a notable difference in the seeds of the two collections: in the type the seeds are a little larger and are low-tuberculate; in the Sierran plant the smaller seeds are smooth except around the edges. In the type the larger leaves nearly equal or exceed the inflorescences while in the plants from the Sierra the leaves are smaller and much shorter; but the more vigorous habit and the green rather than reddish color of the type plants are believed to be due to environmental conditions. Where *C. pygmæum* grew in the Big Arroyo it was associated with *Polygonum sawatchense* Small, *Navarretia divaricata* (Torr.) Greene, and *Cryptantha glomeriflora* Greene.

While I was comparing the plants of *C. pygmæum* with specimens of *C. roseum*, I came across another and earlier collection of *C. pygmæum* from the Sierra Nevada, that of Frank W. Peirson made on Aug. 3, 1937, in the Rock Creek Lake Basin, 10550 ft., Inyo County (Herb. Calif. Acad. Sci.). The collection bears the name *C. roseum* and is a mixture of that species and *C. pygmæum*. According to Mr. Peirson's data, the *Calyptridium* was "first-collected in 1934 under my number 11269. Rather scarce in sandy and gravelly flats on glacial ridges near Heart Lake." An examination of *Peirson No. 11269* (Herb. Peirson.) showed all of it to be *C. roseum*. The discovery of these collections of *C. pygmæum* in the Sierra Nevada adds another notable name to the plants already known from both the southern Sierra Nevada and the high mountains of southern California.

The type of *C. pygmæum* is *Parish No. 1803* and carries the following data: dry hill, Bear Valley, San Bernardino Mountains, 6500 ft., June, 1885. On the label under the name of the species, Parish wrote a later determination, "*C. Parryi* Gray—depauperate." Because of Parish's redetermination and because *C. pygmæum* was only separated with some difficulty from *C. roseum*, I critically examined characters by which the three might be distinguished.

Some of the results of this study have been quite unexpected and have revealed a new arrangement of the species in *Calyptridium* along lines which are possibly more natural than any before proposed. In past treatments (Gray, 1897, p. 278-9; Jepson, 1914, p. 463-5; Rydberg, 1932, p. 319-20), the numbers of petals and stamens have been used as the most important "key-characters" of the species; and although the numbers of flower parts are undoubtedly important, they have not been found entirely reliable. Hence, a new classification based chiefly on the capsule and fruiting sepals offers a distinct advantage, and especially so in a genus like *Calyptridium* in which the petals and stamens are so promptly and completely colliquescent. In the following key the differences between *Spraguea* Torr. and *Calyptridium* Nutt. are indicated, but the key to species concerns only *Calyptridium* sens. strict.

- A. Plants annual, biennial, or perennial; flowers pedicellate, deciduous; style elongate, usually exceeding the petals, the stigma conspicuously forked; capsule orbicular or nearly so, 1—few-seededSPRAGUEA
- A. Plants annual; flowers pedicellate or sessile; style very short or none, stigmas 2; capsule elongate, ovate to linear-oblong, few- to many-seededCALYPTRIDIMUM
- B. Capsule broadly to narrowly ovate, the valves widest near the base, rather faintly nerved, the primary nerves only 5 or 6; flowers pedicellate or subsessile, the pedicels usually conspicuous in the lowest flowers.
- C. Flowers deciduous; fruiting sepals round or round-reniform.
- D. Sepals round*C. roseum*
- D. Sepals round-reniform*C. quadripetalum*
- C. Flowers persistent; sepals ovate, acute.....*C. pygmaeum*
- B. Capsules linear-oblong to elliptic, the valves widest near the middle, many-striate-nerved near the base; flowers subsessile or sessile, deciduous.
- E. Capsule less than twice as long as the fruiting sepals.....
.....*C. Parryi*
- E. Capsule more than twice as long as the fruiting sepals.....
.....*C. monandrum*

With such limited study in a family notorious for diversified opinion regarding generic lines, my belief that *Spraguea* seems best treated as a subgenus of *Calyptridium* need receive no serious attention. I do wish, however, to express a serious doubt as to the correctness of Dr. Hoover's recent conclusion that the shoot of *Spraguea* is indeterminate while that of *Calyptridium* is de-

terminate (Hoover, 1940, p. 223). Because of the condensed character of the primary axis throughout this group, a microscopic histological examination will probably be required to settle this point; but my tentative opinion, based on the examination of many specimens, is that the plant axis in both groups is indeterminate. From Dr. Hoover's article one might be led to consider *Spraguea pulchella* Eastw. more closely related to *Calyptridium* than to *Spraguea*; but I regard that that species is as much a part of the *Spraguea* complex as *S. paniculata* Kell. and that it must not be referred to *Calyptridium* if *Spraguea* is separated from that genus.

A few distributional notes on the species of *Calyptridium* sens. strict. may be in order at this time. Until recently, *C. roseum* has been known in California only from Sierra County (Brewer and Watson, 1876, p. 78) and from Inyo County (Jepson, 1923, p. 344; Peirson, 1938, p. 7), but now it may be reported also from Mono County: Long Valley, *J. T. Howell No. 14387*. Although *C. quadripetalum* Wats. is sometimes limited strictly to Lake County (Rydberg, 1932, p. 320), it has also been reported from Sonoma County (as *C. "tetrapetalum."* Greene, 1891, p. 182) and from Napa County (Howell, 1941, p. 68); and, in Herb. Calif. Acad. Sci., under the misnomer *Spraguea eximia*, is *Heller No. 11929* from Glenn County. Apparently *C. Parryi* Gray has been reported only from the mountains of southern California and southern Arizona (Rydberg, 1932, p. 320; Kearney & Peebles, 1942, p. 300); but on the basis of a specimen in Herb. Univ. Calif., it may now be reported from Gold Mountain, Esmeralda County, Nevada (*Keck No. 559*). In this collection the fruiting sepals are much showier than usual and the seeds are smooth and shiny instead of low-tuberculate; but these differences seem to represent variables which can scarcely indicate a distinct variety. *Calyptridium monandrum* Nutt., the commonest and most widespread species in California, has been collected on a number of occasions in the South Coast Ranges from San Benito and Monterey counties southward, but no mention in the literature has been seen to indicate its occurrence on the west side of the San Joaquin Valley in Fresno County: Alcalde, *Eastwood No. 13568*; Oil Fields, *J. T. Howell No. 5868*.

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PEPLIS PORTULA IN CALIFORNIA. In July, 1943, while botanizing in Summit Valley, Placer County, I discovered *Peplis Portula* L. growing on muddy flats near the east end of Lake Van Norden (*J. T. Howell No. 18566*). The plants were young, the tallest being less than 5 cm. tall with slender decumbent stems which rooted at the nodes. Most of the solitary axillary flowers were in bud but they presented a very distinctive appearance, being somewhat napiform in shape. The base of the flower was cuneate, the valvate calyx-lobes formed a slender beak, and the upper part of the hypanthium was angled with small folds below the sinuses and with shallow pouch-like hollows behind the stamens. None of the numerous flowers examined was petalous, the calices were usually without appendages, and sometimes the flowers were only 4-merous. According to Koehne (*Das Pflanzenreich IV. 216: 56-58*), the flowers of *P. Portula* are 6-merous and petalous and the calyx usually bears at least one appendage. Mature plants would probably exhibit flowers more characteristic of the species, but even with the discrepancies disclosed by these earliest flowers, there is no doubt as to the identity of our palustrine herb.

The only reference to the occurrence of *P. Portula* in North America that I have seen is the doubtful record of a Mexican collection given by Koehne (l. c.). It is not unreasonable to believe that this Old World species has been introduced into the Californian Sierra Nevada by some European visitor who was attracted to the Donner Pass region by the winter sports which are so zealously pursued in that area. — John Thomas Howell.

ERRATA

- Page 11, line 23; *for 2—2.5 read 2.5—3.*
- Page 45, line 8; *for C. A. Mey, read C. A. Meyer.*
- Page 85, line 6; *for ODORATO read ODORATA.*
- Page 95, line 27; *for McDougal read MacDougal.*
- Page 117, line 36; *for longa read longioribus.*
- Page 133, line 22; *for Johnstonii read Johnsonii.*
- Page 144, line 5; *for northwest by west read northeast by east.*
- Page 149, line 3; *for MACROCARPA read MACROTHECA.*
- Page 171, line 29; *for cæspitosis read cæspitosus.*
- Page 183, line 36; *for MAMMILLARIA read MAMILLARIA.*
- Page 205, line 23; *for 5 cm. read 5 mm.*
- Page 227, line 1; *for Cystisus read Cytisus.*

INDEX

(Plants listed on pages 55 to 76 from
the islands of southern California are
not given in the index.)

- Acer macrophyllum*, 34.
Adenostegia parviflora, 86; *viscida*, 208.
Ægilops cylindrica, 258; *ovata*, 258.
Æsculus californica, 44.
Agave sebastiana, 181.
Agropyron Scribneri, 254.
Agrostis Hendersonii, 258; *palustris*, 259; *stolonifera*, 259; *tenuis*, 259.
Aira præcox, 259.
Alisma Geyeri, 79.
Allium Austinæ, 124; *Bolanderi*, 124; *Breweri*, 124; *validum*, 124.
Amaranthus californicus, 225; *fimbriatus*, 185; *hybridus*, 186; *Powellii*, 185, 186; *retroflexus*, 186, 187.
Amblyopappus pusillus, 152.
Ammannia coccinea, 225.
Amsinckia intermedia, 151.
Anabasis glomerata, 46.
Andropogon saccharoides, 259.
Androsace septentrionalis var. *subumbellata*, 256.
Anemopsis californica, 181.
Angelica lineariloba, 86.
Antennaria suffrutescens, 188.
Antirrhinum Nuttallianum, 152; *speciosum*, 152.
Arabis Bolanderi, 163; *pectinata*, 229; *platysperma*, 124; *Selbyi*, 135; *subpinnatifida*, 124.
Araucaria imbricata, 223.
Arctostaphylos acutifolia, 123, 125; *candidissima*, 122, 123, 124; *canescens*, 122, 124; *Jepsonii*, 125; *obtusifolia*, 123, 125.
Artemisia californica var. *insularis*, 32; *pygmæa*, 14; *trifida*, 123.
Asclepias cryptoceras, 178, 199.
Asterella saccata, 135.
Astragalus amphioxys, 50, 101, 102; *amphioxys* x *Layneæ*, 50; *ampullarius*, 137; *asclepiadoides*, 178; *argophyllus*, 102; *callithrix*, 103, 104, 105, 108; *calycosus*, 108, var. *monophyllidius*, 107; *campestris*, 250, 251, var. *crispatus*, 250, 251, 252, var. *decumbens*, 250, 251, 252, var. *hylophilus*, 250, 252, 253, var. *serotinus*, 250, 253; *Carltonii*, 97, 252; *chamæmeniscus*, 100, 105, 107, 108; *chromoseminus*, 108; *cibarius*, 100; *confertiflorus*, 98, 136; *convallarius*, 250; *convallarius diversifolius*, 251; *convallarius hylophilus*, 251, 253; *decumbens*, 250, 251, 252, var. *decumbens*, 251, 252, var. *decurrens*, 252, 253, var. *oblongifolius*, 252, 253, var. *serotinus*, 252, 253; *demissus*, 98; *desperatus*, 105; *detritalis*, 103; *divergens*, 252; *diversifolius*, 112, 250, 251; *feensis*, 105, 107; *Garrettii*, 252; *griseopubes-cens*, 253; *Haydenianus*, 98, var. *nevadensis*, 98; *haydenioides*, 98; *Howellii*, 113; *humilis*, 97; *hylophilus*, 251, 253, var. *oblongifolius*, 251, 253; *ineptus*, 256; *inyoensis*, 113; *iodanthus*, 100; *Jaegerianus*, 49; *Jepsoni*, 98; *junceus*, 250; *Layneæ*, 100; *mala-cus*, 84, 100, 101, 105, 106, 107; *Marcusjonesii*, 50; *melanocalyx*, 50; *Minthornia*, 84; *misellus*, 111, 113; *musiniensis*, 103; *Newberryi*, 103; *nudisiliquus*, 103, 105; *Nuttallianus*, 110, var. *imperfectus*, 108, 109, 110, 111, var. *piliferus*, 108, 110, 111, var. *trichocarpus*, 108, 109, 110, 111, var. *canescens*, 109, var. *acutirostris*, 111; *pachypus*, 50; *Palliseri*, 253; *Patter-*

- sonii, 199; pertenuis, 111; playanus, 50; pseudiodanthus, 99, 100, 101, 108; Rydbergii, 253; scaposus, 108; Serenoi, 50, 113, 114; serotinus, 253, var. strigosus, 253, var. Palliseri, 253; Shockleyi, 113, 114; strigosus, 253; toanus, 107; toquimanus, 108, 111, 112, 113; triflorus, 50, var. playanus, 50; uncialis, 101, 102, 103, 108; utahensis, 103, 105; Wootoni, 50.
- Atriplex* *Barclayana* subsp. Palmeri, 148; californica, 148; pacifica, 181; Palmeri, 38, 148; Rosei, 148.
- Avena barbata*, 146.
- Baccharis consanguinea*, 32.
- Bæria chrysostoma* var. gracilis, 152, var. Palmeri, 152; Palmeri, 152.
- Bæriopsis guadalupensis*, 153.
- Balsamorhiza hirsuta* var. neglecta, 14; platylepis, 14, 15.
- Barneby, R. C. A new Species of *Cymopterus* from Nevada, 81; *Pugillus astragalorum nevadensis*, 97; a Suffrutescent *Gilia* from Southern Nevada, 129; an Addition to the Genus *Swertia*, 155; a new Species of *Mirabilis*, with Remarks on *Hermidium* and Related Genera, 175; Miscellaneous Diagnoses, 193.
- Bebbia juncea*, 184.
- Beetle, A. A. *Scirpus criniger* Transferred to *Eriophorum*, 164; Notes on the Distribution of California Grasses, 258.
- Betula fontinalis*, 83.
- Blepharidachne Kingii*, 8.
- Boisduvalia densiflora*, 53, var. salicina, 53; salicina, 53.
- Brenckle, J. F. A new California *Polygonum*, 166.
- Brodiaea peduncularis*, 47.
- Bromus rubens*, 146; Trinii, 259.
- Buddleia utahensis*, 130.
- Calandrinia Menziesii*, 148.
- Calochortus cæruleus* var. nudus, 124.
- Calyptridium*, 264; monandrum, 264, 265; Parryi, 264, 265; pygmaeum, 262, 263, 264; quadri-petalum, 264, 265; roseum, 262, 263, 264, 265; tetrapetalum, 265.
- Capsella Bursa-pastoris*, 149; procumbens, 149.
- Carex ablata*, 47; debiliformis, 47; vallicola, 255.
- Cassia armata*, 133.
- Castalia odorata*, 142.
- Castilleja adenophora*, 87; Barnebyana, 88; disticha, 88; dolichostylis, 88, 123; Ewani, 89; Hoffmannii, 116; Howellii, 89; inornata, 90; latifolia, 90; linariæfolia, 90; lutea, 117; Martini, 89; miniata, 89, 117; ochracea, 91; pallida, 117; pannosa, 116; pilosa, 91, 117; pinetorum, 88, 89, 123; plagiotoma, 248, 249; salticola, 90, uliginosa, 117; zionis, 91, 135.
- Caulanthus lasiophyllus*, 149.
- Ceanothus cordulatus*, 122; cuneatus, 231, var. dubius, 230; Ferrisæ, 231; integerrimus, 122; Jepsonii var. albiflorus, 231, 232; ramulosus, 231; rigidus, 231.
- Cereus Emoryi*, 31; Pringlei, 183.
- Chenopodium murale*, 148.
- Chlorogalum pomeridianum*, 44.
- Chorizanthe chilensis*, 230; coriacea, 230; Lastarriæa, 230, var. californica, 230; Thurberi var. macrotheca, 205.
- Chylismia lancifolia*, 53; scapoidea var. cruciformis, 53.
- Cicuta californica*, 47.
- Cirsium montigenum*, 47.
- Claytonia nevadensis*, 255.
- Collinsia Greenei*, 124; Rattani, 124.
- Comarostaphylos diversifolia*, 33.
- Convolvulus althæoides*, 179; macrostegius, 151.
- Corallorrhiza innata*, 187; striata, 9; trifida, 187.
- Cordylanthus eremicus*, 86; nidu-

- larius*, 207, 208; *Parryi*, 136; *parviflorus*, 86, 87; *pilosus*, 208; *viscidus*, 208.
Coreopsis gigantea, 32.
 Correll, Donovan S. The Genus *Habenaria* in Western North America, 233.
 Cronquist, Arthur. A new *Erigeron* from Idaho, 167; the Varieties of *Astragalus decumbens*, 250.
Crossosoma californicum, 28, 31.
Cryptantha capitata, 197, 198, 199; *confertiflora*, 131; *echinoides*, 199; *foliosa*, 151; *glomeriflora*, 188, 256; *Grayi* var. *cryptochaeta*, 184; *Jamesii*, 198; *maritima*, 151; *muricata* var. *denticulata*, 135; *semiglabra*, 197, 198, 199; *Watsoni*, 79.
Cupressus guadalupensis, 145.
Cycladenia humilis, 159, 160; *Jonesii*, 159, 160; *tomentosa*, 160; *venusta*, 159, 160.
Cymopterus basalticus, 82; *cinerarius*, 82, 256; *deserticola*, 82; *globosus*, 82; *megacephalus*, 82; *Newberryi*, 136; *panamintensis* var. *acutifolius*, 85; *Ripleyi*, 81, 82, 83, 105, var. *saniculoides*, 82, 111; *Watsonii*, 187.
Cypselea humifusa, 225.
Cytisus monspessulanus, 226, 227; *scoparius*, 226, 227.
Dalea Johnsonii, 133.
 Dayton, William A. The Names of the Giant Sequoia, 209.
Delphinium antoninum, 123, 126; *nudicaule*, 225; *scopulorum*, 123, 126, var. *subalpinum*, 126.
Dendromecon Harfordii, 33.
Deschampsia atropurpurea, 24, 120.
Descurainia pinnata subsp. *Menziesii*, 149.
Dicentra formosa, 123.
Diholcos micranthus, 98.
Distichlis spicata, 180.
Dodecatheon Hendersonii, 121; *zionis*, 134.
Draba Douglasii, 12.
Drymaria holosteoides, 181.
 Eastwood, Alice. New Western Plants, 18, 157; on the Golden Anniversary of the California Botanical Club, 26; Islands of Southern California and a List of the Recorded Plants, 27, 54; the *Lupinus latifolius* Aggregate, 41; New Species of *Castilleja*, 87, 116; a Botanical Expedition to Log Spring Ridge, 121; Two Varieties of *Triteleia peduncularis*, 137; new Species and Varieties of *Lupinus*, 169; *Solanum lanceolatum* in California, 189; *Gilia salticola*, 199; new Western Lupines, 202; a new Alien in California, 208; some *Veronicas* in Golden Gate Park, 220; Variations in *Castilleja plagiotoma*, 248; Two new Species from Baja California, 257; a new Californian Rose, 262.
Echeveria linearis, 181.
Echinocactus chrysacanthus, 183.
Echinocereus maritimus, 183.
Echinocystis fabacea, 44; *oregana*, 44.
Ehrhata erecta, 259.
Eleocharis rostellata, 47.
Ellisia chrysanthemifolia, 151.
Elymus glaucus, 255; *Hansenii*, 255; *Saundersii*, 255, var. *californicus*, 255; *Scribneri*, 254; *triticoides*, 255.
Ephedra californica, 114, 115.
Eremocarpus setigerus, 44.
Erigeron Austinæ, 13; *compactus*, 13; *Engelmanni*, 167, 168, subsp. *Davisii*, 167, 168, subsp. *typicus*, 167, 168; *nudatus*, 188; *pulvinatus*, 13.
Eriogonum arborescens, 33; *bicolor*, 16; *chrysocephalum* subsp. *desertorum*, 11, var. *bannockense*, 200; *Davisianum*, 200; *effusum* subsp. *durum*, 135, var. *limbatum*,

- 15; *esmeraldense*, 187; *exaltatum*, 139; *fasciculatum*, 181; *filicaule*, 134; *fulvum*, 200; *Gilmani*, 16; *Hoffmanni* var. *robustius*, 16; *insigne*, 136; *intricatum*, 181; *latens*, 201; *mensicola*, 16; *nodosum* subsp. *monoense*, 201; *ovalifolium*, 200, 201; *Parryi*, 136; *Pondii*, 181; *pratense*, 201; *pyrolæfolium*, 17, var. *coryphæum*, 201; *racemosum*, 205, var. *desertorum*, 17; *saxatile*, 201, subsp. *multicaule*, 201; *Shockleyi*, 10, subsp. *candidum*, 11, subsp. *longilobum*, 11; *spergulinum*, 202; *subreniforme*, 137, 138; *trichopes*, 133, 139; *umbellatum* subsp. *aridum* var. *versicolor*, 17; *villiflorum*, 187; *vimineum* var. *Davidsonii*, 135; *viscidulum*, 138; *zionis*, 135, 205, var. *coccineum*, 205, var. *typicum*, 205.
- Eriophorum alpinum*, 165; *criniger*, 165.
- Eriophyllum lanatum* var. *aphanactis*, 126, var. *achillæoides*, 126.
- Erodium cicutarium*, 150; *moschatum*, 150.
- Erythea edulis*, 38.
- Eschscholzia elegans*, 149; *frutescens*, 149; *Palmeri*, 149.
- Euclide cordata*, 183.
- Euphorbia bartolomæi*, 182; *guadalupensis*, 151; *melanadenia*, 182; *misera*, 182; *polycarpa* var. *hirtella*, 182, var. *typica*, 182, 183; *Pondii*, 151.
- Ewan, Joseph. The Correct Name for the Pacific Involucrate Tri-
folium, 222.
- Festuca arizonica*, 259; *megalura*, 146; *octoflora*, 146.
- Filago arizonica*, 154; *californica*, 154.
- Frankenia Palmeri*, 183.
- Franseria camphorata*, 40, 154; *chenopodiifolia*, 184.
- Galium anglicum*, 261; *Aparine*, 152; *asperrimum*, 261; *divaricatum*, 260, 261; *Mollugo*, 261; *murale*, 261; *parisiense*, 260, 261, var. *anglicum*, 260, var. *divaricatum*, 260, var. *leioearpum*, 261.
- Galvesia juncea*, 184.
- Gaura odorata*, 85; *sinuata*, 85; *villosa* var. *typica*, 85, var. *McKelveyæ*, 85.
- Gifola germanica*, 186.
- Gilia alpina*, 199; *guadalupensis*, 151; *latifolia* 129, 131, 132; *Nevinii*, 151; *pygmæa*, 151; *Ripleyi*, 129, 130, 131, 132; *salticola*, 199.
- Goodman, George J. Two Names in *Mentzelia*, 53; Notes on *Chorizanthe*, 230.
- Grindelia latifolia*, 33.
- Gutierrezia Sarothræ*, 184.
- Habenaria aggregata*, 243; *behringiana*, 234, 236, 237; *borealis*, 240, var. *albiflora*, 238, var. *viridiflora*, 240; *bracteata*, 247; *brevifolia*, 244; *Chorisana*, 234, 237; *Cooperi*, 245; *dilatata*, 235, 237, 238, 239, 240, var. *albiflora*, 235, 238, var. *leucostachys*, 235, 239, 241; *dilatatiflora*, 238; *elegans*, 246, var. *elata*, 246, var. *maritima*, 247; *flagellans*, 239; *gracilis*, 242; *graminifolia*, 238; *hyperborea*, 236, 238, 240, 243, 245, var. *purpurascens*, 242; *leptoceratitis*, 239; *leucostachys*, 239, var. *virida*, 243; *limosa*, 236, 239, 241, 244, 245; *longispicata*, 246; *maritima*, 247; *Menziesii*, 242; *Michaelii*, 246; *multiflora*, 246; *pedicellata*, 239; *purpurascens*, 242; *obtusata*, 234, 241; *orbiculata*, 234, 242; *sacata*, 236, 240, 241, 242, 243, 244, 245; *septentrionalis*, 240; *sparsiflora*, 236, 240, 242, 243, 244, 245, var. *brevifolia*, 236, 244, var. *laxiflora*, 236, 245; *stricta*, 242; *Thurberi*, 239, 241; *unalascensis*, 235, 239, 245, var. *elata*, 235, 246, var.

- maritima*, 235, 247; *viridis* var. *bracteata*, 235, 247.
Hackelia amethystina, 123, 125; *bella*, 126; *diffusa*, 126; *Rattanii*, 126.
Halogeton glomeratus, 45, 46; *sativus*, 45; *Souda*, 45, 46.
Hamosa austrina, 109; *Emoryana*, 109; *imperfecta*, 101, 109; *Mint-thornia*, 84; *monophyllidia*, 107, 108.
Harfordia fruticosa, 181.
Harpagonella Palmeri, 152.
Hazardia detonsa, 33.
Hedeoma incana, 86.
Hedera Helix, 226.
 Heizer, Robert F. The Use of Plants for Fish-poisoning by the California Indians, 43.
Heleochloa schœnooides, 259.
Helianthella microcephala, 135.
Heliotropium curassavicum var. *xerophilum*, 184.
 Heller, A. A. *Lupinus* Studies, 92.
Hemizonia Greeneana, 38, 154; *Palmeri*, 154.
Hermidium alipes, 176, 178.
Hesperodoria scopulorum, 135.
Heterocodon rariflorum, 48.
Heteromeles arbutifolia, 32, 36.
Homalobus campestris, 250; *camporum*, 252; *decumbens*, 251, 252; *decurrens*, 252, 253; *divergens*, 252; *Hitchcockii*, 97, 252; *humilis*, 97, 252; *hylophilus*, 253; *microcarpus*, 252; *oblongifolius*, 252, 253; *paucijugus*, 252; *serotinus*, 253; *strigosus*, 253; *tenuifolius*, 252.
 Hoover, Robert F. Observations on California Plants, 114, 254.
Hordeum murinum, 146.
Horkelia tenuiloba, 47.
Hosackia flexuosa, 181; *nudiflora*, 159; *Ornithopus*, 150.
 Howell, John Thomas. Closed-cone Pines of Insular California, 1; *Deschampsia atropurpurea* in California, 24; My Visits to Guadalupe Island, 36; Notes on the Eastwood Blackberry, 46; Plants new to California, 79; Notes on Polycarpon, 80; Studies in Phacelia, 95, 117, 190; *Lamium purpureum* L., 96; *Hackelia amethystina* J. T. Howell, spec. nov., 125; *Eriophyllum lanatum* (Pursh) Forbes var. *aphanactis* J. T. Howell, var. nov., 126; Observations on Cleistogamy in Mimulus, 127; Southwest Botanical Odyssey, 132; New Western Plants, 138; List of Vascular Plants from Guadalupe Island, 145; Concerning David Douglas, 160; the Identity of *Phacelia humilis* var. *calycosa*, 162; New from Europe, 163; Now in California, 168; another Bindweed in California, 179; a Short List of Plants from Cedros Island, Lower California, 180; Western Plants from here and there, 187; *Veronica triphylos* in California, 188; a Notable Accession to the Californian Chickweeds, 192; *Plantæ Occidentales*, 205; Marin County Miscellany, 225; Sibara on Cedros Island, 229; new Varieties of Western Plants, 230; new Californian Localities for *Pachystima*, 232; Some Weedy Californian Bedstraws, 260; Notes on *Calyptridium*, 262; *Pepelis Portula* in California, 266.
Hymenopappus lugens, 135.
Hypericum anagalloides, 47; *Eastwoodianum*, 257; *peninsulare*, 257.
Hypochoæris glabra, 154.
Ilysanthes anagallidea, 226; *dubia*, 226.
Ipomœa odorata, 257; *tastensis*, 257.
Iris citrina, 123, 125; *macrosiphon*, 125.
Juniperus californica, 40.
Juncus acutus var. *sphærocarpus*,

- 180; Bolanderi, 47; brachystylus, 135; bufonius, 36, 147.
- Jussiaea californica*, 115; repens, 115, 116.
- Koeleria phleoides*, 259.
- Lamium purpureum*, 96.
- Lastarriæa chilensis*, 230, subsp. *californica*, 230.
- Lavatera assurgentiflora*, 31, 36.
- Lepidium lasiocarpum*, 150; *nanum*, 12, 157; *nitidum*, 150; *oblongum*, 150.
- Leptosyne gigantea*, 33.
- Leptotænia multifida*, 44.
- Lewisia Cantelovii*, 139; *Congdonii*, 139; *Heckneri*, 139.
- Ligustrum vulgare*, 226.
- Lilium fresnense*, 18; *inyoense*, 18; *nevadense* var. *fresnense*, 18; *pardalinum parviflorum*, 18.
- Limnanthes Bakeri*, 206; *Douglasii*, 206; *gracilis*, 206; *striata*, 206.
- Limnia guadalupeensis*, 148.
- Limnorchis aggregata*, 243; *arizonica*, 241; *behringiana*, 237; *borealis*, 238; *brachypetala*, 240, 242; *brevifolia*, 244; *convallariæfolia*, 238; *dilatata*, 237; *dilatatifolia*, 238; *ensifolia*, 243; *foliosa*, 237; *gracilis*, 238, 242; *graminifolia*, 238; *hyperborea*, 240; *laxiflora*, 245; *leptoceratitis*, 238; *leucostachys*, 239, var. *robusta*, 239; *purpurascens*, 242, 243; *sparsiflora*, 243; *stricta*, 242; *Thurberi*, 241; *viridiflora*, 240.
- Linanthus mohavensis*, 187.
- Lindernia anagallidea*, 225, 226; *dubia*, 226.
- Linum Breweri*, 208; *Kingii* var. *sedoides*, 12.
- Lotus cedrosensis*, 181; *nudatus*, 182; *humilis*, 182; *intricatus*, 159; *salsuginosus* var. *brevivexillus*, 182.
- Lupinus albopilosus*, 92, 94, 171; *antoninus*, 202; *bicolor* var. *microphyllus*, 150; *Blaisdellii*, 18; *Brandegeei*, 19; *brunneo-maculatus*, 19; *cæruleus*, 92, 93; *cæsius*, 169; *calcaratus*, 21; *candicans*, 170; *candidissimus*, 20; *caudatus*, 20; *citrinus*, 19; *columbianus*, 41, 43; *cytisoides*, 41, 43; *deflexus*, 19; *Dudleyi*, 41, 42; *elegantulus*, 20; *formosus*, 22, 92, 169, 171, 172, 174, 202, var. *robustus*, 93, 171; *Grayi*, 174; *Kerrii*, 157; *klamathensis*, 169; *Kuschei*, 170; *lasiotropis*, 41, 42; *latifolius*, 41, 43, var. *Dudleyi*, 42; *laxiflorus*, 169, 174, 203; *Lelandsmithii*, 21; *lepidus*, 123; *lilacinus*, 19, 204; *lutosus*, 92, 93; *Lyallii*, 172, 203; *magnificus*, 158, var. *glarecola*, 158; *meionanthus*, 173; *Munzii*, 202; *nanus*, 19; *navicularius*, 92, 94; *niveus*, 150; *ochroleucus*, 171; *oreocharis*, 171; *Parishii*, 41; *pasadenensis*, 172; *Pennellianus*, 41, 42; *piperitus* var. *sparsipilosus*, 172; *pulcher*, 173; *rimæ*, 173; *Rosei*, 22; *rubro-soli*, 203; *salticola*, 203; *sellulus* var. *elatus*, 174; *silvicola*, 169; *sonomensis*, 92, 94; *sublanatus*, 174; *uncialis* var. *cryptanthus*, 204; *Van Dykeæ*, 204; *viridifolius*, 41, 43; *wenatchensis*, 174; *Whiltonæ*, 158.
- Lycium californicum*, 32, 38, 152; *verrucosum*, 32.
- Lyonothamnus asplenifolius*, 33.
- Lysias orbiculata*, 242.
- Lysiella obtusata*, 241.
- Maguire, Bassett, and Arthur H. Holmgren. *Great Basin Plants*, 8.
- Malvastrum parviflora*, 151.
- Mamillaria Goodridgei*, 151; *Pondii*, 183.
- Martynia parviflora*, 86.
- Maurandia petrophila*, 132.
- McVaugh, Rogers. *New Name for Heterocodon rariflorum* Nutt., 48.
- Medicago hispida*, 150.
- Melica stricta*, 8.

- Mentzelia multicaulis*, 53, 54; *pumila* var. *multicaulis*, 53; *stricta*, 54; *tricuspis*, 133.
Mesembryanthemum crystallinum, 148; *nodiflorum*, 148.
Miltitzia pusilla, 188.
Mimulus cleistogamus, 127; *Douglasii*, 127; *modestus*, 127, 128; *Kelloggii*, 128; *Parryi*, 13, 188.
Mirabilis cedrosensis, 181; *Froebelii*, 177; *Greenii*, 175, 176, 178; *Heimerlii*, 148; *lævis*, 115, 148; *Macfarlanei*, 175, 176, 178; *multiflora*, 177; *pudica*, 175, 176, 177, 178; *triflora*, 175, 177, 178.
Mollugo Cerviana, 84; *verticillata*, 225.
Monardella Douglasii, 208.
Montia perfoliata, 148.
Montolivæa unalascensis, 245; *elegans*, 246.
Morton, C. V. Note on *Halogeton*, 45.
Muhlenbergia microsperma, 146; *repens*, 259.
Muilla transmontana, 79.
Munz, Philip A. Interesting Western Plants, 49, 83.
Myrica californica, 47.
Nama depressum, 133; *pusillum*, 133.
Navarretia mellita, 208.
Nemacladus gracilior, 133; *rubescens*, 133.
Nemophila racemosa, 151.
Neostaphia colusana, 259.
Nesothamnus incanus, 154.
Notholæna Newberryi, 145.
Nymphæa odorata, 142, 143, 144; *tetragona* subsp. *Leibergii*, 143.
Oenothera cæspitosa, 52; *cavernæ*, 50; *clavæformis* var. *cruciformis*, 53, var. *purpurascens*, 53; *cruciformis*, 53; *heterochroma*, 52, var. *megalantha*, 52; *Johnsonii*, 52; *pallida*, 82, 105; *Parryi*, 136; *primiveris*, 51, 52; *salicina*, 53; *scapoidea* var. *purpurascens*, 53.
Oligomeris linifolia, 150, 181.
Opuntia Engelmanni var. *littoralis*, 31; *prolifera*, 31, 151.
Orchis bracteata, 247; *dilatata*, 237; *huronensis*, 240; *hyperborea*, 240; *obtusata*, 241; *orbiculata*, 242.
Oreobroma Congdonii, 139; *Heckneri*, 139.
Oreocarya capitata, 198; *multicaulis*, 135; *pustulosa*, 199.
Pachylophis Johnsonii, 52.
Pachystima Myrsinites, 232.
Pæonia Brownii, 9.
Panicum pacificum, 47.
Parietaria floridana, 147.
Parnassia californica, 47.
Pectocarya penicillata, 152.
Penstemon azureus, 123; *cerrosensis*, 184; *petiolatus*, 132; *Purpusii*, 123; *Rattani*, 123.
Peplis Portula, 266.
Perityle Grayi, 154, 184; *Greenii*, 184.
Petalonyx Gilmanii, 85, 86; *Thurberi*, 86.
Petalostemon ornatus, 13; *Searlsia*, 13, 84.
Phaca triflora, 50.
Phacelia Anelsoni, 96, 119; *austromontana*, 190, 191; *Barnebyana*, 191; *calthifolia*, 134, 188; *cephalotes*, 136, 137; *cicutaria*, 120, var. *hispida*, 120, var. *eximia*, 120, var. *heterosepala*, 120, var. *Hubbyi*, 120; *cærulea*, 96; *Davidsonii*, 191; *Eisenii*, 191; *eximia*, 120; *floribunda*, 151; *geraniifolia*, 96, 132; *Gooddingii*, 119; *heterosepala*, 120; *hispida*, 119, 120, var. *cicutaria*, 120, var. *eximia*, 120, var. *genuina*, 120, subvar. *cicutaria*, 120, var. *heterosepala*, 120, var. *Hubbyi*, 120; *humilis*, 141, 162, var. *calycosa*, 162, 163, var. *lobata*, 191; *incana*, 192; *inconspicua*, 191; *integrifolia*, 119; *ixodes*, 183; *laxiflora*, 95, 96; *Lemmonii*, 118; *Leonis*, 206; *marcescens*, 141;

- mustelina*, 118; *neglecta*, 134, 188; *nevadensis*, 120, 192; *pachyphylla*, 134; *Palmeri*, 199; *Parishii*, 83, 111; *Peirsoniana*, 117, 118; *perityloides*, 95, 96, 132; *Pringlei*, 207; *pulchella*, 136, 137, var. *Goodingii*, 119; *Purpusii*, 163; *pusilla*, 119, 120, 192; *Quickii*, 140, 191; *ramosissima* var. *hispidula*, 120; *rotundifolia*, 137; *saxicola*, 96; *sericea*, 119.
- Phalaris caroliniana*, 146; *minor*, 259; *tuberosa* var. *stenoptera*, 79.
- Phaseolus filiformis*, 182.
- Phlox speciosa* var. *occidentalis*, 123.
- Pholiurus incurvus*, 259.
- Physalis Greenei*, 184.
- Pinus attenuata*, 5; *californiana*, 5; *insignis*, 5, var. *binata*, 2, 3, 4, 33; *Lambertiana*, 162; *muricata*, 2, 4, 5, 6, 7, 34, var. *Anthonyi*, 6, var. *cedrosensis*, 7; *radiata*, 2, 4, 6, 145, var. *binata*, 4, f. *binata*, 3, 145, f. *guadalupensis*, 3, 145; *remorata*, 2, 4, 5, 6, 7, 33, 35; *Torreyana*, 35; *tuberculata*, 5.
- Piperia Cooperi*, 245; *elegans*, 246; *elongata*, 246; *lancifolia*, 246; *leptopetala*, 246; *longispica*, 246; *maritima*, 247; *Michaelii*, 246; *multiflora*, 246; *unalaschensis*, 245.
- Plagiobothrys californicus*, 152; *hispidus* var. *foliaceus*, 188.
- Plantago insularis*, 152.
- Plantanthera hyperborea* var. *dilatatoides*, 240; *leucostachys*, 239; *limosa*, 241.
- Poa annua*, 147; *bulbosa*, 259; *Douglasii*, 36; *leptocoma*, 254; *secunda*, 259.
- Polemonium chartaceum*, 256.
- Poliomintha incana*, 86.
- Polycarpon depressum*, 80; *tetraphyllum*, 80.
- Polygala acanthoclada*, 196; *lasseniana*, 195, 196; *subspinoso*, 83, 194, 195, 196, var. *heterorhyncha*, 194, 195, 196, var. *typica*, 194, 195, 196, 197.
- Polygonum montereyense*, 166; *Parryi*, 167; *prolificum*, 167.
- Polypodium californicum*, 145.
- Populus trichocarpa*, 34.
- Porophyllum cedrense*, 185.
- Prunus Lyoni*, 29, 34; *ilicifolia*, 29.
- Psoralea epipsila*, 193, 194; *mephitica*, 193, 194, var. *retrorsa*, 193, 194.
- Pterostegia drymarioides*, 147.
- Quercus agrifolia*, 34; *chrysolepis*, 31, 147; *crassipocula*, 147; *Garryana*, 122, 123; *Kelloggii*, 122; *tomentella*, 31, 147.
- Reboulia hemispherica*, 135.
- Rhododendron occidentale*, 47.
- Rhus integrifolia*, 36; *laurina*, 183; *Lentii*, 183.
- Ribes amarum*, 123; *binominatum*, 123; *Greeneianum*, 228, 229; *Hallii*, 123; *leptosmum*, 228; *Lobbii*, 123; *Menziesii*, 227, 228, 229, var. *Greeneianum*, 229, var. *minus*, 229, var. *Victoris*, 229; *Victoris*, 227, 228, 229.
- Rosa Lesteræ*, 262; *sonomensis*, 262; *spithamea*, 262.
- Rubus Eastwoodianus*, 46, 47; *procerus*, 227.
- Rumex utahensis*, 187; *venosus*, 82, 105.
- St. John, Harold. *The Water Lily, Nymphaea odorata*, a Cultivated Plant in the State of Washington, 142.
- Salix lævigata*, 34.
- Salvia Æthiopsis*, 80.
- Salsola sativa*, 45; *Souda*, 45.
- Saxifraga malvæfolia*, 33; *rhomboidea*, 135.
- Schismus arabicus*, 115, 187, 260; *barbatus*, 114, 115, 260.
- Scirpus atrovirens*, 164; *cæspitosus*, 164; *criniger*, 164, 165; *cyperi-*

- nus, 164; *Eriophorum*, 164; *hudsonianus*, 164, 165; *linearis*, 164; *pumilus*, 164; *sylvaticus*, 164.
Scoliopus Bigelovii, 225.
Senecio eurycephalus, 141; *Freemontii*, 256; *Lewisrosei*, 141; *revolutus*, 256.
Sequoia gigantea, 209; *sempervirens*, 217; *Washingtoniana*, 209; *Wellingtonia*, 209.
Sequoiadendron giganteum, 209.
Setaria geniculata, 259; *italica*, 259.
Sibara pectinata, 229.
Silene gallica, 149.
Simmondsia chinensis, 179, 183.
Sisymbrium Irio, 149.
Sisyrinchium californicum, 47.
Sitanion Hansenii, 255.
Smilacina sessilifolia, 44.
Solanum crotonifolium, 190; *Gayanum*, 190; *lanceolatum*, 189, var. *sinuatum*, 189; *laurifolium*, 189; *marginatum*, 190.
Sonchus oleraceus, 154, 185.
Sonnea foliacea, 188.
Spartium junceum, 226.
Specularia rariflora, 48.
Spergularia macrotheca, 149; *marina*, 149.
Sphæralcea Palmeri, 151; *sulphurea*, 151.
Spiranthes unalascensis, 245.
Spraguea, 264; *eximia*, 265; *paniculata*, 265; *pulchella*, 265.
Stachys pycnantha, 47.
Steinhauera oblonga, 217; *subglobosa*, 217.
Stellaria obtusa, 192.
Stephanomeria guadalupensis, 154.
Stipa arida, 83; *coronata*, 260; *Parishii*, 260; *pinetorum*, 255.
 Stokes, Susan G. Further Studies in *Eriogonum*, 15, 200.
Streptanthus glandulosus, 208.
Suæda fruticosa, 148.
Swertia gypsicola, 155, 156, 157; *nitida*, 155, 156; *perennis*, 157; *tubulosa*, 156.
Talinum guadalupensis, 148.
Tetracoccus Hallii, 84; *ilicifolius*, 132.
Thysanocarpus erectus, 150.
Tillæa erecta, 150, 163; *muscosa*, 163.
Tissa Talinum, 149.
Torilis arvensis, 208.
Trichophorum alpinum, 164.
Trichostema lanceolatum, 44.
Trifolium amplexens, 150; *fimbriatum*, 224; *gracilentum*, 150, var. *Palmeri*, 150; *involutum*, 222, 223, 224, var. *fimbriatum*, 224, var. *Kennedianum*, 224; *microcephalum*, 150; *spinulosum* var. *triste*, 224; *tridentatum*, 30; *Willdenovii*, 223, 224, var. *fimbriatum*, 224, var. *Kennedianum*, 224; *Wormskjoldii*, 222, 224, var. *fimbriatum*, 224, var. *Kennedianum*, 224.
Triodia pilosa, 8.
Triteleia peduncularis, 137, var. *longipedicellata*, 138, var. *trifida*, 138.
Ulex europæus, 226.
Umbellularia californica, 44.
Valeriana Adamsiana, 23; *anomala*, 22; *californica*, 24; *Follettiana*, 23; *maculata*, 23; *occidentalis*, 23; *Whiltonæ*, 24.
Veratrum californicum, 124.
Veronica decussata, 220, 221; *elliptica*, 220, 221; *franciscana*, 221; *triphyllos*, 188.
Vicia exigua, 150.
Viola adunca, 124; *Hallii*, 124; *Macloskeyi*, 192; *purpurea*, 124; *Sheltonii*, 124.
 Wheeler, L. C. *Amaranthus Powellii* in California, 185.
Wyethia helianthoides, 14.
Xylophacos melanocalyx, 50.
Zigadenus fontanus, 47; *micranthus*, 124.

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