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CLAYTONIA NEVADENSIS IN OREGON

BY KENTON L. CHAMBERS

Oregon State University, Corvallis

Among specimens deposited at the Oregon State University herbarium are the collections made by Charles G. Hansen, from 1952 to 1954, in the course of research for a thesis titled, "An Ecological Survey of the Vertebrate Animals on Steen's Mountain, Harney County, Oregon" (Hansen, 1956). A few of Hansen's plants were left unidentified during his study, and one of these forms the basis for this article. On July 12, 1954, at an elevation of 8000 feet on the upper drainage of the Little Blitzen River, Hansen collected a species of *Portulacaceae* which he assigned tentatively to *Montia*. However, the plant was unlike any species of *Montia* or *Claytonia* previously recorded from Oregon (Peck, 1961). Recently reexamined, the specimen has proved to be *Claytonia nevadensis* Wats., a species of the central Sierra Nevada of California. Because of the phytogeographic significance of such wide disjunction in range, as well as the moderate taxonomic confusion surrounding this species, I believe it is worthwhile to present a short review of the present state of our knowledge of *C. nevadensis*.

For over 45 years following its publication by Sereno Watson (1876), the species was rarely collected, and its underground parts, in particular, were poorly understood. The history of this problem has already been presented by Carl Sharsmith (1938). He pointed out that although Watson had described the plant, alternatively, as possessing a "thickened caudex" or "a rather slender rootstock," E. L. Greene (1912) believed it had "a fascicle of several rather thick and fleshy roots," as stated in his description of the synonym, *Claytonia chenopodina* Greene. In 1924, W. L. Jepson correctly reported that the species was "perennial by means of slender stolon-like rootstocks," and Sharsmith's own characterization of the underground parts was that they consisted of "a tangled mass of slender, branching rhizomes with fibrous adventitious roots." The species evidently grows as very densely matted colonies in rocky seepage areas, springs, meadows, and small streams, always at high altitudes.

Research Paper No. 437, Oregon State University, School of Science, Department of Botany and Plant Pathology.

Leaflets of Western Botany, Vol. X, pp. 1–16, March 8, 1963.

Even with a correct understanding of the rhizomatous habit of *Claytonia nevadensis,* one may have difficulty in identifying the species using standard references for the plants of California. Following the synopsis of *Portulacaceae* by Thomas Howell (1893), the general tendency of West Coast botanists has been to divide the native representatives of the *Claytonia-Montia* complex into two genera which are separated mainly on the nature of their roots or rootstocks. Perennial species having corms or thick, long-lived taproots are usually placed in *Claytonia,* and those with slender or tuberous rootstocks, rhizomes, or stolons, along with all annuals, are assigned to *Montia.* The application of these criteria by Jepson (1923) caused him to transfer *C. nevadensis* to *Montia,* where it was placed close to *M. cordifolia* (Wats.) Pax & Hoffm.[1] In a very different approach by P. A. Rydberg (1932), *C. nevadensis* was maintained in *Claytonia,* and *Montia cordifolia* was removed to the genus *Limnia.* This change involved certain inconsistencies, since Rydberg's generic description of *Claytonia* contained the phrase, "Perennial herbs, with corms or fleshy taproots," although his description of *C. nevadensis* was, "Perennial, with a cespitose rootstock." The treatment of *Portulacaceae* by Roxana Ferris (1944) also placed the two species in separate genera. *Claytonia nevadensis,* correctly indicated as having "tangled fleshy but slender rootstocks," was assigned to *Claytonia,* and *Montia cordifolia,* possessing a "creeping, usually fleshy, sometimes slender rootstock," was placed in *Montia.* This arrangement of the species, with its same ambiguities, is found in P. A. Munz's recent manual of the California flora (1959).

The nature of the roots and underground stems of plants of the *Claytonia-Montia* complex is of obvious taxonomic importance at generic, subgeneric and specific levels. The correct interpretation of these features, however, must await more thorough morphological studies on a world-wide basis (Pax and Hoffmann, 1934). For the present, one can only point out the apparent unnaturalness of systems that place the rather similar species, *Claytonia nevadensis* and *Montia cordifolia,* in separate genera. The early treatments of Gray (1887), Greene (1891), Gray and Robinson (1897), and Jepson (1914) made the former a synonym of the latter (using the epithet, *asarifolia*). In 1924,

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[1]Jepson used the name, *M. asarifolia* (Bong.) Howell, but this is now usually thought to apply to a different taxon and is relegated to synonymy under *M. sibirica* (L.) Howell (see Hultén, 1944, page 641).

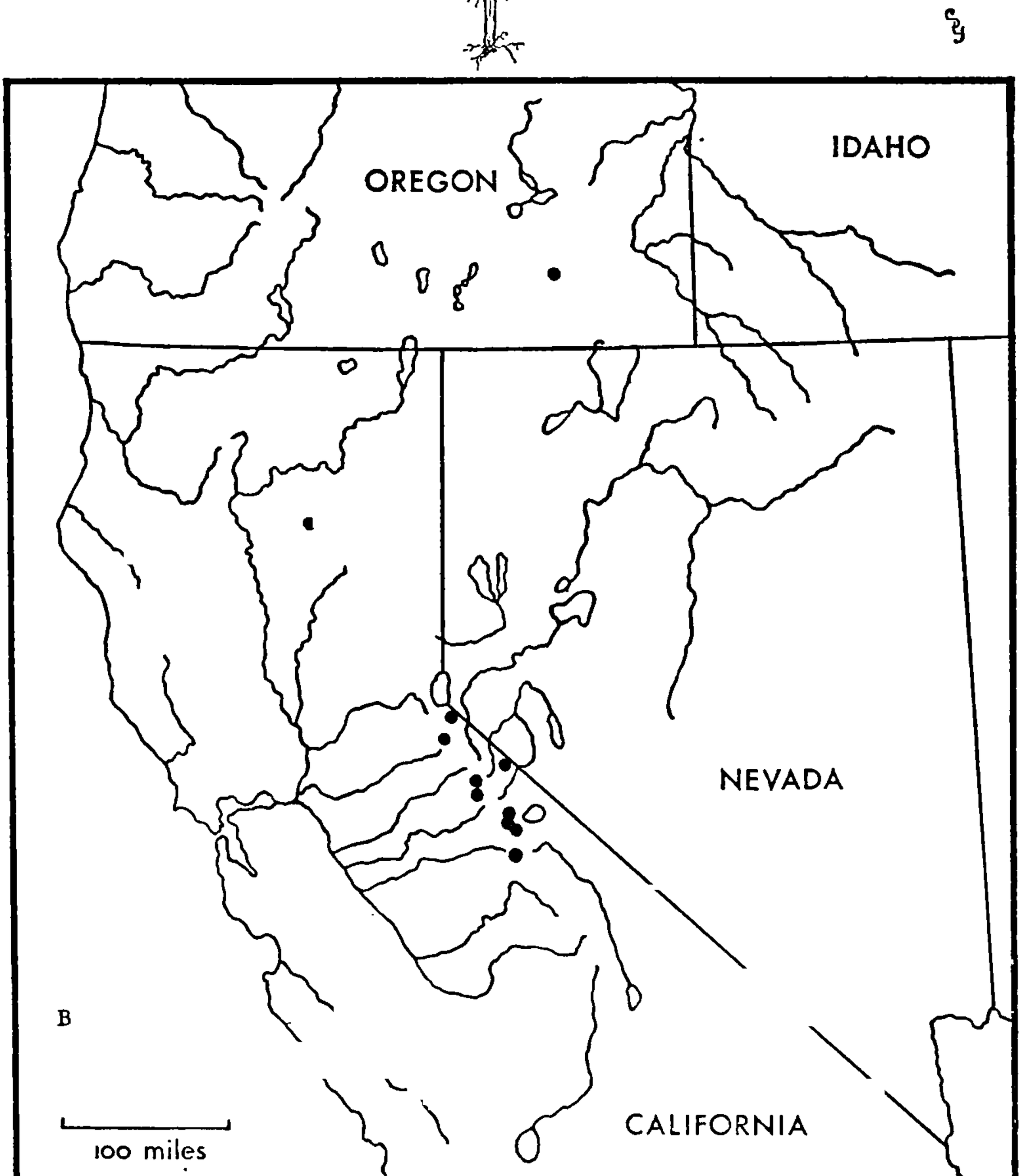

Figure 1. *Claytonia nevadensis* S. Watson. A. Habit, ×½. B. Known geographical distribution, shown by dots.

however, Jepson was able to differentiate the two species on the basis of eight significant characteristics; three of these—inflorescence type, pedicel length, and relation of inflorescence length to leaf length—were used as key differences in his Manual of the Flowering Plants of California.

At the time Sharsmith made his study, only nine collections of *Claytonia nevadensis* were available to him, including three holotypes. From the more abundant material now at hand, the species appears to be remarkably uniform and easily recognizable throughout its range. Only at the Steens Mountain locality in Oregon does it come into geographic contiguity with the related *Montia cordifolia* (see below), and the plants of Hansen's collection show no evidence of intergradation. Besides the eight "differentiae" noted by Jepson, the species possess consistent differences in their rhizomatous portions that are difficult to define but are easily verifiable on herbarium specimens. The principal rootstock in *C. nevadensis* is pale brown, rather uniform in diameter, clothed with adventitious roots, and often marked by a regular sequence of leaf scars, either closely spaced or more distant. Sometimes there is a long segment which lacks leaf scars and roots because of runner-like elongation of a single internode. Many lateral rhizomes are produced, especially from among the leaf bases of the current year's growth, each of which also begins as a more slender, greatly elongated internode, devoid of leaf scars and roots and terminated by a bud which may develop a new plantlet (Figure 1A). The lateral sprouts in *C. nevadensis* are rather succulent and are quite flat when pressed and dried. This active type of vegetative propagation is approximately the same as that illustrated by Holm (1913) for *Claytonia sarmentosa* C. A. Mey. The underground parts of *Montia cordifolia* differ in several respects from the above description. The rootstock consists of a sequence of dark brown, naked, very slender runner-like portions alternating with lumpy, swollen regions covered with adventitious roots. This pattern probably results from periods of stem growth by rapid elongation alternating with the production of closely spaced leaves with only slight increase in length. The smooth, slender rhizomatous sprouts of *M. cordifolia* differ from those of *C. nevadensis* in being less succulent, darker brown, and less abundant. Although the above observations are based only on dried specimens and are necessarily incomplete, the pattern of vegetative growth appears to be basically similar in the two species.

The known distribution of *Claytonia nevadensis* is shown in Figure 1B, which was prepared from herbarium specimens actually identified as this species. If monographic studies were to be undertaken, it is very likely that additional stations for the species would be found. The two more northern localities, on Lassen Peak and Steens Mountain, both involve earlier collections which lay misidentified for many years, and one would suspect that more such specimens exist today in herbaria. On Lassen Peak, *C. nevadensis* was collected in 1935, but the error in its original determination was not detected until a few years ago (Gillett, *et al.*, 1961). From Steens Mountain there is an early collection of *C. nevadensis*, by chance also dating from 1935, which was obtained by Percy Train and was identified by C.V. Morton as a new, but unpublished, species of *Limnia*, dedicated to the collector.[1] Although not yet reported from Nevada (Holmgren, 1955), the species very likely occurs in that state, either in the Sweetwater Mountains, the White Mountains, or in some northern range, such as the Santa Rosas. It is a reasonable supposition that *C. nevadensis* attained a wide distribution during periods of glaciation in the Sierra Nevada and Great Basin ranges and now has only relict occurrence.

The distribution of *Montia cordifolia* in California is in Humboldt County and western Siskiyou County (Munz, 1959) and is separate from that of *Claytonia nevadensis*, but both species occur on Steens Mountain in Oregon. Percy Train's collection of *C. nevadensis* was at "8,500 feet, alpine belt, wet creek banks, McCoy Creek, Marble Homestead;" four days earlier he had obtained *M. cordifolia* at "8,400 feet, sub-alpine belt, shady moist banks about springs, McCoy Creek, Marble Homestead." Charles Hansen (1956) cites *M. cordifolia* as common in shaded, seasonally wet meadows in the juniper and aspen belts; his two collections of this species deposited in the Oregon State University herbarium (*Hansen 373, 923*) are from 7600 feet and 6000 feet elevation, respectively. Hansen's specimen of *C. nevadensis* is not mentioned in his thesis, but it is from 8000 feet elevation, in what he terms the "sub-alpine bunchgrass belt." His field notes place it as occasional, on flat meadows, in moist loamy soil in the shade of rocks. From all the above information we may surmise that the two species are separated both ecologically and

[1] In a letter to Charles Hansen, in 1954, Morton said this manuscript name was certainly unpublished, and he could find no record of his having assigned it to Train's specimen.

altitudinally, although they may grow within a short distance of each other.

The following list of specimens is arranged geographically from north to south. Abbreviations for herbaria are from Lanjouw and Stafleu (1959). I am grateful to the curators of the herbaria concerned for lending me study material of *Claytonia nevadensis,* and to John Thomas Howell and Dianne Halleck for their special assistance with the problem.

OREGON. Harney Co.: Steens Mountain, 17 miles east and 9 miles south of Frenchglen, altitude 8000 feet, July 12, 1954, *C. G. Hansen 768* (OSC); Steens Mountain, McCoy Creek, Marble Homestead, altitude 8500 feet, July 30, 1935, *P. Train s.n.* (OSC).

CALIFORNIA. Shasta Co.: Crescent Cliffs, Lassen Volcanic National Park, altitude 7500 feet, August 28, 1935, *E. G. Anderson s.n.* (UC). Eldorado Co.(?): Freel Peak, September 7, 1960, *Mrs. Jean Pischel s.n.* (CAS). Alpine Co.: Round Top, Woods Lake region, altitude 9600 feet, August 11, 1939, *F. W. Peirson 12818* (UC). Mono Co.: Upper Deep Creek, Sweetwater Mountains, July 29, 1941, *R. F. Hoover 5561* (UC); head of Sweetwater Creek, altitude 9600 feet, July 24, 1955, *P. A. Munz 21176* (CAS, UC); Sweetwater Canyon, altitude 8000 feet, July 14, 1944, *A. M. Alexander & L. Kellogg 3877* (DS, UC); Deep Creek, altitude 10,200 feet, August 2, 1944, *A. M. Alexander & L. Kellogg 3991* (DS, UC, WTU). Alpine Co.: between Sonora Pass and Sonora Peak, July 24, 1940, *R. F. Hoover 4455* (UC). Mono Co.: summit of Sonora Pass, July 23, 1939, *I. L. Wiggins 9248* (DS, POM, UC, WTU); Sonora Pass, July 20, 1939, *A. Eastwood & J. T. Howell 7595A* (CAS, DS, POM); Sonora Pass, altitude 9600 feet, August 3, 1944, *J. T. Howell 19879* (CAS). Tuolumne Co.: Emigrant Meadow, August 1, 1940, *R. F. Hoover 4482* (UC). Mono Co.: 0.2 miles southeast of Summit Lake, Hoover Primitive Area, altitude 10,100 feet, August 4, 1937, *T. M. Hendrix 502* (UC); Virginia Lakes Basin, altitude 10,400 feet, July 15, 1934, *F. W. Peirson 11231* (POM); Slate Creek Valley, east of Mt. Conness, altitude 10,800 feet, July 29, 1932, *J. Clausen 554* (DS); alpine slopes above Slate Creek, altitude 11,000 feet, September 12, 1929, *H. M. Hall 12755* (CAS, UC); Tioga Crest, east of Saddlebag Lake, altitude 11,400 feet, July 31, 1936, *H. L. Mason 11462* (UC); northeast slope of White Mountain, altitude 11,000 feet, August 21, 1950, *V. Grant & A. Grant 8997* (CAS, WTU); White Mountain, toward Fantail Lake, altitude 11,000 feet, August 23, 1954, *P. A. Munz 20120* (DS). Tuolumne Co.: Mt. Conness, altitude 11,500 feet, August 15, 1944, *J. T. Howell 20548* (CAS); Gaylor Lakes, August 12, 1944, *J. T. Howell s.n.* (CAS); Tioga mines, September 15, 1923, *H. L. Mason 786* (UC); northwest slope of Mt. Dana, altitude 11,300 feet, August 5, 1931, *Mrs. H. P. Bracelin 526* (CAS, DS, POM, holotype and isotypes of *Montia alpina* Eastwood); west slope of Mt. Dana, altitude 11,500 feet, August 20, 1933, *J. Clausen 778* (DS, POM); northwest facing slope, Mt. Dana, altitude 12,000 feet, September 9, 1934, *C.W. & H. K. Sharsmith s.n.* (CAS, DS, POM); northwest plateau of Mt. Dana, altitude 11,500 feet, September 10, 1934, *C. W. Sharsmith 2019* (UC); same locality, September 18, 1936, *C. W. Sharsmith 2324* (UC); same locality, August 9,

1933, *C. W. Sharsmith 342* (UC); near saddle between Mt. Dana and Mt. Gibbs, altitude 11,500 feet, July 17, 1937, *C. W. Sharsmith 2540* (UC). Madera Co.: lake on Dike Creek at 10,900 feet, August 5, 1951, *P. H. Raven 3758* (CAS).

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ON THE OCCURRENCE OF LYCOPODIUM INUNDATUM IN CALIFORNIA. Gillespie reported *Lycopodium inundatum* L. in California for the first time in 1931 (Madroño 2:36), but this species has not been included in any published flora of the state (Jepson; Munz and Keck). *Lycopodium inundatum* has been reported for Oregon by both Abrams and Peck. Fernald, in Gray's Manual, reports a rather general distribution in the northern hemisphere, including America and Europe, with a Pacific Coast distribution south to Oregon.

Specimens in the University of California Herbarium are from several locations in Humboldt County, including the Crannell area and the *Sphagnum* bog in Big Lagoon County Park. Recent collecting trips to the Big Lagoon bog have revealed rather sizable local populations of the species. The plants do not grow on the *Sphagnum* mounds themselves but rather are restricted to the open muddy areas on the surface of the mat. Several hundred individual plants, many of them fruiting, have been counted in the bog during the past two growing seasons. In addition to the Big Lagoon populations, a few plants of the species have been observed in the muddy outwash of a seep on a seaside cliff just south of Trinidad, also in Humboldt County. Further field work may reveal additional stations for this interesting clubmoss.

The following collections have been examined in the Herbarium of the University of California at Berkeley (UC) unless otherwise noted, and all are from Humboldt County, California.

Big Lagoon *Sphagnum* bog: *J. P. Tracy and H. E. Parks 6769*, 3 Aug. 1924; *J. P. Tracy 8504*, 8 Sept. 1928; *Ira L. Wiggins 5893*, 19 July 1932; *J. P. Tracy 16022*, 6 July 1938; *D. E. Anderson 1803*, 13 Sept. 1961 (Humboldt State College Herbarium; CAS). 1 mile north of Crannell on trail to Camp 20, *L. B. Kildale 10755*, 1 Nov. 1930.—DENNIS ANDERSON, Humboldt State College, Arcata, California.

OVERLOOKED NAMES IN RATTAN'S WEST COAST BOTANY

BY JOSEPH MONACHINO†

New York Botanical Garden

Volney Rattan's "West Coast Botany, an Analytical Key to the Flora of the Pacific Coast," 1898, contains thirty-four names which are not listed in either the Index Kewensis or in the Gray Cards. Most of these names would seem to constitute new combinations with Rattan as the author. The manual was primarily intended for school students and not as a vehicle for proposing botanical novelties; it is apparently rare in botanical libraries. No formal attempt was made by the author to propose the combinations as new. Rattan merely appropriated the new species described by Greene and treated them under genera preferred by himself. He rarely used parenthetical citations, but simply credited the taxa to Greene, for he thought "it proper that his name should follow that of the species as author." At the same time, he admitted making the transfers himself: "Many of Prof. Greene's new species are placed under generic names which he does not approve" (quotations are from the Preface in West Coast Botany).

The International Code (1956) requires that new combinations or transfers made on and after January 1, 1953, clearly indicate the basonym with its author and the place and date of publication. Indirect reference to the basonym is accepted for new combinations made at an earlier date. Rattan referred to Greene's epithet-bringing synonym in a very indirect manner or not at all. He never cited the original publication; when he did mention a previous work, it was Greene's Manual of Bay-Region Botany and not Pittonia or Erythea, the journals where the majority of the species were first described.

For every one of the species and varieties listed below, Rattan provided a description, although of the briefest and sketchiest sort. Thus the names must be taken into account even if their validity as new combinations is questioned. No attempt will be made here to evaluate the taxa; the new names will be merely written as they appeared in the West Coast Botany. *Krynitzkia*, with which Rattan recombined fifteen specific epithets, is a synonym of the earlier genus *Cryptantha*, so that its only value

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†Joseph Monachino died Dec. 27, 1962.

in the following list is for the historical record. For *Vancouveria hexandra* M. & D. var. *aurea,* Rattan (page 82, West Coast Botany) gives the synonym "(*V. aurea* Greene)." The variety is not in the Gray Cards, but appears in *Synoptical Flora of North America,* 1895, by Gray, Watson and Robinson, p. 71, in synonymy under *V. chrysantha* Greene: "*V. hexandra* var. *aurea* Rattan, Anal. Key, 17."

One later homonym has resulted due to Rattan's work, *Gilia montana* Nelson & Kennedy. *Gilia montana* Greene (p. 52); G. *montana* (Greene) Parish, Plant World 20: 250 (1917). Not G. *montana* Nelson & Kennedy, Proc. Biol. Soc. Washington 19: 37 (1906); G. *congesta* var. *montana* (Nelson & Kennedy) Constance & Rollins, Amer. Jour. Bot. 23: 439 (1936).

Six new combinations first proposed by Rattan have been credited to others as authors: *Downingia humilis* Greene (p. 47); Greene, Leaflets Bot. Obs. 2: 45 (1910). *Gilia nudata* Greene (p. 52); (Greene) Brand, in Engl. Pflanzenreich, Polemon., 4, Fam. 250: 138 (1907). *Gilia Rawsoniana* (Greene) (p. 54); (Greene) Macbride, Contrib. Gray Herb. n.s. 56: 57 (1918). *Mimulus Austinae* Greene (p. 63); (Greene) Grant, Ann. Mo. Bot. Gard. 11: 296 (1924). *Mimulus Cusickii* Greene (p. 63); (Greene) Piper, Contrib. U.S. Nat. Herb. 11: 508 (1906). *Trifolium depauperatum* Desvaux var. *amplectens* (p. 108); (T. & G.) McDermott, Illus. Key N. A. Trifolium 142, pl. 52 (1910).

The remaining twenty-six overlooked names are herewith cited alphabetically, with the author of the basonym, Greene, either in or without parenthesis as it originally appeared in Rattan's manual. *Collinsia sparsiflora* F. & M. var. *divaricata* (160). *Downingia cuspidata* (Greene) (48). *Gilia foliacea* Greene (53). G. *mitracarpa* Greene (p. 53). G. *nigellaeformis* Greene (53). G. *prolifera* Greene (53). G. *serrulata* Greene (52). G. *tagetina* Greene (53). *Hosackia Biolettii* (Greene) (34). *H. subpinnata* T. & G. var *major* (110). *Krynitzkia Austinae* Greene (58). *K. Clevelandi* Greene (59). *K. crinita* Greene (59). *K. diffusa* Greene (58). *K. Hickmanii* Greene (59). *K. hirta* Greene (59). *K. hispidissima* Greene (59). *K. humistrata* Greene (58). *K. myriantha* Greene (58). *K. nemaclada* Greene (59). *K. Rattani* Greene (59). *K. scripta* Greene (59). *K. stipitata* Greene (59). *K. stricta* Greene (58). *K. vestita* Greene (58). *Triteleia scabra* Greene (75).

TWO NEW VARIETIES IN MACHAERANTHERA

BY ARTHUR CRONQUIST

The New York Botanical Garden

Machaeranthera glabriuscula (Nutt.) Cronq. & Keck **var. confertifolia** Cronq. var. nov. A var. *villosa* (Nutt.) Cronq. & Keck differt foliis linearibus, usque ad 2.5 mm. latis.

Type: *Cronquist 9164*, barren clay slopes in piñon-juniper zone 11 miles northeast of Henrieville, Garfield Co., Utah, Twp. 37 S., R. 1 W., S. 1, elevation about 7000 feet, May 31, 1961 (holotype at The New York Botanical Garden, 8 isotypes to be distributed).

Additional collections. *Barneby 13118*, 12 miles northeast of Henrieville, Garfield Co., Utah, June 7, 1961, essentially the same station as the type (New York Botanical Garden; California Academy of Sciences); *Cronquist 9147*, with scattered piñons and junipers on barren clay slopes along Cottonwood Canyon, 21 miles southeast of Cannonville, Kane Co., Utah, May 30, 1961 (New York Botanical Garden, 5 duplicates to be distributed).

The two known stations for var. *confertifolia* are geographically well removed from the nearest known station for var. *villosa*, which barely enters northeastern Utah. Var. *glabriuscula* is still more eastern, occurring chiefly or wholly east of the continental divide. Both var. *villosa* and var. *glabriuscula* have larger, relatively wider leaves than var. *confertifolia*, the larger ones rarely less than 3 mm. wide. Extreme specimens of var. *villosa*, however, such as *Merrill & Wilcox 623*, from near Black Rock, Wyoming, approach var. *confertifolia* in measurements. The leaves of var. *confertifolia* also tend to be more closely crowded than those of the two other varieties, but no sharp distinction can be drawn on this feature.

In addition to the narrower and more crowded leaves, var. *confertifolia* tends to have longer and more conspicuous peduncles than the other two varieties, sometimes up to 8 cm. long, but here again no sharp distinction is to be drawn. The relatively long peduncles of var. *confertifolia* are reminiscent of *M. venusta*, but that species has distinctly larger heads, with about 21 rays. The two previously known varieties of *M. glabriuscula* characteristically have about 13 rays in each head, rarely as many as 21. At the type locality of var. *confertifolia* the heads have from 4 to 14 rays, with 8 the most common number; at the other station the number runs from 4 to 11, with 8 still the most common.

The habitat of var. *confertifolia* (as distinguished from the

geographic location) is very similar to that of the other varieties of the species.

Under a more liberal species concept the var. *confertifolia* might be considered to represent a distinct species, since it is geographically isolated and differs from the remainder of its species in several tendencies as well as one well-defined character. On the other hand, its relationship to *M. glabriuscula* is so obvious, and the morphologic discontinuity so slight, that the varietal status seems more appropriate.

Machaeranthera tortifolia (T. & G.) Cronq. & Keck var. **imberbis** Cronq. var. nov. A var. *tortifolia* differt foliis (marginibus exceptis) caulibus involucrisque modo glandulosis, sine pilis longis.

Type: *Cronquist 8994*, rocky sandstone slope above the east bank of the Green River, a little below Hell-Roaring Canyon, west of Moab, Grand Co., Utah, near the San Juan Co. line, elevation 4000 feet, May 10, 1961 (holotype at The New York Botanical Garden, 13 isotypes to be distributed).

Additional collections. UTAH: *Cronquist 9021*, with scattered junipers in red sandstone area about 70 miles west of Blanding and 16 miles east of Hite, San Juan Co., Twp. 35 S., R. 15 E., elevation about 4700 feet, May 15, 1961; *Cronquist 9148*, with scattered piñons and junipers on barren clay slopes along Cottonwood Canyon, 21 miles southeast of Cannonville, Kane Co., May 30, 1961. ARIZONA: *Margaret Armstrong 21*, Grand Canyon of the Colorado, without further data; *McClintock 52–332*, piñon-juniper community south of Toroweap Point, along trail into side canyon, about half way between Devil's Bathtub and Burro Canyon, Grand Canyon National Monument, elevation about 4200 feet, May 1, 1952; *John Wetherill s.n.*, Kayenta, Navajo Co., in 1922. All at The New York Botanical Garden.

The var. *imberbis*, now known from six collections, occurs in and near the piñon-juniper community in southeastern and south-central Utah and northern Arizona. The var. *tortifolia* is more western and southern, occurring mainly in the creosote bush community on the Mojave and northern Colorado deserts, from extreme southwestern Utah across southern Nevada and western Arizona to southern California.

The quantity of the long, soft hairs on the leaves, stem, and involucre of var. *tortifolia* varies from plant to plant, and occasionally these hairs are largely replaced by coarse, gland-tipped (but still fairly long) hairs. The var. *imberbis* sometimes has some similar, but very short, gland-tipped coarse hairs scattered among the fine glands of the herbage and involucre. Extreme specimens of var. *tortifolia*, such as *Heller 7755*, from Mojave, Kern Co., California, closely approach var. *imberbis* in pubescence, but do not match it. Thus the var. *imberbis*, with a relatively limited variability in pubescence, stands just beyond the

Eriogonum ochrocephalum Wats. var. **Breedlovei** J. T. Howell, var. nov. Inflorescentia non capitata, compacte cymoso-umbellata; foliis, scapis et involucris (7–9-lobis) glanduloso-puberulis; perianthiis albidis vel carneis, minute glanduliferis intus et extus.

Plants cespitose; leaves broadly elliptic, to 7 mm. long and 4 mm. wide, acutish, plane or the margin slightly revolute, densely tomentose below, thinly so above, petiole to about 1 cm. long, glandular-hairy and thinly tomentose, petiole-base broadened, appressed, hairy on both inner and outer sides; scapes erect, 2–3 cm. tall, densely glandular-hairy; bracts 3, triangular, about 2 mm. long; inflorescence compactly cymose-umbellate with short peduncles and branches up to 3 mm. long, the branches sometimes bearing secondary bracts and more than 1 involucre; involucres mostly 4–6 in each inflorescence, turbinate-campanulate, 3.5–4 mm. long and about as broad, glandular-puberulent, 7–9-lobed, the lobes triangular, 1–1.5 mm. long, mostly acute, membranous-margined, sometimes bearing a few elongate cilia, bractlets linear-filiform or -clavellate, glandular-papillate; pedicels papillate-hairy above the middle; perianth 2.5–3.5 mm. long, the outer segments 1.5–2 mm. wide, the inner 0.75–1.25 mm. wide, cuneate, the apex obtuse, truncate or emarginate, finely glandular-hairy inside and out; filaments rough or hairy at base; ovary minutely and sparsely hairy above the middle; fruit unknown.

Type: Herb. Calif. Acad. Sci. No. 436,999, collected by D. E. Breedlove (*No. 3939*) from a rocky outcrop on the ridge between Liebel and Piute peaks, 6.9 miles northwest of Claraville on road to Saddle Springs, elevation 7900 feet, Piute Mountains, Kern County, California, July 14, 1962. Another collection was made in the Piute Mountains on June 22, 1962, by Ernest C. Twisselmann (*No. 7338*): locally common on an exposed ridge-top of metamorphic rock, crest of Piute Mountain, 0.6 mile north of the Bodfish-Walker Basin road junction, elevation 8175 feet (CAS 436, 997).

Although the inflorescence of var. *Breedlovei* presents the appearance of a true head (which is found in all other variants of *E. ochrocephalum* that I have examined), actually it consists of a compactly branched cymose cluster. The peduncles of the involucres and the branches of the cluster are much abbreviated but they are usually evident. This seems to be the one important character which separates the Piute plants from the rest of the wide-ranging and variable *E. ochrocephalum*. In most forms of the species the color of the flowers is yellow, but the characters of the leaves and perianths preclude reference of our plant to the closely related species, *E. Kennedyi* Porter, which is white- or rose-flowered.

Concerning Eriogonum gracilipes. In general appearance, the Piute plant closely simulates *E. gracilipes* Wats., a plant that

was described from the White Mountains, California, whence numerous collections have more recently been obtained. Watson's species was treated by S. G. Stokes (Genus Eriogonum, p. 95,—1936) as a supspecies of *E. Kennedyi*, perhaps because of the white- or rose-colored flowers, but the leaves and perianths relate the plant much more clearly to *E. ochrocephalum*.* Because of this I propose the following:

Eriogonum ochrocephalum Wats. var. **gracilipes** (Wats.) J. T. Howell, comb. nov. *E. gracilipes* Wats., Proc. Amer. Acad. 24:85 (1889). *E. Kennedyi* Porter ssp. *gracilipes* (Wats.) S. G. Stokes, Gen. Eriog. 95(1936).

Collections (CAS) from the White Mountains, Mono County, California: South Fork Cottonwood Creek, el. 11,700 ft., *Maguire & Holmgren 26154*; Big Prospector Meadow, el. 10,500 ft., *Roos & Roos 5104*; Reed Flat, el. 10,300 ft., *Munz 21014*; Sheep Mt., el. 11,400 ft., *Twisselmann 5800*; Patriarch Grove, *Blakely & Muller 3601, Breedlove 1041*.

A WESTERN AMERICAN VARIETY OF CAREX BIPARTITA

BY F. J. HERMANN

Washington, D.C.

A collection of *Carex bipartita* Bellardi ex All. (*C. Lachenalii* Schkuhr; *C. lagopina* Wahl.) from the Rocky Mountains, Boulder County, Colorado, is characterized by perigynia with such elongated beaks, spreading in the spikes, that the plants suggest a member of Section *Ovales* rather than of Section *Heleonastes*. Review of a large series of both American and Eurasian collections of the largely Arctic *C. bipartita* revealed a single additional collection of the long-beaked plant, from the Uinta Mountains of Utah, although the tendency toward longer, more abrupt beaks was more frequent in Scandinavian than in American material.

Because this form in its extreme is sufficiently different in appearance from typical *Carex bipartita* and appears to be

* In both *E. Kennedyi* and *E. ochrocephalum* the leaves have a prolonged, expanded, appressed petiole-base; but, whereas in *E. ochrocephalum* there is a more or less elongate slender petiole that intervenes between leaf-base and blade, in *E. Kennedyi* the blade closely adjoins the base (and hence the leaf has been termed "subsessile"). I believe a further important distinction between *E. Kennedyi* and *E. ochrocephalum* will be found in the base of the fruiting perianth (that is cupulate in *E. ochrocephalum*), but many more fruiting specimens of *E. ochrocephalum* sens. lat. will have to be seen before this character can be advanced with certainty. The number of lobes of the involucre, which was used by Jepson (Fl. Calif. 1:404) for separating these species, has not been found to be reliable, since in both I have found involucres with 5 or more lobes.

geographically restricted to mountains south of the area of greatest development of the typical form, it may be advisable to designate it as

Carex bipartita var. **austromontana** F. J. Herm., var. nov. A varietate typica recedit perigyniis in rostrum tenuem 0.5–1 mm. longum abrupte contractis.

COLORADO: edge of swale on tundra, alt. 11,500 ft., Niwot Ridge, above University of Colorado Science Camp, ca. 8 miles northwest of Nederland, Boulder County, Aug. 15, 1961, *F. J. Hermann 17059* (CAS, COLO, CS, US, type). UTAH: swampy, stony ground around spring, W. exposure of Gilbert Peak, Henrys Forks Basin, Uinta Mountains, alt. 12,700 ft., Summit County Aug. 7, 1936, *B. Maguire et al. 14497* (US).

In typical *Carex bipartita*, which in western North America is known from Alaska and Yukon to British Columbia, Alberta, Montana, and Colorado, the perigynia are usually gradually narrowed into a short beak seldom over 0.5 mm. long, in contrast to the abruptly contracted, elongated, slender beak 0.5-1 mm. long in var. *austromontana*.

Through the kindness of Dr. William A. Weber, material from the two Colorado collections recently reported by him (Univ. of Colo. Studies, Series in Biol. No. 7:2,—1961) was received for study and found to be the typical form of the species.

Forest Service Herbarium, Division of Range,
Wildlife Habitat and Recreation Research,
Washington, D.C.

A SPECIES OF SCIRPUS NEW TO CALIFORNIA. One of our very helpful and alert correspondents, Al Hobart of Takilma, Oregon, has recently discovered a colony of *Scirpus subterminalis* Torr. growing in the shallow water at the edge of Fawn Lake, on Bearcamp Ridge in the Siskiyou Mountains of northern Del Norte County, California, a point about five miles south of the Oregon boundary. Fawn Lake lies at an altitude of approximately 4800 feet above sea level, a little north of Sanger Peak, between Elk Creek and the East Fork of the Illinois River. Previous Pacific Coast records for *S. subterminalis* have been from considerably farther north in Oregon. Specimens obligingly sent by Mr. Hobart have been deposited in the Jepson Herbarium and in the Herbarium of the California Academy of Sciences.—RIMO BACIGALUPI, Jepson Herbarium, University of California, Berkeley.

LEAFLETS
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NOTES ON THE GEOGRAPHIC DISTRIBUTION OF ARCTOSTAPHYLOS MYRTIFOLIA

BY ROMAN GANKIN
University of California, Davis

In May, 1955, Professor G. Ledyard Stebbins of the University of California at Davis introduced me to the Sierran endemic species, *Arctostaphylos myrtifolia* Parry, the Ione manzanita, in the hills just southwest of Ione, Amador County, California. Its low mound-like habit and the characteristic greenish-brown cast to its foliage in contrast to the white desert-like appearance of the highly kaolinitic clay soil gave me a rather unappealing first impression. However, this species has for years been the subject of discussion of many California plant geographers, for it has been one of the best examples of restricted endemism readily available both to classroom and to visiting botanists. Until just recently there has been no published account of its actual distribution, and even in our latest treatment of the California flora (Munz and Keck, 1959, p. 420) there is only an indication that its occurrence goes beyond the confines of the immediate Ione area and into Calaveras County.

The largest present-known population of *A. myrtifolia* is undoubtedly the one discovered by C. C. Parry on a visit to Ione in the late 1880's and is located between Ione and Buena Vista where it covers some six square miles. Not all the vegetation here, however, consists of *A. myrtifolia.* Its associates are mainly plants more or less common to Sierran chaparral at this low elevation (about 300 ft.), namely, *Adenostoma fasciculatum* H. & A., *Arctostaphylos viscida* Parry (also first described from Ione by Parry), *Arctostaphylos Manzanita* Parry, *Quercus Wislizeni* A. DC., *Ceanothus tomentosus* Parry (Ione, the type locality), *Rhamnus californica* Esch., *Heteromeles arbutifolia* (Ait.) Roem., and *Pinus Sabiniana* Dougl. Where Ione manzanita does occur, however, it usually does so to the exclusion of nearly all else and hence forms relatively pure colonies, which in turn appear to be encircled by other vegetation. The closest associated vegetation is generally found to consist of *Arctostaphylos viscida.*

It should be noted that several other species are endemic to

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this area or are found to occur almost exclusively in situations like this. Outcrops of the Ione Formation (Pask and Tume, 1952) in one form or another are known to occur in the foothills of the Sierra Nevada from Chico, Butte County, to Friant Dam, Fresno County. The already-mentioned *Ceanothus tomentosus* seems to occur on these soils. It was noticed that *Potentilla Parryi* (Greene) Greene and *Helianthemum suffrutescens* Schreiber are more locally distributed. *Mimulus viscidus* Congdon and *Lotus stipularis* (Benth.) Greene, or as sometimes called *L. balsamiferus* (Kell.) Greene, seem to exhibit limited distributions, while *Eriogonum apricum* Howell, one of the most geographically restricted species in the world, is found to grow only on the south slope of a hill at the southern rim of the main Ione manzanita population.

During the fall of 1955, Professor Stebbins and I returned to Ione to determine the extent of this largest population and perhaps to find other areas where the species occurs. It was also at this time that a putative hybrid between *A. myrtifolia* and *A. viscida* was found. Traveling south from Buena Vista we made frequent stops to investigate likely habitats (tops of ridges with exposed kaolinitic deposits) where we usually were rewarded by small occurrences of the species. We continued our search all the way to the Mokelumne River, the county line between Calaveras and Amador counties. As the road approaches the Mokelumne River from Buena Vista one sees a high cliff which overlooks the river. It was over the summit of this cliff that a hybrid swarm was discovered between the above-mentioned suspected parents. This population is quite small, but hybrid types are more numerous here compared to other areas.

Five to ten miles to the northwest of Ione and surrounding the community of Carbondale are several large populations of Ione manzanita. Here again, these populations are closely associated with the kaolinitic substrate just as they are near Ione and southward.

Crossing the Mokelumne River to the south and continuing as far as Valley Springs yielded us no further finds of *A. myrtifolia*. Subsequently, however, Dr. A. E. Wieslander of the Forest and Range Experiment Station in Berkeley was contacted, and hitherto unpublished information on the distribution of Ione manzanita was made available. One population, as found on vegetation type maps (Valley Springs sheet), was noted to be

Valley. When I became enthusiastic over the possible rediscovery of the "missing" poppy, Mr. Bill Roden arranged to take me to the field. My hopes were fulfilled—it was the long sought Point of Rocks poppy (my coll. *No. 6770*). It was common in a field of eighty acres, particularly so in places with light soils where that year's dense growth of red-stemmed filaree [*Erodium cicutarium* (L.) L'Hér.] had not crowded it out. As the cotton field is only three miles southwest of Point of Rocks, and as irrigated farming had not yet been extensively developed in Antelope Valley at the time of the first discovery of the plant by Eben McMillan in 1950, it would seem likely that Point of Rocks was the site of its introduction.

Only a few days after I visited the Antelope Valley colony, Mr. T. Franklin Twisselmann brought me a "new" plant he had found in his barley fields in the Sinsheimer Flat area of the Choice Valley Hills of the northern Temblor Range in extreme eastern San Luis Obispo County. This, too, proved to be the resurgent poppy. Mr. Twisselmann and I went at once to visit his barley and wheat fields. The low hills just to the east of Sinsheimer Flat have shallow soil over alternating beds of diatomaceous shale and chalk rock and occasional areas of an acre or less along the hill tops are little more than fractured chalk or white shale. In these places the barley and wheat failed to grow, but they were well covered with an almost pure stand of poppies (my colls. *No. 7025* and *7027*). In the rest of the fields, in better soil, there was a very good stand of wheat and barley and the poppies were few although widespread. These few grew mostly along gullies or in "skips" in the planted fields. He then took me to a sandstone outcrop in arid pasture land in the hills overlooking Antelope Valley. Here, at the summit of a steep slope of more or less typical Upper Sonoran grassland, a few poppies, now mature, grew around the rocks.

Thus, the Point of Rocks poppy is not a transient but is well established in western Kern County in Antelope Valley and in the hills immediately to the west in San Luis Obispo County. It shares with the native California poppies of the region (*Eschscholzia californica* Cham. and *E. Lemmonii* Greene) the ability to thrive in poor or rocky soils and also in rich light loams such as are found in the abandoned cotton fields. Further, it is similar to the native species in being a poor

competitor, and thus ordinarily is restricted to poorer soils where it is not at a disadvantage with the aggressive annuals of the region. Its scarcity, if indeed not complete absence, from 1953 through 1961 suggests it may have drouth-resisting germination mechanisms similar to those of the native and well-established introduced plants of the region. So it seems that once again the flora of southern Europe has contributed a species to the arid inner central California that is well adapted to the unstable and unpredictable climate of that region.

Only one question now remains. Dr. Wallace Ernst has called my attention to the close relationship of *Papaver apulum* var. *micranthum* and *P. hybridum* L. and has written me that he is inclined to treat the Point of Rocks poppy as *P. hybridum*. An inspection of European collections of both species at the California Academy of Sciences leads me to believe that this point will not be determined finally until the California plant has been studied genetically. I think it best to continue to use the name given by Smith and since used by several authors until such time as it is definitely established that the plant is, beyond question, *P. hybridum*. Meanwhile, whatever the name, it is well to report now that this charming weed, invariably noticed by laymen who rarely notice plants, is not a transient but a permanent and well-established plant of western Kern and extreme eastern San Luis Obispo counties.

NOTES ON OXYTROPIS

BY R. C. BARNEBY
The New York Botanical Garden

1. OXYTROPIS LAGOPUS Nutt.

Records tracing the range of this species east into South Dakota and north into Canada have recently been sent me by Dr. S. L. Welsh. The var. *atropurpurea* (Rydb.) Barneby, known formerly only from Wyoming and extreme southern Montana, has been collected "on the highest peaks of the Black Hills" (*Paul Nissen in 1931*, ISC), the county unfortunately not recorded; and var. *conjugans* Barneby, known hitherto from western Montana only, has been found "near the town reservoir," Cardston, Alberta (*R. K. Shaw 35*, ISC).

2. Oxytropis Lambertii Pursh

At the last revision of the North American species of the genus (Barneby, 1952), *O. Lambertii* was known to extend south as var. *articulata* (Greene) Barneby into eastern Texas and as the cordilleran var. *Bigelovii* Gray almost to the Mexican border in southeast Arizona. The latter is still to be expected in northern Chihuahua or northeastern Sonora, but has unexpectedly turned up much farther south, in Zacatecas, making a leap of over 650 miles in a southeasterly direction from the Huachuca and Chiricahua mountains. This remarkable record (2.2 miles southeast of Sombrerete, Zacatecas, locally abundant on stony mountain sides, August 15, 1959, *U. T. Waterfall 14,483*, NY) takes the essentially boreal genus *Oxytropis* south to within a few miles of the Tropic of Cancer.

3. Section Arctobia Bge.

Hultén (1929, p. 102) has already suggested that Bunge's sections *Arctobia* and *Caeciabia*, the former with sessile and the latter with stipitate pods, are artificial groups, for there are some pairs of species virtually indistinguishable from one another except by this one feature. In America some forms of the polymorphic *O. nigrescens* (Pall.) Fisch. closely simulate *O. podocarpa* Gray until the fruit beings to form, and the same difficulty arises in Asia with *O. nigrescens*, *O. longipes* Fisch., and *O. kamtschatica* Hult. We now have neat evidence of transition from one type into the other within the compass of a single species, *O. nigrescens*. The pod of var. *nigrescens* has traditionally been described as sessile and is truly so in many cases, but occasionally it is cuneately narrowed at base into a short but definite stipe concealed by the marcescent calyx (cf. *Calder & Kukkonen 27,193*, NY). This stipitate form is known to me only from Alaska and Yukon but judging from the description and figure in the Soviet Flora (vol. 13, p. 165, tab. IV) it seems that *O. coluteoides* Vass. represents the same or a closely parallel modification in Siberia. In any case I regard the American plants of this nature as minor variants of var. *nigrescens*, but it seems hardly possible to accommodate in the same taxon the remarkable *Oxytropis* lately discovered in an unglaciated limestone region in west-central Yukon in which the pod is elevated on a stipe 4–5 mm. long, of a length about equal to the calyx-tube. It may be known as

Oxytropis nigrescens (Fisch.) DC. var. **lonchopoda** Barneby, var. nov., a var. *nigrescenti* cum quo caeterius exacte congruit legumine in stipitem elongatum 4–5 mm. longum tubo calycino subaequilongum basi angustato absimilis.

YUKON: common on open dry alpine slopes, 2800–3500 ft., Cathedral Rocks, Ogilvie Range, ± 66° 02′ N., 138° 44′ W., June 29, 1960, *J. A. Calder & J. M. Gillett 26,013A* (holotype, DAO No. 9395); ibid., *No. 26,013* (NY); Ogilvie Mts., 3500–4200 ft., ±265° 37′ N., 138° 56′ W., *Calder & Gillett 25,962* (NY).

The new variety was only one of several interesting reocrds in sect. *Arctobia* received for study from Dr. James Calder of Ottawa. In my revision (Barneby, 1952, p. 211, map 2) I cited as *O. nigrescens* var. *arctobia,* an otherwise purely arctic type, two flowering collections from Mt. Selwyn in British Columbia. I was evidently in error, for quite similar forms of var. *nigrescens* with silvery foliage have now been collected in scattered stations along the Alaska Highway in northeastern British Columbia as well as in one spot well south of Mt. Selwyn (Azouzetta Lake, Murray Range, *Calder, Savile & Ferguson 12,619*). An ambiguous *Oxytropis* of the same group has even turned up in the Coast Ranges of British Columbia yet farther south, but as the material is only in young flower I am unable to name it with assurance. The stipitate ovary suggests *O. podocarpa,* found in the main range of the Rocky Mountains at the same latitude, but Dr. Calder (in litt.) thinks that phytogeograpically the Coast Range plant is more likely to be an outlying var. *nigrescens* derived from the northwest.

While my revision of *Oxytropis* was in press A. E. Porsild (1951) published an important paper on the botany of southeastern Yukon in which he described and discussed several new species of the genus. Only *O. Huddlesonii* Porsild (op. cit., p. 242, pl. XVII, fig. 5) added anything to sect. *Arctobia* and I have not seen the type of this. But specimens agreeing closely with the original description have now been collected in Alaska (Mile 34.5, Fortymile Road, a common cushion plant above timberline, *H. J. Lutz 1141,* NY). The species is remarkable for its small sessile glabrous fruits.

In summary the American species of sect. *Arctobia,* which must now be enlarged to include sect. *Caeciabia,* may be distinguished as follows, provided at least forming fruit is present.

1. Leaves simple or trifoliolate, the leaflets decurrent or obscurely jointed to the rachis ..... *O. Mertensiana* Turcz.
1. Leaves pinnate, the leaflets jointed to the rachis and deciduous in age (2)

2. Body of the pod broadly ellipsoid or subglobose, mostly not over 1½ times longer than wide (if realtively longer then not over 1.7 cm. long) (3)
3. Pod stipitate, the greatly inflated body 1.5–3 cm. long, the valves strigulose ..... *O. podocarpa* Gray
3. Pod sessile, the body turgid but not greatly inflated, 10–12 mm. long, the valves glabrous ..... *O. Huddlesonii* Porsild

2. Body of the pod narrowly ellipsoid or cylindroid, 2–3 times longer than wide (4)
4. Pod sessile, about 15 mm. long, subunilocular, the septum nearly obsolete ..... *O. Scammaniana* Hult.
4. Pod either sessile or stipitate, (1.7) 2–4 cm. long, subbilocular, the septum broad and complete or nearly so (5)
5. Stipules chestnut-purple..... *O. kokrinensis* Hult.
5. Stipules pallid or greenish [*O. nigrescens* (Pall.) DC.] (6)
6. Pod sessile or subsessile, the stipe less thn 2 mm. long (7)
7. Leaflets (5) 9–15, hirsute or pilose, commonly greenish when full grown, rarely permanently silvery-canescent; plants densely cespitose to loosely matted, the caudex-branches often elongating and cord-like; Yukon and Alaska, s. in interior British Columbia to the Murray Range; Siberia var. *nigrescens*

7 Leaflets 5–11, densely and permanently silky-canescent; plants very densely cespitose or pulvinate; truly arctic, along the coast from Mackenzie to Baffin Island..... ..... var. *uniflora* (Hook.) Barneby

6. Pod stipitate, the stipe 4–5 mm. long, about equalling the calyx-tube; Ogilvie Range, s.-centr. Yukon..var. *lonchopoda* Barneby

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NEW VARIETY AND NEW COMBINATION IN OXYTROPIS CAMPESTRIS

BY STANLEY L. WELSH
Provo, Utah

Since the end of World War II, botanical explorations in the northern regions of North America have proceeded at a rapid

pace. Many new taxa have been described and their taxonomic status must be evaluated in light of previous investigations. The revision of the North American species of *Oxytropis* by Barneby (1952) did much to clarify the status of various taxa in that genus. However, several taxa were unknown to Barneby and their relationships require clarification.

Research leading to a revision of *Oxytropis* in Alaska and Yukon has demonstrated the need for reducing *O. Jordalii* Porsild to varietal status under *O. campestris* (L.) DC.

Oxytropis campestris (L.) DC. var. **Jordalii** (Porsild) Welsh, comb. nov. *O. Jordalii* Porsild, Canad. Field-Nat. 65:77 (1951).

During the summer of 1962, several specimens from Alaska, Yukon, and British Columbia were sent to the writer. Among them is a specimen from northern British Columbia which belongs to the *O. campestris* complex and which has not been described.

Oxytropis campestris (L.) DC. var. **Davisii** Welsh, var. nov. Herba perennis acaulescens, caudicibus multi- vel pauci-ramosis, ramulis brevibus; foliis pinnatis, 4–10 cm. longis; foliolis 25–39, ovatis vel lanceolatis aliquis fasciculatis, 5–9 mm. longis, 2–3 mm. latis, acutis, pilosis supra et infra; stipulis et petiolis adnatis; scapis foliis longioribus, 5–15-floris; corollis purpurascentibus, 12–14 mm. longis; leguminibus immaturis, adscendentibus, villosis.

Acaulescent perennial herbs from a branching caudex; leaves pinnate, 4–10 cm. long, leaflets 25–39, ovate to lanceolate, some fasciculate, 5–9 mm. long, 2–3 mm. broad, acute, pilose above and below with simple hairs; leaf-rachis and petiole grooved ventrally, strigulose to pilose; stipules adnate to the petioles, 12–14 mm. long, the free ends acuminate, 5–6 mm. long, sparsely pilose dorsally, ciliate; scape 5–14 cm. long, strigulose; raceme 2–4 cm. long. the flowers pink-purple (fading dark purple); calyx cylindric, villous with light and dark hairs, tube 4.2–4.7 mm. long, teeth 1.5–2 mm. long, linear-lanceolate; pods immature, ascending, villous.

BRITISH COLUMBIA, CANADA: across the highway east from the camp ground at Mile 403.4 on the Alaska Highway, in a gravelly river bottom, where the top soil had been removed, *Ray J. Davis 6076,* 19 July 1962 (holotype BRY; isotype IDS). The location is 11.1 miles west of north of Summit Lake, about 59° N., 126° W.

This variety is named in honor of its collector, Ray J. Davis, distinguished botanist and author of the Flora of Idaho. Its purple flowers are diagnostic in differentiating var. *Davisii* from var. *Jordalii* and var. *varians* (Rydb.) Barneby, the only other varieties known from northwestern North America.

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RECORDS OF RUSHES IN MONTEREY COUNTY, CALIFORNIA

BY JOHN THOMAS HOWELL

While preparing an account of *Juncaceae* for Beatrice F. Howitt's projected list of the vascular plants of Monterey County, California, I have found the Monterey occurrence of the following species to have more than ordinary floristic interest. All records are from the Santa Lucia Range and all collections cited are represented in the Herbarium of the California Academy of Sciences.

Juncus bryoides F. J. Hermann. Sandstone ledges at The Indians, *Hardham 5342B*, April 7, 1960. This collection, the first I have seen from the Coast Ranges, not only establishes a noteworthy range extension but introduces to the species a critical morphological variation. Heretofore this diminutive annual has been known from the Sierra Nevada, the mountains of southern California, and from Utah. In confirming my determination of the Hardham collection, Dr. Hermann has written: "The description of *J. bryoides* will have to be emended to read 'bracts 2 (occasionally only 1).' Some of the flowers of the Santa Lucia material do have two bracts, others a vestige of the second, but in most the second bract is completely obsolete."

Juncus Kelloggii Engelm. The Kellogg rush has been known in the Coast Ranges north and south of Monterey County but none from there is cited by Hermann in his treatment of the *J. triformis* group (cf. Leafl. West. Bot. 5:115, 116). The plant has been detected, however, in several parts of the Santa Lucia Range: The Indians, *Hardham 5433*; near mouth of Los Burros Creek, *Hardham 5573, 5896A, 5899*; divide between

JUNCUS BUFONIUS L. *No. 39137.* Although I have collected this common rush perhaps a hundred times, I have never before noted its cleistogamous flowers which would appear to be not uncommon, although most accounts of the species do not mention them. Many flowers were also noted in the Jolon plants as being 2-merous instead of 3-merous.

Juncus bufonius L. var. **Congdonii** (Wats.) J. T. Howell, comb. nov. *J. Congdonii* Wats., Proc. Amer. Acad. 22:480 (1887). This grew with the preceding but appeared very different with its fasciculately clustered flowers (*No. 39136*). It differs from all forms of the variable toad rush with which I am acquainted in its nearly smooth, shining, translucent seeds. "Chowchilla River, Merced County," California, is the type locality of *J. Congdonii*, a plant noted as "forma parva . . ." by Buchenau [Pflanzenreich IV. 36 (Heft 25):107, —1906].

JUNCUS KELLOGGII Engelm. *No. 39139.* On the basis of my rather extensive collection which includes young flowering plants as well as older fruiting plants, I am removing *Juncus capillaris* F. J. Hermann from the flora of the South Coast Ranges. In his revision of the *Juncus triformis* group (Leafl. West. Bot. 5:109–120,—1948), Dr. Hermann (p. 117) referred to *J. capillaris* a collection made at Jolon by Miss Eastwood (*No. 4136,* CAS) on April 4, 1915. All of the plants in this collection are immature and carry flowers in which the perianths exceed the developing capsules, a character suggestive of *J. capillaris*. In my current collection, this character is also shown in young plants, but in mature plants the capsule generally equals or exceeds the perianth. I do not detect any seed characteristic of *J. capillaris* in my collection; all seeds have the prominent longitudinal ridges of *J. Kelloggii*.

JUNCUS SPHAEROCARPUS Nees. Rather common with the other annual rushes at Jolon, *No. 39138.* (See comments on *J. sphaerocarpus* in the first part of these notes.) The stems in this collection are often uniflorous, a condition superficially confusing when found in plants growing with *J. Kelloggii* with its usually 1-flowered peduncles.

POLYCARPELLATE FRUITS IN BIGLEAF MAPLE

BY FERDINAND W. HAASIS
Carmel, California, and Redwood Glen School

On the campus of Redwood Glen School, Bean Creek Road, Santa Cruz,* several staff members, classroom teachers, and sixth-grade students have come upon fruits of *Acer macrophyllum* Pursh having more than two samaras on a single pedicel, 3, 4, 5, 6, 10. They are found on trees which also bear 2-samara fruits.

In 1960 they were observed on at least seven trees scattered over an area perhaps 500 yards across. One staff teacher, Carl Isenberg, observed them the same year near Redwood City (Skyline Boulevard). During the fall of 1962 we came upon them now and then at Redwood Glen. As I recall, we also found them in 1961. In the summer of 1962, Mrs. Barbara Haasis Bean collected a few somewhere along the Feather River Highway.

None of the Redwood Glen School staff recalls having seen such maple fruits before the fall of 1960. In the literature readily available to me, I have found no reference to their occurrence.

Mr. John T. Howell, California Academy of Sciences, San Francisco, has kindly supplied the following information on similar specimens in the C. A. S. Herbarium (one 3-carpellate fruit in each): Big Chico Creek, Butte County, *Heller 11575*; Weaverville, Trinity County, *Kleeberger in 1880*; Nanaimo, British Columbia, *Eastwood 9841*.

In addition to the polycarpellate fruits, I have collected at Redwood Glen one shoot of bigleaf maple with two whorls of three leaves each.

I hereby extend thanks to all those who have contributed specimens of the abnormal fruits, especially my fellow staff teacher William Walls and former staff teacher Carl Isenberg.

* All places mentioned are in California except as noted. Redwood Glen lies at about 37° N. Lat. and 122° W. Long.

NORTHWESTERN WEED NOTES

BY ROBERT ORNDUFF

Duke University, Durham, North Carolina

The weed flora of the Pacific Northwest is gradually increasing in size due to the continuing introduction of new alien plants into the area. The purpose of this report is to record some northwestern weeds which have apparently been established in this region for a number of years, but which have not been included in any of the floras covering Washington or Oregon.

Hemerocallis fulva (L.) L. is a commonly grown garden plant which is widely naturalized in the eastern United States. It is occasionally seen along roadsides in the lower Willamette Valley, Oregon. Since it is a triploid which seldom sets seeds, it is probable that the majority of colonies have become established from rhizomes carried to the site by animals or by man.

Populus alba L. has become locally established in the vicinity of Portland, Oregon, where it is occasionally seen also as a planted ornamental. It is doubtful that it has become naturalized in undisturbed habitats.

In contrast, several other ornamental trees—*Sorbus Aucuparia* L., *Acer platanoides* L., and *Crataegus* spp.—have become rather widely and successfully established in the Portland area in woodlands which, although near habitation, are relatively undisturbed.

Lunaria annua L. has not been reported as a northwestern adventive, probably because it is generally considered a transient escapee from gardens. However, this crucifer has been established for many years in deep woods along the Columbia River Highway (Scenic Route) between Crown Point and Oneonta Gorge, and perhaps elsewhere in the vicinity.

Nymphoides peltata (Gmel.) O. Kuntze is a widely planted ornamental Old World aquatic and has become naturalized locally in the eastern United States. Specimens have been seen which were collected from Long Lake, Spokane County, Washington in 1930 (based on *W. H. Ransom s.n.*, US). Since the specimens were flowering it appears that the plants were growing well, but whether they have persisted there is unknown.

A NEW VARIETY OF STREPTANTHUS CORDATUS

BY JOHN THOMAS HOWELL

Streptanthus cordatus Nutt. var. **piutensis** J. T. Howell, var. nov. Perennis caudice lignosi suffrutescenti interdum multicipitali; caulibus substricte erectis, usque ad 1 m. altis (cum inflorescentia elongata); foliis caulinibus fere oblongo-lanceolatis breviter cordato-amplexicaulibus; floribus purpurascentibus, circa 1 cm. longis; siliquis valde compressis, usque ad 1 dm. longis, 3–4 mm. latis, ascendentibus rectis vel incurvis; seminibus alatis.

Type: Herb. Calif. Acad. Sci. No. 437,866, collected in the Piute Mountains, Kern County, California, on the road between Saddle Springs and Claraville about 1 mile southwest of the Bodfish-Havilah road, at an elevation of 4000 feet, by Dennis E. Breedlove, July 14, 1962, *No. 3840*. Other collections (CAS) from the same region are: between summit of Bodfish-Havilah road and Piute Peak, elevation about 5000 feet, *Bacigalupi 4536;* in Piute cypress (*Cupressus nevadensis*) forest near Bodfish, *Hardham 3641;* in grove of *Cupressus nevadensis,* Piute Mountain, *Raven & Lewis 9348;* in sparse growth of *Juniperus californica,* Ball Mountain (on Claraville road 1.8 mile south of Bodfish-Havilah road), elevation 4400 feet, *Twisselmann 3621*.

Generally this plant has been determined as *S. campestris* Wats. (the Twisselmann collection excepted) and indeed the aspect of the plant and appearance of the flowers more closely resemble that species of the southern California mountains. However, the fruiting specimens from Mr. Breedlove with their broad flattened siliques immediately allies the plant to *S. cordatus* rather than to *S. campestris* in which the fruits are less than 3 mm. wide. From *S. cordatus,* the Piute plant differs in the taller stems from a more woody caudex, the narrower cauline leaves, and the usually smaller flowers.

MAIDEN PINK IN CALIFORNIA. A collection in the Jepson Herbarium, which long remained unidentified, appears to be a species new to the adventive flora of California. The plant is *Dianthus deltoides* L., a native of Europe and temperate Asia. It has been reported as naturalized in the northeastern United States, but this appears to be the first record of its occurrence in California. The flowers of *D. deltoides* are either solitary or in a loose cyme of 2 or 3 flowers. Each flower has an epicalyx of 2 to 4 broadly ovate, cuspidate bracteoles, about one-half as long as the calyx. In *D. prolifer L.* [*Tunica prolifera* (L.) Scop.],

adventive mostly in the lower Sierran foothills bordering the Sacramento Valley, each flower has an epicalyx of 1 bracteole, but the flowers are borne in small clusters partly or almost completely enclosed by 2 or 3 pairs of broad, membranous bracts which form a loose involucre about the flowers. In some cases in *D. prolifer,* where there may be only 1 or 2 flowers in an involucre, the plants then superficially resemble the single, stalked flowers of *D. deltoides.*

The collection of *D. deltoides* was made by Duncan Dunning, formerly of the United States Forset Service, at Toad Lake, northwest of Hambone, southeastern Siskiyou Co., on July 16, 1921. No habitat data are provided with the collection. I have seen no later California collections of this species, so it would be interesting to know if it has permanently established itself in California. A duplicate specimen of the Dunning collection has been deposited in the herbarium of the California Academy of Sciences.—G. THOMAS ROBBINS, Jepson Herbarium, University of California, Berkeley.

HAPLOPAPPUS CILIATUS IN CALIFORNIA. A second California record of the Gr*indelia*-like *Haplopappus ciliatus* (Nutt.) DC., which is native in middle United States from Missouri to New Mexico and Texas, was collected on Nov. 22, 1962, by Henry M. Pollard west of the Ventura River estuary along the Southern Pacific Railroad in Ventura, Ventura County. If only the first California record (*Howell No. 31901* from the San Francisco waterfront, Sept. 30, 1956; reported in Wasmann Journ. Biol. 16:144,—1958) had been noted earlier in Munz and Keck (1959) or in Abrams and Ferris (1960), Mr. Pollard would not have resorted to the following annotation which accompanied his specimen to the California Academy of Sciences:

Primo aspectu facillimum visum est hanc herbam molestam seminibus foliisque solis determinare, sed multis horis frustra consumptis ne generis quidem nomen reperire potui. Nihilo minus mihi ciet tintinnabulum. Me stolidum! Ubi terrarum vidi ego istam?

As noted by Howell, Raven, and Rubtzoff (l.c.), *Haplopappus* may be distinguished from G*rindelia* by its pappus.—J. T. HOWELL.

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LEAFLETS of WESTERN BOTANY

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A publication devoted particularly to the native and naturalized plants of western North America and to the cultivated plants of California, appearing about four times each year. Subscription, $2.00 annually. Cost of back files or single numbers furnished on request. Address: John Thomas Howell, California Academy of Sciences, Golden Gate Park, San Francisco 18.

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southwest of Marsing, Owyhee County, *Baker 10157*. Only one previous collection has been cited for Idaho by Illtis (6). Reported previously from Oregon by Baker (1) from Harney County and by Peck (8) from Sucker Creek about Adrian and Rome in Malheur County. Formerly believed to be limited to northwestern Nevada where it is common about Reno, the type locality.

EUCLIDIUM SYRIACUM (L.) R.Br. Sagebrush flat, 5 miles south of Grasmere, Owyhee County, *Baker 14059*; roadside, grassy flat, 4 miles south of Mountain Home, Elmore County, *Baker 12977*. Well established in the desert region south of Mountain Home. Also found in Washington. Probably introduced from Eurasia with imported seed.

THELYPODIUM INTEGRIFOLIUM (Nutt.) Endl. Occasional, alkali soil, desert shrub zone, Oreana, Owyhee County, *Baker 8546*; fence rows and edge of field, Malad Valley, about 1 mile south of Malad City, Oneida County, *Baker 9324*; abundant, dry flat, sagebrush-grass zone, 1 mile south of Schiller, Power County, *Baker 9624*; alkali flats northeast of Caldwell, Canyon County, *Christ & Ward 8581*. This species is listed in Davis (4) as probably occurring in Idaho. There is a good selection of this plant available which indicates a wide distribution in the southern part of the state.

ASTRAGALUS AQUILONIUS Barneby. On an open ridge in pass, Double Springs Summit, 8 miles northeast of Dickey, Custer County, *Christ 17767*. Known only from eroded bluffs along the upper Salmon River and tributaries in Custer and Lemhi counties, the type locality.

ASTRAGALUS MISER Gray var. PRAETERITUS Barneby. Open lodgepole pine woods, along Mill Creek, 14 miles west of Challis, Custer County, *Baker 10745*; Double Springs Summit, open mountain side, elevation 8200 feet, Custer County, *Christ 1954*. A polymorphic complex of Cordilleran and Great Basin races. Widely distributed in all its varieties from Colorado to South Dakota, British Columbia and interior Washington.

ASTRAGALUS PAYSONII (Rydb.) Barneby. Ridge between Schooner Creek and Soda Creek, 4 miles east of Red River Ranger Station, Idaho County, *Christ 18183*. This species is known at present only from this collection in Idaho and from the type collection from Sublette County, Wyoming, according to R. C. Barneby, personal correspondence.

ASTRAGALUS SHELDONI (Rydb.) Barneby. Dry grassy hillside on Whitebird Grade, Idaho County, *Baker 6720*. Known previously only from the type locality in Horse Creek Canyon, Wallowa County, Oregon. First record for Idaho.

LUPINUS POLYPHYLLUS Lindl. Common along roadside, 21 miles north of Moscow, Latah County, *Baker 7551*; moist meadow, headwaters Goose Creek at Goose Lake, Adams County, *Baker 11711*; wet seepage slope, shady woods along Mormon Creek at junction of the South Fork of the Salmon River, 10 miles south of Warm Lake, Valley County, *Baker 11805*; thickets, coniferous woods, Slims camp, 10 miles southeast of Red River Ranger Station, Idaho County, *Baker 12550*; grassy flat, moist meadow, 0.25 miles south of Nordman, Bonner County, *Baker 13717*; marshy stream bank, edge of Hump Lake, Buffalo Hump, Idaho County, *Baker 12722*; moist open grassy meadow, Burgdorf, Idaho County, *Baker 10348*; grassy meadow, 2 miles south of Priest Lake landing strip, Bonner County, *Baker 8979*; moist swampy hillside, Penny Creek campground, Valley County, *Baker 11693*; moist grassy river bank, 20-mile Bar, along the Selway River, 8 miles west northwest of Selway Falls, Idaho County, *Baker 12798*; Clear Creek Valley at Lowman, Boise County, *Christ 11266*; St. Maries River drainage 4 miles north of Clarkia, Shoshone County, *Chichester s.n.*; in clumps on lava slopes, Three Creek, Owyhee County, *Nelson & Macbride 1866*. A widely distributed plant in Idaho which has been called by several different names. There is not much question as to its identity. It is the same species which is common west of the Cascade Range in Oregon and Washington.

TRIFOLIUM INCARNATUM L. Escape from cultivation in the vicinity of the University of Idaho Farm, Moscow, Latah County, *Brackney s.n.*, *Hobson s.n.*; Sandpoint Substation, Agriculture Experiment Station, Sandpoint, Bonner County, *Christ 2077*.

VICIA SATIVA L. Roadside, at edge of thicket, 3 miles south of Tensed, Kootenai County, *Baker 15933*. This is the common cultivated vetch which has escaped in several localities and is quite common and well established along roadsides and waste places in northern Idaho.

VICIA TETRASPERMA (L.) Moench. In paddock on hummocks, south of Lowell, 0.5 mile south of Fenn Ranger Station, Idaho County, *Christ 15125*; roadside, edge of woods, 3 miles south

of Tensed, Kootenai County, *Baker 15935*. Introduced from Europe. Apparently becoming established in several areas in the northern part of the state.

DATURA METELOIDES A. DC. Near Meridian, Ada County, T3N, R1E, S7, *Higgins s.n.* New record for Idaho. Introduced from the southwest. Widely distributed from California, southwestern Colorado, Utah, Nevada, Arizona, New Mexico, and Texas to Mexico and northern South America.

DASYNOTUS DAUBENMIREI Jtn. Along the Three Links Trail on Big Fog Mountain, southwest slope, Nez Perce Forest, Idaho County, *Baker 14561*. This is a new locality for a seldom-collected plant. Type was collected by Daubenmire, *No. 46289*, near Walde Mountain lookout north of Lowell, Idaho County, in the Lochsa River drainage. Our collection was made from the Selway Crags, north of the falls of the Selway River.

PLAGIOBOTHRYS SCOPULORUM (Greene) Jtn. Grassy flat, edge of McCall, Valley County, *Baker 10281*. Mainly a Rocky Mountain species, found from Alberta to Nebraska, Colorado, Utah, Nevada, and Washington. Identified by Ivan M. Johnston.

IMPATIENS BIFLORA Walt. Swampy ground, 1 mile south of Nordman, Bonner County, *Baker 13741*. Davis (4) lists this as occurring in Idaho on the basis of a report in Rydberg (9). The author has seen plants along the Spokane River in Kootenai County which are probably this species.

CASTILLEJA CUSICKII Greene. This species is not listed in Davis (4). However, since it is so common it was probably left out inadvertently. Collections have been made by the author in Custer, Elmore, Idaho Valley, and Latah counties.

PENSTEMON CINEREUS Piper subsp. FOLIATUS Keck. Dry open rocky slopes near headwaters of Sawpit Creek, about 3 miles southwest of Silver City, Owyhee County, *Baker 7893*. Closely related to *P. humilis* Nutt.

VERONICA CHAMAEDRYS L. Common lawn weed, collected often in the early spring on the campus of the University of Idaho at Moscow. Along paths and in grassy areas, Coeur d'Alene, Kootenai County, *Christ 18220*.

KNAUTIA ARVENSIS (L.) Coult. Open cultivated field, Thomas B. Weeks property, Swan Valley, Bonneville County, T1N, R44E, S4, *Corn s.n.*; adventive in cultivated fields, near Arco, Butte County, *Burleson s.n.* It is becoming established in southeastern Idaho. Hitchcock et al. (5) lists it as "naturalized in

eastern United States, and becoming established in Montana and southern British Columbia."

CHRYSANTHEMUM BALSAMITA L. Gravel bench, Chilco, Kootenai County, *Christ 2403*; waste ground, 5 miles southwest of Driggs, Teton County, T4N, R45E, S4, *Baker 9793*. Also escaped from cultivation in Latah County.

CHRYSANTHEMUM PARTHENIUM (L.) Bernh. Growing along Crumarine Creek, Moscow Mountain, .5 miles northeast of Moscow, Latah County, *Chichester 499, 521*; escape, Sandpoint, Bonner County, *Christ 1173*.

MATRICARIA MARITIMA L. var. AGRESTIS (Knaf) Wilmott. Along railroad tracks at stock yards, along Troy road, east of Moscow, Latah County, *Baker 5869*; Eagle, Ada County. O'Connell (7) has also collected this plant about 2 miles north of Moscow.

RATABIDA COLUMNIFERA (Nutt.) Woot. & Standley. Sandy soil, scattered for distances of 0.5 mile, 2 miles north of American Falls, Power County, *Christ 15030*; roadside, Deep Creek, 7 miles south of Bonners Ferry, Boundary County, *Baker 13860*; roadsides and railroad right-of-way about 5 miles northwest of Superior, Montana, *Cronquist 6739*. The writer has noted this species growing in Waterton Lakes National Park. It has a general distribution from Minnesota west to Montana and Idaho, south to Texas and Mexico. Davis (4) says, "Introduced in southeastern Idaho." It is believed by the writer that it is native to north Idaho having spread by natural means from adjacent areas where it occurs. There are many species with strong eastern American affinities found in northern Idaho.

RUDBECKIA HIRTA L. Sandy edge of road with cottonwood and alder, 3 miles north of Samuels, Bonner County, *Christ 18080*; common, in fields about Fenn Ranger Station, Selway River, Nez Perce National Forest, Idaho County, *Baker 14568*. It has been observed as common in fields and waste places in Idaho north of Sandpoint. Widely distributed from Nova Scotia to Florida west to Montana, Colorado, and Texas. Said to be introduced in the eastern part of its range.

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HIERACIUM REVISITED. In a discussion of various introduced weeds in Oregon (Leafl. West. Bot. 9:113, 114,—1960), I mentioned a yellow-flowered *Hieracium* which was spreading rapidly in the vicinity of Council Crest, Portland, Oregon. At that time, no name was given the plant, although it was suggested that it belonged to the *Euvulgate* species near *H. vulgatum* (Fr.) Almq. A second collection of the unidentified plant was made in August, 1961, and sent to Mr. P. D. Sell at the University of Cambridge, England, who replied that it is "a species widespread in Europe. It has long been known in many European countries as *H. Lachenalii* C. C. Gmel., but the original description does not fit this species, and we have as yet failed to trace the type specimen. We at present use the name *H. strumosum* (W. R. Linton) Ley (having seen the type) but believe that there are several earlier names by Jordan available for the species."

This determination confirms the sectional position of the species as suggested earlier, and will allow at least a provisional name to be given the specimens until the problems of nomenclature are solved by European hieraciarchs.—ROBERT ORNDUFF, Department of Botany, University of California, Berkeley.

A NEW VARIETY OF HACKELIA PATENS FROM OREGON

BY ARTHUR CRONQUIST
The New York Botanical Garden

Hackelia patens (Nutt.) Johnst. var. **semiglabra** Cronq. var. nov. A var. *patente* differt caulibus supra parce antrorso-strigosis, infra mediam glabris, fornicibus corollae tantum papillosis vel papilloso-puberulis.

Type: *Cronquist 8184,* rather sandy sagebrush slopes 11 miles southwest of Vale, along the road to Harper, Twp. 19 S., R. 43 E., S. 23, elevation 2500 feet, Malheur Co., Oregon, May 4, 1959. (Holotype at the New York Botanical Garden; 7 isotypes distributed to major herbaria.)

Paratype: *C. L. Hitchcock 20644,* sagebrush hills about 7 miles southwest of Vale, Malheur Co., Oregon, May 30, 1955. (New York Botanical Garden.)

In contrast to var. *semiglabra,* the var. *patens* has the stems evidently strigose throughout, retrorsely so below, antrorsely so above, and the fornices of the corolla are distinctly villous-puberulent. Except for some diminution in size at higher elevations, var. *patens* is relatively uniform throughout its range. It occurs primarily from the foothills and higher intermontane valleys to moderate elevations in the mountains, occasionally ascending to near timberline, from central Idaho and southwestern Montana to western Wyoming, central Utah, and northeastern and central Nevada. It is missing from the main body of the Snake River plains of Idaho, instead skirting the margins, where it is known as far west as Blaine Co. on the north and Cassia Co. on the south.

The var. *semiglabra* occurs just beyond the western margin of the Snake River plains, some 150 miles west of the nearest station for var. *patens,* and about 2000 feet lower than the lowest recorded elevation for that variety. Since the species is conspicuous and the intervening area is readily accessible, the apparent disjunction in range is probably real.

The technical characters which distinguish var. *semiglabra* from var. *patens* are of the same nature as some of those which mark species in this genus of weakly defined species, and the distinction in this instance appears to be absolute, with neither population intergradation nor morphological overlap. A case would therefore be made for treating the var. *semiglabra* as a distinct species. However, the aspect of the plant and all the other technical characters are so exactly like those of characteristic *H. patens* that I feel constrained to hold the taxonomic

distinction to the varietal level at this stage of our knowledge. In this connection it may be significant that Hitchcock distributed his plants of var. *semiglabra* as *H. patens,* without further comment, and that I likewise took my plants to be typical *H. patens* when I collected them. When the necessary cytological and genetic data become available, the status of var. *semiglabra* should be carefully re-evaluated.

HARDING GRASS IN CALIFORNIA

BY JOHN THOMAS HOWELL

The botanical name, *Phalaris tuberosa* L. var. *stenoptera* (Hackel) Hitchcock, that is currently in use for Harding grass or Toowoomba canary grass in most temperate regions of the world, has recently been shown to be incorrect. According to Dennis E. Anderson in his monographic study, "Taxonomy and distribution of the genus Phalaris," *P. aquatica* L. is the same as *P. tuberosa* L. and the publication of the first antedates the second by sixteen years. Not only does Dr. Anderson place *P. tuberosa* in synonymy under *P. aquatica* but he also places there *P. stenoptera* Hackel and *P. tuberosa* var. *stenoptera,* the names by which Harding grass has been designated, thus leaving without a particular botanical designation this important forage grass. Here in California where the grass has become an attractive and conspicuous feature in disturbed soils of valley lands and along roadways, there is also a definite floristic need for a botanical name. Since Harding grass is not the same as the Mediterranean *P. aquatica* nor the wide-ranging *P. arundinacea* L. (to both of which it is closely related), and since the origin of this impressive grass is uncertain (it may have originated through hybridization between those species at the Toowoomba Botanical Garden in Australia or elsewhere), botanical expediency indicates the use of the name Hackel originally gave it:

PHALARIS STENOPTERA Hackel, Fedde Repert. Spec. Nov. 5:333 (1908). *P. tuberosa* L. var. *stenoptera* (Hack.) Hitchc., Journ. Wash. Acad. Sci. 24: 292 (1934). *P. aquatica* in part, D. E. Anderson in Iowa State Journ. Sci. 36:43–51 (1961); Peñalosa in Wasmann Journ. Biol. 21:25 (1963).

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North Coast Ranges. Humboldt County: Redwood Highway 4 miles north of Loleta, *Howell 13721 in 1937* (determined by Agnes Chase who wrote that this was the first spontaneous occurrence known from the United

A NEW ERIOGONUM FROM THE SOUTH COAST RANGES, CALIFORNIA

BY JOHN THOMAS HOWELL
California Academy of Sciences

AND

ERNEST C. TWISSELMANN
Cholame, California

Eriogonum temblorense Howell & Twisselmann, spec. nov. Herba annua omnino arachnoideo-tomentosa (floribus exceptis), caulibus 1–8 dm. longis, basi erectis sed ramis late patentibus; foliis subbasilaribus paucis alternis non conferte rosulatis, ellipticis, usque ad 2.5 cm. longis et 1.5 cm. latis, obtusis vel raro subacutis, basi late cuneatis, petiolis usque ad 2 cm. longis, foliis caulinis plerumque bracteiformibus, 3, verticillatis; involucris turbinatis, 2(–2.5) mm. longis et usque ad 2 mm. latis, subtruncatis, primo pedunculatis (pedunculis usque ad 2 cm. longis erectis), serius sessilibus, lobis 5, brevissimis obtusis, interdum scariosis margine; bracteolis tenuibus, papillas divaricatas pinnate ferentibus, plerumque involucro longioribus; segmentis perianthii albis costa viridi, in senectute pallide rubescentibus, subsimilibus, 1.5 mm. longis ad anthesin, demum 2–2.5 mm. longis, laevibus extus, minute puberulis intus, tenuiter longitudinaliter cellulari-lineatis, margine integris saepe incurvis in senectute; staminibus 8, longitudine perianthii ad anthesin, filamentis pubescentibus basi, antheris oblongo-ellipticis, 0.3–0.5 mm. longis; stylis 0.75–1 mm. longis; achenio perianthio breviore, 2–2.75 mm. longo, paulum nitenti, rostro granulari sed haud papilloso.

Type: Herb. Calif. Acad. Sci. No. 391,440, collected from a large colony growing in semibarren white shale soil, Chico Martinez Canyon, Temblor Range, elevation 1400 feet, Kern County, Oct. 14, 1954, by Ernest C. Twisselmann, *No. 1619*. Other collections made in Chico Martinez Canyon at the type station, all by E. C. Twisselmann, are: *No. 1508*, Aug. 11, 1954; seedlings, *No. 1848*, Apr. 14, 1955; plants just beginning to bloom, *No. 2085*, June 5, 1955.

Other collections: on ridgetop in barren white shale, Shale Hills, 7 miles west of Blackwells Corner, elevation 1150 feet, Kern County, Aug. 1, 1955, *T. Franklin Twisselmann*; west side of Cottonwood Pass on steep bank of crumbling shale, San Luis Obispo County, Nov. 2, 1946, *Hoover 6547*; in broken brown shale, Cottonwood Pass, 6 miles east of Cholame, elevation 1850 feet, San Luis Obispo County, Sept. 10, 1954, *E. C. Twisselmann 1569*; in sunny dry sandy place by side of Indian Valley Road northeast of Bradley, Monterey County, July 13, 1963, *B. F. Howitt 1697*.

The slopes of Miocene white shale in lower Chico Martinez Canyon and in Shale Hills on the west side of the arid upper San Joaquin Valley are among the driest places in the Temblor Range. Only in rare years of exceptional rainfall is there plant growth sufficient to cover these usually barren slopes. Yet, in

most years, *Eriogonum temblorense* succeeds in limited areas at both places. It is largely restricted to swales or saddles where erosion has deposited some decomposed shale, and which offer a degree of protection from drying winds.

Chico Martinez Canyon is moderately steep, and plant associations change rapidly along its three-mile length from the salt bush association (*Atriplex polycarpa*) at its mouth on the Belridge Plain to the well-developed California juniper association at its head, about 1.5 miles southwest of Carneros Rocks. The Temblor buckwheat grows in the lower part of the canyon, only a few hundred yards below the lower limits of the subshrub association of *Eriogonum fasciculatum* var. *polifolium, Gutierrezia bracteata, Haplopappus acradenius* var. *bracteosus,* and the typical Upper Sonoran annuals that are their associates. The bleak slopes below this subshrub association are often almost devoid of plant growth. In the favorable places where the buckwheat grows, there are no perennials and the annuals are the usually short-lived vernal plants such as *Phacelia distans, Schismus arabicus, Amsinckia vernicosa* (which, like the Temblor buckwheat, has a marked preference for white shales), *Linanthus liniflorus* subsp. *pharnaceoides, Bromus rubens, Erodium cicutarium,* and *Festuca pacifica* var. *simulans.* In all but the wettest of years, none of these is abundant, and the remarkably xerophytic qualities of the Temblor buckwheat enable it to dominate the scene in these small areas after the ephemeral winter annuals have exhausted the normal soil moisture and have dried. During its active growing period, both the heat and the aridity of the white shale slopes are intense: the mechanics of the plants' ability to grow and mature under such conditions merit investigation by a plant physiologist.

The situation is much the same at Shale Hills, a series of low rounded ridges between Bitterwater Valley and Packwood Canyon, about 11 miles north of Chico Martinez Canyon. In this slightly less arid region, an annual form of *Eschscholzia californica* is a colorful addition to the buckwheat's annual associates, and there are scattered shrubs of *Isomeris arborea* var. *globosa,* and, even in the driest of years, such as 1963, when the Temblor buckwheat failed to mature, healthy plants of *Stephanomeria pauciflora* are common. The numerous dead plants of *Eriogonum fasciculatum* var. *polifolium* on the near-

by hillsides are evidence of the severe drouths of the last two decades.

From the Temblor Range occurrence, it might appear that *Eriogonum temblorense* is a plant adapted only to extremely arid conditions. However, on Cottonwood Pass near Cholame, the hillsides have a good cover of *Eriogonum fasciculatum* var. *foliolosum*, *Lupinus albifrons*, and *Haplopappus linearifolius*, with the rich growth of the annuals commonly associated with these subshrubs. Here the thin scattered colonies of *E. temblorense* are largely restricted to outcrops, fractured banks, or gravel slides of barren brown shale, where it is often associated with *E. indictum*. The plant fails to grow on slopes with even a thin cover of soil over the shale; in normal years this soil supports a good growth of the widespread annuals of the region. This suggests that there may be two principal factors that determine the Temblor buckwheat's limited and local distribution. First, it has a tolerance for extreme aridity and for the edaphic peculiarities of white and brown shale, particularly the Miocene white shales along the west side of the upper San Joaquin Valley. Secondly, in common with many plants of localized distribution in the region that tolerate unusual edaphic situations, it is unable to compete with the aggressive annuals in places with good soil. If *E. temblorense* is typical of these plants of restricted distribution, and the somewhat anomalous collection from sandy soil in Indian Valley in Monterey County suggests it may be, its restriction is probably more the result of its inability to compete successfully under normal soil and moisture conditions than the obligate need for any specialized qualities of the white and brown shales.

Eriogonum temblorense is a member of a small group of three annuals found in the Inner South Coast Ranges of California in which some of the involucres are pedunculate (generally produced in the earlier part of the season) and others are sessile and spicately arranged along the upper branchlets. In this group, *E. temblorense* is most closely related to *E. vestitum* Howell and is the plant listed as *E. vestitum vel aff.* by the junior author in his Flora of the Temblor Range and neighboring part of the San Joaquin Valley (Wasmann Journ. Biol. 14: 221,–1956). In turn, this species pair is related to *E. Eastwoodianum* Howell. The differences between these three species are noted in the following key:

A. Foliage leaves chiefly basal, the blades roundish; outer surface of the perianth smooth; stamens about half as long as the perianth; styles very short, 0.1–0.25 mm. long. Southwest of Coalinga in southwestern Fresno County and adjacent eastern Monterey County..... *E. Eastwoodianum*

A. Foliage leaves basal or cauline, the blades oblong to elliptic; outer surface of the perianth smooth or papillose; stamens about as long as the perianth; styles elongate and slender, 0.75–1 mm. long.....B

B. Foliage leaves mostly cauline and axillary; involucres usually with fewer flowers and with bractlets generally included; perianth usually conspicuously papillose, not striate-lineate; anthers roundish, about 0.2 mm. in diameter; beak of achene papillose-roughened. South of Los Banos in southwestern Merced County, northwestern Fresno County, and adjacent San Benito County..... *E. vestitum*

B. Foliage leaves mostly basal or subbasal, rarely axillary; involucres with more numerous flowers and with bractlets generally exserted; perianth nearly smooth with the cells longitudinally striate-lineate, the surface not at all papillose but sometimes a little alveolate towards the base; anthers oblongish, 0.3–0.5 mm. long; beak of achene granular, not distinctly papillose. East of the southern part of the Salinas Valley in southeastern Monterey County, northeastern San Luis Obispo County, and western Kern County..... *E. temblorense*

A NEW CALIFORNIA NEMACLADUS

BY JOHN THOMAS HOWELL

Nemacladus Twisselmannii J. T. Howell, spec. nov. Herba annua parva rosulato-compacta, 0.5–1 cm. alta, usque ad 1.5 cm. diametro, griseo-hirsutula, caulibus simplicibus vel breviter pauci-ramosis prope basim; foliis integris, basalaribus 2 vel 3, spatulatis, 2–3 mm. longis, foliis caulinis oblongis, acutis, 3 mm. longis et 1 mm. latis, vel foliis bractealibus et minoribus; pedicellis crassis brevibus (quam folia et bracteae brevioribus); floribus ad anthesin 2–3 mm. longis, post anthesin accrescentibus et usque ad 4–5 mm.; calycibus hirsutulis, lobis paulum inaequalibus, anguste deltoideis, subacutis, tubo et lobis aequilongis, tubo turbinato primo, hemisphaerico in senectute; corollis et calycibus subaequilongis vel corollis paulum brevioribus, corollis albescentibus, 2–3 mm. longis, tubo circa 1 mm. longo, lobis hirsutulis; antheris ellipticis, 0.25–0.33 mm. longis, filamentorum appendicibus minutis; ovarii glandulis obsoletis; capsula circa ⅓–superiore, acuta, glabra; seminibus 12, ferrugineis, ellipicis vel ellipico-oblongis, 0.7–0.8 mm. longis, longitudinaliter subsinuate circa 8-sulcatis, costis latis, rotundis, tenuissime transverse circa 30-lineatis.

Type: Herb. Calif. Acad. Sci. No. 440,756, collected in the southern Sierra Nevada in Kern County, California, on the rim of the Kern Plateau southwest of Pine Flat at an elevation of 7350 ft., July 10, 1963, by Ernest

C. Twisselmann, *No. 8690*. In the only colony seen, the plants grew sparsely in coarse granitic sand along a ridgetop among widely scattered trees of *Pinus Jeffreyi*.

Nemacladus Twisselmannii with its accrescent calyx and inconspicuous corolla seems most closely related to *N. rigidus* Curran, but it is distinguished from that species and from all species in the genus by its compact rosulate habit that is reminiscent of *Parishella,* by the hirsutulous pubescence that extends even to the outside of the corolla-lobes, and by the short stout pedicel that is usually exceeded by the subtending leaf or bract. Moreover, in all flowers examined, no glands were found, although these structures are usually conspicuous and have come to be regarded characteristic in the flowers of both *Nemacladus* and *Parishella*. The seeds of *N. Twisselmannii* closely resemble those of *N. glanduliferus* Jeps. in their shape and sculpturing, but in the former, the seeds are redder and larger and the transverse lines on the longitudinal ridges are much finer and more numerous.

It is a pleasure to name this distinctive accession to the lobeliads of California in honor of Mr. Ernest C. Twisselmann, who, through his explorations and botanical writings, is making better known the plants of our lands of little rain.

PLANT RECORDS IN KERN COUNTY, CALIFORNIA

BY ERNEST C. TWISSELMANN

Cholame, California

During the past eight years I have been assembling data in field, herbarium, and library for a flora of Kern County, California, and, since the publication of A Flora of California in 1959 by Munz and Keck, I have compiled a list of taxa for which this county is not included in the range notes given in that work. These records are of more than routine significance, especially to the plant geographer and ecologist, for Kern County, situated in arid central California and comprising an area of 8,172 square miles (almost exactly the size of the state of Massachusetts), is a natural area of merger and transition of several of the regional florulas of California. Here the flora of

the Sierra Nevada reaches its southern limits; that of the southern California mountains its northern limits; that of the inner Coast Ranges its southeastern limits; a large part of the endemic-rich flora of the Mojave Desert reaches its western and northwestern limits; and the distinctive flora of the arid upper San Joaquin Valley reaches its southern limit in the central part of the county. In such a critical region, even a slight range extension, such as from southern Tulare County to northern Kern County, may be significant.

In addition to range extensions, taxa that have been described and weeds that made their first California appearance since the publication of the Munz and Keck flora that occur in Kern County are also included. The nomenclature and taxanomic treatment have usually followed that work for consistency and convenience, although this procedure does not always reflect my own judgment.

All collections cited, unless otherwise noted, are deposited in the herbarium of the California Academy of Sciences. The abbreviations, *H* for J. T. Howell and *T* for E. C. Twisselmann, are used in citations in order to save space.

I am grateful to Mr. John Thomas Howell for his critical review of these collections and for lending me his extensive collections made in the Greenhorn Range in 1962. Dr. Rimo Bacigalupi and Mrs. Charlotte Nash Smith have been of great help in making available the determinations and collection data for Mrs. Smith's Greenhorn Range collections deposited in the Jepson Herbarium of the University of California. Mr. Clifton F. Smith has supplied information on pertinent collections deposited in the Santa Barbara Museum of Natural History and the Santa Barbara Botanic Garden and has generously shared his keen knowledge of the plants of the Mt. Pinos region. Mr. Dennis Breedlove kindly allowed me to examine his Kern County collections made in 1962 and made available the records of those made in 1963. Finally, I am indebted to Mrs. Hazel A. Record and to Mr. Donald J. Bedell for making collections specifically for use in this project.

SELAGINELLA ASPRELLA Max. Common around metamorphic outcrops, digger pine association, Kern River Canyon north of Kernville: 3 miles north of Kernville, *H38648*; rocky point at the south limits of River Kern, *T8460*; 7 miles above old Kernville, 2770 feet elevation, *H5031*.

EQUISETUM × FERRISSII Clute. Occasional to common along Kern River

from Kernville to northeast of Bakersfield: Kern River bed near Kernville, *H38898*; Kern River Canyon, 1400 feet elevation, *H38686*; Kern River at Hart Park, *T6626*.

AGROPYRON ELONGATUM (Host) Beauv. Occasionally spontaneous, wet places, San Joaquin Valley; sparingly established on brush burns, Greenhorn Range: Lerdo Highway, 3.2 miles east of Spicer City Gin, *T5462*; University Test Plot, 2.5 miles west of Lost Hills, *T4875*; Black Mountain burn, Greenhorn Range, *H38266*. *See* Leafl. West. Bot. 9:143 (1961).

AGROPYRON INTERMEDIUM (Host) Beauv. Seeded, 1961, Black Mountain burn, Greenhorn Range, doubtfully established: Black Mountain burn, *H38227*; southwest slope of Black Mountain, 5300 elevation, *T8755*.

AGROPYRON TRICHOPHORUM (Link) Richt. Seeded and probably locally established on brush burns, Greenhorn Range: Black Mountain burn, *H38225*; southwest slope of Black Mountain, elevation 5300 feet, *T8756*; Hill 3206 on the Henry Bowan Ranch near Glennville, *T4473*. *See* Leafl. West. Bot. 9:143 (1961).

ERIOCHLOA GRACILIS (Fourn.) Hitchc. Common in vineyards, MacFarland and Delano regions; scarce on canal banks, Weedpatch to Greeley: Garces Road, just west of Jasmin, *T8952*; Cecil Road, 7.2 miles east of Delano, *T8965*; Driver Road, 1.7 mile north of Peterson Road, Macfarland region, *T5568*; Stockdale Highway at the Hiller Ranch, Greeley region, *T4895*; Cottonwood Road, 0.7 mile south of Di Giorgio Road, Weedpatch region, *T5449*. *See* Leafl. West. Bot. 9:143 (1961).

FESTUCA EASTWOODAE Piper. Upper Sonoran grassland: Temblor Grade, 10.9 miles west of McKittrick, *T619*, *T2015*, *T2015B*; summit of Orchard Peak (Antelope Mountain), *T2725*.

FESTUCA OCCIDENTALIS Hook. Greenhorn Range, 1.5 mile southeast of the summit, *H38329*, *T8644*.

HELEOCHLOA SCHOENOIDES (L.) Host. Rare, old Kern River channel in the dry bed of Lake Isabella in 1961, *T6488*.

LEPTOCHLOA VISCIDA (Scribn.) Beal. Canal bank weed, Kern Lake Ranch Road, 4.6 miles west of Highway U. S. 99, San Joaquin Valley, *T4765*. *See* Leafl. West. Bot. 9:142 (1961).

PHALARIS STENOPTERA Hack. Seeded on brush burns in the mountains; pasture escape at Indian Hills Ranch near Tehachapi; possibly locally established; Black Mountain burn, *H38224*; Greenhorn Pass Road, 2.9 miles west of Wofford, *T8467*.

POA BIGELOVII Vasey & Scribn. Red Rock Canyon, elevation 2400 feet, *M. N. Ackley 49*, 15 April 1928 (SBM). Apparently now extinct at this station.

POA BULBOSA L. Occasional, Douglas and Kellogg oak woodlands, Greenhorn Range; less common, southern Tehachapi Mountains: Greenhorn Road, 0.25 mile east of the Glennville fire station, *T6993*; Rattlesnake Road, about 5 miles southwest of the summit of Eugene Grade, *C. N. Smith 1087*; French Ranch, about 4 miles from the summit of Eugene Grade, *C. N. Smith 1117*; Dry Field Corrals, Tejon Ranch, *T6967*; the old hog ranch, Catskin Basin, Tehachapi Mountains, *T6208*.

POA LONGILIGULA Scribn. & Will. Chaparral to yellow pine forest, mountains south to Breckenridge Mountain: 1.5 mile south of Greenhorn Sum-

Club Road, 8.9 miles north of Semitropic School, *T2263*. *See* Leafl. West. Bot. 9:145 (1961).

WASHINGTONIA FILIFERA (Lindl.) Wendl. At least eight trees grow spontaneously just above the mouth of Kern Canyon, *T5962*. *See* Twisselmann, Leafl. West. Bot. 9:187, 188 (1961).

JUNCUS MACROPHYLLUS Cov. Scarce, wet places, yellow pine forest, Greenhorn Range: Black Mountain, *H38237, H38256*; Greenhorn Summit Road, 5.6 miles east of Wofford, *T7887*.

BRODIAEA LUTEA (Lindl.) Mort. var. ANALINA (Greene) Munz. Scarce, Jeffrey pine forest, Piute Mountains: Saddle Springs, *T3646, T7347*; Bright Star Mine Road, 0.3 mile north of Woolstaff Meadow, *T7353*.

ZIGADENUS EXALTATUS Eastw. Chaparral, mountains south to Breckenridge Mountain and the north end of Piute Mountain: peak above stone corral on Cedar Creek, Farnsworth Ranch, Greenhorn Range, *C. N. Smith 1084* (JEPS), *C. N. Smith 1099* (JEPS); Breckenridge Mountain Road, Breckenridge Mountain, 14.6 miles south of Kern Canyon Highway, *T4998*; northwest of Tunnel Spring, Breckenridge Mountain, *C. N. Smith 1017* (JEPS); southeast flank of Bald Eagle Peak, Piute Mountains, *T7355*; west side of Bald Eagle Peak, *T3613*.

IRIS PSEUDACORUS L. Sparingly established, New Rim Ditch near Highway U. S 99, Mettler region, *T8028*.

SISYRINCHIUM HALOPHILUM Greene. Scarce, mostly subalkaline meadows, Piute Mountains and the alkali flat below Kern Hot Springs: Weldon Meadow, *T7320*; French Meadow, *C. N. Smith 880* (JEPS), *T8928*; Kern Hot Springs, *T8458*.

SALIX GEYERIANA Anderss. var. ARGENTEA (Bebb) C. K. Schneid. Common along the fork of Cannell Creek on Pine Flat, Jeffrey and lodgepole pine association, Kern Plateau, *T8679, T8707*.

MORUS ALBA L. Well naturalized along Kern River near the Stockdale Country Club, San Joaquin Valley, *T4752, T5000*. *See* Leafl. West. Bot. 9:145 (1961).

HESPEROCNIDE TENELLA Torr. Uncommon but widespread in shady places, cismontane Upper Sonoran associations: Temblor Range, Alec Cook Rocks, *T1026;* Outlaw Rocks near Jim Cook Spring, Temblor Range, *T639*; Hart Flat, Tehachapi Mountains, *T8217*; creek 2 miles east of Woody on the Glennville Road, Greenhorn Range, *T6994*.

ERIOGONUM COVILLEANUM Eastw. Rare, fractured brown shale, Temblor Range: 2 miles south of Bitterwater Road, Cedar Canyon, *T1207*; 6 miles south of Bitterwater Road, *T1413*.

ERIOGONUM GRACILE Benth. var. CITHARAEFORME (Wats.) Munz. Apparently rare, Douglas oak woodland, Kern River Canyon near Bodfish, *H37398*.

ERIOGONUM INERME (Wats.) Jeps. var. HISPIDULUM Goodm. Occasional, mostly in disturbed soils, yellow pine forest, Greenhorn Range: forest clearing, south side of Black Mountain, *H38274*; south slope below Black Mountain Saddle, *T8604*; Wofford Highway, 1.5 mile east of Greenhorn Pass, *T8643*; Shirley Meadows, *T3934*.

ERIOGONUM MOLESTUM Wats. var. DAVIDSONII (Greene) Jeps. Occasional, mostly in Jeffrey pine forest, Mt. Pinos region: Mt. Abel Road, 4 miles from the summit, *T2189*; Frazier Park, *Hoffmann*, 25 May 1928 (SBM).

ERIOGONUM OCHROCEPHALUM Wats. var. BREEDLOVEI J. T. Howell. Endemic around metamorphic rock outcrops, crest of Piute Mountain: *Breedlove 3939* (type), *T7338, T8908.*

ERIOGONUM TEMBLORENSE Howell & Twisselmann. Rare and local, barren white shale slopes, Temblor Range: Chico Martinez Canyon, *T1619* (type), *T1508, T1848, T2085*; Shale Hills, 7 miles west of Blackwells Corner, *T. Franklin Twisselmann*, 1 August 1955.

POLYGONUM DOUGLASII Greene var. LATIFOLIUM (Engelm.) Greene. Scarce, wet meadows, yellow pine forest, Greenhorn Range: Shirley Meadows, *T3924.*

ATRIPLEX BREWERI Wats. Local at an alkaline spring, Bitterwater Canyon, 3.5 miles southwest of Maricopa, *T4125.*

CHENOPODIUM BERLANDIERI Moquin. Widespread summer weed, particularly of dry farm lands and waste places: summit of Greenhorn Pass, *H38826, H38827*; 6.5 miles east of Glennville, *H38936*; summit of Cooks Peak, *H38761*; Kern River at Enos Road, San Joaquin Valley, *T7979.* Our plants probably represent var. *Zschackei* (Murr) Murr.

AMARANTHUS PALMERI Wats. Common and widespread weed, especially in cotton fields in the San Joaquin Valley: Tupman Highway, 1 mile south of Buttonwillow, *T1602*; Adohr Road, 7.2 miles southeast of Buttonwillow, *T1501*; Kern Lake Ranch Road, 2.9 miles west of Highway U. S. 99, *T4767*; Highway U.S. 99, 1.5 mile south of Cawelo, *T8826*; Taft Highway, 0.6 mile east of Old River, *T7989*; Stockdale Highway at the Hiller Ranch, Greeley district, *T4897*; Garzoli Road, 0.5 mile north of Whistler Road, Macfarland district, *T5578*; Antelope Valley, west side San Joaquin Valley, 0.5 mile east of Iver Hansen Ranch, *T1558*; Temblor Ranch grounds, *T1475.*

GLINUS LOTOIDES L. Scarce, drying beds of canals and ponds, Buena Vista Lake basin, mostly along Buena Vista Slough: 1.5 mile north of Tupman, Buena Vista Slough, *T1586*; 2 miles north of Tupman, *T7942*; 3.6 miles west of Buttonwillow, *T4889.*

TRIANTHEMA PORTULACASTRUM L. Common weed, especially in cotton fields in alkaline soil in the San Joaquin Valley: Adobe Road, 4.5 miles south of Bear Mountain Boulevard, Weedpatch region, *T4903*; Lake Woolloomes near Delano, *T8956*; Magnolia Road at Garces Road, Pond region, *T8974*; Kern Island Road just south of the Kern Valley Packing Plant, Bakersfield district, *T4786*; Goose Lake Road, 0.5 mile south of Highway U. S. 466, Semitropic district, *T4882*; Antelope Valley, west side San Joaquin Valley, 10 miles west of Blackwells Corner, *T784. See* Leafl. West. Bot. 9:145 (1961).

LEWISIA REDIVIVA Pursh var. REDIVIVA. Uncommon, Douglas oak woodland, western foothills of the Greenhorn Range: Granite Station Road, 7.4 miles west of Glennville, *T7032*; about 2–3 miles east of Woody, *C. N. Smith 601* (JEPS).

MONTIA GYPSOPHILOIDES (F. & M.) Howell. Occasional in chaparral, central Temblor Range: Black Canyon, *T201*; summit of Associated Canyon, *T1981.*

MONTIA SPATHULATA (Dougl.) Howell var. SPATHULATA. Occasional, mostly in sandy rather barren soil in the shade, Upper Sonoran associations, Temblor Range: Packwood Canyon, *T1738*; summit of Ross Ridge, *T1061*; Messa Ridge, *T1963*; Black Canyon, *T203.*

MONTIA SPATHULATA var. VIRIDIS A. Davids. Small dense colony in moist

soil in heavy shade, yellow pine forest, Peel Creek on the west slope of Sunday Peak, Greenhorn Range, *T5219*.

ARENARIA MACRADENIA Wats. var. MACRADENIA. Rare, arid Jeffrey pine association, ridgetop southwest of Pine Flat, Kern Plateau, *T8662*.

ARENARIA MACRADENIA var. PARISHIORUM Rob. Scarce, canyon live oak and chaparral associations, rocky ridge at the summit of Tunis Canyon, Tehachapi Mountains, *T4600*.

ARENARIA PUSILLA Wats. East base of Greenhorn Range, *Hardham 3601*.

SILENE MONTANA Wats. ssp. BERNARDINA (Wats.) Hitchc. & Maguire. Scarce, summit of Mt. Pinos: Mt. Pinos, 0.5 mile east of the summit, *T6349*.

SILENE MONTANA var. SIERRAE Hitchc. & Maguire. Occasional, mostly borders of meadows, yellow pine forest, Greenhorn Range south to Evans Flat; east slope of Breckenridge Mountain: north slope of Black Mountain, *H38576*; Shirley Meadows, *H38469*; east border of Evans Flat, *T7895*; Breckenridge Mountain Road, 8.8 miles west of Havilah Road, *T3175*.

SPERGULARIA ATROSPERMA R. P. Rossb. Occasional, wet alkaline places, San Joaquin Valley; Red Rock Canyon, Mojave Desert: alkali sink, 9 miles north of Lost Hills, *T887*; Red Rock Canyon, about 0.25 mile above the freeway bridge, *T7094*.

STELLARIA SITCHANA Steud. var. BONGARDIANA (Fern.) Hult. Occasional to common, wet meadows, yellow pine forest, Greenhorn Range: near Tiger Flat, *H38792;* Shirley Meadows, *T4134*.

ACONITUM COLUMBIANUM Nutt. Local and becoming rare in wet places around Sunday Peak, yellow pine and red fir forests, Greenhorn Range: cienega on the east slope of Sunday Peak, *T6396*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 711* (JEPS).

DELPHINIUM PATENS Benth. ssp. MONTANUM (Munz) Ewan. Occasional, mostly in shade, Jeffrey pine forest, Mt. Pinos region: 1.8 mile east of the summit, Mt. Pinos, *T3779*; northwest flank of the summit, *T6310*.

RANUNCULUS CALIFORNICUS Benth. var. CALIFORNICUS. Local in moist playa clay around the spring on the mesa about 2 miles north of the mouth of Alamo Canyon, southeast slope of the Tehachapi Mountains, *T6948*.

ERODIUM TEXANUM Gray. Scarce, creosote bush association, mouth of Last Chance Canyon, El Paso Range, *T4441*.

ARGEMONE MUNITA Dur. & Hilg. var. MUNITA. Occasional, Upper Sonoran associations, Temblor Range south to Mt. Abel: Little Carneros Spring, *T1180*; McNaughton Ridge, *T218*; Agua Media Creek flood plain, *Bedell 74–1*; upper San Emigdio Canyon, 1.9 mile east of Mill Potrero, *T5287*.

DENDROMECON RIGIDA Benth. Scarce in chaparral, mountains from the Greenhorn Range southeast to the southeast end of Piute Mountain: ridge 0.25 mile southwest of the Greenhorn School, *C. N. Smith 1033* (JEPS); near the foot of Geringer Grade, Piute Mountains, *T3065, T7509*.

ESCHSCHOLZIA LOBBII Greene. Scarce in colonies in Douglas oak woodland, Woody region, west slope of the Greenhorn Range: Delano Road, 4.1 miles west of Woody, *T4242;* about 2 miles east of Woody, *C. N. Smith 257* (JEPS); 3.5 miles east of Woody, *C. N. Smith 1142*.

DICENTRA PAUCIFLORA Wats. Very rare, acc. Mrs. Smith (pers. comm.) rarely blooming, yellow pine forest, about 1 mile northeast of Evans Flat near the junction with the Wagy Flat fire road, Greenhorn Range, *C. N. Smith 654* (JEPS).

ARABIS PLATYSPERMA Gray. Common in decomposed granite and around granite outcrops, red fir forest, northeast slope of Sunday Peak, Greenhorn Range: trail to Sunday Peak, *T3862*; ridge northwest of Mountain Meadow, *T7750*.

ARABIS REPANDA Wats. Occasional, yellow pine forest, Greenhorn Range: near Tiger Flat, *H38812*; north slope of Black Mountain, *H38546*; 1.5 mile south of Greenhorn Summit, *H38436*; slope south of Cow Creek, *T8998*. Jepson Flora (2:62) cites Tehachapi and Mt. Pinos.

DRABA VERNA L. Near the shipping corrals, west slope of Breckenridge Mountain, about 3250 feet elevation, Douglas oak woodland, *C. N. Smith 1072* (JEPS).

ERYSIMUM PERENNE (Wats.) Abrams. Rare on rocky ridgetops, south end of Kern Plateau; not uncommon on metamorphic rocks, crest of Piute Mountain: ridgetop southwest of Pine Flat, Kern Plateau, *T8651*; crest of Piute Mountain, *Breedlove 3930, T8912*.

LEPIDIUM DENSIFLORUM Schrad. var. DENSIFLORUM. Common in disturbed places, yellow pine forest, Greenhorn Pass south to Shirley Meadows, rare weed in the Temblor Range: Greenhorn Pass, *T5213*; near Kern County Park Headquarters, *H38396*; Shirley Meadows, *T3915*; Temblor Ranch grounds, *T1345*.

LEPIDIUM NITIDUM Nutt. var. OREGANUM (Howell) C. L. Hitchc. Uncommon, winter-wet, often subalkaline soils, upper San Joaquin Valley: Goose Lake, *T1726B*.

SISYMBRIUM ORIENTALE L. Becoming common, roadsides and waste places, northern Temblor Range and the San Joaquin Valley; uncommon, eastside foothills: Choice Valley Road, 0.5 mile north of the Choice Valley School, Temblor Range, *T6272*; Highway U. S. 466, about 1 mile east of Jerry Slough, *T7005*; Highway U. S. 466, 3 miles east of Edison, *T8058*; Maricopa Flats, 5 miles east of Maricopa, *T8099*; Caliente Canyon across the creek from Caliente, *T8050*.

STREPTANTHUS CORDATUS Nutt. var. PIUTENSIS J. T. Howell. Endemic to the north end of Piute Mountain where it is occasional to common in clayey soils in Piute cypress, chaparral, and California juniper associations: north end of Piute Mountain, *Breedlove 3840* (type), *Bacigalupi 4536, Hardham 3641, Raven & Lewis 9348, T3621, T8893*.

PARVISEDUM CONGDONII (Eastw.) Clausen. Scarce around granite outcrops, oak woodland to yellow pine forest, west slope of the Greenhorn Range: granite outcrop on the south side of Poso Creek Narrows, *T8241*. Dr. Robert Clausen has kindly furnished the following collection data: Greenhorn Mountains, 3.2 kilometers northeast of Glennville, *Howard Maddox*, 23 May 1937 (POM); south slope of Greenhorn Peak, *Edwin J. Symmes*, 25 May 1932 (POM).

HEUCHERA RUBESCENS Torr. var. ALPICOLA Jeps. Occasional around rock outcrops at high elevations in the Piute Mountains: Lookout Point, *T7462*; Piute Lookout Road, 3.7 miles west of Claraville, *Breedlove 3977*, crest of Piute Mountain, *T8910*.

LITHOPHRAGMA SCABRELLUM (Greene) Greene var. PEIRSONII Jeps. Rare, Jeffrey pine forest, Piute Mountain, 0.5 mile south of Saddle Springs, *T7344*.

RIBES CALIFORNICUM H. & A. Scarce, Joe Messa Spring, Douglas oak association, Temblor Range, *T746, T1709.*

RIBES MALVACEUM Sm. Local and rare, Kellogg oak woodland, head of Palos Altos Canyon, southwestern Tehachapi Mountains, *T6966.*

CHAMAEBATIA FOLIOLOSA Benth. Common in open areas, yellow pine forest and Kellogg oak woodland, south to Cedar Creek, Greenhorn Range: Portuguese Pass Road, 1.3 mile north of Greenhorn Pass, *T3687*; south side of Black Mountain, *H38259*; Black Mountain Saddle, *T8570*; Greenhorn Pass-Glennville Road, 0.5 mile east of the National Forest boundary, *T8764.*

GEUM MACROPHYLLUM Willd. Local, Brown Meadow, Piute Mountains, *T3196, Breedlove 3981.*

PHOTINIA ARBUTIFOLIA (Ait.) Lindl. Acc. Donald J. Bedell (oral comm.), an isolated colony of several plants grows in the California juniper association in Don's Canyon, a fork of upper Cedar Canyon, Temblor Range, *Bedell 65–1, Bedell 74–4.*

POTENTILLA GLANDULOSA Lindl. ssp. HANSENII (Greene) Keck. Local, Brown Meadow, Piute Mountains, *T3194.*

POTENTILLA PURPURASCENS (Wats.) Greene. Occasional, meadows in yellow pine forests in the Piute Mountains and on Breckenridge Mountain: French Meadow, *T7487*; Grouse Meadow, *T3080*; Claraville Meadow, *C. N. Smith 895* (JEPS); Breckenridge Mountain at Barrel Spring, *T4717.*

POTENTILLA SAXOSA Lemmon ssp. SIERRAE Munz. Around rocks, digger pine association, 12 miles northeast of Weldon, *Hardham 2110.*

ROSA PINETORUM Heller. Moist usually shaded places, yellow pine forest, Greenhorn Range: Portuguese Pass Road, 4.1 miles north of Greenhorn Pass, *T3830*; Likely Mill Road, 0.4 mile east of White Sawmill, *T8553.*

RUBUS GLAUCIFOLIUS Kell. Rare, shaded slopes, Jeffrey pine forest, north end of Piute Mountains: near Saddle Springs, *C. N. Smith 858* (JEPS); 2 miles south of Saddle Springs on the Piute Mountain summit road, *T8905.*

ASTRAGALUS ASYMMETRICUS Sheld. Common, Upper Sonoran grassland and Douglas oak woodland, northern Temblor Range; rare and perhaps transient, central Temblor Range: Still Ranch, 1 miles east of Annette, *T1257*; Annette Hills, 0.25 mile south of Annette, *T8021*; Choice Valley, 1.75 mile north of the Choice Valley School, *T8383*; summit of Drake Ridge, *T8482.*

ASTRAGALUS GAMBELLIANUS Sheld. Small dense colony, ridge above Saucelito Corrals, oak woodland, Tehachapi Mountains, *T6247.* Jepson Flora (2:377) cites Rowan, Tehachapi Mountains.

CERCIS OCCIDENTALIS Torr. Colony of several plants on slope of granite blocks 2.4 miles east of Onyx, *T4499, T6890.*

LATHYRUS LAETIFLORUS Greene var. LAETIFLORUS. Rare, Black Bob Canyon, Douglas oak association at 3250 feet elevation, San Emigdio Range, *T8356.*

LOTUS SALSUGINOSUS Greene var. SALSUGINOSUS. Colonies scarce, north slopes in Upper Sonoran grassland, San Emigdio Range: Wheeler Ridge *T8075.*

LOTUS SALSUGINOSUS var. BREVIVEXILLUS Ottley. Scarce, canyons in El Paso Range; Last Chance Canyon, 2150 feet elevation, *T4360.*

LUPINUS POLYPHYLLUS Lindl. ssp. SUPERBUS (Heller) Munz. Common in wet places, yellow pine forest in mountains south to the Piute Mountains:

trail to Sunday Peak, Greenhorn Range, *T3855*; summit of Greenhorn Mountain, *Roy V. Parker*, 26 August 1958; Shirley Meadows, *H38468*; French Meadow, Piute Mountains, *T7483*.

TRIFOLIUM DEPAUPERATUM Desv. Common, moist subalkaline places, San Joaquin Valley; Temblor Range: alkali sink, 10 miles north of Lost Hills, *T1004*.

TRIBULUS CISTOIDES L. The only record for the western United States is from the Kern River Canyon, 7 miles below Hobo Hot Springs, Jesse D. Skoss, 7 May 1948. The plant, acc. Dr. Skoss (pers. comm.), was common on a rocky slope above Kern River, where it was obviously spontaneous. Efforts to rediscover it have failed, and it is doubtful that it has persisted. *See* D. M. Porter, Contrib. Gray Herb. 192:127.

LIMNANTHES MONTANA Jeps. Occasional in colonies, usually in moist swales, Douglas oak woodland, Greenhorn Range: Poso Creek, about 1.5 mile below the south end of Poso Flat, *Hazel A. Record*, 10 May 1962; high slope about 1 mile east of Poso Creek Narrows, *T8247*; French Ranch on Greenhorn Mountain, *C. N. Smith 1106* (JEPS); streamlet on Wagy Flat fire road, *Hardham 3667*.

HYPERICUM PERFORATUM L. Local, 1 mile south of Kernville on the road to Weldon, *H38927*.

VIOLA GLABELLA Nutt. Rare in moist, heavily shaded places, yellow pine forest, Greenhorn Range: Sandy Creek, west slope of Sunday Peak, *T5242*; Little Poso Creek below Pettitt Meadow, *T8542*.

VIOLA SHELTONII Torr. Scarce, shaded places in moist loam, yellow pine forest, Greenhorn Range: woods above Shirley Meadows, *H38408*; summit of Shirley Peak, *T8616*; north slope of Basket Peak, *T8551*.

EUCNIDE URENS (Gray) Parry. Occasional on rocky canyonsides, El Paso Range, Mojave Desert: Last Chance Canyon, elevation 2400 feet, *T4434*.

BOISDUVALIA GLABELLA (Nutt.) Walp. var. CAMPESTRIS (Jeps.) Jeps. Scarce, alkali sinks, San Joaquin Valley; Mt. Pinos region: 10 miles north of Lost Hills, San Joaquin Valley, *T1271*; vernal pond on road to Mt. Abel, *Pollard in 1952*.

BOISDUVALIA STRICTA (Gray) Greene. Occasional, wet places in Upper Sonoran associations, Greenhorn Range: Tillie Creek, east slope of the Greenhorn Range, *Hardham 3632*; vernal pool bed, 1 mile west of Glennville, *T8475B*; Cedar Creek, 0.25 mile below the mouth of Fulton Creek, *T8504*.

LUDWIGIA PALUSTRIS Ell. Scarce, old Kern River channel in the dry bed of Lake Isabella (1961); rare, Kern River Canyon: at the site of old Kernville, *T6376*; bed of Lake Isabella near the old Borel Canal Bridge, *T6503*; Kern River Canyon, elevation 1400 feet, *H38679*.

ANGELICA LINEARILOBA Gray var. CULBERTSONII Jeps. Occurs on Sunday Peak in the Greenhorn Range, on the southwest rim of Kern Plateau, and is rather common at high elevations in the Piute Mountains: summit of Sunday Peak, *T3863*, *T4641*, *H38845*, *C. N. Smith* 731 (JEPS); ridge southwest of Pine Flat, Kern Plateau, *T8687*; Piute Peak Road, 2.9 miles west of Claraville, Piute Mountains, *Breedlove 3974*; 0.7 mile south of Saddle Springs, *T8906*; Lookout Point, *T8925*. The variety is treated as a synonym by Munz

& Keck, but the broad sharply incised leaflets of var. *Culbertsonii* and its distinctive geographic range along the Kern River drainage from Little Kern River to Piute Mountain would certainly seem to justify varietal status for the plant. The problem is not presently critical, as Munz & Keck give Tulare County as the southern limits for *A. lineariloba* sens. lat.

CYMOPTERUS PANAMINTENSIS C. & R. Very local, creosote bush association, summit of Mesquite Canyon, El Paso Range, *T4407*.

ERYNGIUM SPINOSEPALUM Math. Occasional in low places, Upper Sonoran grassland through oak woodland, Greenhorn Range: low hills, 6 miles southwest of Woody, *H38959*; Granite Station Road, 8.3 miles west of Glennville, *T7034*; Famosa Road, 4.5 miles west of Woody, *T6053*; between the old Granite Schoolhouse and Adobe Canyon, *C. N. Smith 1096*.

LOMATIUM CARUIFOLIUM (H. & A.) C. & R. Rare, moist swales in Upper Sonoran grassland, Greenhorn foothills: Delano Road, 9.5 miles west of Woody, *T4245*.

CORNUS NUTTALLII Aud. Scarce in yellow pine forest, west slope of the Greenhorn Range south to Mill Creek near Basket Peak: Sandy Creek on the west slope of Sunday Peak, *T5230*; Spout Spring, 0.5 mile west of Greenhorn Pass, *T3823, T8471*.

GARRYA FLAVESCENS Wats. var. PALLIDA (Eastw.) Bacig. Occasional in shin oak brush and in chaparral, mountains south to the Tehachapi Mountains; common on the east slope of Breckenridge Mountain and the north end of Piute Mountain: southwest of Black Mountain Saddle, Greenhorn Range, *H38528*; Greenhorn Pass Road, 4.4 miles west of Wofford, *T6070*; Havilah Road, 6 miles east of Squirrel Meadow, Breckenridge Mountain, *T4688*; north end of Piute Mountain, *T3617*; slope just east of Bald Eagle Peak, *T5047*; ridge southwest of Cottonwood Creek, Tehachapi Mountains, *T8860*.

ARCTOSTAPHYLOS NEVADENSIS Gray. Red fir forest and upper levels of yellow pine forest, Greenhorn Range: Sunday Peak, *H38841*; trail to Sunday Peak, *T3861*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 730* (JEPS).

GENTIANA SIMPLEX Gray. Scarce, Shirley Meadows, Greenhorn Range: *T3914*.

GILIA JACENS A. & V. Grant. Uncommon, mostly gravelly soils, Upper Sonoran associations, southeastern Tehachapi Mountains northwest to the central Temblor Range: summit of Ybarra Canyon, Temblor Range, *T1937*. Acc. to Grant (Aliso 4:437), the type locality is the valley between Stauffer Junction and Mt. Pinos, near the Kern-Ventura county line.

GILIA TENUIFLORA Benth. ssp. TENUIFLORA. Common in colonies in the central Temblor Range, mostly in chaparral: Messa Ridge, *T1962, T1159*.

GILIA TENUIFLORA ssp. AMPLIFAUCALIS A. & V. Grant. Scarce in colonies in sandy soil, Upper Sonoran grassland, northern Temblor Range: Choice Valley, about 0.4 mile northwest of the Choice Valley School, *T6040*.

NAVARRETIA DIVARICATA (Torr.) Greene. Common in colonies in disturbed soils, mostly at the borders of meadows, yellow pine forest, Greenhorn Range: Shirley Meadows, *T3745, T3932*; 1.5 mile south of Greenhorn Summit, *H38421*.

NAVARRETIA MITRACARPA Greene. Scarce, mostly in heavy soils, central Temblor Range: Alec Cook Rocks, Cedar Canyon, *T1208*; upper Cedar Canyon, *T2234*.

in Jeffrey pine forest, Piute Mountains and Breckenridge Mountain: Saddle Springs, *Breedlove 3950*; Landers Meadow, *T7475*; ridge 0.2 mile east of Grouse Meadow, *T3056*; Piute Peak Road, 1 mile west of French Meadow, *T2488*; French Meadow, *C. N. Smith 876* (JEPS); Cottonwood Creek at the foot of Geringer Grade (digger pine association), *T7512*; Squirrel Meadow, Breckenridge Mountain, *T4693*. For an interesting discussion of the significance of the occurrence of this plant in the Piute Mountains, *see* Harlan Lewis, Britt. 12:93–97.

TRICHOSTEMA OBLONGUM Benth. Wagy Flat fire road, Greenhorn Range, *Hardham 2559*.

PHYSALIS WRIGHTII Gray. Scarce in moist soils, farmlands east of Buena Vista Lake, northwest to Buttonwillow; rare, cottonfields north of Wasco: Buena Vista Lake Road, 0.7 mile west of Millux Siding, *T4768*; Bagiano Ranch, 4 miles west of Buttonwillow, *T1499*; Blankenship Road just east of Poso Creek, Wasco district, *T8975*.

SOLANUM TRIFLORUM Nutt. Kellogg oak woodland, about 3 miles southwest of the head of Eugene Grade, Greenhorn Mountains, *C. N. Smith 1049* (JEPS).

CASTILLEJA BREWERI Fern. Rare, crest of Piute Mountain, *C. N. Smith 861* (JEPS).

CASTILLEJA DISTICHA Eastw. Scarce, yellow pine forest, Piute Mountain: crest of Piute Mountain, *T7335*; 2.9 miles northwest of Saddle Springs on the Bodfish Road, *T3633*.

CASTILLEJA PLAGIOTOMA Gray. Sagebrush flats at Landers Meadow, Piute Mountains, *T7451*.

COLLINSIA TINCTORIA Hartw. Uncommon, Douglas oak woodland and chaparral, mountains south to Breckenridge Mountain: Alta Sierra Road, 5.9 miles east of Glennville, *T3599*; Breckenridge Mountain Road, 5 miles west of Barrel Spring, *T4721*.

CORDYLANTHUS FERRISIANUS Penn. Common in yellow pine forest, less common in Douglas oak woodland and digger pine association, mountains south to Walker Basin: near Tiger Flat, Greenhorn Range, *T6424*, *H38855*; Wofford, Kern Valley, *H38694*; Kernville, *H38916*; Breckenridge Mountain Road, 8.8 miles west of Havilah Road, *T3173*; Walker Basin Road, 8.1 miles northeast of Caliente, *T2479*; Saddle Springs, Piute Mountains, *T8902*; French Meadow Road, 1.1 mile east of Piute Summit Road, *T8934*.

CORDYLANTHUS NEVINII Gray. Scarce, yellow pine forest, Mt. Pinos and Piute Mountains: Piute Mountain, *C. N. Smith 860* (JEPS).

HOWELLIELLA OVATA (Eastw.) Rothmaler. Rare, Temblor Range; also known from the western edge of the San Joaquin Valley from a single plant from the Agua Media Canyon flood plain: Cedar Canyon, 0.3 mile south of the canyon forks, Temblor Range, *T2232*; Agua Media Canyon flood plain, *Bedell 74–2*. *See* Twisselmann: The field occurrence of Howelliella, Leafl. West. Bot. 8:57, 58 (1956).

LINARIA DALMATICA (L.) Mill. Established and apparently spreading, pinyon association at the west end of Frazier Park, Mt. Pinos region: north town limits of Frazier Park, *T3787*.

LINDERNIA ANAGALLIDEA (MichX.) Penn. Occasional in wet places, Buena Vista Lake northeast to Rosedale, thence occasional along Kern River to

Kernville; rare, Poso Creek drainage below the yellow pine forest: Buena Vista Lake bed, *T2879*; Brimhall Road, Rosedale district, *T5418*; Kern River, elevation 1400 feet, *H38684*; at the site of old Kernville, *T6370*; at Borel Intake east of Wofford, *T6462*; Cedar Creek, just below the forks with Fulton Creek, Greenhorn Range, *T7709*; Poso Creek, 5.5 miles northwest of Famosa, *T8970*.

MIMULUS CONGDONII Rob. Scarce, Douglas oak woodland, Greenhorn foothills: 3 miles east of Woody, *C. N. Smith 259* (JEPS); west foot of Pine Mountain, *C. N. Smith 322* (JEPS).

MIMULUS DOUGLASII (Benth.) Gray. Scarce, Douglas oak woodland, Greenhorn foothills: Lynns Valley, *C. N. Smith 57* (JEPS); 2.5–3 miles east of Woody, *C. N. Smith 261* (JEPS).

MIMULUS PARISHII Greene. Rare, damp soil along Cottonwood Creek, digger pine association: southeast base of Piute Mountain, *T7513*; also known from Marques Spring, Kern Plateau, southeastern Tulare County, *T7866*.

MIMULUS PRIMULOIDES Benth. var. PRIMULOIDES. Common, wet meadows, yellow pine forest, northern Greenhorn Range; scarce, Piute Mountains: cienega, 0.9 mile north of Tiger Flat, *T6410*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 739* (JEPS); Saddle Spings, Piute Mountains, *T7346*.

MIMULUS WHITNEYI Gray. Occasional, dry open areas, yellow pine forest, Greenhorn Range south to Windy Gap: near Shirley Meadows, *H38405*; Windy Gap, *T3702*.

MOHAVEA BREVIFLORA Cov. Rare, steep talus of metamorphic rock, Last Chance Canyon, elevation 2150 feet, El Paso Range, *T4353*.

PENSTEMON CAESIUS Gray. Scarce, rocky slopes and ridges, yellow pine forest, Greenhorn Range south to Black Mountain; southern rim of Kern Plateau: trail to Sunday Peak, *T3857*; Sunday Peak, *H38839*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 734* (JEPS); north slope of Black Mountain, *H38581*; ridge southwest of Pine Flat, Kern Plateau, *T8678*.

PENSTEMON NEWBERRYI Gray. Scarce, rock outcrops, yellow pine forest, mountains south to Lookout Point, Piute Mountains: summit of Sunday Peak, Greenhorn Range, *T3867*, *H38847*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 736* (JEPS); 1 mile east of White Sawmill on Basket Peak, *C. N. Smith 557* (JEPS); northwest slope of Black Mountain, *H38555*; ridge southwest of Pine Flat, Kern Plateau, *T8652*; north end of Piute Mountain, *T7361*; Lookout Point, *T8919*.

SCROPHULARIA CALIFORNICA C. & S. var. DESERTORUM Munz. Digger pine association, Fay Creek at the Fay Ranch, about 5.5 miles north of Weldon, *C. N. Smith 952* (JEPS).

OROBANCHE CALIFORNICA C. & S. var. CORYMBOSA (Rydb.) Munz. Crest of Piute Mountain, *Breedlove 3942*, *T8907*, *C. N. Smith 864* (JEPS).

OROBANCHE GRAYANA G. Beck var. FEUDGEI Munz. Rare, mostly disturbed places in chaparral, Temblor Range: Garcia Rocks, *C. F. Twisselmann*, 23 May 1953; lower Messa Ridge, *Hardham 758*.

GALIUM ANGUSTIFOLIUM Nutt. var. ONYCENSE Dempster. Acc. Lauramay Dempster (oral comm.) found on arid rocky slopes bordering South Fork

Valley from Onyx to Walker Pass Station. The type locality is "hill above Onyx Ranch" (Britt. 10:189).

GALIUM BOLANDERI Gray. Common, Upper Sonoran woody associations, occasional to borders of yellow pine forests, mountains south through the Tehachapi Mountains: Cedar Creek, 0.25 mile below the mouth of Fulton Creek, Greenhorn Range, *T8503*; hills near Glennville, Greenhorn Range, *H5166, H5167*; Mill Creek crossing on the Basket Pass Road, *C. N. Smith 564* (JEPS); Black Mountain burn, *H38203*; just north of River Kern, Kern Canyon, *T8462*, Kern Canyon at elevation 2770 feet, *H5045*; near Democrat Springs, *Eastwood & Howell 9656*; Fay Canyon northeast of Weldon, *C. N. Smith 954* (JEPS); Erskine Creek, elevation 4050 feet, Piute Mountains, *T8424*; north end of Piute Mountain, *Breedlove 3877*; Keene Station, Tehachapi Mountains, *Heller in 1905*; 1.5 mile west of Tejon Pass, *T8872*; east side of Cottonwood Canyon, *T8864*.

GALIUM MATTHEWSII Gray. Local, on metamorphic rock at base of canyon walls, Short Canyon on the east slope of the Sierra Nevada north of Walker Pass, *T7124, T7125*; acc. Lauramay Dempster (Britt. 11:111), also occurs at Erskine Creek, Piute Mountains.

GALIUM NUTTALLII Gray var. TENUE Dempster. Rare, Douglas oak woodland, west slope of the Greenhorn Range: Poso Mine, *C. N. Smith 608* (JEPS).

SYMPHORICARPOS ACUTUS (Gray) Dieck. Occasional, north slopes, yellow pine forest, Greenhorn Range; Breckenridge Mountain: summit of Cooks Peak, *H38784*; near Shirley Meadows, *H38462*; Breckenridge Mountain Road, 0.4 mile east of Barrel Spring, *T4726*.

SYMPHORICARPOS PARISHII Rydb. Occasional, mostly yellow pine forests but common in oak woodland in the southern Tehachapi Mountains; Piute Mountains southeast to the Mt. Pinos region: north end of Piute Mountain, *T7365, T8900*; crest of Piute Mountain, *Breedlove 3934*; Piute Peak, just below the summit, *T3048*; meadow near the summit of the southwest end of Catskin Basin, Tehachapi Mountains, *T4555*; Winters Ridge, Tehachapi Mountains, *T7378*; Mt. Pinos Road, elevation 7600 feet, *T3159*.

DOWNINGIA BELLA Hoover. Abundant in a small vernal pool, Mt. Abel Road, Ventura County, 0.1 mile south of the Kern County line, where it is frequently collected and often labelled as from Kern County, *T2222*, Blakley *5266* (SBBG), *Chandler 818, Pollard in 1952*.

GITHOPSIS SPECULARIOIDES Nutt. Scarce, dry slopes, Doulas oak woodland and chaparral, west slope of the Greenhorn Range: Howling Gulch, 1.25 mile southeast of Woody, *C. N. Smith 338* (JEPS); about 0.75 mile west of the summit of Eugene Grade, *C. N. Smith 522* (JEPS).

NEMACLADUS TWISSELMANNII J. T. Howell. Known only from a small colony of a few plants in coarse granitic sand along the rim of the Kern Plateau southwest of Pine Flat, *T8690* (type).

AGOSERIS GLAUCA (Pursh) Greene var. DASYCEPHALA (T. & G.) Jeps. Rare, sagebrush association, Woolstaff Meadow, Piute Mountains, *T7302*.

ASTER EATONII (Gray) Howell. French Meadow, Piute Mountains, *C. N. Smith 873* (JEPS), *T8931*.

ASTER PAUCIFLORUS Nutt. Subalkaline flats below Isabella, where it is especially common around Scovern Hot Springs: Isabella subalkaline flats, *H38352, T7873*; Scovern Hot Springs, *T8450, T8892*.

BACCHARIS SERGILOIDES Gray. Rare, Joshua tree association, Grapevine Canyon on the east slope of the Sierra Nevada north of Walker Pass, *T7119*.

BIDENS CERNUA L. Rare but persistent weed, canal bank along Cottonwood Road at Di Giorgio Road, Greenfield region, *T4900*.

BIDENS FRONDOSA L. Occasional in wet places in Kern Valley, especially along Kern River; local at Hart Park northeast of Bakersfield: just east of Kernville Cemetery, along Kern River, *T6475*; near Kernville, *H38926*; Weldon Road 1 mile south of Kernville, *T9015*.

BRICKELLIA MULTIFLORA Kell. Rare, creosote bush association, White Rock fork of Jawbone Canyon, extreme southern Sierra Nevada, *T6658*.

CALYCADENIA SPICATA (Greene) Greene. Extensive colonies grow in the Douglas oak woodland in the high hills at the head of Lumreau Creek, Greenhorn Range, *T7715*.

CALYCADENIA VILLOSA DC. forma ALBIFLORA Keck. Locally abundant, low ridge between Brites Valley and Tehachapi Valley, *T3994*.

CARTHAMUS TINCTORIUS L. Often spontaneous, San Joaquin Valley; rarely so in the Temblor Range; probably established in the alkali sinks along Adobe Road southwest of Arvin: Adobe Road, 2 miles south of Bear Mountain Boulevard, *T7411*; Highway U.S. 99, 1.5 mile south of Cawelo, *T8825*; Temblor Canyon near the Temblor Ranch Headquarters, *T616*.

CHRYSOPSIS BREWERI Gray. Scarce, red fir forest, Sunday Peak, Greenhorn Range: trail to Sunday Peak, *T3956*; north slope of Sunday Peak, *T4643*; summit ridge of Sunday Peak, *H38846*.

CHRYSOPSIS OREGONA (Nutt.) Gray var. SCABERRIMA Gray. Greenhorn Mountains, 3.5 miles southwest of the summit of Eugene Grade, Kellogg oak woodland, *C. N. Smith 1136* (JEPS). Acc. Mrs. Smith (pers. comm.), it also occurs at the foot of Rattlesnake Grade and at the north end of Lynns Valley.

CHRYSOTHAMNUS PARRYI (Gray) Greene ssp. VULCANICUS (Greene) Jeps. Common, yellow pine forest, especially on sagebrush flats, mountains southwest to the Piute Mountains: near Tiger Flat, Greenhorn Range, *H38861*; Cooks Peak, Greenhorn Range, *H38785*; 2 miles east of Kern County Park, *H38720*; Claraville Road, 9 miles southeast of the Havilah-Bodfish Road, Piute Mountains, *T2474*; Woolstaff Meadow, *T3189*.

CHRYSOTHAMNUS VISCIDIFLORUS (Hook.) Nutt. ssp. VISCIDIFLORUS. Occasioual, chaparral and shin oak brush, north end of Piute Mountain; rare and perhaps adventive, east slope of the Greenhorn Range: east flank of Bald Eagle Peak, Piute Mountains, *T8894*; Wofford Highway, elevation 3500 feet, south side of Black Mountain, Greenhorn Range, *H38836*. In our region, the distinctions between the typical subspecies and ssp. *pumilus* become indistinct and determinations often must be made arbitrarily.

CHRYSOTHAMNUS VISCIDIFLORUS ssp. PUMILUS (Nutt.) Hall & Clem. Locally common, summits of Piute Mountain, Mt. Pinos, Sawmill Mountain, and Mt. Abel: crest of Piute Mountain, *T8909*; Lookout Point, Piute Mountains, *T8917*; summit of Mt. Pinos, *T3157*; summit of Mt. Abel, *T2354*.

CIRSIUM ANDERSONII (Gray) Petr. Scarce, yellow pine forest, mountains south through the Piute Mountains: summit of Cooks Peak, *H38513*, *T7892*; Piute Lookout Road, elevation 7900 feet, *Breedlove 3976*.

CIRSIUM CRASSICAULE (Greene) Jeps. Uncommon, Buena Vista Slough and

Jerry Slough in the Carmel Ranch region east of Lost Hills: Jerry Slough, 1 mile north of Goose Lake, *T1593*; Buena Vista Slough, 7 miles southeast of Lost Hills, *T1278*.

CIRSIUM CYMOSUM (Greene) J. T. Howell. Scarce in oak woodland, low hills at the mouth of Water Canyon, Tehachapi Mountains, *T7251*.

CROCIDIUM MULTICAULE Hook. Known from 1.5 mile southeast of Poso Mine (Bill Fritz Canyon), *C. N. Smith 591* (JEPS).

CROCKERIA CHRYSANTHA Greene. Occasional in wet years in dense colonies around the alkali pools northwest of Pond, San Joaquin Valley: Garces Road, 2 miles west of the Corcoran Highway, *T4148*.

DIMORPHOTHECA SINUATA DC. Commonly spontaneous in and about Shafter, questionably established: Lerdo Road, just east of Shafter, *T4257*. *See* Leafl. West. Bot. 9:52.

ECLIPTA ALBA (L.) Hassk. Occasional but becoming common, wet soil in rice fields, canal banks, and cultivated ground, San Joaquin Valley: Tupman Highway, 0.25 mile south of Adohr Road, Buttonwillow region, *T6579*; Taft Highway, 0.25 mile west of Tupman Highway, *T4878*; Canal at Stockdale and Renfro roads, Greeley region, *T4892*; Lake Woolloomes, Delano region, *T8953*; Poso Creek, 5.5 miles northwest of Famosa, *T8969*. *See* Leafl. West. Bot. 9:146 (1961).

ERIGERON FOLIOSUS Nutt. var. HARTWEGII (Greene) Jeps. Scarce, yellow pine forest, higher elevations around Tejon Pass: head of Catskin Creek, *T4563*.

EVAX CAULESCENS (Benth.) Gray var. HUMILIS (Greene) Jeps. Douglas oak woodland, Poso Mine, Greenhorn Range, *C. N. Smith 310* (JEPS).

GNAPHALIUM BENEOLENS A. Davids. Occasional, mostly in chaparral and digger pine association, ascending to yellow pine forest, Greenhorn Range: Kern River, 3 miles north of Kernville, *H38882*; Weldon Road 1 mile south of Kernville, *T9012*; 1.5 mile south of Greenhorn Summit, *H38769*; 2 miles east of Kern County Mountain Park, *H38726*; head of Lumreau Creek, *T7731*.

GNAPHALIUM CALIFORNICUM DC. Scarce, digger pine association, Kern Canyon: at the mouth of Cow Flat Creek, *T8408*; at about 1750 feet elevation in Kern Canyon, *H38174*.

GNAPHALIUM LUTEO-ALBUM L. Common, moist soils below and occasionally to the yellow pine forests, often locally abundant in the San Joaquin Valley, reaching to the edge of the Mojave Desert: Olive Road, 1.3 mile west of Highway U. S. 99, Bakersfield region, *T5424*; Bakersfield, *Roy V. Parker*, 30 June 1959; Kern River near Enos Road, *T2870*; Tehachapi Road, 0.9 mile west of Oak Creek Pass, Tehachapi Mountains, *T3972*; El Paso Creek, elevation 2600 feet, Tehachapi Mountains, *T4568*; Kelso Creek, 7.8 miles south of Weldon, *T2701*; Kern River, 3.4 miles south of Kernville, *T6364*; Kernville, *Howell*, 21 May 1962; 2 miles east of Kern County Mountain Park, Greenhorn Range, *H38725*.

HAPLOPAPPUS ARBORESCENS (Gray) Hall. Scarce, chaparral, east slope of the Greenhorn Range; north end of Piute Mountain: 4.5 miles east of Wofford, Greenhorn Range, *H38712*; north end of Piute Mountain, about 2 miles above Bodfish Gap, *C. N. Smith 850* (JEPS); east flank of Bald Eagle Peak, *T8897*.

HAPLOPAPPUS PALMERI Gray ssp. PACHYLEPIS Hall. Very rare, sandy flat in California juniper-pinyon association, Salt Canyon, elevation 3375 feet, San Emigdio Range, *T8346*.

HAPLOPAPPUS WHITNEYI Gray. Occasional, rocky ridges, yellow pine forest, Greenhorn Range; southern rim of the Kern Plateau; north end of Piute Mountain: point above Tiger Flat, *T7742*; near Tiger Flat, *H38811*, *H38838*; Greenhorn Summit Road, 0.3 mile north of Tiger Flat, *T6404*; ridge southwest of Pine Flat, Kern Plateau, *T8680*; near Saddle Springs, Piute Mountains, *C. N. Smith 852* (JEPS); north end of Piute Mountain, 7.7 miles above Bodfish Gap, *T8899*.

HELENIUM BIGELOVII Gray. Occasional, moist places, red fir and yellow pine forests, mountains south to Mt. Pinos: trail to Sunday Peak, *T3858*; cienega on the east slope of Sunday Peak, *T6395, T7757*; near Tiger Flat, *H38797*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 724* (JEPS); cienega at the head of Tejon Creek, Tehachapi Mountains, *T8835*; near Iris Point, Mt. Pinos, *T3152*.

HEMIZONIA FITCHII Gray. Known from a recurring roadside colony 0.7 mile west of Granite Station, Greenhorn foothills, *T4042*.

HOLOCARPHA OBCONICA (Clausen & Keck) Keck. Common in wet years in Lower Sonoran grassland in the low foothills on the east side of the San Joaquin Valley south to the mesas east of Bakersfield: Famosa Road, Poso Hills, about 2.5 miles west of Poso Oil Field, *T7430*; open rolling hills, 5 miles east of Bakersfield, *H37098*, *H38137*.

PERITYLE EMORYI Torr. Local and scarce on rocky canyon walls, Last Chance Canyon, El Paso Range, elevation 2150 feet, *T4362*.

PLUCHEA SERICEA (Nutt.) Cov. Local, Kern River northeast of Bakersfield; Grapevine Canyon, Sierra Nevada north of Walker Pass: Joshua tree association, Grapevine Canyon, *T6528*; east side of Kern River at Hart Park, *T4216*; Kern River flood plain, 5.8 miles west of Hart Park, *T6510*.

SENECIO CLARKIANUS Gray. Wet places, yellow pine and red fir forests, northern Greenhorn Range: creek below Mountain Meadow, east slope of Sunday Peak, *T7760*; canyon, 0.9 mile above Tiger Flat, *T6405*; near Tiger Flat, *H38800*.

SENECIO DOUGLASII DC. var. TULARENSIS Munz. Common, Douglas oak woodland to yellow pine forest, Greenhorn Range, where it largely replaces the typical variety: granitic outcrops just above Granite Station, *T8477*; Lynns Valley, 3.5 miles northwest of Glennville, *T8766*; Greenhorn Pass Road, 2.5 miles west of Wofford, *H38708*.

SENECIO IONOPHYLLUS Greene. Scarce around rock outcrops, vicinity of Piute Peak: French Meadow Road, 0.4 mile east of Piute Peak, *T3035*. Acc. Ferris (Abrams Fl. 4:442), Tehachapi Mountains. The type locality is "pine woods south of Tehachapi," *Greene*, 25 June 1899.

SENECIO SERRA Hook. A small dense colony grows at the north end of French Meadow, Piute Mountains, *T7578*.

SOLIDAGO SPECTABLIS (D. C. Eat.) Gray. Extensive colonies grow in the subalkaline flats below Kern Hot Springs, Kern Valley, and along nearby canals and wet places: 1 mile south of Kernville on the Weldon Road, *H38929, T9014*; Kern Hot Springs, *T9016*.

WYETHIA OVATA T. & G. Occasional, dry slopes of yellow pine forest, mountains south to the Piute Mountains and Breckenridge Mountain: ridge southwest of Pine Flat, Kern Plateau, *T8667*; between Greenhorn Summit Store and Tulare County line, *C. N. Smith 695* (JEPS); forest clearing, south side of Black Mountain Saddle, *H38269*; west slope below Black Mountain Saddle, *T8596*; Squirrel Meadow, Breckenridge Mountain, *T4694*; Landers Meadow, Piute Mountains, *T7446*; French Meadow Road, 0.4 miles east of Piute Peak, *T3034*; Piute Mountain Road, 5.4 miles east of Rancheria Creek, *T8940*.

A NEW NAME IN CEANOTHUS

Ceanothus velutinus Dougl. ex Hook. var. **Hookeri** M. C. Johnst., nom. nov. *Ceanothus laevigatus* Dougl. ex Hook. Fl. Bor.-Amer. 1:125 (1831), non DC. Prodr. 2:30 (1825). *Ceanothus velutinus* var. *laevigatus* (Dougl. ex Hook.) Torr. & Gray, Fl. N. Amer. 1:686 (1838).

Two botanists, both in good faith, can find equally good argument for different names for this variety. One, following Article 64 of the 1961 Code of Nomenclature, can say that Hooker's name must be rejected as a later homonym. Another, invoking Article 72, can treat the Torrey and Gray combination as new and legitimate, simply deleting the "(Dougl. ex Hook.)". The latter procedure is not recommended. Torrey and Gray obviously were making a new combination, legal fiction to the contrary notwithstanding.—Marshall C. Johnston, University of Texas, Austin.

OENOTHERA CARDIOPHYLLA NOT IN NEVADA. *Oenothera cardiophylla* Torr. was recently reported from Nevada by G. W. Gullion (Leafl. West. Bot. 9:229,—1962), on the basis of a collection from about 1 mile west of Boulder City on U. S. Highway 93, elevation 2500 feet, Clark Co., May 13, 1952, *Gullion 301* (UC). In 1960, while I was preparing my paper on *Oenothera*, subg. *Chylismia* (Univ. Calif. Publ. Bot. 34:1—122,—1962), I examined this specimen, and found it to be an overmature and nearly leafless plant of *O. brevipes* A. Gray, common in the area. I have seen no material of *O. cardiophylla* from the state, although it is found nearby in the Death Valley region of California.—PETER H. RAVEN, Stanford University.

LEAFLETS
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A NEW CAREX FROM GLACIER NATIONAL PARK, MONTANA

BY F. J. HERMANN

Washington, D.C.

A rather extensive colony of a strange-looking member of *Carex* § *Acutae* was encountered by the writer while collecting above the Hanging Gardens, Logan Pass, in Glacier National Park, in August, 1962. The plants were growing on the peaty edge of a pond in an alpine meadow near Hidden Lake Overlook at about 7300 ft. elevation. Although somewhat suggestive of the Eurasian and, in eastern North America, largely subarctic and maritime *Carex nigra* (L.) Reich., the congested spikes, deep red coloration of the basal leaf-sheaths, and absence of prolonged, scaly rhizomes in this sedge showed at once that it could not be that species. It was clearly neither one of the only two species in section *Acutae* having nerved perigynia that were to be expected in this area, *C. Kelloggii* and *C. lenticularis,* so there seemed to be grounds for speculating whether it might not prove to be the related *C. kokrinensis** described by A. E. Porsild (Rhodora 41:206. 1939) from the Kokrines Mountains in central Alaska, and subsequently collected by him in the Yukon. This possibility seemed the more likely since a fine array of arctic mosses was associated with the sedge, including *Chamberlainia turgida* (Hartm.) Robins., *Ditrichum flexicaule* (Schwaegr.) Hampe, *Grimmia mollis* BSG., *Hygrohypnum Smithii* (Sw.) Broth., *Kiaeria Starkei* (Web. & Mohr) Hag., *Orthothecium chryseum* (Schwaegr.) BSG., *Paraleucobryum enerve* (Thed.) Loeske, *Pohlia cucullata* (Schwaegr.) Bruch, *Polytrichum norvegicum* Hedw., and *Tortula norvegica* (Lindl.) Wahl. The peaty turf on which the sedge occurred was devoid of other vascular plants.

Later study of the Logan Pass *Carex* in the herbarium revealed that it was indeed most nearly related to *C. kokrinensis,* but that it differed notably in the following characteristics. The perigynia are larger (2.25–2.75 mm. long, averaging 2.5 instead

* Dr. Porsild informs me that after having examined authentic material of *C. eleusinoides* Turcz. at Kew he is inclined to agree with O. Gjaerevoll (Kgl. Norske Vidensk. Selsk. Skr. No. 5, 1958) that *C. kokrinensis* cannot be separated from this species of central and eastern Asia.

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of 2 mm.) and more conspicuously nerved; they are sharp-, almost wing-, margined, and the upper part is not filled by the achene but is often twisted. The perigynium-beak is shorter, often almost obsolete (less than 0.1 mm., instead of 0.25–0.5 mm., long), and the stipe averages somewhat longer but is quite variable. The more consistently aggregated pistillate spikes, on generally shorter peduncles, are shorter than those of *C. kokrinensis*, being only 8–12 (17), instead of 10–20 mm. long. From *Carex nigra* the plant may be readily distinguished by its smaller, ovate, and thin-membranaceous perigynia (in *C. nigra* mostly 3 mm. or more in length, obovate and subcoriaceous) in addition to the habit differences already mentioned. The Logan Pass sedge is here proposed as:

Carex plectocarpa F. J. Hermann, spec. nov. (ACUTAE). Laxe caespitosa e rhizomatibus brevibus; culmi graciles, phyllopodi, 1–3 dm. alti folia paulo superantes; folia frondosa 3 vel 4 ad basim culmi aggregata vaginis infimis valde rubrotinctis; spicae 3 vel 4, cylindricae, 8–12 (17) mm. longae, 3–4 mm. latae, spica terminalis brevipedunculata laterales subsessiles vel infima brevipedunculata in capitulum 12–25 mm. longum confertae, terminalis gynaecandra vel ad basim etiam mascula, laterales plerumque femineae vel ad apicem masculae; squamae atropurpureae costa pallida conspicua; perigynia biconvexa, ovata vel oblongo-ovata, 2.25–2.75 mm. longa, 1.25–1.75 mm. lata, membranacea, brevistipitata, conspicue nervosa, valde marginata vel fere alata margine supra undulata vel plus minusve intorta in rostrum brevissimum truncatum abrupte contracta; achaenia lenticularia ovoidea 1.5 mm. longa, 1.1 mm. lata, perigynii e tribus duas partes explentia.

Loosely cespitose, with short, ascending rhizomes; culms phyllopodic, 1–3 dm. high, slender and usually nodding, little exceeding the leaves, smooth below, sharply triangular and scabrous above, the dried leaves of the previous year persistent at the base; leaves 3 or 4 to a fertile culm, mostly clustered toward the base, the blades white-striolate, 5–18 cm. long, 0.75–2.25 mm. wide, flat below, channeled to triangular toward the scabrous, attenuate apex, the midrib keeled on the under surface, scabrous, like the margins, toward the apex, the sheaths very thin, white-hyaline ventrally and soon breaking but not becoming fibrillose, the lowermost dark red dorsally, the ligule variable, from longer than wide to wider than long; spikes 3 or 4, cylindrical, 8–12 (rarely 17) mm. long, 3–4 mm. wide, the uppermost gynaecandrous but often also staminate at the base, the lateral chiefly pistillate but often staminate at the apex or occasionally nearly throughout, the terminal on a peduncle averaging 3 mm. in length, the lateral subsessile or the lowermost on a peduncle up to 3 mm. long, aggregated into a head 12–25 mm. long; bracts mostly 2, the lower 4–8 cm. long, exceeding the inflorescence, with very short, colored, open sheath; scales elliptic to ovate-lanceolate, obtuse to acute, deep mahogany-red to almost black, the midrib prominent and extending nearly to the apex but some-

times almost obsolete, the pistillate shorter and conspicuously narrower than the perigynia; perigynia ovate to oblong-ovate, 2.25–2.75 mm. long, 1.25–1.75 mm. wide, biconvex, ascending, strongly, sometimes almost wing-, margined, the margin usually undulate to twisted on the upper, empty portion of the perigynium, short-stipitate, slenderly but generally conspicuously several-nerved, thin-membranaceous, mostly white tinged with mahogany-red above and green at the granular apex, abruptly tipped by a minute (less than 0.1 mm. long), sometimes alomst obsolete, truncate, break; achene lenticular, ovoid, 1.5 mm. long, 1.1 mm. wide, light brown, apiculate, narrowed at base, filling the lower two-thirds of the perigynium; stigmas 2.

MONTANA: on peaty edge of pond in alpine meadow near Hidden Lake Overlook, Logan Pass, alt. about 7300 ft., Glacier County, Glacier National Park, Aug. 21, 1962, *F. J. Hermann 18120* (CA;CAN;MONTU;NY;US, type).

The following key will serve to distinguish *Carex plectocarpa* from its immediate American allies, those members of the *Acutae* having slenderly nerved to ribbed, usually stipitate, perigynia with an apiculate, entire beak.

Plants with long, stout, horizontal, scaly rhizomes; lowest bract usually shorter than the inflorescence; basal leaf-sheaths not red; spikes not congested.....*C. nigra* (L.) Reich.

Plants cespitose or with either short, ascending or slender, vertical rhizomes; lowest bract exceeding the inflorescence.

Spikes separate to distant or, if contiguous, not aggregated into a head, usually on well-developed peduncles, the terminal normally staminate; basal leaf-sheaths brownish.

Lowest bract short-sheathing; sterile shoots phyllopodic; pistillate scales brownish-red tinged.....*C. lenticularis* Michx.

Lowest bract sheathless; sterile shoots aphyllopodic; pistillate scales blackish.

Perigynia short-stipitate, suborbicular; achenes sessile.....
C. paucicostata Mack.

Perigynia strongly stipitate, ovate; achenes substipitate.

Scales early deciduous; perigynia papillate-roughened, ribbed, yellowish-green; maritime, Pacific Coast species.....
C. Hindsii C. B. Clarke

Scales persistent; perigynia very minutely granular, nerved, light- to glaucous-green; inland, chiefly montane species.
C. Kelloggii W. Boott

Spikes all or chiefly congested into a terminal head, sessile or short-peduncled, the terminal gynaecandrous.

Non-cespitose, creeping from slender, mostly vertical rhizomes; spikes stout, ovoid, 5–7 mm. wide; perigynia coarsely nerved or ribbed, ovate-lanceolate, mostly 3–3.75 mm. long, strongly stipitate, the

stipe more than 0.5 mm. long; achenes broadly obovoid, filling only the lower half of the perigynium; basal leaf-sheaths not red; species of the Canadian Rockies.....*C. eurystachya* F.J. Herm.

Cespitose; spikes slender, cylindrical, 3–4 mm. wide; perigynia slenderly nerved, ovate or oblong-ovate to ovate-orbicular, 2–2.75 mm. long, short-stipitate, the stipe less than 0.5 mm. long; achenes ovoid; basal leaf-sheaths red.

Achenes filling the perigynium or essentially so; perigynia 2 mm. long, not sharp- or wing-margined, faintly nerved, the prominent beak 0.25–0.5 mm. long; lateral spikes 10–20 mm. long; species of Alaska and Yukon.....*C. kokrinensis* Porsild

Achenes filling only the lower two-thirds of the perigynium; perigynia 2.25–2.75 mm. long, sharp- or wing-margined, conspicuously nerved, the upper, empty portion often twisetd, the beak minute, less than 0.1 mm. long; lateral spikes 8–12 (17) mm. long; species of the northern Rocky Mountains.....*C. plectocarpa* F.J. Herm.

Forest Service Herbarium,
Division of Range and Wildlife Habitat Research,
U.S. Department of Agriculture, Washington, D.C.

NOTES ON FRESH-WATER MARSH AND AQUATIC PLANTS IN CALIFORNIA–III[1]

BY PETER RUBTZOFF

In the present notes, records in *Cyperaceae* are given.

CYPERUS NIGER Ruiz & Pavon var. CAPITATUS (Britt.) O'Neill. This plant, reported in the Coast Ranges as far north as Sonoma County (Munz & Keck, 1959), has been collected also farther north in the Coast Range and Klamath Mountain region: near Sims (north of Hazel Creek), Shasta Co., *Eastwood 11547* in 1922 (cited, without locality, in Concoran, 1941, p. 8); Swift Creek Road west of North Fork of Swift Creek, Trinity Co., *Cantelow 1842* in 1937; near Orleans, Humboldt Co., *Pollard*, Sept. 1–7, 1944. The three specimens have capitate, ochre-brown inflorescences characteristic of this variety and do not show any tendency toward *C. niger* var. *rivularis* (Kunth) V. Grant (*C. rivularis* Kunth), the plant typical of the North Coast Range and Klamath region.

CYPERUS DIFFORMIS L. This Asiatic weed has been reported

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[1] The second part of the Notes was published in 1961 in volume 9 of this journal, pages 165 to 174. For a map showing marshes in southern Sonoma County and a list of their names used in these studies, *see* Leafl. West. Bot. 9 (5):73–76 (1960).

in the Coast Ranges from Napa County (Howell, 1934, p. 104[2]), Marin County (Howell, 1949; Mason, 1957), San Francisco (Howell et al., 1958; Thomas, 1961), and Oakland (cited in McGivney, 1938, p. 42), where it had been collected at 16th Street Station by Jussel on July 8, 1935. It was collected by the writer in 1956 on margin of Russian River at Vacation Beach, 1.5 miles below Guerneville, Sonoma Co., *No. 2919*.

ELEOCHARIS RADICANS (Poir.) Kunth (*E. acicularis* var. *radicans* in Munz & Keck, 1959). This little spike rush was formerly known to range from South America to the southern United States, including southern California. Only in relatively recent years has it been reported from the Coast Ranges of central California in Sonoma, Napa, San Francisco, and Santa Cruz counties (Rubtzoff, 1953; Baker, 1954; Mason, 1957; Howell et al., 1958; Thomas, 1961). Subsequent collections made by the writer in Sonoma County, where the plant has been heretofore reported only from near Kenwood and from the Pitkin Marsh (Rubtzoff, 1953), indicate that it is not uncommon there. The new stations are: Guerneville Marsh *(1611)*; margin of Russian River at Vacation Beach, 1.5–2 miles below Guerneville *(2918, 2933, 3940,* and *4761)* and at Forest Hills *(4722)*; Laguna de Santa Rosa area northeast of Graton, near the Laguna Road *(4440)*, and east of Cunningham, near Llano Road *(5006)*.

ELEOCHARIS PAUCIFLORA (Lightf.) Link. The typical variety of this species of spike rush, with capillary culms and filiform rhizomes bearing small, leafy tubers (Svenson, 1929, p. 171; Mason, 1957; Munz & Keck, 1959), has been reported for the Coast Ranges from an elevation of 5000 feet in the North Coast Ranges (Mason, 1957), from about 1900 feet (8.9 miles south of Kelseyville[3]) in Lake County (Baker, 1943, as *E. pauciflora Suksdorfiana;* Rubtzoff, 1953), and from about 160 feet in the Pitkin Marsh, Sonoma County (Rubtzoff, 1953). Since the plant seems to be rare at low elevations, it may be of interest to cite the following collections by the author from Sonoma County:

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[2] Baker (1934) reported the plant as collected by Howell 4 miles south of Napa. The collection, *Howell 10798*, was actually made 7 miles south of Napa, and thus the mileage in Baker (1934) is incorrect. The above number of Howell has been cited, without locality and incorrect (as "10789"), in McGivney (1938, p. 42).

[3] Since this station is located on Kelseyville-Lower Lake road (according to Baker, 1943, and to J. T. Howell, personal communication), the label should, according to map, actually read "8.9 miles *southeast* of Kelseyville." M. S. Baker's *No. 9884* was apparently also collected at this station (*see* Baker, 1941), although the label reads "4 3 miles south of intersection of Seigler Springs road and Kelseyville-Lower Lake road." This seems to be just a different way of indicating the same locality, and the direction should, according to map, actually be "4.3 miles *east* of intersection . . . ."

Forestville Marsh (about 140 feet), *No. 1922* in 1955; Laguna de Santa Rosa east of Cunningham near Llano Road (about 80 feet), *No. 4817* in 1962; Bennett Mtn. Lake (1180 feet), *No. 5191* in 1963.

Eleocharis pauciflora var. *Suksdorfiana* (Beauverd) Svenson, a coarser plant than the typical variety, with compressed culms about 1 mm. wide, and apparently lacking leafy tubers on filiform rhizomes (Svenson, 1929, p. 174; Mason, 1957; Munz & Keck, 1959), has been reported for the Coast Ranges as a rare plant in Marin and Lake counties (Howell, 1949; Mason, 1957; Munz & Keck, 1959).

SCIRPUS FLUVIATILIS (Torrey) Gray. The river bulrush has been previously reported in the Coast Ranges from Lake and San Mateo counties (Mason, 1957; Munz & Keck, 1959; Thomas, 1961), from Pajaro River at the southern boundary of the Santa Cruz Mountain area (Thomas, 1961), and from Sonoma County (Baker, 1932). It has also been found in Napa County (St. Helena, *Jussel,* Aug. 10, 1935). For Sonoma County it was reported from the Laguna de Santa Rosa (Baker, 1932). The writer has collected it in that county in the Guerneville Marsh (*2033* in 1955), where it forms a small colony in wet ground. In the Laguna de Santa Rosa area it has been collected by the writer at various places between Sebastopol and Trenton where it frequently forms extensive stands.

SCIRPUS CALIFORNICUS (C. A. Meyer) Steud. The California tule, previously reported in the Coast Ranges as far north as Marin County (Howell, 1949; Munz & Keck, 1959) and Napa County (Mason, 1957), has been collected at two localities in Sonoma County: Bennett Mtn. Lake, *Rubtzoff 1995* in 1955, and Bodega Harbor Marsh, *Rubtzoff 2020, 4573,* and *4580* in 1955 and 1960. At both stations it forms large stands in shallow water and marshy ground. At the latter locality the stand extends from the freshwater part of the marsh through the *Salicornia* belt into the water of Bodega Harbor.

SCIRPUS VALIDUS Vahl. Although earlier accounts of the great or soft-stem bulrush in California have variously attributed its dispersal from southern to northern parts of the state, according to Munz & Keck (1959), it is restricted in California to Humboldt, Trinity, and Siskiyou counties. Baker (1946) and Howell (1949) reported it for Marin County, and Howell et al.

adds a fourth station to the known distribution of this narrow endemic.

CAREX HASSEI Bailey. This sedge is reported in coastal California as rare and local from Humboldt County to Monterey County (Mason, 1957; Howell, 1949; Thomas, 1961). Therefore it is of interest to report its occurrence in the Laguna de Santa Rosa area of Sonoma County, where a colony was found in a wet meadow east of Cunningham near the Llano Road crossing of the Laguna (*Rubtzoff 4819* and *5194* in 1962 and 1963).

CAREX HENDERSONII Bailey. This sedge of damp woods is known to occur in the Coast Ranges as far south as Sonoma County (Howell, 1959). It is rare in the southern part of its range and apparently has been reported for Sonoma County only from Guerneville (Mackenzie, 1922). Therefore it seems to be of interest to report its occurrence at Duncans Mills, where a colony is known to the writer from a moist, shaded area where the Duncans Mills Marsh borders a redwood forest (*Rubtzoff 1855, 3302, 3387*, and *4360* in 1955, 1957, and 1960).

CAREX COMOSA Boott. This sedge, which has a rather scattered distribution in California, is known to occur in the Coast Ranges from Lake County to Santa Cruz County (Mason, 1957; Howell, 1959). Since within this region it has been collected only at a few scattered localities and has apparently been reported for Sonoma County only from Russian River near Guerneville (Jepson, 1901, as *C. Pseudo-cyperus* var. *comosa*; Mackenzie, 1922), it may be of interest to mention here its occurrence at the Bodega Head Marsh: *Rubtzoff 2115* in 1955.

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"SOLEDAD" OF MARCUS E. JONES

BY JOHN THOMAS HOWELL

The Spanish word for solitude, *soledad,* has been used for two settlements in California, the one in Soledad Canyon, San Diego Co., "at the site of present Sorrento" (Gudde, 1960, p.

300), the other in Monterey Co. in the vicinity of *La Misión de Nuestra Señora de la Soledad.* While at work on a current manuscript of the vascular plants of Monterey County, I doubted the authenticity of an extra-limital record of *Streptanthella longirostris* (Wats.) Rydb. as given by Jepson [1935, p. 40, under *Thelypodium longirostris* (sic!)] on the basis of a collection made by Marcus E. Jones at "Soledad, Monterey Co., *Jones* 3129."

By reference to Jones' manuscript account of his collecting from 1875 to 1919, it was immediately clear that the locality, given merely as "Soledad" without county designation on Jones' printed label, is the one in the vicinity of San Diego, San Diego Co. This confusing error can also be found in Jepson's accounts of *Astragalus tener* Gray, *Cryptantha muricata* (H. & A.) Nels. & Macbr. var. *Jonesii* (Gray) Jtn., and perhaps others. The confusion was not new with Jepson but goes back even to the period of Jones' visit, since in the type description of *Krynitzkia Jonesii,* Gray (1885) gave the locality data as: "Bay of Monterey, California, at Soledad and at Santa Cruz, *Marcus E. Jones,* 1882 . . ." (1885, p. 274); and in the sequence of localities cited, Johnston (1925) under *Cryptantha muricata* var. *Jonesii* placed Jones' Soledad in the midst of Santa Cruz Co. Gillett (1955), in removing *Phacelia Parryi* Torr. from the flora of Monterey Co., called direct attention to the misinterpretation of Jones' locality datum.

Because of so much confusion over so long a time, I am quoting here that part of Jones' manuscript telling of the three days on which he collected at Soledad in 1882 and giving the collection numbers obtained on each day.

". . . On the 25th. [March, 1882] I got 3126–3129 at Soledad including Krynitzkia Jonesii n. sp. On the 29th. I got 3130–3135 there. April 3rd. I got 3137–3142 at San Diego. From April 5th. to the 19th. I was with C. G. Pringle and C. C. Parry on a trip to All Saints Bay at Ensenada from San Diego. This trip was taken by wagon. . . .

"On April 19th. I got 3143–3153 at San Diego. On the 20th. 3154–3161 at Soledad. On the 21st. I got 3162–3165 at San Diego. . . ."

From all this, several botanical items are worthy of mention.

1. So far as I am aware, *Streptanthella longirostris* does not grow in Monterey Co., the Monterey records in Jepson (1925 and 1935), Abrams (1944), and Munz (1959) having probably been based on a misinterpretation of Jones' Soledad.

2. Jones' *No. 3155* (CAS, determined by R. C. Barneby) is *Astragalus tene*r var. *Titi* (Eastw.) Barneby, a rare annual with a bifarious distribution localized in western San Diego Co. and on the Monterey Peninsula. Jepson (1935) treated *A. Titi* as synonymous with *A. tener.*

3. When Jepson (1943) designated Jones' Soledad collection as the type of *Krynitzkia Jonesii* Gray, he was perhaps not aware of the fact that Johnston (1925) had already designated Jones' Santa Cruz collection as the type. Johnston was in error when he gave the number of Jones' Santa Cruz collection as *2810.* It is probably *No. 2310,* a collection, according to the Jones manuscript, made in the hills near Santa Cruz on June 28, 1881.

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NOTES ON CALIFORNIA GRASSES AND FORBS

BY BEECHER CRAMPTON

Festuca californica Vasey. In typical form, this rather coarse and usually densely tufted grass is known to occur in foothill oak woodland, chaparral and coniferous or mixed forest associations. This Californian endemic extends through the Coast Ranges from western Siskiyou County south to Monterey County. Some of the best stands of the grass occur on serpentine soils, either in conjunction with chaparral or open mixed forest situations.

Its occurrence in the Sierra Nevada has now been established by a collection *(Crampton 5445)* on serpentine soil just east of

Georgetown, Eldorado County. Quite likely the plant occurs in other areas of the northern to perhaps the central Sierra, probably on serpentine.

GLYCERIA DECLINATA Brébiss. This European introduction is undoubtedly more widespread in California than the few collections of it indicate. It is relatively common along the north fork of the Calaveras River at its junction with Jesus Maria Creek (*Crampton 5330*). Here it does well in the sandy soils at the edge of moving water as well as in or on the borders of stagnant pools along the stream. Quite likely the grass may be found on the sandy or gravelly banks of other rivers draining the Sierra Nevada.

Other areas in California where the plant is known to occur are in the vicinities of Mt. Shasta City, Dunsmuir, and Castle Crags, primarily along the Sacramento River; also in a vernal meadow south of Oakdale *(Crampton 1247*; see Leafl. West. Bot. 8:160,—1957) .

MUHLENBERGIA ANDINA (Nutt.) Hitchc. This is an attractive species of *Muhlenbergia* known to occur in California from Siskiyou County south through the Sierra Nevada to Tulare County and in the San Bernardino Mountains.

The species, or a variant of it, has been collected in the North Coast Range: Napa County, on serpentine soil at the north end of Capell Valley (*Crampton 5450*). This and other collections (cf. Raven, Leafl. West. Bot. 8:174,—1957) establish its extension through the Coast Ranges.

STIPA CORONATA Thurb. This robust bunchgrass has been known in California as occurring mostly in the southern Coast Ranges from Monterey County southward to San Diego County but extending inland to the Tehachapi, San Gabriel, and San Bernardino mountains.

A collection in Napa County (*Crampton 5465*) now extends its range into the North Coast Range. Here the grass grows on a steep stony hillside in the Vaca Mountains about 3 miles southwest of Monticello Dam. It is associated with *Melica Torreyana, Aesculus californica, Photinia arbutifolia, Adenostoma fasciculatum, Quercus dumosa, Diplacus aurantiacus,* and *Umbellularia californica.* Though rather infrequent in the area of collection, it is assumed the grass may be more abundant

throughout the steep, chaparral-covered slopes typical of this western slope of the Vaca Mountains.

VERONICA HEDERAEFOLIA L. This unusual European annual was collected just north of Sacramento along Richards Boulevard (*Crampton 5858*) where it grew in disturbed soil of a former orchard. Weedy introductions belonging to such genera as *Avena, Lolium, Cynodon,* and *Rumex* were the common plant-cover in this area, while the inconspicuous *Veronica* was either infrequent or virtually lost among the other weeds. The relatively large capsules and particularly the large seeds distinguish this species from the other species of *Veronica* in California. As far as is known this represents the first occurrence of the plant in California.

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NOTES ON THE GRASSES AND SEDGES IN MONTEREY COUNTY, CALIFORNIA

BY JOHN THOMAS HOWELL

GRAMINEAE

In a current enumeration of the Grass Family in Monterey County, California, that I have prepared for a county flora by Beatrice F. Howitt and me, I have been somewhat disappointed that this important family has not been numerically stronger and more diversified floristically, particularly when one considers how varied is the topography and how numerous are the plant communities in this relatively large area in the Coast Ranges. In the 3324 square miles of the county, which extend from seashore and coastal woodland to montane forest and desert borders, I have been able to count only 152 species and 10 varieties in 53 genera (which include as introductions 69 species and 2 varieties). This is approximately the size of the Grass Family in Marin County (of only about one-sixth the area), where in 53 genera 81 species are native and 60 species are introduced (Leafl. West. Bot. 4:243). In comparison to the grass flora of Monterey County, that of the Santa Cruz Mts. as treated by John H. Thomas in his Flora is relatively rich, 197

species and varieties in 65 genera, in an area of 1386 square miles.

When one examines the distributional data for the Grass Family in the California floras of Jepson and of Munz, one is impressed by the rather considerable number of species which reach a southern limit in Monterey County, but again closer scrutiny of the facts brings disappointment. Whereas one would expect about 20 species to reach a southern distributional limit in Monterey County, at present I can list only 6: *Agrostis californica, Festuca idahoensis, Hierochloë occidentalis, Melica aristata, Poa Douglasii, P. unilateralis.* All have a more or less continuous distributional pattern southward in the Coast Ranges except the honeygrass, *Melica aristata* Thurb. This species has been collected on Chew's Ridge by Clare B. Hardham, an important record that adds another disjunct Sierran element to the Santa Lucia flora of Monterey County.

Of the 14 species that have been found farther south, 2 are given the extended range by Hitchcock in Jepson's Flora of California *(Bromus vulgaris* and *Festuca Elmeri),* while 11 are listed by Hoover for San Luis Obispo County in his mimeographed "Check List of Vascular Plants of San Luis Obispo County": *Calamagrostis nutkaensis, C. rubescens, Danthonia californica, Deschampsia holciformis, Elymus mollis, E. pacificus, Festuca californica, F. rubra, Melica Geyeri, M. Harfordii, Trisetum cernuum* var. *canescens.* Although Dr. Hoover gives little local distributional data in his list, most of these species are undoubtedly restricted to the Santa Lucia Range and adjacent areas, so that they become part of the total important distributional picture of that range (to which all but *Festuca idahoensis* of the Monterey limitals belong). The fourteenth species, *Festuca occidentalis,* has been collected near Santa Barbara in Rattlesnake Canyon by H. M. Pollard.

It is interesting at this point to consult the list of grasses reaching a southern limit in the Santa Cruz Mts. as given by Thomas in his Flora. Of the 19 species he lists (pp. 27, 28), 5 are among those listed here as ranging southward to Monterey County or San Luis Obispo County. Two others, *Elymus virescens* and *Pleuropogon californicus,* are not known from Monterey County but are listed by Hoover as occurring in San Luis Obispo County. The remaining 12, however, still present an impressive figure indicative of the importance of the Santa

Sinaloa, Mexico, by J. Ortega in 1925 and distributed by Mrs. Mexia. Attached as an impurity to the "Monterey" specimen of *Chloris virgata* (at UC) is *Dactyloctenium aegyptium* (L.) Beauv., again a grass unknown at Monterey, but one which could well be part of Ortega's collection of that weedy species made at Mazatlan in 1925 (*Ortega 5764*, CAS).

Until further evidence for the Monterey occurrence of these grasses is forthcoming, they are not being counted as part of the flora of Monterey County.

CYPERACEAE

In the Howitt and Howell enumeration of Monterey County plants there are 43 species in the *Cyperaceae* (*Carex*, 25; *Cyperus*, 3 (too few!); *Eleocharis*, 6; and *Scirpus*, 9). The following 7 species reach a southern distributional limit in the county: *Carex Bolanderi, C. densa, C. gynodynama, C. leptopoda, C. pansa, Eleocharis pauciflora*, and *Scirpus fluviatilis.*

The Ventura County record for *C. densa* (in my treatment of the genus *Carex* in A California Flora, 1959) has been redetermined as *C. alma;* and for some reason I overlooked the Monterey County record for *C. leptopoda* from the Hastings Reservation (Leafl. West. Bot. 7:205, — 1955) in drawing up the distribution for that species in Munz' Flora. *Carex Dudleyi,* whose southern limit is given as Monterey County in the Munz Flora, is now known from San Luis Obispo County (Waterdog Creek, *Hardham*).

The occurrence of *Eleocharis pauciflora* on the valley flats at Jolon is quite remarkable since this is the only known station for the plant in the South Coast Ranges. The "Monterey County" occurrence of *Scirpus fluviatilis* is assumed from the locality citation of Pajaro River in the Santa Cruz Mt. Flora. According to State floras (Mason, 1957; Munz, 1959), this marks a southern limit in California, although the species is not among those given by Thomas (1961, p. 28) as reaching a southern limit in his area. Four species of *Carex* given in his list, *C. densa, C. gracilior, C. leptopoda,* and *C. nudata,* are known southward to limits in Monterey County or beyond.

Sedges reaching a northern limit in Monterey County are only two, *Carex alma* and *C. spissa.* The latter has been reported heretofore northward only to San Luis Obispo County.

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JOHN THOMAS HOWELL

THE JUNCUS MERTENSIANUS COMPLEX IN WESTERN NORTH AMERICA

BY F. J. HERMANN

Washington, D.C.

In Pacific North America six reputed "species" of *Juncus*, in section *Septati* have been found to be so poorly defined and so variously interpreted that, complicated as this ambiguity is by a high degree of polymorphism in nearly all of the taxa, the names currently applied to them in herbaria and manuals are often almost meaningless. All are important economically on the range because of having the highest palatability to livestock of any group in the genus. They are commonly reported to be about 90% grazed and one of the larger forms (*J. Suksdorfii*) has been observed to comprise, together with *J. Tracyi* Rydb., the bulk of the hay cut in meadows in the foothills of the Uinta Mountains in northeastern Utah and southwestern Wyoming. These plants, characterized by having 6 stamens and the septa of the terete, non-gladiate leaves complete, are: *Juncus Mertensianus* Bong., *J. nevadensis* S. Wats., *J. Suksdorfii* Rydb., *J. badius* Suksd., *J. columbianus* Coville, and *J. Duranii* Ewan. The related *J. dubius* Engelm., before maturing of the capsules, is sometimes difficult to distinguish from the members of this complex, but in mature fruit the attenuate beak of the capsule, clearly exserted from perianth, is evidently a reliable distinguishing feature. And even when immature it may generally be recognizd by its numerous heads (usually 17–150, rarely only 8), at least some of which are borne on slender, conspicuously divaricate, instead of erect or merely ascending, peduncles. This is a characteristic shared with its close ally, *J. rugulosus* Engelm., which is noteworthy for its transversely rugulose epidermis.

As an example of vagaries in interpretation of the *J. Mertensianus* complex, we may cite the following. To Coville the hallmark of *Juncus badius* was an obtuse to truncate capsule, but to Buchenau *J. badius* was synonymous with *J. Suksdorfii* (distinguished by him from *J. nevadensis* on the basis of a dark-colored perianth) which, however, was synonymized by Coville with *J. nevadensis* (capsules acuminate; perianth pale, according to Buchenau, dark according to Coville) while maintaining

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J. badius as a valid species. Again, Coville's concept of his *J. columbianus* is a plant with abruptly acute capsules, but Buchenau found them to be "gradually attenuate into a short beak," so that he had to distinguish the taxon from *J. dubius* on the basis of "flowers variegated, ferrugineous to reddish" rather than "stramineous to reddish." So much importance was attached by Buchenau to the "gradually attenuate" capsule of *J. columbianus,* in fact, that he employed it as the diagnostic characteristic setting it off from *J. nevadensis* which he interpreted as one of the taxa having pale flowers. Both Coville and Peck, on the other hand, distinguish *J. nevadensis* from *J. columbianus* on the basis of dark brown flowers.

The two most widely distributed elements of this complex, *J. Mertensianus* and *J. nevadensis* are ordinarily the most readily separable; indeed, in their extreme forms are strikingly different. Yet in the Cascade Mountains, and particularly in the Sierra Nevada, the lines of demarcation become bewilderingly unstable and in some areas the transitional forms are so predominant that it is impossible to maintain the two entities satisfactorily as species. Indeed, it was the difficulty experienced by John Thomas Howell in attempting to do so, while working up the *Junci* of Lassen Volcanic National Park for a flora of the region, that led him to suggest that the writer review the taxonomy of the pair. The present study is based largely upon the extensive representation in the California Academy of Sciences (CAS), generously lent by Mr. Howell, and material of the whole series in the U.S. National Herbarium (US), the Forest Service Herbarium (USFS), and in the writer's collection (H).

Traditionally *J. nevadensis* (*J. phaeocephalus* var. *gracilis* Engelm.) has been demarcated from the most wide-ranging of all these plants, *J. Mertensianus* (Alaska to California, inland in the Rocky Mountains from Alberta to New Mexico), on the basis of its long anthers which exceed the filaments in length. But although the anthers are generally shorter than the filaments in *J. Mertensianus,* and apparently consistently so in the Rocky Mountain area, in the western and southern portions of its range the character breaks down too frequently to be reliable as a diagnostic mark. The inflorescence in *J. Mertensianus* is typically a single head, which tends to become

spheroid in fruit, is many (usually over 12) -flowered, dark purplish or brownish black and commonly closely subtended by a short, spathaceous bract. In contrast, orthodox *J. nevadensis* is characterized by an inflorescecne of 2–12 (occasionally solitary) hemispheric heads, with less than 12 flowers, from medium to dark brown in color and with a generally reduced and inconspicuous or even obsolete bract. Supplementary distinctions that are sometimes helpful are included in the descriptions recently drawn up by Munz in A California Flora: leaves and perianth-segments flaccid, auricles round, opaque, 1–2 mm. long in *J. Mertensianus;* leaves and perianth-segments stiffish, auricles acute to rounded, translucent, mostly 2–3 mm. long in *J. nevadensis.*

Valuable as these characters are when found in combination for discriminating between the two entities, the preponderance, over large areas, of transitional forms where little if any correlation is evident, indicates that the subspecific category for *J. nevadensis* would be a truer expression of its status. This will allow for the recognition of the recently proposed *J. Duranii* Ewan, which does not appear to be sufficiently sharply demarcated from *J. Mertensianus* to merit specific rank yet has obviously more in common with *J. Mertensianus* than with *J. nevadensis,* as a geographic variety of subspecies *Mertensianus.* The remaining taxa involved, *Juncus badius, J. Suksdorfii,* and *J. columbianus,* which blend imperceptibly into *J. Mertensianus* subsp. *gracilis* (*J. nevadensis*) can then take their place as varieties, since each is characterized by some degree of geographic segregation, under this subspecies. The proposed realignment of the group, which it is hoped will render it more manageable, would be, therefore, as follows.

KEY

1. Head usually solitary (sometimes 2), many (12 or more) -flowered.
   2. Perianth-segments purplish black, flaccid, narrow and exposing much of the mature capsule; bract spathaceous; anthers usually much shorter than the filaments; auricles rounded, opaque, 1–2 mm. long; widespread from the Rockies to the Pacific ..... *J. Mertensianus* subsp. *Mertensianus*
2. Perianth-segments brown, stiffish; bract narrow; anthers and filaments usually subequal; auricles rounded to acute, translucent; localized in mountains of southern California..... ..... *J. Mertensianus* var. *Duranii*

1. Heads usually several to many, few (12 or less) -flowered, light to dark brown; perianth-segments usually stiffish; bract not spathaceous; anthers longer than the filaments (occasionally shorter in var. *columbianus*).
   3. Perianth-segments 3–6.5 mm. long, usually exceeding the capsule, their broad hyaline margins largely concealing the fruit except in var. *columbianus*.
      4. Heads usually dark brown, discrete; inflorescence mostly loose, the branches ascending or divaricate (except in forms of var. *gracilis* with one to few spherical or hemispherical heads); anthers commonly twice the length of the filaments.
         5. Plants of low or medium height (0.5–5 dm. high), the culms and leaves slender; perianth-segments 3–4.5 mm. long; capsule ovate to short-oblong..... .....*J. Mertensianus* subsp. *gracilis*
         5. Plants tall (usually 6–7 dm. high), the culms and leaves stout; perianth-segments 4.5–6.5 mm. long; capsule rather narrowly oblong..... .....*J. Mertensianus* var. *Suksdorfii*
      4. Heads usually light brown, more or less aggregated into several clusters; inflorescence strict, the branches erect; capsule rather narrowly oblong, clearly visible between the narrow perianth-segments; anthers usually from shorter than to little exceeding the filaments..... .....*J. Mertensianus* var. *columbianus*
   3. Perianth-segments 2.5–3 (3.5) mm. long, usually somewhat shorter than the obtuse to abruptly acute, ovate capsule, not hyaline-margined or only inconspicuously so; anthers commonly less than twice the length of the filaments..... .....*J. Mertensianus* var. *badius*

JUNCUS MERTENSIANUS Bong., subsp. MERTENSIANUS. *J. Mertensianus* Bong., Mem. Acad. St. Petersb. 6(2):167 (1833).

Mountain meadows, mostly alpine and subalpine, from Alaska southward to southern California and central New Mexico. Also in Unalaska.

Representative material. ALASKA: Sitka, *Mertens* (type) (LE). YUKON: Canol Rd., Mile 95, *Porsild & Breitung 10473* (US). BRITISH COLUMBIA: Revelstoke, *C. H. Shaw 982* (US). ALBERTA: Lake Louise, Banff Natl. Park, *J. Macoun 68408* (US); Mt. Edith Cavell, Jasper Natl. Park, *F. J. Hermann 13521* (ALTA;CAN;US). WASHINGTON: Wenatchee Natl. Forest, Chelan Co., *F. B. Lenzie 476* (USFS). OREGON: Paulina Lake, Deschutes Co., *J. T. Howell 7060* (as *J. Regelii* (CAS). NEVADA: Copper Basin, Humboldt Natl. Forest, *B. K. Crane 155* (USFS); Lamoille Canyon, Ruby Mts., Elko Co., *F. J. Hermann 12088* (US). CALIFORNIA: Lassen Loop, Lassen Volcanic Natl. Park, Shasta Co., *J. T. Howell 36314* (CAS); north base of Middle Ridge, Slate Creek, Mono Co., *P. A. Munz 19918* (as *J. nevadensis*) (CAS). UTAH: Mt. Emmons, Uinta Mts., Duchesne Co., *F. J. Hermann 5112* (GH;H;PH;RM).

Leiberg 2363 (as *J. nevadensis*) (US); Drew Valley, *Coville & Leiberg 460* (as *J. nevadensis*) (US); "P" Ranch, *Griffiths & Hunter 283* (as *J. Suksdorfii*) (US). CALIFORNIA: Warner Mts., *Griffiths & Hunter 434* (as *J. Suksdorfii*) (US).

An example of an occasionally occurring form transitional to var. *badius* (inner perianth segments with broad, hyaline margins but shorter than the capsule and filaments as long as the anthers) is the following. OREGON: Meadow Creek, Starkey Experimental Forest, Union Co., *F. J. Hermann 18834* (CA;H;US;USFS).

Juncus Mertensianus subsp. **gracilis** var. **Suksdorfii** (Rydb.) F. J. Herm., stat. nov. *J. Suksdorfii* Rydb., Bull. Torrey Bot. Club 26:541 (1899).

The distinctions of this variety indicated in the key would, for the most part, suggest that it might be merely an ecological phase of subsp. *gracilis*. The difference in shape of the capsule, however, as well as the apparently more restricted geographic range, appear to indicate that its characteristics are genetic rather than representing a response to edaphic influences.

Meadows at medium elevations from southern Washington and Idaho to northern Utah and northwestern Nevada.

Representative material. WASHINGTON: near Fulda, Falcon Valley, *W. N. Suksdorf 585* (evidently the same as the type collection in the Gray Herbarium, but there it is numbered *217*) (H;US); Pullman, Whitman Co., *C. V. Piper 3053* (US). NEVADA: Washoe Lake, Washoe Co., *M. E. Jones*, June 7, 1897 (US). UTAH: Goodman Ranch, Summit Co., *F. J. Hermann 5798* (as *J. nevadensis*) (CM;H;MO). IDAHO: Big Camas Prairie, *L. F. Henderson 3294* (as *J. nevadensis*) (US); Troy Rd., 8 mi. east of Moscow, Latah Co., *W. H. Baker 14390* (as *J. nevadensis*) (H;ID).

Juncus Mertensianus subsp. **gracilis** var. **columbianus** (Coville) F. J. Herm., comb. nov. *J. columbianus* Coville, Proc. Biol. Soc. Wash. 14:87 (1901). *J. nevadensis* var. *columbianus* (Coville) St. John, Fl. S. E. Washington, 82 (1937).

Along streams, springs and in wet meadows from eastern Washington and southwestern Montana to Oregon.

Representative material. WASHINGTON: Pullman, Whitman Co., *A.D.E. Elmer 235* (type) (US); springs, Columbia River, Klickitat Co., *W. N. Suksdorf*, Aug. 8, 1881 (paratype) (US). OREGON: wet meadows, *W. C. Cusick 1201* (US). MONTANA: Bozeman, Gallatin Co., *P. A. Rydberg* (as *J. nevadensis*) *2210* (H;US), *2212a* (US).

Juncus Mertensianus subsp. **gracilis** var. **badius** (Suksd.) F. J. Herm., stat. nov. *J. badius* Suksd. Deutsche Bot. Monatss. 19:92 (1901). *J. truncatus* Rydb., Bull. Torrey Bot. Club 31:399 (1904).

This variety is in many respects intermediate between subsp. *gracilis* and subsp. *Mertensianus*, some forms, in fact, being so close to typical *J. Mertensianus* as to be only with difficulty separable from it, particularly in the case of specimens that are either not ample or fully mature. It seems never to develop the broad, translucent margins running for most of the length of at least the inner perianth-segments so prevalent in much of the material of subsp. *gracilis* and its varieties *columbianus* and *Suksdorfii* (which, however, need not necessarily be present in this subspecies). Com-

monly in var. *badius* the tepals will be marginless or the inner showing a narrow, semi-translucent margin toward the apex only.

Meadows and banks of streams at medium elevations from eastern Washington and Oregon to central Montana and northwestern New Mexico.

Representative material. WASHINGTON: Falcon Valley, Klickitat Co., *W. N. Suksdorf 2144* (type) (US). OREGON: Blue Mts., *C. L. Shear 5594* (US). ARIZONA: north rim of Grand Canyon, Coconino Co., *Eastwood & Howell 7031* (CAS;H). UTAH: Green Lakes, Uinta Mts., Daggett Co., *F. J. Hermann 4842* (H;MO). IDAHO: Birch Creek, Cache Natl. Forest, Bannock Co., *K. E. Weight 185* (as *J. columbianus*) (USFS). MONTANA: below Castle, Meagher Co., *P. A. Rydberg 3237* (as *J. nevadensis*) (US). WYOMING: Rife's Ranch, Sweetwater Co., *A. Nelson 3809* (as *J. nevadensis*) (H;RM;US). COLORADO: Heights, Jefferson Co., *Shear & Bessey 4323* (type of *J. truncatus* Rydb.) (US). NEW MEXICO: Navajo Indian Reservation, Tunitcha Mts., San Juan Co., *P. C. Standley 7565* (as *J. badius*) (US).

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A NEW MANZANITA FROM MONTEREY

BY ROBERT F. HOOVER

California State Polytechnic College, San Luis Obispo

Arctostaphylos montereyensis Hoover, spec. nov. Frutex erectus, ramosus, 1.25 m. altus; tumore lignoso basalare nullo; caulibus cortice laeve, rubro; ramulis viridibus vel pallide brunneis, capillis glandulosis patentibus provisis; petiolis glanduloso-hirsutis, 3–5 mm. longis; laminis foliorum ellipticis vel ovatis ad late ovalibus, 15–34 mm. longis, 8–25 mm. latis, ad basim rotundatis vel late cuneatis, apice plerumque obtusis et mucronulatis, interdum truncatis et sine mucrone, nonnullis superioribus acutis, laete viridibus, concoloribus, minute ciliatis, sparse hirsutis in costa media, saepe sparsissime hirsutis versus basim supra, alioqui glabris; panicula plerumque 2–4-ramosa, glanduloso-hirsuta; bracteis lanceolatis, circa pedicellos floriferos aequantibus; pedicellis fructiferis divaricatis vel deflexis,

bracteas excedentibus, glanduloso-pubescentibus; lobulis calycis ciliatis; corolla alba, plus minusve rosacea; ovario minute et dense pubescente, paucis capillis glandulosis; fructis immaturis sparse pubescentibus, non viscidis.

Erect branching shrub 1.25 meters tall, without a burl at base; older stems with smooth red bark; branchlets green or light brown, with spreading glandular hairs; petioles glandular-hairy, 3–5 mm. long; blades elliptic or ovate to broadly oval, 15–34 mm. long, 8–25 mm. wide, at base rounded or broadly cuneate, at apex mostly obtuse and mucronulate, sometimes truncate and without a mucro, some of the upper acute, bright green, alike on the two surfaces, minutely ciliate, sparsely hairy on the midrib, often very sparsely hairy on surfaces toward base, otherwise glabrous; panicle usually with 2–4 branches, glandular-hairy; bracts lanceolate, about equaling the flowering pedicels; fruiting pedicels divaricate or deflexed, exceeding the bracts, glandular-pubescent; calyx-lobes ciliate; corolla white, more or less pink-tinged; ovary minutely and densely hairy, a few of the hairs glandular; unripe berries sparsely hairy, not viscid.

Growing in sand on south edge of Monterey Airport, Monterey County, California, December 17, 1963, *Hoover 8614* (in early flower); February 8, 1964, *Hoover 8635* (in flower and very young fruit); March 1, 1964, *Hoover 8641* (fruit young to nearly full-grown but unripe); April 11, 1964, *Hoover 8694* (heavy crop of berries). All branches were collected from the same individual, but *No. 8641* is designated as the type collection (holotype in herbarium of California State Polytechnic College, San Luis Obispo).

One of the many outstanding botanical features of the region around Monterey Bay is the diversity of kinds of *Arctostaphylos* to be found there. In the immediate area where *A. montereyensis* was found, *A. pumila* Nutt. and *A. tomentosa* (Pursh) Lindl., mostly represented by var. *trichoclada* (DC.) Munz, are both plentiful. Both of those species are highly variable, and they seem to hybridize in this locality. The newly discovered plant stands apart from the two associated species, however, as well as from their hybrid, in having the two leaf-surfaces alike and essentially glabrous. Under a magnification of 45 diameters, both surfaces show whitish dots indicating the presence of stomata. Further, *A. montereyensis* is already in fruit before the others are in full bloom. From reference to the available literature, it appears that the closest affinity of *A. montereyensis* is not with the species found nearby but with the northern group including *A. columbiana* Piper and *A. virgata* Eastwood. There seems to be no previous authentic record of the occur-

detectably glandular, although a few of the hairs seem to be very minutely capitate. Mrs. Hardham has noted on the label "no stump sprouts," which indicates that this shrub too did not form a burl.

If the airport, Los Laureles, and Pine Canyon shrubs belong to a single species, as I am convinced that they do, then the problem is to differentiate this species from its relatives. *Arctostaphylos virgata,* an endemic of Marin County, is evidently the only previously known species with which *A. montereyensis* might be readily confused. The combination of spreading glandular pubescence, long bracts, hairy ovary, concolorous leaf-surfaces, smooth bark, and absence of a basal burl sets them off from the rest of the genus. The type (airport) shrub is very distinctive in its rather small, broad, prevailingly obtuse leaves, but *Howell 29,059* in particular is strikingly similar to some specimens of *A. virgata.* The following differences between the Marin County and the Monterey County plants are constant, so far as specimens now available show:

Longest glandular hairs on branchlets varying on different shrubs between 1 and 2 mm. long; berries rather densely glandular-hairy even when mature ..... *A. virgata*

Longest glandular hairs on branchlets always less than 1 mm. long; berries when full grown sparsely hairy, with few if any of the hairs glandular ..... *A. montereyensis*

NOTES ON THE GENUS ALISMA

BY PETER RUBTZOFF

Alisma lanceolatum in North America

In the course of field work on marsh plants, I encountered in Sonoma County, California, representatives of the genus *Alisma* which differ markedly in their appearance from our well-known and widespread *A. triviale* Pursh[1], which also grows in this region. Following Samuelsson (1932), I decided that the morphological characters of these unusual plants agree with those of the Old World *A. lanceolatum* Withering.

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1 See Fernald (1946) and Pogan (1963) for discussion on the name and taxonomic level to be used for this plant, which appears under the name *A. Plantago-aquatica* subsp. *brevipes* (Greene) Samuelsson in Mason (1957) and under the names *A. Plantago-aquatica* L. var. *triviale* (Pursh) Farwell, *A. Plantago-aquatica* L., and *A. Plantago* L. in various other western floras.

The two entities of the genus *Alisma* present in Sonoma County were studied cytologically in 1963 by Peter H. Raven of Stanford University. In *A. lanceolatum,* he found 13 pairs of chromosomes at meiotic metaphase I of my collections *5012, 5074,* and *5200.* This same number had been observed by me in 1962[2] in plants from the same colony from which I had collected my *No. 1528* in 1954 and agrees with a chromosome number common in European material of this species (Pogan, 1961, 1962). On the other hand, Dr. Raven found in my collections of *A. triviale* from two Sonoma County localities (Brooks Gulch Marsh, *5076,* and Laguna de Santa Rosa east of Graton, *5199*) 14 pairs of chromosomes at meiotic metaphase I, as is probably characteristic of all individuals of this species (Pogan, 1963).

Dr. Eugenia Pogan of the Jagiellonian University in Krakow, Poland, who is engaged in the study of the North American representatives of the genus *Alisma,* received from me in 1962, during her stay at the University of Montreal, Canada, living material of the two taxa of *Alisma* present in Sonoma County. After having studied the morphology and the karyotype of my collection *5012,* and of the material taken from the same colony as my *No. 1956* collected in 1955, she also concluded that these represent *A. lanceolatum,* a fact she indicated to me in a letter of Jan. 8, 1964.

The principal external differences between *A. lanceolatum* and *A. triviale* are as follows. *Alisma triviale:* blades usually broad, typically ovate, rounded to subcordate at base; corolla typically white, although at times faintly pinkish; petals varying from entire to distally denticulate, roundish in general outline; styles thickish, usually shorter than the ovary, varying, usually within the same gynoecium, from straight to considerably curved outward. *Alisma lanceolatum:* blades usually narrower than in *A. triviale,* typically lanceolate, cuneate at base to somewhat decurrent; corolla decidedly pink; petals, varying from entire to distally denticulate, more or less pointed apically; styles relatively thinner than in preceding, usually about as long as the ovary, but varying from shorter than to longer than the ovary, straight or slightly curved at tip.

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2 Gratitude is expressed to Dr. Edward L. Kessel and Dr. Francis P. Filice of the University of San Francisco for making available to me the biology laboratory facilities of the university.

The relative width of blades, which varies in both species, in most cases provides a good diagnostic character. In extreme variants of both species, however, this character overlaps. In depauperate individuals of *A. triviale* some or all of the blades may be quite narrow. Also, some specimens from higher elevations in the Sierra Nevada, having floral characters like those of *A. triviale,* have quite narrow blades reminiscent of those of *A. lanceolatum.* Since the leaves and the pistils do not seem always to furnish unmistakable clues, and in herbarium material the original color and shape of the delicate petals is not always sufficiently well preserved, and cytological examination is not possible, the identity of some atypical herbarium specimens could not be established with certainty.

In the listing of specimens to follow, the ones collected by me in Sonoma County are definitely *A. lanceolatum.* Following these, some specimens from other areas are listed, which I consider also to be *A. lanceolatum.* In most of these latter specimens, remarks written on the labels by collectors indicate, that some characters appeared unusual to them at the time of collecting.

CALIFORNIA. Sonoma County (all numbers are mine, collected from 1954 through 1963, first set at CAS): Austin Creek Marsh, *1528, 1550, 1627;* Bennett Mtn. Lake, *1696, 1697, 1959, 4626;* Duncans Mills Marsh, *1956, 5074;* Russian River at East Guernewood, near Guerneville, *2105;* Russian River at Vacation Beach, near Guerneville, *2845, 2932, 4265;* Laguna de Santa Rosa northeast of Graton, *3783, 3993, 4189, 5012;* Laguna de Santa Rosa north of Sebastopol, *3872;* Willow Creek Marsh, *4174, 4176;* Russian River at Fitch Mtn. Grove, 2 miles east of Healdsburg, *4967;* Laguna de Santa Rosa east of Graton, *5200.* Colusa County: along highway between Colusa and Williams, *Baker 11631* on Sept. 5, 1946 (CAS; note on the label reads 'blue flowers"[3]); road to Lake County, 1.6 miles west of Williams,[4] *Mason & Grant 13119,* also on Sept. 5, 1946 (UC, DS; note on the UC sheet label reads "corolla pink"). Placer County: Rock Creek, Highway 49, about 9 miles north of Auburn, *Nobs 686* in 1948 (UC; note on the label reads "petals rose pink"); 3 to 5 miles above Auburn, *Abrams 6760* in 1917 (DS[5]).

OREGON. Lane County: Willamette River at Eugene, Willamette Valley,

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3 Actually, as could still be seen on some dry petals, the color was pink or purple.

4 According to Malcolm A. Nobs (personal communication) the living material used for the illustration of *A. Plantago-aquatica* subsp. *brevipes* by Mason (1957, Fig. 43) was collected at this locality. The narrow leaves and pointed petals of the plant in this figure indicate that actually material of *A. lanceolatum* was used.

5 This material consists of two sheets, only one of them having a plant with leaves. Pistils of plants from both sheets are like those of *A. lanceolatum.* The single plant with leaves has their blades ranging from very narrow-lanceolate to as broad as in typical *A. triviale.* Further study of the population may be necessary to determine with certainty the identity of this unusual plant.

in our local herbaria (CAS, DS, UC). This revealed some additional data worth publishing.

An Occurrence of Alisma subcordatum in California

Broad-leaved plants agreeing with the eastern *A. subcordatum* Rafin. in having small floral parts and very short, recurved styles have been collected in Yosemite Valley, Mariposa County, California: in wet depressions, Yosemite Valley, Yosemite National Park, 3950 feet, *Hall 9226* in 1911 (UC; entry in H. M. Hall's notebook reads "near Camp Curry");[8] Yosemite Valley, *Michaels,* Sept. 9, 1921 (CAS); Yosemite Valley, *Baker,* Aug. 22, 1931 (DS). It seems most likely that this Yosemite plant represents an introduction that maintains itself. It would be desirable to find out more about its distribution in the area, as well as to obtain material for a cytological check.

On Alisma in Arizona

Two species are listed in Kearney & Peebles (1960), *A. triviale* Pursh and *A. subcordatum* Raf.; however, an accompanying statement reads ". . . it is somewhat doubtful that there are 2 species in this state." I examined the Arizona material at CAS and UC (none was found at DS) and found all the specimens to be *A. triviale,* although some of them were originally determined as *A. subcordatum.* It would seem very doubtful, that the eastern *A. subcordatum,* not generally known west of Texas in the southern part of its range, has been collected at all in Arizona.

Record of Typical Alisma Plantago-aquatica from Seattle, Washington

Two collections of typical *A. Plantago-aquatica* L. are known to me from King County, Washington: Seattle, G. *N. Jones,* Aug. 3, 1934; margin of Lake Washington, Seattle, G. *N. Jones,* Sept. 23, 1937 (both UC).[9] Both plants have long, thin styles with minute stigma papillae characteristic of the typical subspecies of *A. Plantago-aquatica.* These two collections, possibly from the same station, probably represent an introduction from the Old World where the plant is known to be indigenous.

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8 Although Hendricks annotated this specimen as *A. Plantago-aquatica* var. *parviflorum* (Pursh) Torr. (a synonym of *A. subcordatum*), he does not mention the unusual record in his paper (1957).

9 The two specimens have been annotated by Hendricks as var. *Michalettii* and var. *americanum* respectively of *A. Plantago-aquatica.*

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A NEW CALIFORNIA CHORIZANTHE

BY CLARE B. HARDHAM

Paso Robles, California

Chorizanthe Blakleyi Hardham, spec. nov. Planta erecta, circa 10 cm. (5–20 cm.) alta, flavovirens, pubescens pilis longis patulis; caulibus solitariis aut paucis ex basi, infra trichotome ramosis et dichotome supra; foliis basalaribus, longe petiolatis, laminis petiolisque circa 2 cm. longis; inflorescentia in cymis unipartitis composita; involucris urceolato-cylindraceis, tubo 3.5–4 mm. longo, saepe paulum gibboso basi, dentibus 6, 5 uncinatis, dente anteriore 1.5–2 mm. longo, paulum recurvo vel subrecto; floribus albis, 5.5–6 mm. longis, sepalis interioribus profunde bilobatis, margine sparse dentatis, lobis circa 0.5 mm. longis acutis, sepalis exterioribus paulum longioribus, augustis, similiter bilobatis lobis acutis; staminibus 9, antheris linearibus, 0.5 mm. longis, probabiliter albis.

Erect annual, about 10 cm. (5–20 cm.) tall, the vegetative parts a bright yellow-green, pubescent throughout with long spreading hairs; stems one or few from the base, trichotomously branched below and dichotomously above; leaves basal with long petioles, petiole and blade approximately 2 cm. long; inflorescence of uniparous-branched cymes; involucres urceolate-cylindric, tube 3.5–4 mm. long, glabrous except for long spreading hairs on the veins of the older involucres and short upcurled hairs on the

veins of the younger involucres, teeth 6, 5 uncinate and short, the anterior tooth 1.5–2 mm. long, slightly recurved or nearly straight; flowers white, 5.5–6 mm. long, the inner sepals deeply bilobed, with remotely dentate margins, the lobes about 0.5 mm. long, acute, the outer sepals slightly longer, narrow, similarly bilobed; stamens 9, anthers linear, 0.5 mm. long, probably white.

Type (Herb. Calif. Acad. Sci. No. 444,474; isotype Herb. Santa Barbara Botanic Garden No. 18948) collected at an elevation of 5000 feet, 1 mile southeast of McPherson Peak, Sierra Madre Mountains, Santa Barbara County, June 29, 1963, by E. R. Blakley, *No. 6067*. Duplicates to be distributed.

Chorizanthe Blakleyi, with its slightly gibbous involucre, more or less straight, long, anterior involucral tooth, and linear anthers, is a typical member of the subsection *Uniaristatae*. It differs from all other members and from all other known North American species of *Chorizanthe* in having both inner and outer sepals deeply bilobed with the lobes sharply acute. In addition it is the only large-flowered member of the *Uniaristatae* without fimbriate inner sepals. In *C. ventricosa* Goodm. the inner sepals are shallowly bilobed, but the midvein and some surrounding tissue are prolonged into the notch as a mucro. This prolongation of the midvein as a tooth or cusp is common in many species in other subsections as well. In *C. biloba* Goodm. and *C. rectispina* Goodm. the outer sepals are bilobed but only shallowly in *C. rectispina;* and in the former the midvein is not prolonged as a cusp, in the latter it may be. The striking yellow-green color of *C. Blakleyi* may indicate a relationship to *C. rectispina* since it also is distinctly yellowish-green.

As with many other chorizanthes in this group, the ecological factors which determine the occurrence of the new species are obscure. The only known colony covered an area of about an acre. Here it was abundant in a chaparral opening on a south slope in rocky sandy loam with other annuals.

This distinctive species is named for my good friend, E. R. "Jim" Blakley, a real lover of plants, whether they flourish in Nature's garden or come under his conscientious care in a botanic garden.

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OBSERVATIONS ON REPRODUCTION OF BIGTOOTH MAPLE

BY EARL M. CHRISTENSEN AND ELRAY S. NIXON[1]
Provo, Utah

INTRODUCTION. Although bigtooth maple, *Acer saccharum* Marsh. spp. *grandidentatum* (Nutt. ex T. & G.) Desmarias, is an important member of the mountain brush and streamside communities in Utah, little has been published about its reproduction. Some observations on the reproduction of the bigtooth maple are described in this paper. These observations were made in central Utah in Pole Canyon, a branch of Provo Canyon, at elevations between 5000 and 6500 feet. Reproduction of this subspecies is both by seeds and by layering (Christensen, 1962). Observations of the flowering periods of bigtooth maple and other species of the mountain brush zone were made in 1949 by Allman (1953).

SEED PRODUCTION AND GERMINATION. In central Utah, the flowers of bigtooth maple appear in April or in May with the new leaves, and the fruits mature in August or September. Germination and cotyledon emergence occur in April and May of the following spring. Germination is epigeous in bigtooth maple.

In August, 1956, bigtooth maple samaras were collected in square meter quadrats. Calculations from these data indicated 235,500 single samaras per acre in the mountain brush zone in the sample area of Pole Canyon. The percent viability of the 1956 crop of samaras was very low, however, because of 412 mature samaras examined by sectioning, not one was observed with a viable embryo.

In 1957, germination tests (emergence from the soil) were made in flats using 298 mature samaras collected on October 24 and stored for 3 months in a dry, cool room in paper bags. A lot of 98 samaras was stratified in moist soil at 40° F for 4 weeks and then placed in the greenhouse for three months. About one-fourth started to germinate during the cold treatment, and emergence of seedlings occurred only during the first 5 weeks after the flats were placed in the greenhouse. Fifty per cent of the single samaras germinated, but only 30.6% had

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normal seedlings. All the abnormal seedlings died. Double samaras were examined for seeds by sectioning. In 96% of those examined only one ovary of the pair contained a developed seed, so about one-half of the single samaras were empty. Therefore, essentially all the filled samaras had viable embryos and germinated after the short cold treatment, although a large proportion were abnormal and died. In addition, 200 samaras were given no cold treatment; and only 8% of these germinated. It appears that a short cold treatment stimulates germination.

Observations over a several year period on the bigtooth maple reproduction in an exclosure dominated by bigtooth maple and Gambel oak (*Quercus Gambelii* Nutt.) indicated that the reproduction by seeds was very low. However, in April and May of 1958, bigtooth maple seedlings were a conspicuous feature in the exclosure. A density of 39,070 seedlings per acre occurred in June, a figure determined from counts made in 132 square meter quadrats. If the same rate of germination of normal seedlings occurred in nature in the 1957 crop of samaras as was observed in the greenhouse (30.6%), 127,600 samaras were dropped on each acre. In the exclosure and vicinity there were 706 maple stems per acre that were 2 inches in diameter or greater at 1 foot above the ground. It may be assumed that each was capable of producing samaras. If there were 127,600 samaras per acre, the average production of samaras per stem would be only 181. This figure is doubtless lower than the actual average production of samaras. Considerable destruction and loss of viability of the seeds certainly occurred during the winter, so the actual number of samaras produced was doubtless greatly in excess of 127,600 per acre in 1957.

TABLE 1. Survival of bigtooth maple seedlings in the mountain brush zone of central Utah.

Month and year	*Seedlings per acre*
June, 1958	39,070
August, 1958	29,440
June, 1959	11,400
October, 1961	246
October, 1962	184

EFFECTIVE REPRODUCTION. The survival of the 1958 seedlings

cover for the native garden (Emery, 1957; Schmidt, 1957; Everett, 1960; Ingraham, 1962). It has not been until recently that the botanical exploration of the entire stretch of coast of Monterey and San Luis Obispo counties has attracted more attention. In the past few years three new species, *A. cruzensis* Roof, *A. Hooveri* Wells and *A. montereyensis* Hoover, have been reported from the Santa Lucia Mountains and foothills overlooking this part of the coast (Wells, 1961; Roof, 1962; Hoover, 1964); and there seem still to be reports of additional new species and range extensions of manzanitas, yet unpublished, having been observed in the field in that area. It is not surprising, therefore, that horticulturists, keen on the use of California native plants in the garden, are now beginning to search out more carefully the still relatively unexplored coastal bluffs of this region. One such keen observer has been James Roof, Director of the Tilden Botanical Garden in the East Bay Regional Parks in Berkeley, California. Mr. Roof (1961) made an interesting survey of the manzanitas of the Point Sur region of Monterey County, and although it was quite detailed, several locations for *A. Edmundsii* have been found since, both to the north and south of the type locality. It is here that we desire to expand on the information known about the distribution of this manzanita.

On March 23, 1964, we set out specially to gather, in a limited time, as much data regarding the Little Sur manzanita as we could. Leaving Carmel Highlands and traveling quite slowly south along California State Highway 1, we carefully searched the canyons to the east of the highway. In this way we continued south with several unrewarding stops, until we came to Garrapata Creek about 5 miles south of Carmel Highlands. Here we discovered the first locality of this species just to the north of the creek and found it to occur on both sides of the highway; that on the west side was very prostrate and could, with a very broad definition, be considered as *A. Uva-ursi* (L.) Spreng. (This is a discussion which we prefer not to enter at present, but we feel it more suitable to refer to everything within this region which superficially resembles *A. Uva-ursi* as *A. Edmundsii* because it does not consistently have the typical fruit, surface hairiness, nor leaf-shape of *A. Uva-ursi*.) On the east side of the road is a remarkable population of extremely varied manzanitas some of which are prostrate and others of which are distinctly

upright. Most, however, have the leaf-shape peculiar to *A. Edmundsii* even though some of the leaves are 3–4 cm. long and half as broad, compared to 2–3 cm. long or usually less in most other populations. The Garrapata Creek population of *A. Edmundsii* is easily visible from the highway and it is amazing that no one until now has reported this northernmost site for the species.

A scant three miles separates the Garrapata Creek population of *A. Edmundsii* from the next ones to the south at Rocky Creek and the seaward slope of Division Knoll near the mouth of Bixby Creek. In this area are several populations, some of which are viewed daily by the numerous travelers on State Highway 1. In this area the largest population appears to be on the seaward face of a low hill just above the highway and to the west of Division Knoll; this is between Rocky Creek and Bixby Creek. Overlooking Rocky Creek, yet several hundred yards inland is still another population of the species. In order to approach this site one must follow the Bixby Canyon Road (Old Coast Road) to the east side of Division Knoll, then leave the road and proceed to the west and north facing slopes of the Rocky Creek canyon at or below 400 feet elevation.

Although we did not explore Bixby Canyon thoroughly, it is quite possible that near the mouth of Bixby Creek and under the scenic Bixby Bridge one may again find the Little Sur manzanita.

Mr. Roof (1961) describes, at some length, the region of the type locality as being near "Hurricane Point." According to the U. S. Geological Survey topographic map (Point Sur 1956), Hurricane Point is about two miles north of the mouth of the Little Sur River and lies in an area apparently quite devoid of any manzanitas. The insignificant promontories referred to by Mr. Roof as "Hurricane Point" are unnamed and lie about a mile south of the Little Sur River. In this region are two populations of *A. Edmundsii,* one of which is at the type locality with only a few specimens and another which is quite extensive and which probably contains the second largest number of plants. It is in the latter population one mile south of the Little Sur River where Mr. Roof discovered *A. Edmundsii* var. *parvifolia* Roof.

Mr. Roof makes special note of the Point Sur stand, describ-

ing the material there as *A. Uva-ursi*. Although some members of the population may qualify under the description of *A. Uva-ursi* in a broad definition, the material we examined, to the largest extent, we would consider *A. Edmundsii*. It occurs on the south face of the mount and just below the southernmost buildings on the summit. It is also found on the western and northern sides but not as abundantly as on the south. On the south slope (above the road) we found a solid, prostrate mat about 6–8 inches thick and covering about a half acre. Some of the plants have closely imbricated foliage; others have striped fruit reminiscent of *A. pilosula* Jeps. & Wiesl. Here again is another veritable storehouse of horticultural possibilities.

The southernmost locality of *A. Edmundsii* is in the vicinity of Pfeiffer Beach about two miles directly west of Pfeiffer-Big Sur State Park *via* Sycamore Canyon. A small population occurs about 300 yards north of the creek outlet and just above the beach, with branches trailing down into the sand from the seaward cliffs. When scaling Pfeiffer Point, a promontory rising 393 feet above the ocean to the south of Pfeiffer Beach, we discovered the largest colony of *A. Edmundsii* so far known. The colony extends over some 20 acres or more and covers most of the point. Some of the shrubs on the leeward side of the point approach four feet in height and have a shaggy-barked trunk with a base diameter of up to four inches.

To the south of Pfeiffer Point, soil conditions change abruptly, there being almost a complete lack of the typical sandstone outcrops commonly associated with this species. It is doubtful, therefore, that new localities for the Little Sur manzanita will be found south of Pfeiffer Point.

In the three days of exploring for *A. Edmundsii* we feel that we have uncovered much important horticultural material. The variability in stature, in leaf-shape, and in disposition of leaves along the branchlets, that we have observed in the various populations, may serve as a rich source of material suitable for garden use.

In respect to the affinities of *A. Edmundsii* with other species, one could repeat several possibilities such as have already been postulated (Howell, 1952; Roof, 1961). It is interesting to note, however, that in one population we found several plants that had both 4- and 5-merous flowers. The only manzanitas known

THE KAWEAH FAWN LILY, A NEW SUBSPECIES IN CALIFORNIA

BY PHILIP A. MUNZ
Rancho Santa Ana Botanic Garden
AND
JOHN THOMAS HOWELL
California Academy of Sciences

Erythronium grandiflorum Pursh subsp. **Pusaterii** Munz & Howell, subsp. nov. Rhizoma breve, ascendens, 1–3 cm. longum, 1 vel 2 cormiculos basilares ferens; foliis viridibus, crispato-undulatis, 2–5 dm. longis, 2–6 cm. latis, laminis 1.5–2.5 dm. longis; inflorescentia 1–3 dm. alta; floribus 1–3 pedicellis 2.5–6 cm. longis; segmentis perianthii lanceolatis, acuminatis, 2–3 cm. longis, in parte inferiore luteo-aurantiacis, in parte superiore eburneis, appendicibus basilaribus subglobosis; filamentis inaequalibus, circa 4 et 6 mm. longis, tenuibus, in parte inferiore inflatis; antheris in floribus siccis luteis, circa 4 et 8 mm. longis; pistillo circa 10–12 mm. longo; lobis stigmatis 3, 1–2 mm. longis, in aetate reflexis; capsula matura non visa.

Rhizome short, ascending, 1–3 cm. long, with 1 or 2 basal cormlets; leaves green, not mottled, more or less crisped-undulate, 2–5 dm. long, 2–6 cm. wide, acutish to obtusish, the portion above ground (blade) 1.5–2.5 dm. long; inflorescence 1–3 dm. tall, 1–3-flowered; pedicels 2.5–6 cm. long; perianth-segments lanceolate, 2–3 cm. long, acuminate, yellowish-orange on lower half or third, cream-color in distal portion, the basal appendages apparently somewhat globular; filaments unequal, about 4 and 6 mm. long, slender with somewhat dilated lower portion; anthers yellow, about 4 and 8 mm. long in dry flowers; pistil about 10–12 mm. long; stigma with 3 lobes 1–2 mm. long, the lobes reflexed at maturity; immature capsule obovoid, mature not seen.

Type from rocky soil at about 2560 m., below Hockett Lakes, southern Sierra Nevada, Tulare County, California, *Samuel J. Pusateri,* June 15, 1964, Rancho Santa Botanic Garden Herbarium No. 167,345. Isotype at California Academy of Sciences. Dr. Pusateri reports that the plants grew in profusion and were perhaps over 1000 in number. He deposited kodachromes and sketches as well as leaves and flowers for the type.

This new plant is near *E. grandiflorum* Pursh in its evenly green leaves and lobed stigma, as well as basal appendages of the perianth-segments. It resembles subsp. *chrysandrum* Applegate of the Wasatch and Rocky mountains in its yellow anthers but differs in its crisped-undulate rather than plane leaves, in its petals being yellow in the basal half only and whitish-cream distally. Its range is remote from the other forms of *E. grandiflorum* (Applegate, Madroño 3:70–83, –1935).

It is a pleasure to name this for Dr. Samuel J. Pusateri, professor of botany at the College of the Sequoias, Visalia, California, and student of the Sierran flora. The plant was originally discovered by Mr. George Brooks, formerly a ranger in Sequoia Park, and his wife, Gaynell, who for many summers were stationed at Hockett Meadow. Mrs. Brooks suggests that the common name for this beautiful and distinctive Sierran flower should be Kaweah fawn lily.

PTERIS VITTATA NATURALIZED IN SOUTHERN CALIFORNIA

BY DAVID M. HUTT AND ROBERT M. LLOYD

Pteris vittata L., a subtropical fern found extensively in the Pacific islands and southeast Asia, has become naturalized in several canyons of the San Gabriel Mountains, in Los Angeles County, California.

This fern was collected as early as 1943 in San Dimas Canyon at the edge of the stream above flume V (*Beach 1900*). It was later collected in 1944 at the Dalton damkeeper's house in Big Dalton Canyon (*Beach 1901*). Recently, Hutt collected the fern in 1959 just below Morris Dam in San Gabriel Canyon on the north-facing walls directly above the access road (*Hutt 599*). Larry L. Kiefer collected depauperate plants at the same location in November, 1963 (*Kiefer 1070*). However, he reports several hundred individuals growing luxuriantly on the south slope of Eaton Canyon about 2 miles from the mouth between the first and second falls at an elevation of 1200 feet (pers. comm.; *Kiefer 432*). Kiefer found these plants in relatively exposed areas of the canyon. In other localities plants grow near water seepages or on very moist canyon walls where they are associated with typical riparian vegetation in the chaparral belt.

Pteris vittata has most likely reached these areas by spore dissemination from cultivated specimens growing nearby and now seems to be permanently established in the flora of California.

This species is separated from *P. longifolia* L., to which it is very closely related, by the lack of a conspicuous joint at the

base of each pinna. *Pteris vittata* also has fewer, more widely spaced pinnae with regular serrations. Of the California genera of the *Pteridaceae, Pteris* is most closely related to *Pteridium.* In both genera, fronds are monomorphic and large, with sporangia borne near the margins at the vein endings. However, *Pteris vittata* can be easily distinguished from *Pteridium aquilinum* (L.) Kuhn by its once pinnate fronds and the lack of a widely creeping rhizome.

Cited specimens are deposited in the Herbarium of the University of California, Berkeley. The authors would like to thank Dr. T. R. Pray, Dr. Robert Ornduff, and Mr. L. L. Kiefer for their assistance.

Department of Botany
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THE NOMENCLATURE OF MICROSERIS LINDLEYI (DC.) GRAY

BY KENTON L. CHAMBERS
Corvallis, Oregon

The common western wildflower which was for many years known as *Uropappus linearifolius* (DC.) Nutt. (*see:* W. L. Jepson, Man. Fl. Pl. Calif. 992,–1925; M. E. Peck, Man. Higher Pl. Oreg., ed. 2, 850,–1961), has suffered from an unfortunate nomenclatural confusion in the most recent floras dealing with *Compositae* of the Pacific states. Being in part responsible for this confusion, I wish to present what I think is a reasonable approach to the problem, with the hope that taxonomists will cooperate in stabilizing the name of this plant in the future.

The species is rightfully a member of the genus *Microseris* and has been called *M. linearifolia* (DC.) Sch.–Bip. (K. L. Chambers, Contr. Dudley Herb. 4: 283,–1955), *M. linearifolia* (Nutt.) Sch.–Bip. (A. Cronquist, Vasc. Pl. Pac. N. W. 5: 269,–1955; Chambers in L. R. Abrams & R. S. Ferris, Illus. Fl. Pac. States 4: 558,–1960), and *M. Lindleyi* (DC.) Gray (P. A. Munz & D. D. Keck, Calif. Fl. 1290,–1959). The treatment in Abrams & Ferris was based on proposals (Chambers, Contr. Dudley Herb. 5: 63,–64,–1957) that certain names in the synonymy be rejected as *nomina confusa.* A brief résumé of

Calais linearifolia DC., loc. cit., as to description, not as to synonym; *Uropappus linearifolius* Nutt., loc. cit., legitimate name; *Microseris linearifolia* Sch.–Bip., Pollichia 22–24: 308 (1866); *M. linearifolia* Gray, op. cit., 211, unnecessary combination.

The further synonymy of this species may be found in a previous publication (Chambers, op. cit. 4: 283,–1955).

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NOTES ON THE FLORA OF IDAHO – IV*

BY WILLIAM H. BAKER
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This is the fourth of a series of papers which lists additions to the flora of Idaho based on the work done for University of Idaho Special Research Project No. 31 entitled "A Taxonomic and Distributional Survey of Aquatic, Range and Weed Plants of Idaho". Some new records listed here are based on specimens sent or given to the author for identification by other collectors. Credit is given in the text.

BLECHNUM SPICANT (L.) Roth. Deer Fern. Open grassy flat, along dry creek ravine, Brown's Meadow, Flat Creek region, about 7 miles east of Harvard, Latah County, *Baker 16064A*. This fern has been collected once before at Rathdrum, Kootenai County, *Ash 8571*. Aleutians, Alaska to middle California and Eurasia.

CYNODON DACTYLON (L.) Pers. Bermuda Grass. Along a roadside, 3 miles southeast of Emmett, Gem County, *Erickson s.n.* Introduced from Europe. Sporadically established in dry areas in southern Idaho. Bermuda grass is the most important pasture grass in the south, and it is also utilized as lawn grass in southern United States. It is not listed for Idaho by Davis (4) or Hitchcock (5).

VENTENATA DUBIA (Leers) Coss. & Dur. Rocky banks, mouth of Beauty Bay Creek at Beauty Bay, Lake Coeur d'Alene, Kootenai County, *Baker 14870;* field, 3 miles south of Tensed, Kootenai County, *Baker 15931;* hillside, 5 miles north of Wor-

* Funds for this work were provided by the Research Council of the University of Idaho under Special Research Project No. 31.

ley, Rockford Road, Kootenai County, *Baker 15938*. Introduced from Europe. Previously known in U.S. from only one collection at Spokane, Washington. Apparently becoming well established and naturalized in Kootenai County. A new record for Idaho.

BUTOMUS UMBELLATUS L. Flowering Rush. Growing locally at small pond on the west fork of Felton Creek, covering an area 100 feet by 150 feet, 5 miles northeast of Moscow, Latah County, *Francq s.n.* In the water the stand is almost pure but toward the bank it is associated with *Typha*. Introduced and spreading rapidly in the Lake Champlain basin and the western end of Lake Erie. It first became naturalized in North America in the marshes of the St. Lawrence River near Montreal. In the United States it is known from Vermont, New York, Ohio, and Michigan. Native to Eurasia. How this plant became established in Latah County, Idaho, is a matter for conjecture.

CAREX PAUCICOSTATA Mkze. Along Lake Coeur d'Alene, Kootenai County, *Rust 1978;* on sand bar along the North Fork of Boise River, 5 miles west of Deer Park Ranger Station, Boise County, *Christ 19392*. Known previously from Tulare County to Eldorado County in California. First records for Idaho.

JUNCUS COVILLEI Piper. Rocky streambank along the south fork of the Clearwater River, 4 miles west of Elk City, Idaho County, *Baker 12343*; moist grassy river bank, 20-mile Bar, along the Selway River 8 miles west-northwest of Selway Falls, Idaho County, *Baker 12797*. Rare in Idaho according to Davis (4). These are the only collections in the University of Idaho Herbarium of this species.

EPILOBIUM CILIATUM Raf. Swamp, 1 mile north of Last Chance, Island Park, Fremont County, T12N, R43E, S17, *Baker 9917*; creek bottom at headwaters of Red River Hot Springs, Idaho County, *Baker 12406*. This species is listed in Davis (4) as *E. adenocaulon* Hausskn. var. *perplexans* Trel.

VIOLA MACLOSKEYI Lloyd var. PALLENS (Banks) C. L. Hitchc. Moist streamside near McCall, Valley County, *Cametti s.n.;* wet marshy meadow, headwaters of Sawpit Creek, about 3 miles southwest of Silver City, Owyhee County, *Baker 7901;* moist meadow, headwaters of Goose Creek at Goose Lake, Adams County, *Baker 11706*; wet sphagnum bog, Hagen Lake, Bis-

mark Mountain trail, west of Kalispel Ridge, Priest Lake, Bonner County, *Baker 15526;* in meadows, 2 miles south of Headquarters, Clearwater County, *Christ 12050*. Hitchcock (6) says, "not known from Idaho".

OENOTHERA SCAPOIDEA T. & G. ssp. BRACHYCARPA Raven. Dry sandy plains, south of Bruneau along Highway 51, Owyhee County, *Baker 14026;* dry sandy banks, 1 mile north of Bruneau, Owyhee County, *Baker 10204;* gravelly soil, along dry creek bed at Rabbit Creek, 1 mile south of Murphy, Owyhee County, *Baker 10098, 12956*.

GENTIANA SIMPLEX Gray. Marshy ground, along Fishhook Creek, 2 miles west of Redfish Lake, Stanley Basin, Custer County, *Baker 10891*. Grows in mountain bogs and meadows from the central Cascades of Oregon south to the central Sierra Nevada of California, eastward through Oregon to central Idaho. Davis (4) combines this species with G. *thermalis* O. Ktze. It should be considered a separate species in this author's opinion.

ANTHEMIS TINCTORIA L. Yellow Chamomile, Yellow Marguerite. Roadsides and slopes, Kendrick Grade, 2 miles west of Kendrick, Latah County, *Baker 16186*. Well established and becoming quite prolific in this area. Native of Europe escaping from cultivation.

CNICUS BENEDICTUS L. Blessed Thistle. Fairfield, Camas County, *Paulsen s.n.* Appears as a weed in fields and waste ground, especially abundant in cultivated soils, established from central Washington to southern California, occasional eastward to the Atlantic States. Introduced from Europe.

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eventual publication of her revision in 1936.

Dr. Jepson was not one to shower attention upon us as students, but rather we were left to our own botanical devices and only by a distant and indirect supervision were we kept from going too far astray. This was accomplished not by classes or formal conferences but rather by informal and chatty conversation with individual students or small groups. Instead of giving a formal lecture, he would emerge from his office and share with any of us who might be in the herbarium room some bit of botanical information that he had just come upon and that he believed we should have. And usually such a lesson would be pointed out by reference to literature or specimen.

Once when on such a tour of teaching Dr. Jepson came into the herbarium room carrying a woody stem a foot or so long and about an inch in diameter. Although it seemed completely nondescript and unimpressive with its smooth dark brown bark—a branch that might have come from any one of scores of woody plants in California—Dr. Jepson asked us what it was. I am certain he thought that we would never guess and that he would have the pleasure of amazing us with its identity. However, this was one of those occasions when a small morphologic detail trips the spring of accidental sagacity—a bit of a branchlet attached to the woody stem told me indubitably that it was from an *Eriogonum*.

In my mind's eye I can still see the amazed expression that crossed my professor's face—I was almost sorry that so small a detail had furnished the telltale evidence that aborted a professor's discourse. We shall never know what Dr. Jepson would have told us of the wonders of *Eriogonum:* all I now know is that the long smooth brown woody stem was from *E. deserticola* Wats., one of those remarkable desert species which even to this day I have never seen growing (cf. I. T. Weeks in Madroño 1: 260, 261,—1929).

SAN FRANCISCO, *ante* 1933

Already in 1929 when I first came to work at the California Academy of Sciences things were getting crowded in the old quarters of the Botany Department in the west wing of North American Hall. There were just three rooms, a large herbarium

room which was herbarium and work room and two small rooms which were Miss Eastwood's office-library and a closet-like store-room. Fortunately, Miss Eastwood had earlier acquired for herbarium overflow the use of the long hallway that extended nearly the full length of the west wing and there along one wall were ranged more than a third of the herbarium cases. In succeeding years, as each building project for the Academy was completed, the Botany Department acquired additional space: with the completion of the Simpson African Hall (1933), it added the three rooms that had been occupied by the Academy's administrative and business office, and with the completion of the Planetarium and Science Hall (1949), Botany acquired the large storage room that had been part of the Department of Ornithology and Mammalogy. But back in those early days between 1914 and 1933, all department activity went on in the congested confines of the herbarium room—all of the routine and research activities connected with a vitally active and growing department.

At the north end of the herbarium room, Miss Eastwood worked at her long plain wooden table which was generally strewn with plants, books, papers, correspondence—anything and everything that happened to be "in the works" at the time. At right angles to this table was a shorter one at which Mrs. Kate Phelps, Miss Eastwood's sister, worked at mounting plants, attending to the flower show at the Academy's entrance, preparing notices for the California Botanical Club, and being general botanical assistant. Mrs. Phelps' table was cleared at noon and a museum type lunch with hot tea was partaken of by the botany "staff" and by Miss Susie Peers and perhaps others who came in from the Academy's office down the hall, as well as by any botanist or friend who happened to be visiting. Here in the herbarium room Miss Eastwood met with the gardeners of Golden Gate Park one evening each week, instructing them in the taxonomy of park plants so they might garden more intelligently and perhaps pass the park examinations for more advanced positions. After 1931 (when Miss Eastwood was crippled by an automobile), the Botanical Club held its meetings here too; before that all meetings of the club had been field excursions.

When I arrived on May 1, 1929, there wasn't room for me

at the center of departmental activity near Miss Eastwood's table—but I was settled not far removed, just over a double row of herbarium cases and an aisle against the middle windows of the room. Here I had a small work table with a smaller folding table behind me for overflow of books and specimens. If crowded quarters would have made me unhappy, I would have been miserable—but instead I was supremely happy to be at work in Botany at the Academy. Never before had I had easy access to so ample a library, and to have that library so conveniently available within the herbarium was a situation I had never enjoyed at Berkeley.

Convinced that I was highly privileged, I sought to express my appreciation by being as helpful as I could to Miss Eastwood. Not only would I be as useful as possible in routine duties about the herbarium, but I resolved I would help her in any way I could in any group of plants in which she might be interested. At that time her chief interest centered in *Arctostaphylos,* so everywhere I went I collected manzanitas; and, in order to do so more intelligently I spent considerable time reviewing what others had done and studying collections that I was making.

In mid-December 1930, Miss Eastwood went on a field trip to the Ione region in the foothills of the Sierra Nevada and returned with fresh flowering specimens of the Ione endemic, *Arctostaphylos myrtifolia,* which she gave me to study. I was puzzled why even a conservative botanist should have doubted the specificity of this remarkable plant, and I decided to compare these Ione specimens with fresh flowering material of *A. sensitiva* from Mt. Tamalpais in order to determine why Jepson could have proposed the combination *A. nummularia* var. *myrtifolia* (Madroño 1: 85,—1922).

On December 28, 1930, I collected flowering specimens of the sensitive shatter-berry on Mt. Tamalpais and within the week, on January 3, I was able to write up detailed accounts of both the Sierran and Coast Range plants. It was in this study that I first made that interesting and original observation on the differential distribution of stomata on leaves in *Arctostaphylos:* in the Sierran plant the number of stomata was equal on upper and lower leaf-surfaces, in the Coast Range plant the stomata were restricted to the lower surface. Funda-

landing. In retrospect, however, the Galápagos routine, has yielded the richest returns possible in proportion to time spent in the islands (April 15 to June 16). The rainy season in the islands during the first half of 1932 was one of the wettest and most prolonged, not only judged by repeated widespread downpours but also judged by the rampant herbaceous vegetation that grew on all parts of the lowlands except on barren expanses of recent lava. Would it not seem providential that I was obliged to collect within *Zaca*-call near sea level during this rare season when the usually desert lowlands bloomed as rarely seen before, if ever! Reported returns from studies of my lowland collections attest the richness and variety exhibited by the vegetation during that lush season.

When on May 24 the *Zaca* moved northward from the semi-barren middle western coast of Albemarle Island to the grass-carpeted slopes adjacent to Tagus Cove, I could rhapsodize that, after the sterile lava deserts of the preceding days, I was now in a botanist's paradise! Furthermore, as luck would have it, we were forced to spend four days in this scenic anchorage, because here was a spring that would replenish, keg by keg, our dwindling supply of potable water, the last such source we would contact during the remainder of our Galápagos visit. So long did we stay, that at last Mr. Crocker acceded to my perhaps importunate pleading—he granted me leave with two companions from the crew to make an overnight climb to the top of the great mountain east of Tagus Cove. For the opportunity and privilege I shall be ever grateful—the 4000-foot ascent was one of the memorable climbs of my life. From the grass-strewn slopes at the Cove, up glacier-like cascades of lava, through brushy thickets of a composite (*Lipochaeta laricifolia*) that at times were well-nigh impassable, it was a long, hot, strenuous pull, but even when we paused to rest, there was always the hope that with increasing altitude something different, something new would be discovered.

Perhaps if the climb had not been so arduous, perhaps if I had not been so alert to the occasion, perhaps if the shrubby Tagus Cove prickly pear (*Opuntia insularis*) with its huge lobes (the largest in the genus) had not grown all the way from sea level to the top of the mountain, what I looked at might never have registered mentally. As it so happened, however,

once when I paused to rest I made the startling observation that all the *Opuntia* crowns were fan-shaped and all the fans were aligned parallel to each other in an east-west direction. The fact was obvious—but why? Why did the crowns of these cacti assume the shape of grotesque fans and why then did these thousands of fans deploy themselves army-like with such precision across the face of this equatorial volcano? What visible or invisible elemental commander of land, sea, fire, or air marshalled this fantastic army?

These were my observations and questions as I paused to rest and cool myself in the gentle steady breeze that blew up from the sea over the hot dry slopes of the Tagus Cove volcano,—while all about me were the remarkable opuntias with their ponderous branches. Then as I looked out to the west,—past thin-edge of the cactus fans, down to the *Zaca* riding at anchor in the fjord-like cup of Tagus Cove, and on across the bit of tropic sea to the lava-streaked cone of Narborough,—I pronounced: "It's the air. It's this gentle constant rise of sea air that has shaped these weighty crowns." (*See* Proc. Calif. Acad. Sci., ser. 4, 21: 45; Cactus & Succulent Journ. Amer. 5: 518, figs. 5, 6.)

There my sagacity ended; for nothing in the plant or scene told me whether the fans would remain fans if subjected to a less constant or a rougher wind or to no wind at all. However, one cannot expect accidental sagacity in any particular instance to operate indefinitely. Even the princes of Serendip, after assessing a phytological anomaly along a road they were traversing, did not proceed to anticipate Lamarck or Darwin with a declaration on the inheritance of acquired characters.

POLYPOGON AUSTRALIS BRONGN. IN NEVADA. This close relative of *P. interruptus* Kunth, reported from a wide range of localities in California and from Cedros Island, Baja California, by Rubtzoff (Leafl. West. Bot. 9:166–169,–1961), may now be reported from Nevada: margin of Cane Springs, drainage of Frenchman Flat, Nye Co., elev. 4000 ft., 13 May 1959, *J. C. Beatley & W. H. Rickard 556* (herb. Nevada Test Site). The specimen was sent to me for identification by Dr. Janice C. Beatley.—PETER H. RAVEN, Stanford University.

Range Extensions for Three Species in New Mexico

Agave Lechuguilla Torr. has been reported just inside New Mexico at the north end of the Franklin Mountains. It has been suggested that temperature limits the spread of this species farther north. I have found plants growing profusely on appropriately southeast and southwest facing slopes of Bishop's Cap as far north as the northern boundary of Section 25, Township 24 South, Range 3 East. This is 13 miles north of the Texas-New Mexico boundary. Since these specimens were so robust and since our temperatures in the winter of 1961–62 were the lowest on record, it would appear that temperature may not be the restricting factor. This lends hope that the species will be found still farther north on properly oriented limestone slopes.

Echinocactus uncinatus var. Wrightii Englem. has previously been reported only from the extreme southern end of the Organ Mountains. I have found this in Ash Canyon, in the San Andres Mountains in the SW 1/4, Section 21, Township 19 South, Range 4 East, some 28 miles farther north. One of the specimens found is in the cactus garden at New Mexico State University.

Opuntia Grahami Engelm. was reported by Wooten and Standley as common on the mesas near El Paso, Texas, though they knew of no report from New Mexico. I have found several specimens in a small area in SW1/4 of NW1/4, Section 35, Township 24 South, Range 3 East, just southwest of Bishop's Cap at the south end of the Organ Mountains.—Thomas K. Todsen, Las Cruces, New Mexico.

A Name in Poa

Poa Douglasii Nees subsp. **macrantha** (Vasey) Keck, comb. nov. *Poa macrantha* Vasey, Bull. Torrey Bot. Club 15:11 (1888); *Melica macrantha* (Vasey) Beal, Bull. Torrey Bot. Club 17:153 (1890). Some time ago Dr. James A. Calder of Ottawa, Canada, called my attention to the fact that the above-proposed combination had not been validly published in Munz and Keck, A California Flora, 1485 (1959), since the place of publication of the original basonym of *Poa macrantha* was not cited. To meet the requirements of the International Rules, I submit this note.—David D. Keck.

—1964) and in southern California from San Bernardino, Riverside and Orange counties.

It may be of interest to note that in the Hendy Woods State Park, where *P. australis* was found to be very common along the Navarro River, it grew together with three other species of the genus, namely *P. monspeliensis* (L.) Desf., *P. interruptus* H.B.K., and *P. maritimus* Willd. (*Rubtzoff 5410* in 1964, CAS). For the last species this is probably a new county record, *P. maritimus* not having been previously reported from Mendocino County (Leafl. West. Bot. 9:169, 170, —1961).

Of great interest is the following specimen of *P. australis* from Arizona, since the plant, to my knowledge, has not been reported heretofore from that state: Havasu Canyon, Coconino Co., *Deaver 2104* in 1947 (CAS).—PETER RUBTZOFF.

PUBLICATION DATES FOR ILLUSTRATED FLORA OF THE PACIFIC STATES

In answer to my expressed wish to have placed on record the full publication dates for Abrams and Ferris' Illustrated Flora of the Pacific States, I received the following data from Mrs. Dorothy O. Riedel at the Stanford University Press through Mrs. Roxana S. Ferris with permission to publish them:

Volume I. Ophioglossaceae to Aristolochiaceae
First published, May 15, 1923.
Second printing, with corrections, August 1, 1940.
Third printing, February 21, 1955.
Fourth printing, February 5, 1962.

Volume II. Polygonaceae to Krameriaceae
First published, March 29, 1944.
Second printing, September, 1950.
Third printing, January, 1964.

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LEAFLETS *of* WESTERN BOTANY

CONTENTS

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The question of the precise relationship between the two species is one to which geneticists could find the answer, if they could be induced to work with these plants; but, in default of any better evidence, some pertinent information is available from study of the living plants in their natural habitats.

Fritillaria biflora is characteristically a plant of the coastal region, but in San Luis Obispo County extends as far inland as the vicinity of Creston, where the climate is characterized by a wide range of temperatures and very dry summers. This locality is about ten miles from the nearest place where *F. agrestis,* strictly a plant of the interior region with its "continental" climate,[1] is found. Despite the close resemblance between them, it has been possible to refer each stand of the plants in this local area to one species or the other, on the basis of the key characters stated below; and in the region of their closest proximity no hybrid-like individuals (which if they existed would suggest interfertility) have been seen. It will be instructive to note whether the reliability of these key characters can be confirmed by other observers.

Herbage very glaucous; bracts linear-lanceolate to lanceolate; flowers strongly odorous; style-branches about equaling the undivided portion of the style.....*F. agrestis*

Herbage not glaucous; bracts lanceolate, often broadly so; flowers not noticeably odorous; style-branches about twice as long as the undivided portion of the style.....*F. biflora*

Finally a note on the odor of the flowers is in order. Those of *F. agrestis* always have a strong fragrance which has been compared to that of decaying fish. For a long time I was unable to detect any odor in *F. biflora,* although Mr. Philip McMillan of San Luis Obispo told me that the common name "vinegar bells" was applied to this species. In the spring of 1960, however, I noted that a bunch of *F. biflora* did indeed give off a faint odor suggesting vinegar. The presence or apparent lack of this odor could be conditioned by the genetic constitution of individual plants, or could equally plausibly vary with the condition of a person's olfactory apparatus.

While the "brown bells" of San Luis Obispo County seem to fall into two geographically separate groups, whether specifi-

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[1] At least in San Luis Obispo County. Collections from the coastal region farther north, which have been referred to *F. agrestis,* are, I suspect, more probably referable to *F. liliacea* Lindl.

cally distinct or not, a consideration of related plants from the east side of the Great Valley and adjacent Sierra Nevada foothills reopens the question, and once again emphasizes the need for more intensive ecologic and genetic ("genecologic") studies in *Fritillaria*. Although these east-side plants have been collected numerous times, they apparently have been referred uncritically to *F. agrestis* until a collection was made southeast of Oakdale on Claribel Road, Stanislaus County, March 17, 1962, *Hoover 8536*. On this occasion, a careful study of the fresh plants was made. The Stanislaus County plants resembled *F. biflora* of San Luis Obispo County in being not glaucous, and the style-branches, although variable, were mostly at least twice the length of the undivided portion. On the other hand, the bracts were linear, on the average even narrower than in most specimens referred to *F. agrestis*. The perianth at the locality mentioned, and also elsewhere on the east side of the Great Valley, is dull white to yellowish-green with often a purplish tinge, never deep purple. The variation in odor is particularly remarkable. At the time of making the 1962 collection, it was noted that some individual plants had flowers without detectable odor, but others in the same stand showed the distinctive odor customarily associated with *F. agrestis*.

Thus a possible basis for distinguishing between *F. biflora* and *F. agrestis*, worked out with some difficulty in San Luis Obispo County, collapses when tested on related plants in Stanislaus County. The proper taxonomic status of these plants remains puzzling. The nature of their relationship to the coastal species *F. liliacea* Lindl. also ought to be studied.

CHLOROGALUM

One of the most highly localized of all species is *Chlorogalum purpureum* Brandegee. The typical form is restricted to the vicinity of Jolon, Monterey County, where despite various hazards it is still plentiful. Plants found in an equally restricted area in central San Luis Obispo County, discovered apparently for the first time in 1947, seem to be identical except for their compact, dwarf manner of growth. Since the two populations of the species are consistent within themselves and geographically separated, they may be treated taxonomically as varieties. Both have been cultivated at San Luis Obispo and have retained

their distinctive habit when grown side by side. The difference is therefore not attributable to a less favorable soil in the San Luis Obispo County habitat.

Chlorogalum purpureum Brandegee var. **reductum** Hoover, var. nov. Planta 10–20 cm. alta (in var. *purpureo* 20–40 cm. alta).

Plant 10–20 cm. tall (in var. *purpureum* 20–40 cm. tall).

Type: 18 miles east of Creston on La Panza road, San Luis Obispo County, May 3, 1957, *Hoover 8384* (herbarium of California State Polytechnic College at San Luis Obispo).

Other material: same locality, May 15, 1949, *Hoover 7691*; "Camatta Road, three-eighths mile east of Honey Bee Mine, Upper Camatta Canyon, occasional in open areas in hard, dry serpentine soil," May 27, 1955, *Twisselmann 2039*.

A fact of biological interest is that under cultivation, when watered occasionally, *Chlorogalum purpureum* var. *reductum* continued to produce new branches from the base and to bloom repeatedly throughout the summer. By contrast, the typical form of the species showed no new growth after its initial early-summer flowering period. The dwarf variety would thus be of horticultural value despite its small size.

Chlorogalum pomeridianum var. *divaricatum* (Lindl.) Hoover, the low-growing coastal form of the species, has been previously reported no farther south than Monterey County (Madroño 5:143, —1940). Actually it is abundant on the coast of San Luis Obispo County from Cambria northward, and also has been observed on Point Sal Ridge, Santa Barbara County.

Chlorogalum pomeridianum var. *minus* Hoover remains a puzzle genetically and taxonomically. The variety was originally based on plants from an area of serpentine rock in western Tehama County. The stems are shorter and the bulb-coats less fibrous than in the widely distributed typical phase of the species. Seeds collected at the type locality of var. *minus* and planted at San Luis Obispo gave rise eventually to stems quite as tall as the average of the species. Meanwhile, plants similar to the type of var. *minus* have been found in other serpentine areas in the Coast Ranges, as far south as the vicinity of Cuesta Pass, San Luis Obispo County. Bulbs from the last-named locality also produced taller stems in cultivation. These facts by themselves suggest that the variety is merely an environmental form (ecophene) dwarfed by a sterile or subtoxic serpentine soil. The fact remains that the coarse fibers in the bulb-coats are less

ueroa Mountain, again in an area of serpentine. Plants from farther south and farther east are probably referable to the more widespread var. *pallida*:

Mariposa clavata (Wats.) Hoover var. **pallida** Hoover, var. nov. A var. *clavata* differt: petalis dilute luteis, pilis sensim dilatatis sursum, certe sub 0.1 mm. diametro; glandis pilis fungoideis minoribus et minus ramosis; antheris luteis vel purpurascentibus.

Petals light yellow, the hairs gradually enlarged toward apex, distinctly less than 0.1 mm. in maximum diameter (in dried specimens); fungoid processes of gland smaller and less branched; anthers yellow to pale or medium purple.

Type: summit of La Panza Range, Pozo-Simmler road, San Luis Obispo County, June 30, 1955; *Hoover 8362* (herbarium of California State Polytechnic College at San Luis Obispo).

Other representative specimens. San Joaquin Co.: Hospital Canyon, *Bacigalupi 3097* (J, UC).[3] Stanislaus Co.: Mt. Oso, *Rose 49144* (CA); lower part of Arroyo del Puerto Canyon, *Hoover 3415* (UC). Merced Co.: hills bordering Ortigalita Valley, *Hoover 4372* (UC). San Benito Co.: San Carlos Creek, *Bacigalupi 2730* (J); 17.6 miles from New Idria on road to Panoche, *Raven 9232* (CA); two miles north of Idria, *Constance & Morrison 2266* (UC). Fresno Co.: Ciervo Hills, *Johannsen 73* (UC). Kern Co.: Alec Cook Canyon, Temblor Range, *Twisselmann 1186* (CA). Ventura Co.: 1.6 miles south of Blue Point, *Nordstrom 576* (UC). Santa Barbara Co.: Cachuma Canyon, *Peterson 192* (UC). Los Angeles Co.: Pico Canyon, *Moran 192* (UC); top of first grade in Mint Canyon, *Peirson 288* (J); near summit, Ridge Route, *Epling & Wheeler 1854* (UC).

Most of the plants which belong to the species *M. clavata* are here considered to be of this variety, which represents the species exclusively over most of its area. In addition to having a distinct (although contiguous) geographical distribution, var. *pallida* is also differentiated from var. *clavata* by its soil requirements. Although there is no proof that var. *pallida* never grows on serpentine, at least it does not ordinarily. Very frequently it is found growing luxuriantly in a sandy loam derived from the weathering of either sandstone or granite.

Mariposa clavata (Wats.) Hoover var. **recurvifolia** Hoover, var. nov. Plantae nanae, 9–12 cm. altae; internodiis usque ad 20 mm. longis; foliis valde recurvatis; floribus var. *clavatae*.

Plants dwarf, 9–12 cm. tall (including flowers); internodes 20 mm. long or less; leaves strongly recurved; flowers as in var. *clavata*.

Type: 1.8 miles north of Arroyo de la Cruz on State Highway No. 1, San Luis Obispo County, in heavy soil on ocean bluff, July 17, 1954, *Hoover 8349*.

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[3] Herbaria abbreviated as follows: California Academy of Sciences (CA); Jepson Herbarium at University of California, Berkeley (J); University of California at Berkeley (UC).

This localized variant has retained its distinctive vegetative features when grown at San Luis Obispo. It occurs in association with the two notable localized species, *Ceanothus maritimus* Hoover and *Bloomeria humilis* Hoover. Wild plants bear usually only one flower, sometimes two. In cultivation the stems may branch and bear several flowers, although always remaining short and retaining short internodes.

A complete study of *M. clavata* should take into account two isolated populations which I have been able to study neither in the field nor as garden cultures. Because herbarium specimens are inadequate for determining whatever distinguishing features might exist, I refrain at this time from giving these variants new names under the genus *Mariposa*. One of them is *Calochortus clavatus* var. *avius* Jepson, from the Sierra Nevada in Eldorado County. Dried specimens seem to conform with *M. clavata* var. *pallida* in the relatively slender hairs on the petals as well as in other respects. The limited material available suggests that the flowers may average larger and the petals somewhat wider in proportion to length, but the measurements fall within the total range of variation of var. *pallida*. However, as the Sierra Nevada plants grow under climatic conditions quite different from those prevailing in the main area of var. *pallida*, there is a suspicion that fresh flowers would reveal differences which are not yet evident. If the two plants later prove identical, the name var. *pallida*, of course, will have to be discarded in favor of the earlier varietal epithet.

The other variant in question is *Calochortus clavatus* var. *gracilis* Ownbey, found in the San Gabriel Mountains of Los Angeles County. In this case even herbarium specimens are readily recognizable. The stems are more slender and the flowers smaller than in other forms of the species. The hairs on the petals evidently resemble those of var. *pallida*, but the deep coloration visible in at least some of the dried specimens suggests an approach to the intense yellow of var. *clavata*. Here again is a problem to which the methods of genetics should be applied. A really intensive study might lead to the conclusion that the plants in question should be classified as a distinct species, not merely a variety.

Differentiation of Mariposa simulans from M. venusta

At one time it was believed that *Mariposa simulans* Hoover, a fairly localized endemic, completely replaces its near relative

M. venusta in the central portion of San Luis Obispo County. That this is not the case has been shown by finding both species growing together in the La Panza district. Significantly, there were no apparent hybrids or other indication of interbreeding despite the close proximity of the plants. In addition to the distinguishing features previously stated (Leafl. West. Bot. 4:3,—1944), a difference in the shape of the petals separated the plants of the two species at this locality. The petals of *M. venusta* were inwardly curved on the sides so as to form a narrowed base (i.e., a "claw"). In *M. simulans* the petals had straight sides and thus were cuneate. Whether this means of differentiation would extend to all plants of these species is doubtful. Attempts to apply it to herbarium specimens have not been uniformly satisfying. However, fresh flowers of *M. venusta* from throughout its range should be studied with this point in mind.

Petals of *Mariposa:* left, *M. simulans,* from Rocky Canyon between Atascadero and Creston, *Hoover 8375*; right, *M. venusta,* from La Panza road 14 miles east of Creston, *Hoover 7697*. Although these two collections did not come from a mixed stand, they well illustrate the differences between the petals of the two species as they are represented in central San Luis Obispo County. Portions shown shaded were red or reddish. The drawings were made from herbarium specimens.

ANOTHER CHICKWEED IN CALIFORNIA. The Old World jagged chickweed, *Holosteum umbellatum* L., was collected on the Shasta-Siskiyou field trip of the California Botanical Club on May 11, 1964, at Grenada, Siskiyou County, California (*Howell 40699*). It has been known along the Pacific Coast from southern British Columbia south to Lake County, Oregon, but this is the first record we have seen from California.—J. T. HOWELL.

(U.S. National Herbarium). There are also at New York fragments of two un-numbered collections made by Percy Train in the Steens Mts. One of these had earlier been identified by Dr. Keck as *P. fruticosus,* under an unpublished subspecific combination based on the more northern *P. Douglasii*; the other had been labeled with an unpublished subspecific name under *P. Menziesii,* attributed to Pennell & Keck.

The var. *praeteritus* is known from four mountain ranges in southeastern Oregon and adjacent northern Nevada, in a coherent geographic area well removed from the other varieties of *P. Davidsonii.* It is scattered over the Steens Mts. (though not really abundant), and it has been collected once each in the Pueblo, Pine Forest, and Santa Rosa mountains.

The nearest known geographic approach of *P. Davidsonii* var. *Davidsonii* to the var. *praeteritus* is in the Warner Mts., where several collections of var. *Davidsonii* have been made, these being on both sides of the Oregon-California border. The nearly 80 miles in Oregon between the Warner Mts. and either the Steens Mts. or Pueblo Mts. is not likely country for any of the varieties of *P. Davidsonii.* A similar stretch of dry plains separates var. *praeteritus* from the more northern *P. fruticosus,* which extends south only to the Ochoco-Strawberry-Blue Mt. complex in Oregon. Exploration of some of the mountain ranges of northwestern Nevada, such as the Granite Range in Washoe Co., might narrow the apparent range gap between the var. *praeteritus* and the var. *Davidsonii,* however.

The possibility that the plant here described as var. *praeteritus* might represent a distinct taxon was apparently first noted by Charles V. Piper, who wrote, "If not abnormal a new subspecies" on the sheet of *Leiberg 2494* at the U.S. National Herbarium. As shown by other herbarium annotations, Pennell and Keck later considered both separately and jointly the possibility of describing it. However, none of these botanists had a large enough series of specimens available to feel confident of the stability of the foliar characters which mark the var. *praeteritus.* The characteristic and uniform flower color was not known to them, and the relatively large size of the flower was not shown to its full degree by the specimens then available. The Leiberg collection, in fact, has unusually small flowers for the variety and does in some vague way look abnormal. Piper apparently never saw another specimen, and neither Pennell nor Keck was

able to study the plant in the field. The continuing uncertainties led to an indefinite postponement of publication by Pennell and Keck, and Dr. Keck now advises me to approach the problem *de novo*. The historical background is here presented for the sake of the record.

When I collected the var. *praeteritus* at several stations in 1959, I took it to be an undescribed species, related to *P. Davidsonii,* but diverging in the direction of *P. fruticosus*. The habit is very much like that of typical *P. Davidsonii,* although in old plants of var. *praeteritus* the dense leaf-mat tends to become elevated an inch or so above the substrate. I have not observed this tendency in the other varieties of *P. Davidsonii,* in which the leaf-mat characteristically lies flat on the ground. The flowers of var. *praeteritus* are distinctly larger than those of the other varieties of *P. Davidsonii,* and their bright blue-lavender color is seldom encountered in the other varieties; they are, indeed, altogether like those of *P. fruticosus*. The leaves are in the size-range of *P. Davidsonii* rather than *P. fruticosus,* although in the Blue Mt. region of Oregon the highly variable *P. fruticosus* runs to a small-leaved extreme which approaches *P. Davidsonii* in this regard. Although the leaves of var. *praeteritus* are in the size-range of *P. Davidsonii,* they differ in form from those of both of the other varieties. The range of var. *praeteritus* is wholly discrete from those of its immediate relatives, with no overlap at all; it lies to the south of *P. fruticosus,* and to the east of the other varieties of *P. Davidsonii.*

Study in the herbarium tends to confirm the distinctness of var. *praeteritus* from *P. fruticosus*. The ranges of the two are wholly distinct, so that there is no chance for hybridization, and there are no doubtful specimens. The mat-forming habit of var. *praeteritus* is not always obvious in the herbarium, perhaps because its degree of woodiness leads collectors to different techniques in making specimens from those that are applied to the other varieties of *P. Davidsonii*. Even without recourse to this feature, however, the var. *praeteritus* can be consistently distinguished from *P. fruticosus* by the size and outline of the leaves. One does not need to know the geographic origin of a specimen to draw the distinction confidently.

On the other hand, a sharp distinction between var. *prac-*

teritus and var. *Davidsonii* is impossible when the whole range of variability is considered. There are no specimens of var. *praeteritus* which need be mistaken for var. *Davidsonii,* but there are specimens of var. *Davidsonii* (e.g., *Pennell 26370,* Elizabeth Lake, Yosemite National Park, California; at the Academy of Natural Sciences of Philadelphia) which could easily pass as var. *praeteritus* if the label were covered. This Pennell collection has large flowers, up to about 4 cm. long, and the leaves are variable, with some of them being quite like those of var. *praeteritus.* There is no doubt that the var. *praeteritus* constitutes a distinctive and relatively uniform regional population, but its separation from the more variable var. *Davidsonii* is not at all absolute. I am therefore constrained to subordinate the var. *praeteritus* to *P. Davidsonii,* rather than treating it as a distinct species as I had at first intended.

The inclusion of var. *praeteritus* in *P. Davidsonii* tends to weaken the distinction between that species and *P. fruticosus,* but does not vitiate it. The expanded *P. Davidsonii* is sharply distinguished from *P. fruticosus* by its mat-forming (rather than suberect) habit, and by its relatively small leaves. The already tenuous specific status of *P. ellipticus* Coult. & Fisch., of the northern Rocky Mts., is rendered still more tenuous by the var. *praeteritus,* since the relatively large flowers and elongate, strongly glandular calyx which serve as secondary distinguishing features of that species are duplicated in var. *praeteritus.* I have elsewhere questioned the advisability of maintaining *P. ellipticus* as specifically distinct from *P. Davidsonii,* but I am not now prepared to do more than point out the problem.

The three varieties of *P. Davidsonii,* as I understand them, may be characterized as follows:

Flowers relatively large, the corolla (3) 3.5–4.5 cm. long, bright blue-lavender; leaves entire, elliptic or ovate, broadest at or below the middle, mostly acutish; mts. of Harney Co., Oregon, and Humboldt Co., Nevada .....var. *praeteritus*

Flowers mostly smaller, the corolla 2–3.5(4) cm. long, seldom bright blue-lavender, usually a darker or duller blue-purple; mostly Cascade Sierran.

Leaves entire, tending to be broadest above the middle, and fairly consistently rounded or obtuse at the tip; Cascade-Sierran, extending east to the Warner Mts. and Sweetwater Mts.; the only form of the species in Calif. and most of Oregon, extending north in the Cascade

nina) occurs in the mountains of Ventura County (*Hardham 5686, 6957*). At present these two species are quite distinct, since, although in both $n = 7$, *C. Parryi* has never been found to have more than 5 closed pairs at meiosis while *C. antonina* has 7 closed pairs. Garber[1] considers chiasma frequency to be a valid cytotaxonomic character by which to separate species in the genus *Collinsia*. Probably *C. antonina* is another case of an outlier of a southern species persisting after the post glacial warm period as a relict in the valley of the San Antonio and Nacimiento rivers of the Santa Lucia Range, although it would seem to represent one of the few cases in which evolution has proceeded far enough to separate the northern relict and the main southern populations into two distinct species.

Collinsia antonina is rare on Monterey silicious shale talus slopes in the San Antonio Hills between Bradley and San Antonio Mission. It grows in sun or part shade on north slopes under or near *Quercus dumosa* Nutt. However, it does not grow where leaves from the oak accumulate. Suitable habitats can usually be recognized by the presence of *Montia spathulata* (Dougl.) Howell. Typically the *Montia* is abundant while the *Collinsia* is restricted to areas where the talus is comparatively stable and the microclimate comparatively mesic. The banks formed by deer trails and depressions in the vicinity of fallen branches and exposed roots are the most likely places for these plants to be found, especially in unfavorable seasons. Occsasionally *C. antonina* also occurs on shale ledges (as in the hills north of San Antonio Mission).

To a limited extent, especially compared with sandstone and serpentine, silicious shale serves as a suitable ecological niche for relict and endemic species. An odd form of *Clarkia deflexa* (Jeps.) Lewis & Lewis and a bicolored form of *Chorizanthe rectispina* Goodman (whose white sepals are distinctly yellow at the base) are both local races of species whose main ranges are farther south. Like the *Collinsia*, these local endemics are restricted to the shale soils of the southern margin of the San Antonio Hills. None of these three endemics has been found in similar habitats a few miles to the east on the other side of the Salinas River.

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[1] Garber, E. D. The genus *Collinsia* I: chromosome number and chiasma frequency of species in the two sections. Bot. Gaz. 117:73–76 (1956).

Collinsia antonina occurs as two distinct subspecies, occupying essentially the same microhabitat, but rarely occurring together. In a season in which one subspecies thrives the other may be rare and depauperate. On the rare occasions when the two subspecies are sympatric some hybrids can be found. I have not been able to decide what factors may determine the presence of one subspecies and the absence of the other.

Collinsia antonina Hardham ssp. **antonina.** Corolla alba basi loborum superiorum rubro-maculata, tubo corollae calyce circa 1 mm. breviore.

Corolla white, red-spotted at base of upper lobes, corolla-tube about 1 mm. shorter than the calyx.

Collinsia antonina Hardham ssp. **purpurea** Hardham, ssp. nov. A ssp. *antonina* differt: corolla purpurea basi loborum superiorum alba et rubro-maculata, tubo corollae calyce paulum longiore.

Differing from ssp. *antonina* in its ecological requirements, in the color of the corolla which is purple with a red-spotted white area at the base of the upper corolla-lobes, and in its calyx which is slightly shorter rather than slightly longer than the corolla-tube.

Type: Herb. Calif. Acad. Sci. No. 447,811, *Hardham 11013,* collected April 20, 1964, on silicious shale in the hills on the west side of Hames Valley, Jolon-Bradley Road, Monterey County, California. Isotypes to be distributed.

Numerous other collections of this species as well as all the collections of the hybrid between the two subspecies are in the Jepson Herbarium at Berkeley.

THE JUVENILE LEAVES OF A CALIFORNIA JEWEL FLOWER. By the time the plants of *Streptanthus polygaloides* Gray attain anthesis and produce those remarkable flowers that distinguish the species, only the middle and upper cauline leaves remain. These are entire and have been described as either filiform (Gray, Proc. Amer. Acad. 6:519; Jepson, Fl. Calif. 2:32) or linear (Abrams, Ill. Fl. 2:251; Munz, Calif. Fl. 221). On April 29, 1964, I was able to collect seedlings of this species (*No. 40676*) on the serpentine slopes between Bagby and Coulterville, Mariposa County, at the same place where, on May 19, 1954, I had collected flowering plants (*No. 29890*).

The basal and lowest cauline leaves of these seedlings are mostly 4–8 cm. long, slender-petiolate, and pinnately divided to the linear rachis, with the divisions usually 3–5 on each side, divaricately spreading, 2–15 mm. long, entire, linear or linear-

oblong, rarely narrowly obovate or oblanceolate. Although most of the middle and upper cauline leaves are entire, occasionally some about the middle are intermediate and bear one or few short lobes. The earliest leaves, which I cannot find described for the polygaloid jewel flower, are reminiscent of those of *S. diversifolius* Wats.—JOHN THOMAS HOWELL.

A NEW STATION FOR ERIOGONUM APRICUM

On February 22, 1964, Arthur Menzies, Barbara Sherfey, and I were investigating the plant material in the Ione area of Amador County, California. On an old deserted road, we found *Eriogonum apricum* J. T. Howell and thought we were at the type locality of this plant.

On April 16, 1964, I was again in the Ione area in the company of Roman Gankin, who was conducting a botanical expedition to collect variations of *Arctostaphylos myrtifolia* Parry. We ate lunch at a point about two miles north of Buena Vista at the restricted type locality patch of *Eriogonum apricum*. It was at this time I realized that I had seen it elsewhere on Washington's Birthday.

After inspecting it where it was originally discovered, I led the group to a point about two hundred yards northeast of the intersection of Buena Vista Road and Highway 88 cut-off to Jackson. On the north side of the highway, we climbed the low roadcut and at this point there is an old abandoned road. Following this for about one hundred yards, we came upon the first group of plants, a few individuals of *E. apricum* among *Arctostaphylos myrtifolia* in the most barren spots. Other members of our party scouted around the perimeter and found the *Eriogonum* to be quite extensive. The plants are more scattered than in the type locality where the occurrence is more concentrated and the plants are larger.

It is also interesting to note that at the intersection of Highway 88 cut-off to Jackson and Buena Vista Road, there is a large patch of *Ceanothus tomentosus* Parry, in the vicinity of its type locality. Among the plants with pure blue flowers, there are at least four fine plants with snow-white flowers. They seem to be normal in every respect otherwise.—WAYNE RODERICK, University of California Botanical Garden, Berkeley.

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CHENOPODIUM CARNOSULUM AND SOME RELATED TAXA IN NORTH AND SOUTH AMERICA [1]

BY HERBERT A. WAHL
Pennsylvania State University

1. CHENOPODIUM CARNOSULUM

In the herbarium of the California Academy of Sciences are several sheets of *Chenopodium* which, when I examined them in 1955, could not be placed with any known North American species. These were from sand dunes or similar habitats along or near the coast in San Luis Obispo and Santa Barbara counties, California. The plants are nearly or quite prostrate, with branches to 3 dm. long, though often much shorter. Blades of the primary leaves are membranaceous or slightly thicker, narrowly ovate, averaging 1/3 as broad as long, to 20 mm. long, gradually broadened above the cuneate base to a width of up to 9 mm., then tapering to an obtuse or acute tip, and varying from this to lanceolate bracts near the tips of the branches. In most cases the broadened base of the leaf hardly constitutes a lobe although occasionally it may terminate in an obtuse tip and then may be referred to as a lobe. The leaf margins are otherwise entire. Flowers and fruit are present in cymose glomerules in short (usually 1 cm. long or less), irregular, naked, interrupted spikes from the axils of the leaves and bracts. The achenes are horizontal, 0.9 to 1.1 mm. broad, with the usually attached pericarp variously minutely puncticulate and grey-striped or -mottled.

The possibiilty of these representing an undescribed species was considered but the known occurrence on the west coast of varieties of species native in the drier and colder parts of southern and western South America [*C. macrospermum* Hook. f. var. *farinosum* (Wats.) J. T. Howell, *C. chenopodioides* (L.) Aellen var. *Degenianum* (Aellen) Aellen and var. *Lengyelianum* (Aellen) Aellen] suggested a possibly similar relationship for these relatively restricted plants.

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[1] Authorized for publication on Nov. 2, 1964, as Paper No. 2953 of the Pennsylvania Agricultural Experiment Station, and Contribution No. 185 from the Department of Botany, Pennsylvania State University.

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More recently, in studying the *Chenopodium* collections from the University of California Herbarium, additional collections of the same taxon from the same area were found, and fortunately, a photograph of the type of *C. patagonicum* Phil., which is such an exact match for the California plants as to leave no doubt as to their inclusion with this species.

Aellen (in Fedde Rep. Spec. Nov. 26:125,—1929), however, had discussed *C. carnosulum* Moq. and suggested it might be the same as *C. patagonicum* Phil., *C. fuegianum* Speg., and *C. scabricaule* Speg. On page 160 (l.c.) he discussed *C. scabricaule* and *C. fuegianum,* considering the latter to be identical with *C. patagonicum,* and suggesting they might all be included under *C. carnosulum.* In 1943 (Amer. Mid. Nat. 30:65) all these, including the three forms of *C. scabricaule,* were reduced by Aellen to synonymy under *C. carnosulum.* The previously known range of these taxa was from the southern tip of South America, northward in the Andean region, to southeastern Mexico, with *C. fuegianum* also in the Pacific Islands.

In order to pursue the specific identities further, material was secured from Gray Herbarium, New York Botanical Garden, U.S. National Herbarium, Chicago Natural History Museum, and Missouri Botanical Garden, and a photograph of the type of *C. carnosulum,* together with pertinent notes concerning microscopic details, from the Royal Botanic Gardens, Kew, England. Through the courtesy of the curators of these herbaria, and with the material already at hand, a total of 51 sheets, representing 36 separate collections of these apparently not well-understood species, and including some related material, became available for study.

The type of *C. carnosulum* Moq. (in DC. Prod. 13(2):64,—1849), from Port Gregory, Patagonia, and essentially identical more recent collections from Gob. Vera Cruz and Gob. Tierra del Fuego, Argentina, differ from the California plants in having the leaf-blades chiefly coriaceous, nearly rhombic in outline, lobed above the base, ⅔ to as wide as long. The lobes are short but prominent, usually less than 1 mm. long, and even the uppermost leaves, though becoming successively smaller, retain the same outline and do not grade into lanceolate bracts as do those of *C. patagonicum.* The largest leaves available in the material at hand hardly reach 1 cm. in length but the low-

C. CARNOSULUM var. CARNOSULUM

ARGENTINA. Gregory Bay, eXtra-tropical South American Survey of H. M. S. Nassau, 1866–69, *Cunningham* (GH). Tierra del Fuego: Viamonte, eastern coast, alt. 5 m., *Mexia 7960,* Mar. 20, 1936 (GH, NY, MO, UC). Santa Cruz: alt. 200 m., *Donat 110,* Jan. 2, 1929 (GH, NY, MO, CAS, F, UC) (labeled as *C. patagonicum*; the last three mixed with *C. scabricaule* f. *pusillum*); Depto. Magallanes, 50 km. n. of San Julian, alt. 60 m., *Eyerdam, Beetle & Grondona 23964,* Dec. 30, 1938 (GH) (somewhat doubtful; "perennial herb, prostrate"; branches to 4 dm. long).

MEXICO. Region of San Luis Potosi, *Parry & Palmer 780,* 1878 (US, type of *C. Parryi* Standl.). This is referred here although the material is not presently at hand.

C. CARNOSULUM var. PATAGONICUM

CHILE. Tuncal (Uspallata Pass), alt. 2200 m., *Buchtien* (in part), Feb. 1903 (US) (seeds 1.3–1.5 mm.).

MEXICO. Mt. Orizaba, alt. 10,000 ft., *Seaton 184,* Aug. 6, 1891 (GH). Vera Cruz: Perote, Los Molinos, alt. 7500 ft., *Balls B5508,* Sept. 22, 1938 (UC).

UNITED STATES, CALIFORNIA. Santa Barbara County: adjacent to Santa Maria, road to Casmalia, *Eastwood 789,* July 2, 1906 (CAS); Surf, *Hoffman,* Maria, road to Casmalia, *Eastwood 789,* July 2, 1906 (CAS); Surf, *Hoffmann,* Mar. 29, 1939 (CAS). San Luis Obispo County: Oceano, *Condit,* Apr. 30, 1910 (UC), *Hoffmann 420,* May 30, 1931 (CAS); Oso Flaco Lake region, *L. S. Rose 50116,* May 13, 1950 (CAS, UC).

2. CHENOPODIUM SCABRICAULE

As mentioned above, the three forms of *C. scabricaule* Speg. were included in *C. carnosulum* as f. *pusillum* (Speg.) Aellen, f. *robustum* (Speg.) Aellen, and f. *megalospermum* (Speg.) Aellen. At least the type of f. *pusillum* differs, however, in several respects from *C. carnosulum*. It is from Gob. Chubut, southern Argentina, and a photograph (G, UC) is exactly matched by several generous sheets at hand from Gob. Santa Cruz. These plants differ from those of *C. carnosulum* in having thicker leaves with narrow, nearly or quite linear lobes, the lateral lobes chiefly to 5 mm. long by 1 to 2 mm. broad, the terminal chiefly 5 to 8 mm. long by 1 to 2 mm. broad. The lateral lobes are sometimes bilobed at the tips. The achenes of f. *pusillum* are similar in size to those of *C. carnosulum* but the sepals are broader, thinner and with a characteristic wavy appearance. The plants, rather than being prostrate as in *C. carnosulum,* are pyramidal, with the lower branches horizontally spreading, to 1.5 dm. or more in length, and with a stiffly upright central axis to 1.5 dm. or more, with branches gradually decreasing in length upward. Even depauperate plants only 3 to 4 cm. tall have an upright

central axis. The types of the other two forms are similar, although the leaf-lobes are less narrowly linear, and that of f. *megalospermum* consists of only a branch so that it is not possible to determine if the plant was upright. The achenes are larger, however, 1.25 to 1.5 mm. being given for f. *robustum* and 1.5 to 2 mm. for f. *megalospermum*. The inclusion of *C. scabricaule* Speg. in *C. carnosulum* Moq. does not seem to be justified.

The following are referred to *C. scabricaule* f. *pusillum:*

ARGENTINA. Santa Cruz: alt. 30 m. *Donat 97,* Dec. 29, 1928 (CAS, GH, NY, F, MO, UC) (as *C. patagonicum*); alt. 200 m., *Donat 110,* Jan. 2, 1929 (CAS, F, UC) (as *C. patagonicum*; mixed with *C. carnosulum*).

3. CHENOPODIUM PHILIPPIANUM

The specific name *carnosulum* has been used freely on collected material of small and more or less prostrate (and on depauperate forms of normally larger upright) *Chenopodium* species in which the leaves may be relatively small and trilobed. Of particular importance with relation to the recognition of the *carnosulum-patagonicum* series is *C. Philippianum* Aellen (in Fedde, Rep. Spec. Nov. 26:123,–1929). This species occurs at least from central Chile to Ecuador, usually at higher altitudes, and collected material has been regularly referred to *C. carnosulum*. The vegetative characters are essentially similar to an intermediate between *C. carnosulum* var. *carnosulum* and var. *patagonicum,* but the sepals are united to or above the middle, usually closely investing the achene, the pericarp is solid brown and smooth, and many of the later-produced achenes are vertical. Immature material of *C. Philippianum* may be difficult to separate from *C. carnosulum* but the floral characters clearly establish it as a separate species.

The following collections, all of which were distributed as *C. carnosulum,* have been seen:

CHILE. Coquimbo: Cero la Yerba, alt. 3450 m., *Morrison 16981,* Dec. 21, 1938 (UC); Coquimbo (?): Tuncal (Uspallata Pass), alt. 2200 m., *Buchtien* (in part), Feb. 1903 (US).

ARGENTINA. Mendoza: Las Heras, *Leal 4386,* Mar. 7, 1937 (F); Tenuyan, *Leal 2046,* Jan. 29, 1934 (F), *Leal 3100,* Mar. 23, 1935 (F).

BOLIVIA. Potosi: Uyuni, alt. 3700 m., *Asplund 6295,* Mar. 24, 1921 (US).

ECUADOR. Tungurahua: Ambato, alt. 2600 m., *Hitchcock 21730,* Sept, 21, 1923 (GH, NY, US).

A Note on the Distribution of Saxifraga debilis in California

Saxifraga debilis Engelmann is a pygmy species of saxifrage that is distributed from British Columbia south through the Rocky Mountains to the San Francisco Peaks in Arizona, and along the Cascades and Sierra Nevada farther to the west. W. L. Jepson (Fl. Calif. 2:121,–1936, as *S. rivularis* L.) cites only a single collection from California, that by F. W. Peirson from the Rock Creek Lake Basin of Inyo County. Abrams (Ill. Fl. Pac. States 2:358,–1944) says, "recently collected at several points along the crest and eastern slopes of the Sierra Nevada." Munz and Keck (Calif. Fl., p. 734,–1959) give "Sierra Nevada of Inyo, Tulare, Madera, and Tuolumne cos." It is of phytogeographic interest to clarify the range of this species in the Sierra, since it is a southern representative of a boreal group. This may be done by the citation of the following specimens (all from the herbarium of the California Academy of Sciences unless otherwise indicated):

TUOLUMNE COUNTY: west slope of Mt. Dana, 11,000 ft., *Mabel B. Peirson 7627* (JEPS, RSA).

MADERA COUNTY: east face of saddle between Mt. Banner and Mt. Ritter, 11,800 feet elevation, *Raven 3598;* cliffs above Minaret Lake, about 10,200 ft., *Helen K. Sharsmith 5460* (UC); west slope of Rogers Peak, Lyall Fork, Merced River, 11,500 ft., *Schreiber 1925* (UC).

MONO COUNTY: Tee Jay Lake, Mammoth Crest, 10,500 ft., *H. & M. Dearing 3951* (UC).

FRESNO COUNTY: above the south side of Lake Italy, 11,200 ft., *Raven 7823;* cliffs just above the southwest end of the lowest lake in Fourth Recess, 10,200 ft., *Raven 6049.*

TULARE COUNTY: Center Basin at about 12,000 ft., *Howell 25089;* west base of Mt. Barnard, 12,000 ft., *Raven 8369;* Center Basin to Junction Pass, 11,900 ft., *Munz 12588* (RSA).

INYO COUNTY: Schobers Holes, above Lake Sabrina at about 11,400 ft., *Raven & Stebbins 108;* Bottleneck Lake, above Lake Sabrina at about 11,000 ft., *E. Michael in 1950;* Midnight Lake, at about 11,000 ft., *Raven & Stebbins 151;* west of Sixth Lake at about 11,200 ft., Big Pine Lakes, *Howell 23859;* above Ruby Lake, Rock Creek Lake Basin, 11,500 ft., *Peirson 10765* (RSA, UC), *Mabel B. Peirson in 1934* (POM); Lone Pine Canyon, 11,000 ft. *Sharsmith 3374* (UC), 12,400 ft., *Sharsmith 3341* (UC).

This species is inconspicuous, growing locally from 10,000 to 12,400 feet in elevation, in moist, rocky places near timberline, often in recesses under rocks where partially shaded.—PETER H. RAVEN, Stanford University.

neither Bailey nor the authors of recent treatments in floristic accounts have done much to alleviate the difficulty. This paper suggests some means of making measurements so that the species may be more precisely described but does not undertake clarification of the species of *Vitis*.

H. P. Olmo and A. Koyama collected a fine series of specimens of plants belonging to the family *Vitaceae* during July and August, 1961. Most of the collections are referable to the genus *Vitis*. Many of the vouchers consist of 3 herbarium sheets, a specimen of the young growing tip of the plant, a portion of a sterile branch with mature foliage, and a fruiting

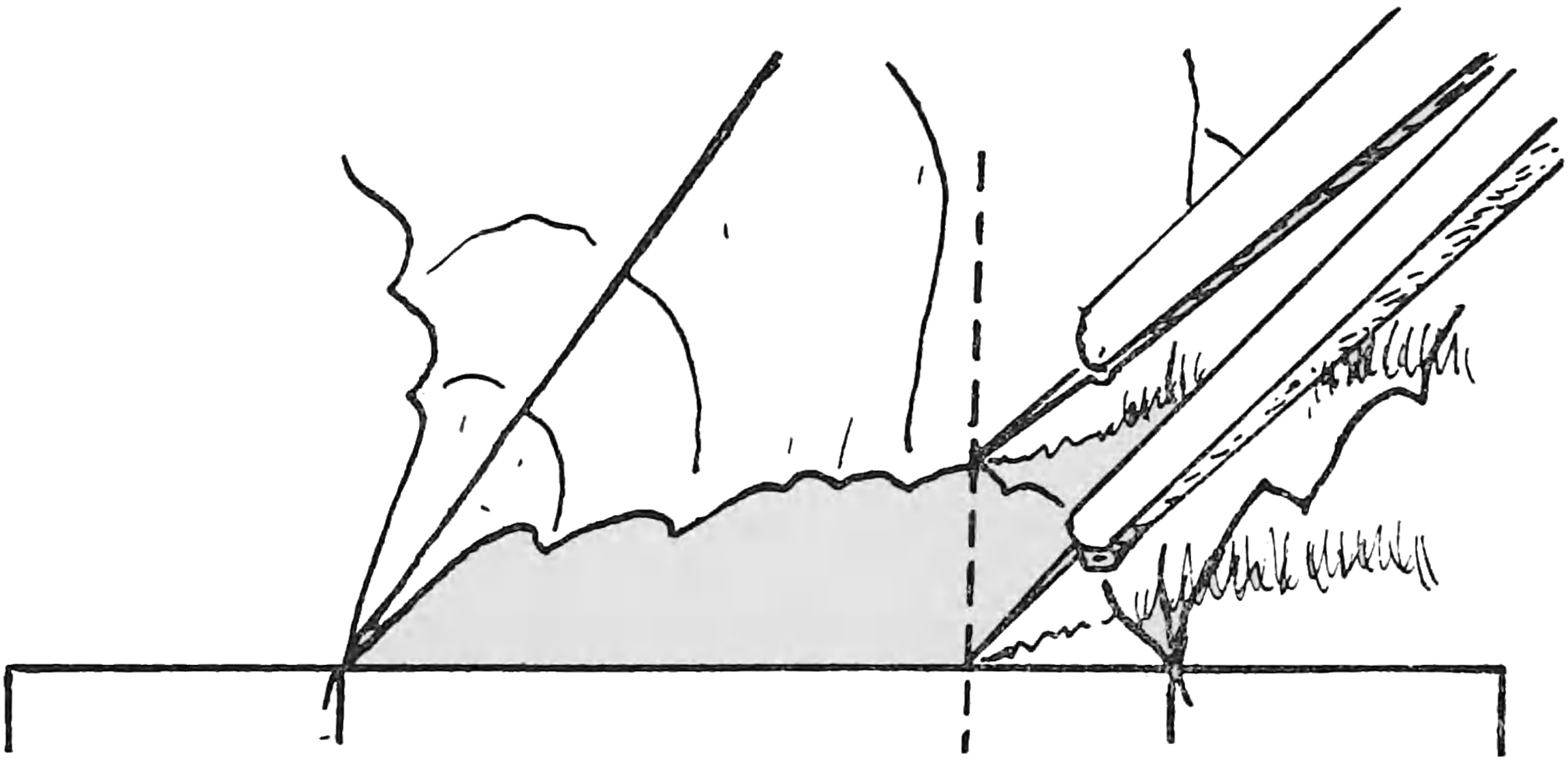

Figure 2

branch. In spite of the generally good quality of the specimens, it has been impossible to name the material accurately.

The literature of the family *Vitaceae* has been ably reviewed by Bailey (1934). Except for Bailey's paper, little has been published in summary of the North American species of *Vitis* since the several papers prepared by Munson (1885, 1890, 1900, 1909). Munson probably had a better knowledge of the morphological characters of *Vitis* species than any one who has published on the subject. Unfortunately, at the time when Munson was intensely interested in grapes, no real understanding of the mechanics of variation had been achieved. Even as late as the 1930's, when Bailey presented his review of the taxonomy of North American *Vitis*, knowledge of genetic control of variation and the flow of genes through populations had not been vigorously applied to an understanding of wild plant populations. The synopses by these men, therefore, could be based

only on the apparent morphological features of the living plants or herbarium specimens.

Descriptions of species of *Vitis* abound in general statements concerning the shape of the leaves, lobing, toothing of margins, and configuration of the sinus, but rarely are they definitive. It is relatively easy, though, to express the depth versus the breadth of a sinus or lobe as a single number so that the great variation in leaf size is discounted. If a straight edge is laid from the tip of the midrib to the end of the major primary vein in the tip of each lobe, a base line is obtained from which a measurement can be made at a right angle to the deepest in-

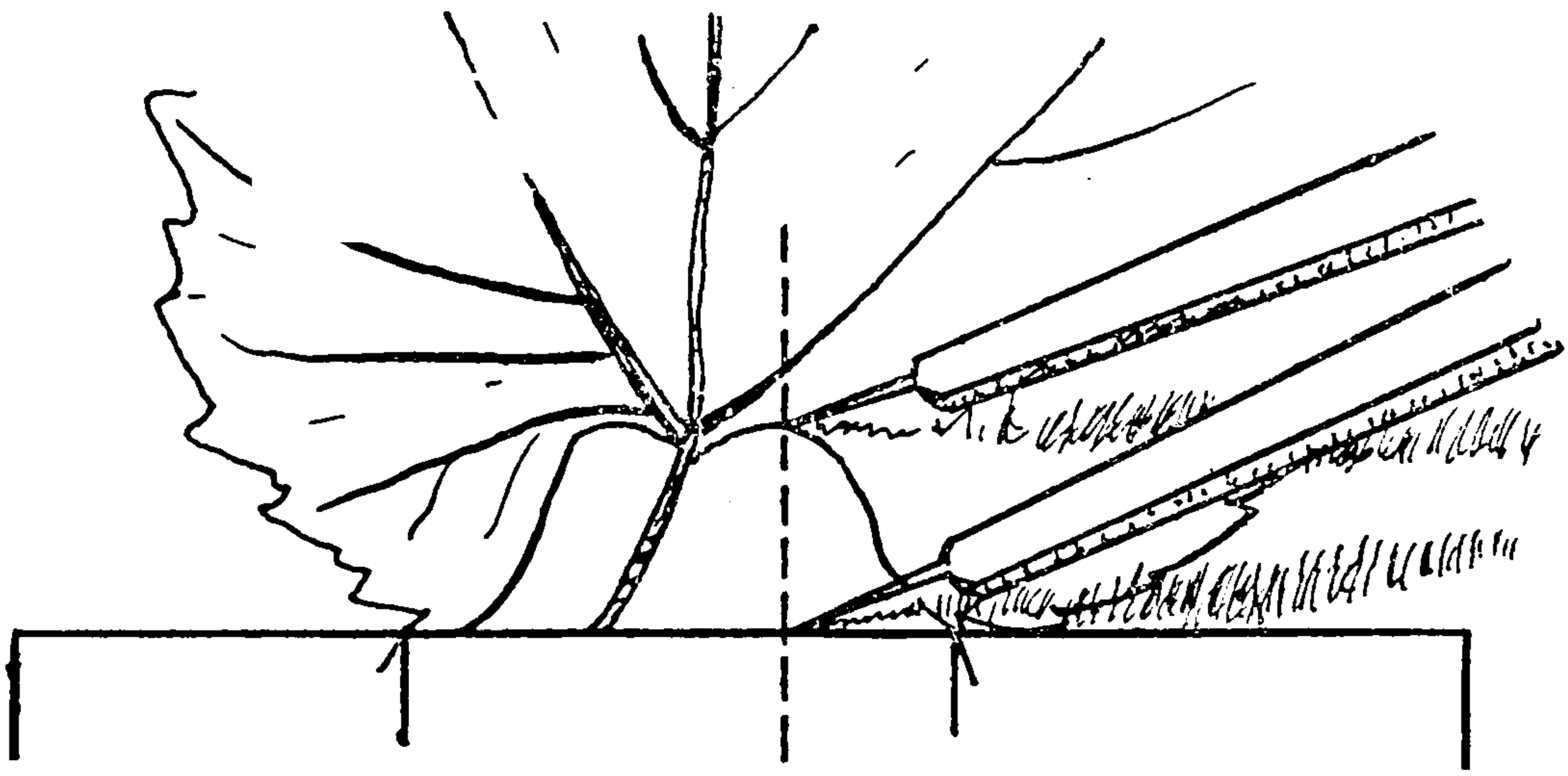

Figure 3

dentation in the leaf margin (fig. 2). If the depth is divided by the distance between the tip of the midrib and the lateral primary vein, an index figure, called the lobe index or l.i., is obtained; this is an accurate indication of the degree of lobing. A measurement at a right angle to a line between the leaf tips was chosen to eliminate the differences resulting from measurements at more acute or obtuse angles. Similarly, the depth of the leaf sinus was measured at a right angle from a line between the 2 first teeth appearing on the leaf margin at the base (fig. 3). When this figure is divided by the distance between the teeth, a sinus index (s.i.) is found; this expresses the size of the sinus without the interference of foliar-size variation. The first 2 teeth at the base of the leaf were chosen as the point for measurement in an endeavor to eliminate any confusion with leaf shape.

The length-width index (l.-w.i.) is a simple measurement of the breadth of the leaf at its widest part divided by the length of the leaf. A straight edge is laid at the base just touching the margin at the basal lobes to obtain a base line and a measurement is made from this line to the leaf apex (fig. 4). Again, a

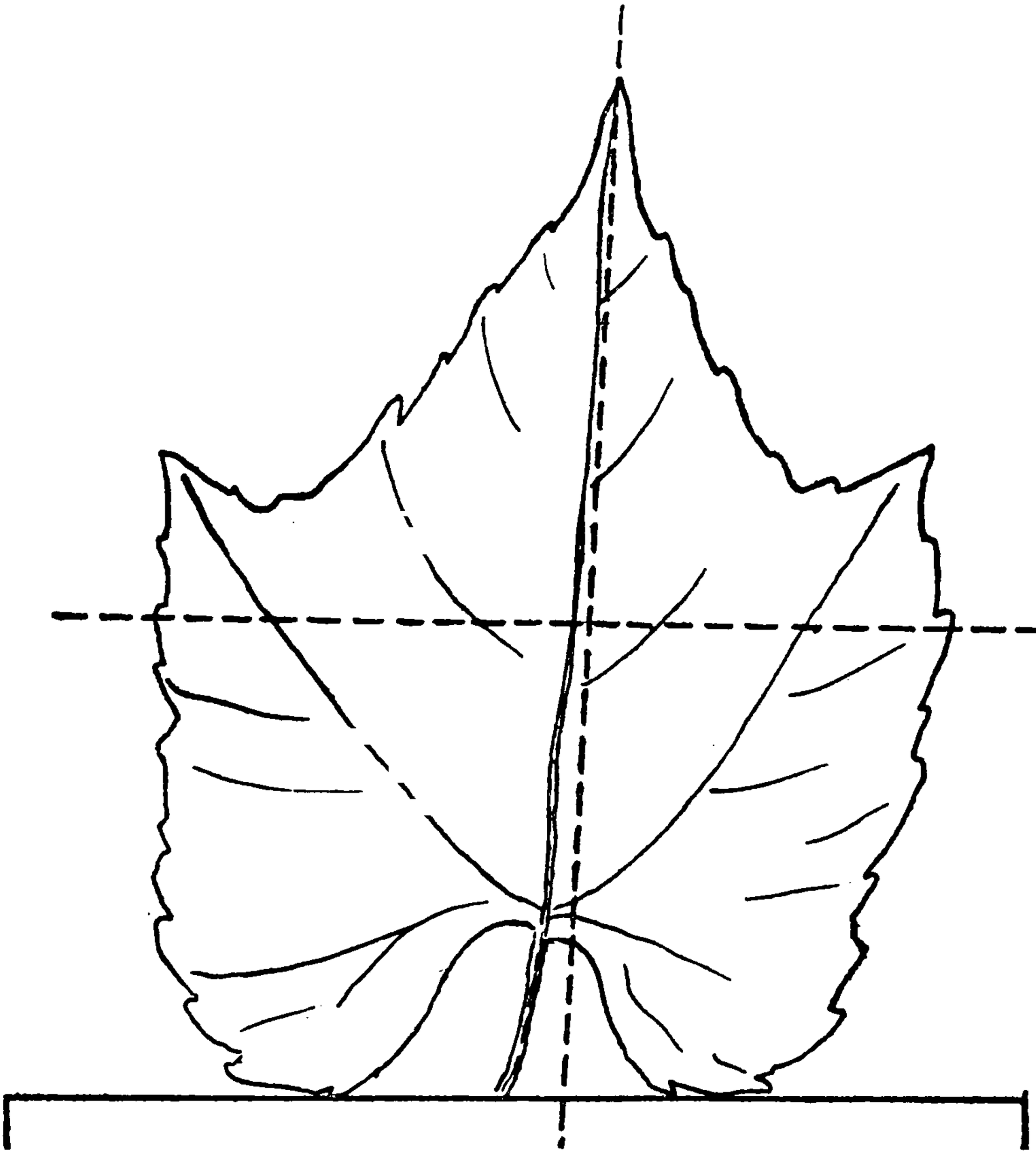

Figure 4

relative leaf shape is expressed without confusion with actual leaf size since the greater the length in proportion to the breadth, the smaller the index number.

Finally in an attempt to establish the size differences claimed for the seeds of different species, an index number obtained by dividing the breadth by the length of the seed was derived for all of the specimens bearing fruit. Insufficient seeds were

Vitis rotundifolia Michx., which, if they had been found in southern Florida, would probably have been referred to the segregate species *V. Munsoniana* Simps. The specimens fit well into the range of variation of the species as represented by U.S. National Herbarium specimens which were collected primarily in the southeastern United States. In view of the known relationship between the floras of the southeastern United States and Mexico, this distribution is not unusual.

The remainder of the specimens collected by Olmo and Koyama can not be identified with confidence. Since the primary purpose of their exploration seems to have been the collection of *Vitis,* they succeeded in sampling a number of populations sufficiently well to exhibit a remarkable range in variation. As a result, the specimens show a nearly continuous series of intergradations in pubescence, leaf shape, lobing, toothing and size, tendril form and origin, inflorescence length and density, and stem features.

Consequently, the numerous measurements required to produce the previously described indices were made with the hope that at least one set of characters could be found to differentiate the species. Such was not the case, however. An examination of the graphs (fig. 5) will show that there is continuous overlapping in the specimens and, in no case, does a group of specimens fall together as a discreet unit. I have indicated that the pubescence on the specimens was not measured, but it, too, constitutes a continuum through the series from those specimens which only are barbate in the leaf-vein axils to those which are pubescent over the entire vegetative surface.

I finally broke the specimens into groups on the basis of geography and similarity of the overall morphological features including the pubescence and degree of development of the leaves in the young shoots. The geographical sorting is based on the premise that specimens from a population probably belong to the same species and specimens from nearby populations possibly belong to the same species.

It should be emphasized that no one group of specimens is amply distinct from the remainder of the specimens. The one group of characters which seemed to be the most reliable was the overall felty pubescence, the slowly developing leaves which make the shoot appear gangling, and the glabrous glandular (?)

mucro on the tip of the marginal teeth in the young shoots of the specimens which I have called the cinerea group. Generally, any specimen removed from its group could easily be fitted into the pattern of variation of several other groups. Since this is supplemented by the lack of definitive breaks in the measurements and by the fact that the groups can be matched by specimens identified as several different species in the National Herbarium, I do not believe that the groups of specimens truly represent species. This is further emphasized by the facility with which botanists have amalgamated and resurrected species names in North American *Vitis*.

The last point may be illustrated by the names *Vitis riparia* Michx., *V. cordifolia* Lam., and *V. vulpina* L. In 1887, Planchon used *V. riparia* and placed *V. vulpina* in its synonymy, but failed to account for *V. cordifolia* Lam.; he recognized *V. cordifolia* Michx. as a valid species. Munson (1909) did not use *V. riparia* but placed it in the synonymy of *V. vulpina* and he noted in the synonymy of *V. cordifolia* Lam., "*V. vulpina*, in part, Linnaeus." Bailey (1934) used *V. cordifolia* Lam. and *V. vulpina* and placed *V. riparia* in the synonymy of *V. vulpina*. By 1949, Bailey had decided to recognize *V. riparia* and *V. vulpina* and placed *V. cordifolia* Lam. in the synonymy of the latter species. Both Fernald and Gleason followed this treatment in their respective manuals. In spite of the very wide range of entities bearing these names in the United States portion of North America, Standley (1923) did not identify any of these species among the grapes of Mexico nor is there a specimen currently in the Mexican and Central American folders at the National Museum identified as these species. Not only are taxonomists somewhat confused as to what is represented by these names, but they apparently also find the Mexican boundary an effective barrier to the natural distribution of plant species.

Many measurements are possible on a *Vitis* leaf. Only the most obvious features were chosen in this attempt to find an accurate and easy means of distinguishing species. When a definitive study of the genus *Vitis* in North America is finally undertaken, careful mass collections, breeding studies in field plots, and cytological data will probably be needed to untangle the snarl of nomenclature, but the problems would not seem to be irreconcilable.

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From the Editor's Correspondence

"Dr. Hoover's article (Leafl. West. Bot. 8: 141–143) on the natural extension of Monterey cypress plantings in California calls to mind several instances of spontaneous reproduction in Marin County, and in Montecito and nearby canyons. The determining factor here about Santa Barbara, when the ground is left undisturbed, seems to be the presence of enough surface moisture to carry the seedlings through their first summer. In one of the forks of Cold Spring Canyon there is a thick-set clump of these trees, big and little, which I believe started as seedlings from a planted parent tree spared by the big brush fire of the early 1920's. In this case, renewed chaparral growth and the presence of rodents may have stopped the further advance of the colony, which remains unchanged from year to year."—H. M. Pollard, Santa Barbara, California.

the eastern *L. perennis*. During the 10,000-odd years since the last glaciation it has failed to reestablish geographic connection and possibly due to the short season seldom produces rhizomes. The flower size is nearly twice that of *L. perennis* but the foliage and floral characters clearly indicate a previous close relationship.

The most southerly relative of *L. perennis* is *L. madrensis* var. *Garcianus* C. P. Sm. of Mexico, as presently known. It is very closely related to Nuttall's *L. gracilis*, which is here proposed as a subspecies of *L. perennis*. The extent of the population of the Mexican taxon and the number of related taxa there are still in doubt and still being studied. Subspecies *gracilis* extends along the gulf coast from Texas to Florida and across the upper part of Florida into Georgia and the Carolinas. It has numerous intermediates at its zone of junction with *L. perennis* proper, hence the suggestion that it is a geographically and physiologically distinct subspecies only. *Lupinus perennis*, composed of the two sympatric varieties, extends up the Atlantic coast to New England and westward in sandy areas, primarily south of the Great Lakes, in areas of glacial outwash to central Minnesota. It is suggested that the present distribution was established post-glacially, with the population forced southward primarily in the coastal area during glaciation. It is possible, however, that during glacial times *L. arcticus* or *pre-arcticus* may have had an ecological zone around the glacier permitting introgression with *gracilis* to produce *perennis*. Similarly *L. plattensis*, which is confined to a narrow belt along the eastern side of the Rocky Mountains from New Mexico to Wyoming, can be most readily explained by introgression between the *pre-arcticus-pre-perennis* entity and *L. sericeus* (not a member of this group but having the foliage and floral traits necessary). In a synthetic hybrid between *L. rubricaulis* of the Rocky Mountains and *L. excubitus* of California the F_1 hybrid possesses a glabrous upper leaf surface. As shown by Anderson (1949, p. 33–60), hybrids in the absence of backcrossing will tend to produce a population intermediate in nature with virtually no chance of returning to the appearance of either parent. Dobzhansky (1941, p. 177–185) has in a sense shown the same to apply when the effective breeding populations have small N values, in that random fixation of genetic traits results

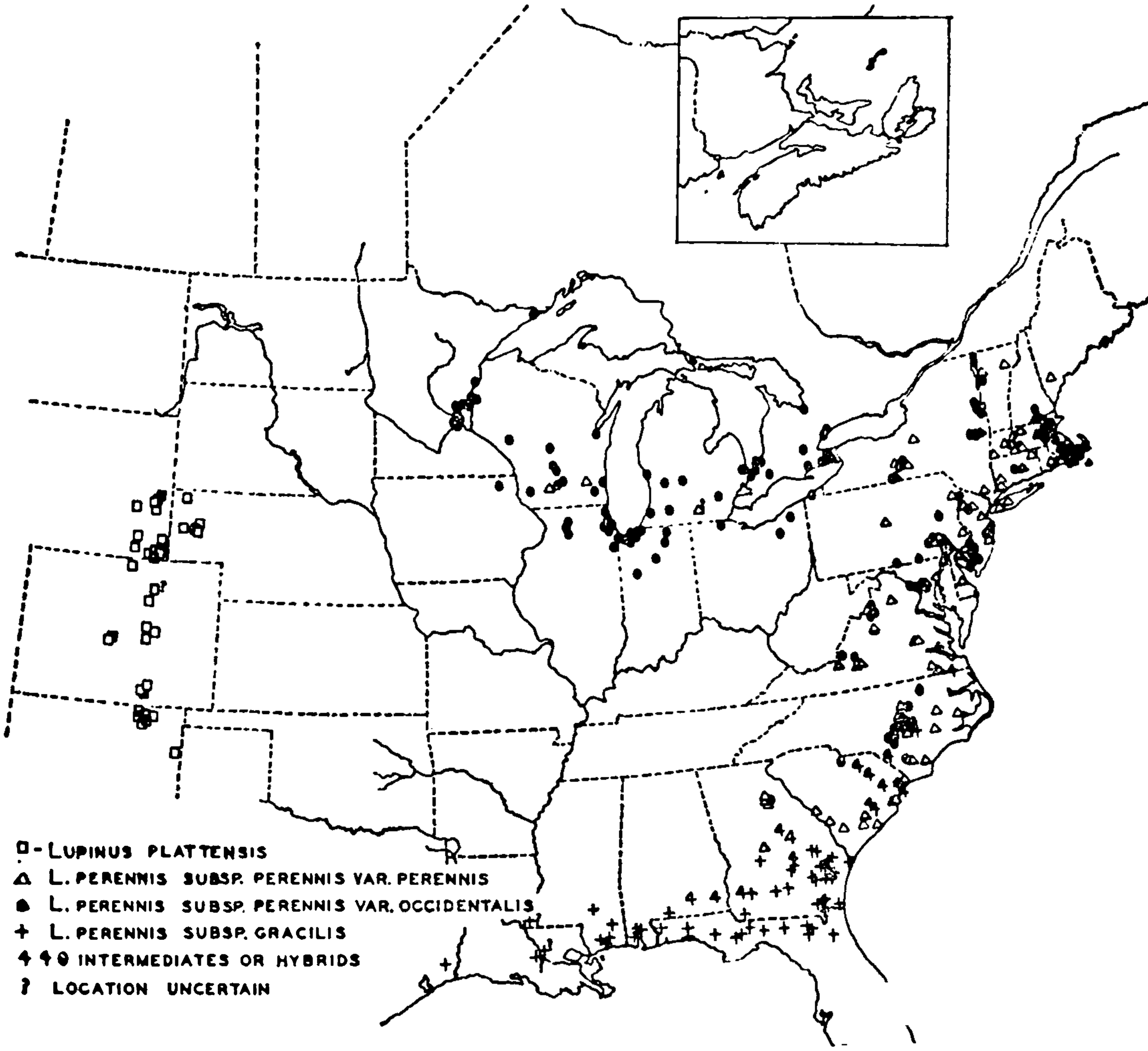

Figure 1. The distribution of members of the *Lupinus perennis* complex in the eastern United States, showing the nearness of subsp. *gracilis* to locations of material considered intermediate. Note the narrow distributional pattern of *L. plattensis* and the wide geographic hiatus between it and related taxa.

in a relatively short time due to inbreeding. In any event, *L. plattensis* shows a definite relationship to *L. perennis* but it is so widely separated both geographically and morphologically that it constitutes an isolated gene pool and a distinct species.

To the south and west of *L. plattensis* is *L. ammophilus*, which is restricted to the high sandy valleys of northwestern New Mexico, northeastern Arizona, southeastern Utah, and southwestern Colorado. This taxon still possesses the rhizomatous character but has a few sparse coarse hairs on the upper side of the leaflet (glabrate above). Its closest relationship is to subsp. *gracilis* and the Mexican *L. madrensis* var. *Garcianus*

but it is so far removed that it is considered relictual.

Even farther removed and more relictual is *L. onustus* of the mountains of northern California, which possesses the rhizomatous habit and other characters of the *Perennes* and must surely have been derived from ancestral stock of the *Perennes* complex.

Nomenclature of the Perennes

1a. Lupinus perennis L., Sp. Pl. 2:721 (1753). Photo at GH.

1b. Lupinus perennis var. occidentalis Wats., Proc. Amer. Acad. Arts & Science 8:526 (1873). Type not designated.

1c. **Lupinus perennis** subsp. **gracilis** (Nutt.) Dunn, comb. nov. *L. gracilis* Nutt., non Agardh, Journ. Phil. Acad. 7:115 (1834). Type at PH. *L. perennis* var. *gracilis* (Nutt.) Chap., Fl. So. States 89 (1872). *L. Nuttallii* Wats., Proc. Amer. Acad. Arts & Science 8:526 (1873).

2. Lupinus arcticus Wats. Treated monographically by the author in another paper on Alaskan lupines. The inter-relationships of the Alaskan lupines, Madroño 8:1–17 (1965).

3. Lupinus plattensis Wats., Proc. Amer. Arts & Science 17:369 (1882). Type at GH. *L. ornatus* Dougl. var. *glabratus* Wats., Proc. Amer. Acad. Arts & Science 8:528 (1873). *L. glabratus* (Wats.) Rydb., Fl. Rocky Mts. 465, 1063 (1917).

4. Lupinus ammophilus Greene, Pittonia 4:136 (1900). Types at POM, MIN, NMC.

5. Lupinus onustus Wats., Proc. Amer. Acad. Arts & Science 9:127 (1876). Isotype at UMO. *L. violaceus* Heller, Muhl. 2:65 (1905). *L. Thompsonianus* C.P. Sm., Sp. Lup. 149 (1940).

6. Lupinus madrensis Seem. var. Garcianus C.P. Sm., Sp. Lup. 42 (1938). Type at US.

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Eustoma in Wyoming. *Eustoma Russellianum* (L.) Griseb. was collected in a pasture at the Laramie River bridge just upstream from old Fort Laramie on the Wheatland cut-off road, Goshen County, Wyoming, by Hugh B. Leech on July 29, 1964. I can find no reference to a Wyoming record of this showy gentian (cf. Rydberg, Fl. Rocky Mts. & Adj. Plains, 1917; Rydberg, Fl. Prairies & Plains Central N. Amer., 1932; Porter, Spring Fl. Laramie Area, 1942).—J. T. Howell.

ARABIDOPSIS IN CALIFORNIA. Although *Arabidopsis Thaliana* (L.) Heynh. was first collected in California in 1892 (Jepson Fl. Calif. 2:44, as *Sisymbrium*), this delicate Old World mustard has been reported from relatively few collections from Trinity, Lake, and Alameda counties in the Coast Ranges (Jepson, ibid.; Munz, 1959, p. 232). Another record from the same region but in Mendocino County may be reported on the basis of a collection made in 1948 by M. S. Baker (8 miles north of Ukiah, *No. 12011*, CAS). In 1964 I collected the Thalian cress in the foothills of the Sierra Nevada (just south of Morman Bar on the road to Ben Hur, Mariposa County, *No. 40542*).

In 1956 E. C. Twisselmann reported the occurrence of *Arabidopsis* in the Temblor Range (Wasmann Jour. Biol. 14:234), one collection having come from western Kern County (Temblor Ranch, *Twisselmann 1477*, CAS) and another from eastern San Luis Obispo County (Chris Twisselmann Ranch, *Twisselmann 1493*, CAS). These plants, which occurred as weeds in disturbed or cultivated ground, are low, slender and nearly leafless, and the tentative Twisselmann identification as *Arabidopsis* was not questioned by me when I reviewed the specimens before the publication of the Temblor Flora.

It is now realized that these plants are depauperate specimens of *Sisymbrium Irio* L., a plant noted by Mr. Twisselmann as "widespread in moist soil and about residences and ranch grounds" (l.c., p. 237). I should have been more perspicacious since Mr. Twisselmann noted on his labels that the flowers of his collections were "yellow," a condition not obtaining in *Arabidopsis Thaliana*.—J. T. HOWELL.

MAIDEN PINK IN THE SIERRA NEVADA. *Dianthus deltoides* L., which was recently reported as a California adventive in southeastern Siskiyou Co. (Leafl. West. Bot. 10:31, —1963), should also be reported from the Sierra Nevada at Huntington Lake, Fresno Co. In July, 1951, the maiden pink was collected by Henry M. Pollard on the north shore at Blue Jay Camp where it had become established as a garden escape. Native in a wide area from western Europe to eastern Asia, it is cultivated in most temperate regions of the world.—J. T. HOWELL.

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NOTES AND KEY TO SOME CALIFORNIA SPECIES OF STIPA*

BY JACK MAZE
University of California, Davis

That specific determinations involving *Stipa occidentalis* Thurb. ex Wats., *S. Elmeri* Piper & Brodie ex Scribn., *S. californica* Merr. & Davy, *S. columbiana* Macoun, *S. Williamsii* Scribn. and *S. nevadensis* B. L. Johns. are sometimes difficult can be seen from the determinations on herbarium specimens. This difficulty is due, in part, to the overlap in the variation patterns of these species. The primary cause of these overlapping variation patterns is hybridization. *Stipa occidentalis* and *S. Elmeri* have hybridized with *S. columbiana,* the resulting product being *S. californica,* which has backcrossed to both parents (Johnson, 1962). The overlap of the variation patterns of *S. nevadensis* and *S. californica* is due to the similarity of the parents of the two taxa. One parent of *S. nevadensis, S. occidentalis–S. Elmeri*[1] is also involved in *S. californica* and the other parent of *S. nevadensis, S. Lettermani* Vasey, resembles the other parent of *S. californica, S. columbiana,* in awn pubescence and callus shape. Another factor that has contributed to the difficulty in specific determinations is the use of features in the various keys to these species (Hitchcock, 1925, 1936, 1950; Dedecca, 1954) that key dissimilar plants into the same species.

Because the key presented here deviates from those previously constructed for these species, it is desirable to discuss the reasons for change. This discussion will involve only the most recent treatment of Hitchcock as revised by Chase (1950) as it is here that these species are best keyed.

Stipa Elmeri, S. occidentalis, and *S. californica,* all of which have pubescent awns (with some exceptions in *S. californica*), have been keyed apart on the basis of vegetative pubescence, lemma pubescence, and overall height. *Stipa Elmeri* and *S.*

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* Revised from a thesis submitted in partial fulfillment of the requirements for the degree of Master of Science at the University of Washington.

[1] Johnson (1962) considered one parent of *S. nevadensis* to be "the combined species of *S. occidentalis* and *S. elmeri*" and evidently meant that both have contributed to *S. nevadensis.*

Leaflets of Western Botany, pages 157–180, June 24, 1965.

californica are supposedly taller than *S. occidentalis* and have longer hairs on the upper part of the lemma. *Stipa Elmeri* and *S. californica* differ from each other in vegetative pubescence, *S. Elmeri* having pubescent sheaths and *S. californica* having glabrous sheaths. However, when the above features are used to separate these species in a key, some plants do not fit any of the choices and some, when they are keyed, are found not to fit the description of the species to which it keyed. On studying members of the above mentioned taxa, we find that they fall into two major groups based on awn pubescence and lemma pubescence. One category represents *S. californica* and the other represents both *S. occidentalis* and *S. Elmeri.* Within the *S. occidentalis–S. Elmeri* group there are two groups of plants, one consisting of tall plants with usually pubescent sheaths and growing at lower altitudes (*S. Elmeri*) and one consisting of short plants with usually glabrous sheaths and growing at higher altitudes (*S. occidentalis*). Therefore, it seems that the use of new characters will more accurately key the species.

Stipa Williamsii supposedly differs from *S. columbiana* in its larger size, longer awn, and vegetative pubescence. However, the original description of *S. Williamsii* (Scribner, 1898) included measurements that agree with those of *S. columbiana.* This, as well as the facts that pubescence may be seen in both larger and smaller plants and that the pubescent plants exhibit no distinctive range, dictates relegating *S. Williamsii* to synonymy under *S. columbiana.* Probably what Hitchcock refers to *S. Williamsii* are pubescent phases of *S. columbiana* var. *Nelsoni* (Scribn.) Hitch., a long-awned variety of *S. columbiana.*

Stipa californica is usually distinguished from *S. columbiana* on the basis of its distinctive awn pubescence. However, because of the intergradation between these two taxa, occasionally awn pubescence is unsuitable to separate them and features of lemma pubescence and callus shape and pubescence must be employed.

Stipa nevadensis, because of its relatively (1962) recent description, is not included in any of the published keys. In

that of *S. nevadensis,* callus about 1 mm. long (see fig. 2) .....*S. californica*

1. Awn scabridulous to hirtellous. (Note: the majority of plants that will key here will be found to be *S. columbiana.* However, there are a few plants that will key here but are best referable to *S. californica* on the basis of lemma pubescence and callus shape and pubescence.)

5. Lemma with few, if any, longer hairs at the tip, the hairs not spreading, or glabrous area on the inside curve of the callus short-acute and not well extended toward the lemma.

6. Awn less than 3.5 cm. long, or blades more than 4 mm. broad; callus acute-rounded.....*S. columbiana*

6. Awn more than 3.5 cm. long; blades less than 4 mm. broad; callus acuminate-rounded....*S. columbiana* var. *Nelsoni*

5. Lemma with many distinctly longer hairs at the tip, the hairs usually spreading; the glabrous area on the inside curve of the callus long-acute and well extended toward the lemma; glabrous tip of the callus acuminate (see fig. 2).....*S. californica*

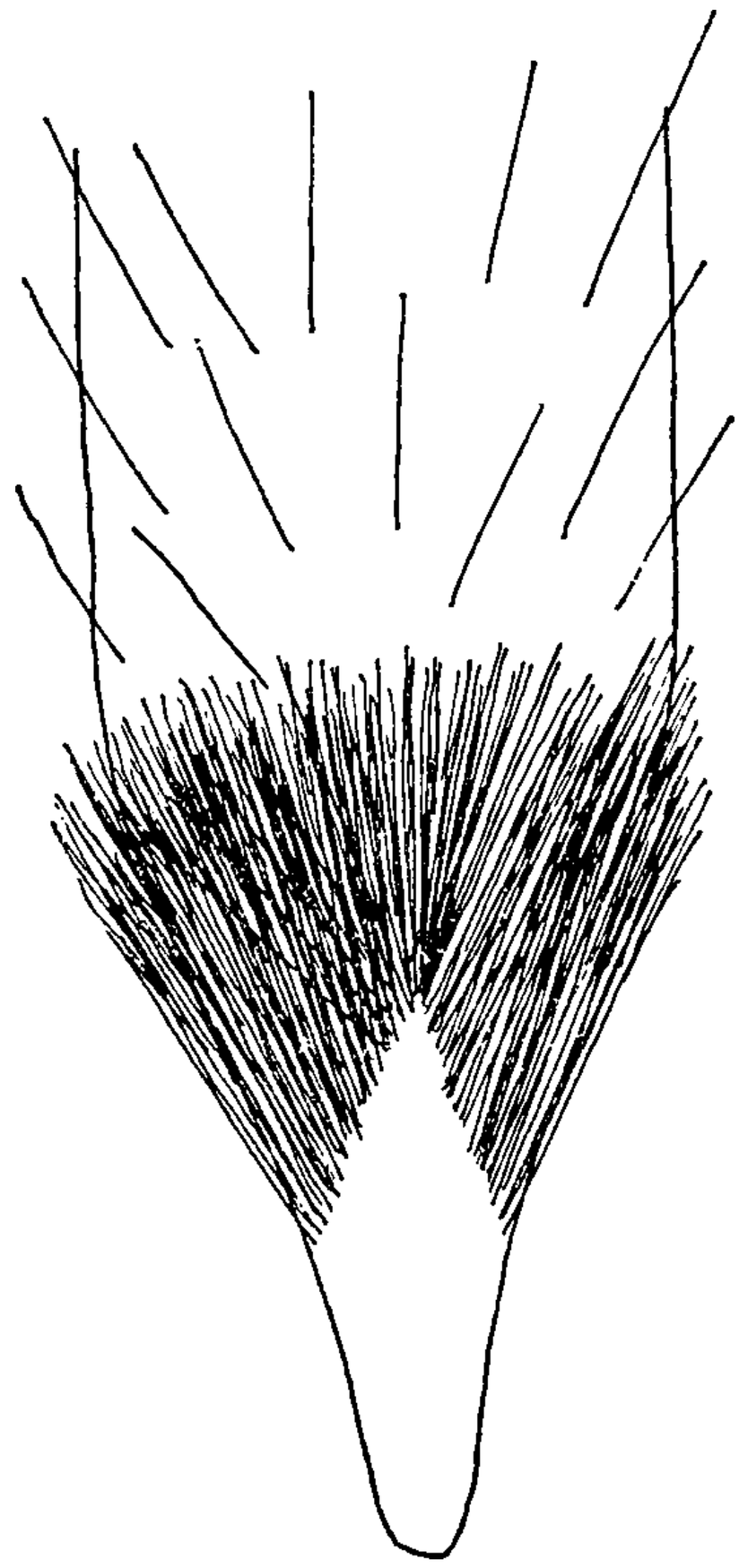

Figure 1

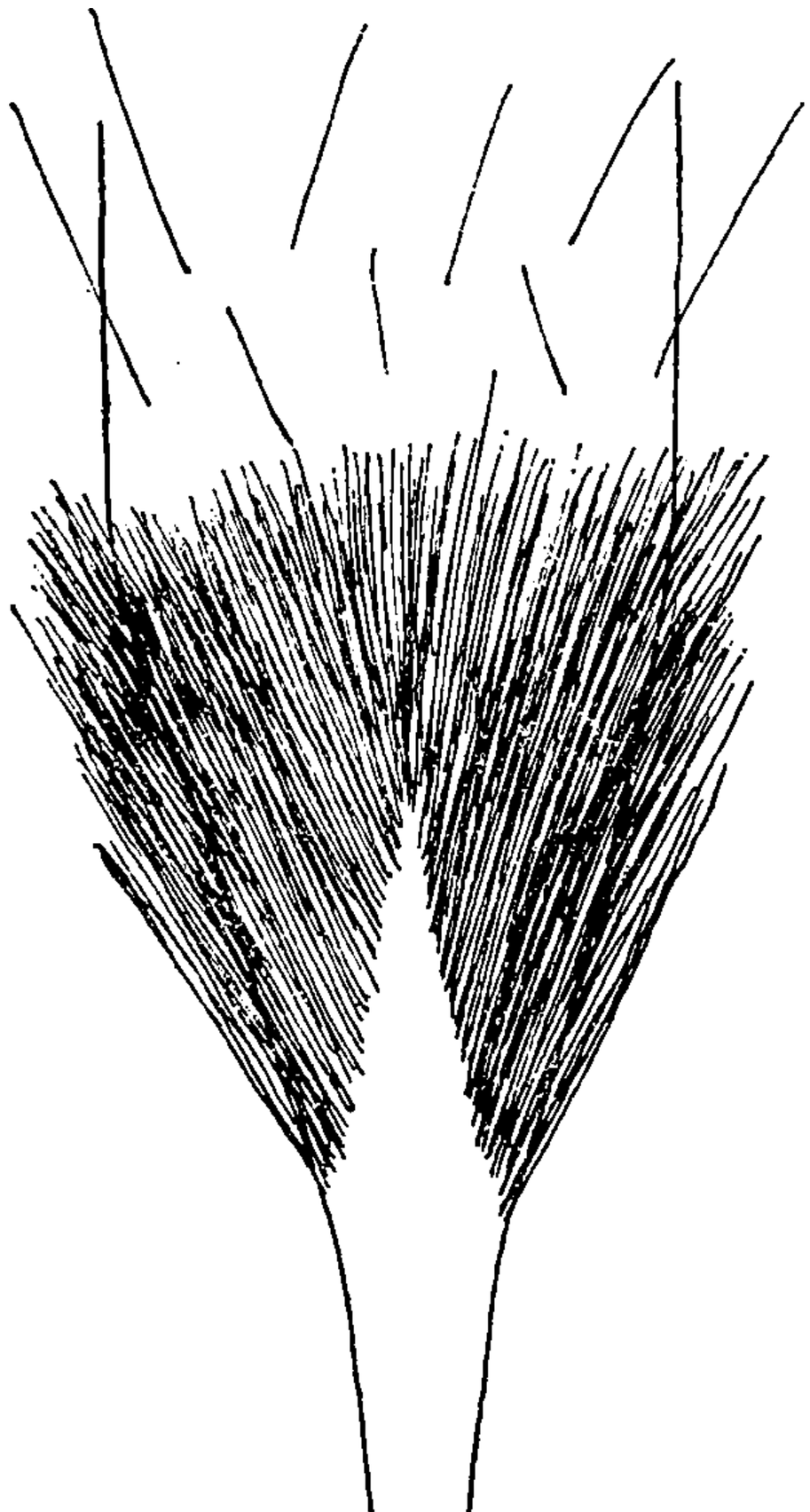

Figure 2

Callus tips of *Stipa nevadensis* (fig. 1) and *S. californica* (fig. 2).

STIPA OCCIDENTALIS Thurb. ex Wats. A plant of shorter stature but otherwise similar to *S. Elmeri*. Contrary to Hitchcock (1925, 1935) and Dedecca (1954), pubescent plants may be found within this taxon. See also discussion of *S. Elmeri*.

STIPA ELMERI Piper & Brodie ex Scribn. This species seems to be interfertile with *S. occidentalis* as intermediates may be found. Because *S. occidentalis* occurs mostly at higher altitudes, these two species are perhaps ecotypes of one species, *S. Elmeri* representing the lower altitude ecotype and *S. occidentalis* representing the higher altitude ecotype.

STIPA CALIFORNICA Merr. & Davy. As was stated previously, this species intergrades with both *S. occidentalis* and *S. Elmeri*. Consequently some plants will not be placed with ease.

There is a group of plants very similar to *S. californica* but of shorter stature. These occur mostly at higher altitudes and may show the same relationship with *S. californica* that *S. occidentalis* shows with *S. Elmeri*.

STIPA COLUMBIANA Macoun. It is between this species and *S. californica* where it becomes difficult to draw specific distinction. There are some plants which are hardly referable to either taxon and seem to combine randomly the characters of both.

Stipa columbiana var. *Nelsoni* is a somewhat larger, long-awned variety of *S. columbiana* and combines the awn pubescence of *S. columbiana* with the callus of *S. californica*.

STIPA NEVADENSIS B. L. Johns.

That this is an alloploid species derived from hybrids between *S. Lettermani* and *S. occidentalis–S. Elmeri* was demonstrated by Johnson (1962). Its status as a valid species is beyond doubt and it is most easily distinguishable by its longer palea with relatively long hairs, an expression of such characteristics of the palea seen in *S. Lettermani*. However, there are extreme plants of *S. californica* with exceptionally long palea that grossly resemble *S. nevadensis*. It is for this reason that the key choices are unusually long and involve characters which admittedly are not readily obvious. Even with such a key, some plants will still not be placed with any degree of certainty without the benefit of chromosome numbers.

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IPOMOEA LACUNOSA (CONVOLVULACEAE) IN ARIZONA.—In reporting two collections of the tropical American *Ipomoea triloba* L. from Arizona, Kearney and Peebles (Arizona Flora, 1960, p. 678) observe that "Pringle's specimen differs from the common phase of the species in having glabrous leaves, sepals, and capsules and nearly glabrous stems." A duplicate of the Pringle collection was included in a loan from the Missouri Botanical Garden recently received through the courtesy of Dr. Walter H. Lewis. It bears the collection number 15939, "Santa Cruz Valley, Arizona," Sept. 27, 1884. It is a small, complete plant of the Southeastern *I. lacunosa* L., a common native annual from central Texas east to the Atlantic and as far north as Missouri, Ohio, and Virginia. The peduncles bear only 1 or 2 (rarely 3) flowers, and except near ends of stems or branches are shorter than the adjacent petioles during flowering (often becoming longer in age); the small corolla is usually white, occasionally red-purple. In *I. triloba* the stouter peduncles are usually 3–6-flowered except the uppermost (rarely 1-flowered) and are longer than the adjacent petioles from the time the flowers open; the corolla is usually colored. Pubescence is not a reliable distinguishing feature. I have not seen the Thornber collection also cited by Kearney and Peebles, but the Arizona occurrence of *I. triloba* is confirmed by the following: "a weed in fields, Tucson, Ariz.," G. *Engelmann,* Sept. 24, 1880 (MO). Curiously enough this happens to be a glabrate form of the species. I strongly suspect that both *I. lacunosa* and *I. triloba* were casual introductions in Arizona; they have apparently not become established.

It may be mentioned that there is one necessary nomenclatural correction in Arizona *Ipomoea,* and three other changes are to be made if one accepts (as I do) the conclusions of the late Dr. Carlos O'Donell. *Ipomoea muricata* Cav. is a later homonym of *I. muricata* (L.) Jacquin; its correct name is *I. capillacea* (H.B.K.) G. Don. The Arizona plants referred to *I. coccinea* L. belong rather to the related *I. hederifolia* L.; *I. heterophylla* Ortega is not separable from the earlier-named *I. pubescens* Lamarck; and *I. hirsutula* Jacquin is a synonym of *I. purpurea* (L.) Roth var. *diversifolia* (Lindley) O'Donell. —LLOYD H. SHINNERS, Southern Methodist University, Dallas, Texas.

in the bristlecone pine stands in this area have not yet led to the discovery of the parasite. These studies did, however, reveal two other dwarfmistletoes not previously recorded on bristlecone pine.

The Southwestern dwarfmistletoe, *Arceuthobium vaginatum* (Willd.) Presl f. *cryptopodum* (Engelm.) Gill, a common parasite of *Pinus ponderosa* Laws., was found to attack *Pinus aristata* in two Colorado localities: 6 miles south of Divide on the Cripple Creek highway, Teller County (*Hawksworth & Hinds 422*, June 19, 1963); and near North Cochetopa Pass, Saguache County (*Hawksworth 437*, July 9, 1963). In these instances, occasional bristlecone pines were attacked in infected ponderosa pine stands.

The lodgepole pine dwarfmistletoe, *Arceuthobium americanum* Nutt. ex Engelm., was found to parasitize *Pinus aristata* in an area 4 miles north of Grant, Park County, Colorado (*Hawksworth 449*, July 10, 1963). Several bristlecone pines in a stand that was predominantly lodgepole pine (*Pinus contorta* Dougl. ex Loud.) were infected. Bristlecone pine appeared to be very susceptible to *A. americanum*,—a number of heavily infected trees as well as some that had been killed by the parasite were found.

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NOTES ON FRESH-WATER MARSH AND AQUATIC PLANTS IN CALIFORNIA – IV[1]

BY PETER RUBTZOFF

The present notes contain information on *Lemnaceae* and *Juncaceae*.

LEMNA GIBBA L. Mr. Howell, in his Marin Flora (1949), has the following entry under *Lemna gibba* L.: "Lake Ranch, Point Reyes Peninsula, acc. H. L. Mason. This is the only station known for this widespread duckweed in Marin County,

[1] The third part of the Notes was published in 1964 in the present volume of this journal, pages 68 to 73. For a map showing marshes in southern Sonoma County and a list of their names used in these studies, *see* Leafl. West. Bot. 9:73–76 (1960).

but it may be expected elsewhere since it has been collected on the road between Tomales and Petaluma only one mile east of the Marin County line."

In A Flora of San Francisco, California, by Howell, Raven, and Rubtzoff (1958), we find that the only collection with a definite locality listed under this species is the non-gibbous material collected by Raven near the mouth of Lobos Creek.

In view of the above observations it may be of interest to publish the following data known to me on occurrences of *L. gibba* in Marin County and San Francisco.

Marin County. Small lake, 2.8 miles north of Lake Ranch, east side of Drakes Bay, alt. 200 ft., *Mason 12916* in 1946 (UC; this, probably, is the collection on which the information in Marin Flora is based; it is cited, without collection number or date, in Landolt, 1957, p. 351, from east of Drakes Bay) ; small marshy creek 2 miles north of Bolinas, *Nobs & Smith 916* (in sun, gibbous, flowering) and *917* (in shade, flat) in 1949 (UC; cited, without collection number or date, in Landolt, 1957, p. 351, from Bolinas); San Rafael, Aug. 1904, *Ashmun* (DS; cited, without date, in Landolt, 1957, p. 351; this material consists mainly of *Lemna valdiviana* Phil., with some *L. gibba*) .

Data accompanying material of *Wolffiella lingulata,* collected in 1958 by Smith and Chisaki in a small pond about 2 miles south of Olema (discussed in more detail below, under that species), state that it was associated there with, among other plants, *Lemna gibba.*

I collected *L. gibba* in Americano Creek 0.5 mile east of Valley Ford. Here the creek forms the boundary line between Sonoma and Marin counties, and, although I collected the material (*Rubtzoff 4674* in 1961) from the Sonoma County edge of the creek, the colony filled its entire width. It formed a solid floating mat several layers thick in which it was mixed with *Azolla.* Many plants were in flower, some in fruit.

San Francisco. Mountain Lake, July 1, 1893, *Davy* (UC; cited, without date, in Landolt, 1957, p. 352); Cienega Lagoon, Ocean Beach at end of Ocean Ave., Parkside, Oct. 9, 1909, *Dudley* (DS; cited, without date, in Landolt, 1957, p. 352; this material consists mainly of *L. valdiviana* and *Wolffiella lingulata,* with a few plants of *L. gibba*).

WOLFFIELLA LINGULATA (Hegelm.) Hegelm. This interesting duckweed which has been reported in the Coast Ranges by Mason (1957) and Munz & Keck (1959) respectively from San Francisco and San Mateo counties south, was found to occur at the two following localities north of the Golden Gate. Small pond on east side of road, about 2 miles south of Olema along Highway 1, Marin County, *Smith & Chisaki 3132* in 1958 (UC, DS, CAS); a note added by J. T. Howell to the Academy dupli-

cate in April, 1963 reads: "Not reported heretofore from Marin County (to my knowledge)." Bennett Mtn. Lake, Sonoma County, *Rubtzoff 2001A* on July 30, 1955 [a few plants collected accidentally with the floating liverwort *Ricciocarpus natans* (L.) Corda]; and *Rubtzoff 5250* on Sept. 1, 1963 (the plants this time formed rather large masses near the surface of water and were again associated with *Ricciocarpus natans*).

In A Flora of San Francisco, California, by Howell, Raven, and Rubtzoff (1958), the only information given under *Wolffiella lingulata* is "Lake Merced according to H. L. Mason." Therefore it is of interest to mention the following material from San Francisco: Cienega Lagoon, Ocean Beach at end of Ocean Ave., Parkside, Oct. 9, 1909, *Dudley* (DS); it is cited in Landolt, 1957, p. 361 as "Sienega Lagoon (Dudley, DU, SF)", but no sheet could be located at the California Academy of Sciences, for which SF stands. The material consists of a mixture of *Lemna valdiviana* and *Wolffiella lingulata* with some *L. gibba* and has been cited above under the latter species as well.

JUNCUS ORTHOPHYLLUS Coville. In a letter of June 10, 1963, Dr. F. J. Hermann confirmed my supposition that some of the Coast Range material which has been treated as *Juncus falcatus* E. Mey. actually ought to be treated as *Juncus orthophyllus* Coville. I am very grateful to Dr. Hermann for having reviewed some of the material in question.

The following collections extend geographically, as well as altitudinally, the known range of *J. orthophyllus* which according to Munz and Keck (1959), occurs in California at 4000 to 11,000 feet in montane wet habitats in San Bernardino Mts., Sierra Nevada, and North Coast Ranges from Yolla Bolly Mts. north.[2]

Lake Co.: foot of Mt. Sanhedrin, June 1917, *Reynolds* (CAS). Mendocino Co.: near Point Arena, *Eastwood & Howell 6254* in 1938 (CAS, UC; collected in a meadowy place in chaparral 3 miles east of Point Arena, acc. to Mr. Howell; cited in Rubtzoff, 1953, under *Juncus falcatus* E. Meyer var.). Sonoma Co.: Pitkin Marsh (at elevs. of 150 to 200 ft.), *Baker 11122* (NCH–Santa Rosa), *Howell 13030* (CAS), *20908* (CAS, DS) and *21329* (CAS) in 1937 and 1945, *Rubtzoff 316* (CAS), *535* (CAS, DS) *623* (DS), and

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[2] In Mason (1957) we find the California distribution of *J. orthophyllus* given as follows. "Chiefly montane meadows: San Bernardino Mountains, Sierra Nevada, higher Coast Ranges north to Siskiyou County; east of the Sierra Nevada from Inyo County to Modoc County"; no definite southern limit of the distribution in Coast Ranges is given, as is the case in Munz and Keck (1959). However, I was unable to find at the U. C. Herbarium any Coast Range material of this species south of Humboldt County.

JUNCUS MERTENSIANUS subsp. GRACILIS (Engelm.) F. J. Herm., Leafl. West. Bot. 10:85, 1964. *J. nevadensis* S. Wats. Dr. Hermann kindly determined as such two collections of mine from marshy shores of Boggs Lake, elev. about 2750 ft., 7 miles northwest of Cobb in southern Lake County (*Rubtzoff 1919* and *2816* in 1955 and 1956). This station is located considerably outside the reported range of this plant in California, the nearest Coast Range region of its occurrence being in Trinity County (Mason, 1957). However, it may have been overlooked in the relatively little collected section of the North Coast Ranges from Lake County north.

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FOUR NEW NEVADAN SPECIES OF PENSTEMON (SCROPHULARIACEAE)

BY FRANK S. CROSSWHITE

Herbarium, University of Wisconsin, Madison

At the request of the Academy of Natural Sciences of Philadelphia, I have attempted to identify specimens of *Scrophulariaceae* from that institution that were left unnamed at the time of Dr. Francis W. Pennell's unfortunate death. Indeed, much of the material was thought to be unique by Dr. Pennell,

as he had applied manuscript names to some parts of it. The four new species of *Penstemon* described below were either in this material or were discovered later during a personal visit to the herbarium of the Academy, or in the material that Pennell had reviewed at the U. S. National Herbarium. I am very grateful to Drs. Alfred Schyler, Walter Benner, and Francis Drouet of the Academy's staff for their kind assistances and for making the material available.

In the case of *Penstemon decurvus,* I have respected Dr. Pennell's manuscript name. In the case of *Penstemon Francisci-Pennellii,* I have preferred this commemorative name to the more provisional one which he had applied. Dr. Pennell obviously spent considerable time collecting this species at the many altitudes of the mountain peak upon which it is endemic; I think it quite fitting that his name should be closely associated with it.

Of the four species named below, *P. Francisci-Pennellii* belongs to the section *Habroanthus* Keck, a group which has never been satisfactorily revised, but which is in the author's schedule. Although members of the group are often only technically distinct, this species is exceptional since it bears many distinct differences from the other species.

Penstemon nyeensis, by virtue of its saccate anthers, fits easily into section *Saccanthera* (Reichenb.) Bentham, but the delimitation of the section merely on the basis of saccate anthers has independently been questioned by David D. Keck (Univ. Cal. Publ. Bot. 16:371), Francis W. Pennell (Mon. Acad. Nat. Sci. Philad. 1:199), J. T. Howell (Leafl. West. Bot. 2:120), and the present writer (ms.). A more thorough study of the section is something for the distant future, and partly for this reason, the species is put on record at this time.

Penstemon Maguirei and *P. decurvus* are quite obviously members of section *Penstemon,* a section being studied by the present writer. This section is very large and revisions of the specific alliances to which these distinctive species belong will not be published for some time. David D. Keck (Amer. Midl. Nat. 33:128–206) revised the section some years ago and it is obvious that these present species are quite distinct from those treated there.

Penstemon Francisci-Pennellii Crosswhite, spec. nov. Caulibus 1–6, 1–2.5 dm. altis, ex caudice suffrutescenti; foliis radicalibus petiolatis, lanceolatis, 2–12 cm. longis, 8–20 mm. latis; foliis caulinis sessilibus, 11–47 (–70) mm. longis, 1–4 (–8) mm. latis; inflorescentia minus glanduloso-pubescenti, paniculata; corolla violaceo-caerulea; filamento sterili glabro minus pubescentique; calyce 6–8 mm. longo, lobis lanceolato-attenuatis; capsula 7–12 mm. longa; semine 2 mm. longo.

Stems 1–6, 1–2.5 dm. high, about 2 mm. in diameter at the base; caudex woody, thicker than the stem; leaves all entire, lightly puberulent or glabrous, somewhat glaucous, the basal petiolate, lanceolate, 2–12 cm. long, 8–20 mm. wide, the cauline linear-lanceolate, 11–47 (–70) mm. long, 1–4 (–8) mm. wide; inflorescence only sparingly glandular-pubescent, simply paniculate, only moderately spreading, the pedicels usually 10 mm. or less long; corollas blue or blue-purple (not seen fresh), ascending, 27–34 mm. long, the tube 8–12 mm. long, the throat much inflated, 10–15 mm. wide when pressed, the lateral sinuses well developed, 9–12 mm. deep, the lower lip obviously bearded with short but flexuous white hairs; staminode apparently glabrous or bearded with 3 or 4 (rarely more) light yellow hairs at the slightly expanded tip; stamens exceeding the lateral sinuses but not exserted beyond the limb; anther-sacs sigmoidly twisted, opening from the free ends, about 3 mm. long across the connective; sepals green or scarious-margined, 6–8 mm. long, usually over 2 mm. wide at base, lanceolate-attenuate; mature capsules 7–12 mm. long; seeds about 2 mm. long; chromosomes unknown.

Type: No. 860,363 in the herbarium of the Academy of Natural Sciences of Philadelphia, rocky calcareous slopes near Lake Theresa, at 10,200 to 10,500 ft. elevation, below Mt. Wheeler, White Pine County, Nevada, collected July 16, 1938, *F. W. Pennell & R. L. Schaeffer, Jr., No. 23170.* Isotypes belonging to the herbarium of the University of Wisconsin are being deposited in the following herbaria: California Academy of Sciences, Missouri Botanical Garden, University of Michigan, Southern Methodist University, and University of Wisconsin.

Other specimens examined of this species are all from the Mt. Wheeler region of White Pine County, Nevada: shaded rocky bank, valley of Lehman Creek, 8500 to 8700 ft., *Pennell & Schaeffer 23105* (PH, WIS); aspen forest, valley of Lehman Creek, 8700 to 9300 ft., *Pennell & Schaeffer 23116* (PH); aspen forest, valley of Lehman Creek, 9400 to 9700 ft., *Pennell & Schaeffer 23128* (PH, WIS); aspen and conifer forest, along Lehman Creek, 9800 to 10,000 ft., *Pennell & Schaeffer 23134* (PH); infrequent on stony aspen slopes, Lehman Creek Basin,

glabrata, locally common in sandy soil, 2 miles west of San Antonio Range, in Smoky Valley, Nye County, Nevada, collected July 20, 1945, *Bassett Maguire & Arthur H. Holmgren No. 25884.*

Penstemon decurvus Pennell, spec. nov. Caulibus 2–3 dm. altis, ex caudice suffrutescenti, minus puberulis; foliis glabris, integris, radicalibus lanceolatis, petiolatis, 15–65 mm. longis, 9–15 mm. latis, caulinis sessilibus, 4–7 mm. latis; inflorescentia moderate glanduloso-pubescenti, 7–20 cm. longa; corolla 15–18 mm. longa, caerulea; filamento sterili dense aurato-barbato apice; calyce 4.5 mm. longo.

Plants 2–3 dm. high, stems 2 (on both plants of the type sheet), from a woody caudex, only lightly puberulent; leaves entire, glabrous, the basal broadly lanceolate, petiolate, 15–65 mm. long, 9–15 mm. wide, the rosette well developed; cauline leaves sessile, 4–7 mm. wide, or the lowest short petiolate; inflorescence moderately glandular-puberulent, 7–20 cm. long, the peduncles rather short and ascending, rendering the panicles narrow; flowers borne horizontally, but decurved downward; corollas 15–18 mm. long, apparently some shade of blue (not seen fresh); staminode bearded at the tip with a tuft of yellow hairs; anther-sacs dehiscent throughout and opposite, flat, 1.2 mm. long across the continuous apices; sepals 4.5 mm. long, green or tinged with the color of the corolla; capsules, seeds, and chromosomes unknown.

Type: No. 1,733,484 in the United States National Herbarium, rocky hillsides in sagebrush-*Amelanchier* association, 7800 ft. elevation, Mahogany Mt., north of Deer Lodge, Lincoln County, Nevada, collected June 10, 1935, *D. H. Galway No. 8261.*

LUPINUS NOTES IV

BY DAVID B. DUNN
University of Missouri, Columbia

LUPINUS MICRANTHUS DOUGL. IN LINDL., ILLEGITIMATE

Lupinus micranthus Douglas, a name long in use, must be replaced under the homonym rule, Article 64(2). I was not aware of the earlier use of the name *L. micranthus* by Gussone at the time I published my monograph of the *Micranthi* (Aliso 3:135–171,–1955). The difficulty resulted from the rareness of Gussone's early publication and the fact that Index Kewensis, while listing both names, gave Gussone's as a synonym and without any date of publication. I first became aware of the date of Gussone's publication in C. P. Smith's Species Lupinorum, while reviewing during the past year the names pub-

lished on Canadian lupines. Both the date (1828) and the fact that there is a complete Latin description, constituting a valid description, have now been verified for Gussone's plant.

I suspect that the manner of citation in Index Kewensis is the reason why none of the authors of treatments of western United States lupines became aware of the illegitimacy of the name. I have been unable to find any note in C. P. Smith's Species Lupinorum indicating that he ever tried to check the Giovanni Gussone publication (Florae siculae prodromus, sive plantarum in Sicilia ulteriori nascentium enumeratio . . . 2:400, 401,–1827–8). The work is in the Library of the U. S. Department of Agriculture in Washington, D.C.

The correct name now is: LUPINUS POLYCARPUS Greene, Pittonia 1:171 (1888). Type: *Greene,* San Francisco, California (ND-G). Synonym: *L. micranthus* Dougl. in Lindl., Bot. Reg. 15: tab. 1251 (1829), non Gussone (1828). Type: *Douglas* (CGE); see Dunn, 1956.[1]

RECONSIDERATION OF CANADA LUPINE

Lupinus arcticus Wats. subsp. **canadensis** (C. P. Sm.) Dunn, comb. nov. Basonym: *L. latifolius* Agardh var. *canadensis* C. P. Sm. (Type: *C. F. Newcomb,* June 24, 1915, Colewood, Vancouver Island, British Columbia, DS.) Common name: Canada Lupine.

It is evident after studying the herbarium material that the affinity of this taxon is with *Lupinus arcticus* subsp. *subalpinus* (Piper & Robinson) Dunn. The intergradation from subsp. *canadensis,* predominant in the lowlands, into subsp. *subalpinus,* which dominates the higher areas even to glacier margins, appears to be so complete that there are intermediate areas where the plants are difficult to place in one taxon or the other. This situation appears to be analagous to the altitudinal subspecies described in the classic work of Clausen, Keck, and Hiesey. The characteristic of ciliation above the claws of the keel, which caused Smith to place var. *canadensis* in *L. latifolius,* is present in three taxa in the Vancouver Island area, namely, *L. rivularis, L. littoralis,* and *L. nootkatensis.*

The explanation of the derivation of subsp. *canadensis* ap-

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[1] DUNN, D. B. 1956. The lupines collected by David Douglas from 1825 to 1827: their type localities and nomenclature. Leafl. West. Bot. 8:52.

pears to be introgression from one of these coastal taxa into subsp. *subalpinus* during the past glacial age when mountain glaciers would have displaced subsp. *subalpinus* sufficiently to permit hybridizing. With the recession of the glaciers the plants with a genome adapted to the glacier margin habitat would be expected to follow the glaciers back into the higher mountains, while plants retaining a genome for milder lower elevations would be left behind.

The true *L. latifolius* material is from the Columbia River area southward. A final proof of the relationship can undoubtedly be obtained by chromatographic studies. Illustrations and detailed descriptions will appear in the forthcoming treatment of *Lupinus* for Canada and Alaska.

A NEW SPECIES OF ERIOGONUM FROM THE PANAMINT MOUNTAINS, CALIFORNIA

BY JOHN THOMAS HOWELL
California Academy of Sciences
AND
JAMES L. REVEAL
Utah State University, Logan

Eriogonum eremicola Howell & Reveal, spec. nov. Annuum, 8–25 cm. altum, pauciramosum vel basi vel supra basin, caulibus omnino minute pubescentibus cum pilis brevibus tenuibus erectis capitato-glandulosis, ramis circa per 45° divergentibus; foliis foliaceis basilaribus, laminis rotundatis, usque ad 2.5 cm. longis et latis, supra tenuiter tomentosis demum glabratis, infra albo-tomentosis, petiolis tomentosis, usque ad 3 cm. longis, foliis caulinis bracteiformibus; pedunculis deflexis, glandulosis, inferioribus usque ad 1 cm. longis, superioribus perbrevibus involucris subsessilibus; involucris obconicis, circa 2 mm. longis et 1–1.5 mm. latis, sparse glandulosis extus, intus sparse pilosis, 5-lobatis, lobis circa 1 mm. longis, subobtusis vel acutis, pedicellis glabris, bracteolis minute glandulosis et sparse pilosis; perianthiis albescentibus, in senectute rubescentibus, post anthesin 2–2.5 mm. longis, segmentis exterioribus quam interiora paulum longioribus, segmentis ovato-oblongis, apice obtusis, basi obtusis vel subcordatis, costa segmenti et basi perianthii cellulari-verrucosa; antheris rotundatis, circa 0.25–0.33 mm. diametro, rubidis; stylis brevibus, circa 0.3 mm. longis; achenio 2 mm. longo, brunneo, paulo compresso, cellulari-lineato, rostro 0.6 mm. longo, granulare.

Type: Herb. Calif. Acad. Sci. No. 450,759, collected on a

Plants 1–2.5 dm. tall, slender, yellowish-green to reddish, glandular; involucres deflexed, sessile or subsessile above, peduncled to 5 (–10) mm. below, deeply lobed; perianth oblong, 2–2.5 mm. long; Panamint Mountains, 7500 to 10,000 feet elevation.....*E. eremicola*

Plants 1–4 (–10) dm. tall, stout, green, glabrous; involucres erect, sessile or nearly so, not deeply lobed; perianth 1.5–2 mm. long. *E. Hoffmanni*

Leaves entire, not crisped or wavy-margined, 1–4 cm. long, 2–4 cm. wide, petiole up to 5 cm. long; stems up to 15 cm. long, plants under 5 dm. high; perianth spatulate; Panamint Mountains, elevation 5000 feet.....var. *Hoffmanni*

Leaves crisped with a wavy margin, 2–5 cm. long, 3–8 cm. wide, petiole up to 10 cm. long; stems 2–4 dm. long, plants 4–10 dm. high; perianth ovate; Funeral and Black mountains, elevation 2000 to 4000 feet.....var. *robustius*

A MISPLACED MANZANITA FROM THE SANTA LUCIA RANGE, CALIFORNIA

BY PHILIP V. WELLS

Department of Botany, The University of Kansas, Lawrence

The holotype of *Arctostaphylos pechoensis* Dudley ex Abrams was collected by W. R. Dudley in Wild Cherry Canyon in the Pecho sector of the coastal San Luis Range, San Luis Obispo County (*Dudley*, April 5, 1902, DS). Although the type specimen has bright green, glabrous leaves and bracts, and setose hairs on the branchlets, petioles, and bracts, the original description by Abrams (1914) does not mention these characters, but describes the indument as finely tomentose throughout, including the leaves. It happens that Dudley collected specimens of another manzanita with sessile auriculate leaves on the mountains east of Cuesta Pass in the Santa Lucia Range (*Dudley*, April, 1903, DS, CAS, UC). These specimens are finely tomentose on branchlets, leaves, and bracts, but lack setose hairs throughout. Circumstantial evidence suggests, therefore, that Abrams obtained his misleading description of *A. pechoensis* from the Santa Lucia material, which was apparently confused with the holotype from the San Luis Range, perhaps because the two separate collections were both made in April of successive years.

Unfortunately, this confusion eventually led Alice Eastwood

to describe, as a new variety, *A. pechoensis viridissima* Eastw., based on a collection from China Harbor, Santa Cruz Island (*J. T. Howell 6368,* April 14, 1931; CAS). The variety was later raised to specific rank as *A. viridissima* (Eastw.) McMinn (McMinn, 1939, p. 640). *Arctostaphylos viridissima* is, indeed, very different from the Santa Lucia manzanita, but strongly resembles the type material of *A. pechoensis* from the San Luis Range, in all essential characters. Therefore, *A. viridissima* (Eastw.) McMinn is a synonym for *A. pechoensis* Dudley, and the Santa Lucia manzanita remains unnamed. The latter has at times also been misidentified as *A. obispoensis* Eastw., but for the most part, the long-standing confusion has, in effect, illegitimately shifted the name *A. pechoensis* from the San Luis manzanita (which is then *A. viridissima*) to the Santa Lucia manzanita! The publication of *Arctostaphylos cruzensis* Roof (1962), which sharpens the lines of specific distinction in the group, has focused attention on this tempest of nomenclatural and taxonomic confusion. The much-abused Santa Lucia manzanita deserves specific recognition.

Arctostaphylos luciana P. V. Wells, spec. nov. Frutex erectus griseus 15–40 dm. altus; cortex levis atroruber; caudex etumescens; ramuli incani, sine setis albis; folia dense sparseve viriduli-canescentia rotundato-ovato, 2–3 cm. longa, 2–2.5 cm. lata, sessilia, basi cordata auriculatave, apice acuta obtusave; inflorescentia nascens campanulata patens recurvatave; bracteae foliaceae canescentes lanceolatae, marginibus sine setis hispido-ciliatis; pedicelli glabri recurvatique in fructu; ovarium glabrum; drupa glabra.

Erect gray shrub 1–4 meters high, bark smooth, dark purplish-red; stem lacking a basal burl and not crown-sprouting; branchlets canescent or tomentose *without white bristles* or hispid hairs; leaves imbricated, round-ovate, 2–3 cm. long, 2–2.5 cm. wide, sessile or on very short petioles, cordate or auriculate-clasping, acute or obtuse and rounded at the apex; leaves *densely to sparsely canescent, gray-green*; nascent inflorescence campanulate, usually recurved or cernuous; bracts foliaceous, canescent, *without white bristles* or hispid-ciliate margins; ovary and fruit glabrous.

The type is designated as *Dudley, April, 1903* (CAS) collected in the Santa Margarita Mountains, east of Cuesta Pass in the Santa Lucia Range, California. *Arctostaphylos luciana* differs from *A. pechoensis* in lacking setose or hispid hairs on stems, petioles, and bracts, and in having the leaves and branchlets densely to finely canescent, giving the shrub a gray-green appearance in striking contrast to the greenery of *A. pecho-*

ensis (the synonym, *A. viridissima,* is apt). There are more nearly equal numbers of stomata on the upper and lower surfaces of the leaves of *A. luciana; A. pechoensis* has fewer stomata above than below. The nascent infloresence is more campanulate-cernuous in *A. luciana,* and the pedicels are strongly recurved in fruit, a trait lacking in *A. pechoensis.*

Arctostaphylos luciana differs rather strikingly from *A. obispoensis* Eastw. in having sessile, round-ovate, auriculate-clasping and imbricated leaves, and smaller, less branched and more compact inflorescences. Individuals intermediate between *A. luciana* and *A. obispoensis* occur in Cuesta Pass, a location conducive to frequent collection, which has contributed to the confounding of the two distinct species. Northwestward from Cuesta Pass, the populations of *A. obispoensis* become essentially homogeneous with respect to leaf-characters, with the leaves distinctly petiolate, mostly truncate to obtuse or rounded at the base and not at all auriculate-clasping. In fact, the tendency toward cordate leaf base in the extreme southern part of the range of *A. obispoensis* is probably caused entirely by introgression of genes from *A. luciana.* The serpentine manzanita *(A. obispoensis)* is restricted almost exclusively to the extensive outcrops of serpentinite and altered diabase, which occur only to the northwest of a major fault (Cuesta Pass) in the Santa Lucia Range. On the other hand, *A. luciana* does not occur on serpentine, but is confined chiefly to the silicious Monterey shale east and southeast of Cuesta Pass. Populations of the two species are in close juxtaposition only in Cuesta Pass, where limited introgression has apparently taken place. The fact that typical *A. obispoensis* is a dominant species in the chaparral for many miles to the northwest of Cuesta Pass on serpentine, while typical *A. luciana* is likewise a dominant species in the chaparral for many miles to the southeast of Cuesta Pass on Monterey shale, places the much collected and confused intermediate individuals in Cuesta Pass in proper perspective.

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We have been unable to ascertain the origin of introduction, whether intentional or accidental; but from what we have seen of the area and learned of its history, it seems unlikely that the plants originated from ballast. Because the species is so well established on Deer Island, one might expect to find it in other nearby areas, such as Sauvie Island; but thus far, this is not the case.

Scirpus cyperinus is quite a striking plant when in fruit, due to its elongate woolly perianth-bristles. Both the bristles and the scales are rust-colored. Plants range from 1 to 1.5 m. in height and form dense tufts.

Chromosome counts from this population show $n = 33$ *(Dennis 2632).*

I am grateful to Dr. Kenton L. Chambers for assistance in the preparation of this report.—La Rea J. Dennis, Department of Botany and Plant Pathology, Oregon State University, Corvallis.

Notes on Oxytheca. The known range of the southern Californian endemic, *Oxytheca caryophylloides* Parry, is to be extended northwestward from the San Gabriel Range in Los Angeles County to the mountains of Ventura County as indicated by the following collections: summit road on Pine Mountain, el. about 7000 ft., *Pollard,* July 12, 1956; rocky sandy area among pines, Pine Mountain, el. 7250 ft., *E. R. Blakley 6086,* July 14, 1963; in a moist meadow in a ponderosa pine forest, Thorn Meadow, el. 5100 ft., *Twisselmann 2969,* June 14, 1956.

There are numerous small differences between *O. caryophylloides* and *O. trilobata* Gray, but the key difference usually given, "calyx-segments entire" *vs.* "calyx-segments cleft," can be misleading. In *O. caryophylloides* the segments are not entire but are shortly fimbriate; in *O. trilobata* the segments are 3-lobed with the lobes more or less unevenly denticulate. It is not always easy to see these distinctive calyx characters in herbarium specimens but differences in the anthers are usually readily apparent: in *O. caryophylloides* the anthers are roundish, about 0.25 mm. in diameter, and yellow; in *O. trilobata* the anthers are purplish-red, oblongish, and about 0.5 mm. long. — John Thomas Howell.

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LEAFLETS *of* WESTERN BOTANY

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A NEW SIERRAN STREPTANTHUS

BY JOHN THOMAS HOWELL

Streptanthus Farnsworthianus J. T. Howell, spec. nov. Herba annua erecta glaberrima, plus minusve glaucescens et purpureo-tincta, fere pauciramosa, 1.5–4 dm. alta; foliis basalaribus incognitis, caulinis perdiversis, foliis inferioribus prope basin viridibus, bi- vel tri-pinnatisectis, petiolis rhachidibusque vel tenuibus vel paulo dilatatis et basi petiolorum anguste auriculatis, follis mediis et superioribus purpureis, subsessilibus vel sessilibus, amplexicaulibus, lanceolatis oblongo-ovatis vel late ovatis, dilatatis, profunde pinnato-lobatis usque ad integerrimis, aliquot apicem cristaeformem ferentibus supra basin latam integrem amplexicaulem, vel foliis superioribus ovatis integris acutis acuminatisve amplexicaulibus; racemis basi foliaceo-bracteatis, longis vel brevibus, pauci- vel multi-floris, pedicellis usque ad 5 mm. longis, floribus 1–1.5 cm. longis; calyce suburceolato viridescenti et violescenti-tincto; petalis aequalibus, ungue alato-marginato, lamina rotundata, albescenti purpureo-nervosa, margine vix undulata; staminibus inaequalibus, filamentis distinctis, antheris valde inaequalibus, 2 mm. et 4 mm. longis; ovario subsessili, stigmate rotundato, concavo; siliquis compressis, ascendentibus, rectis vel paulo curvatis, 7–9 (vel 12) cm. longis, 3 mm. latis; seminibus subrotundis, compressis, anguste alatis, brunneis.

Types, in Herb. Calif. Acad. Sci., collected by Evalyn L. Farnsworth on a high ridge at the head of Lumreau Creek, 5.5 miles southeast of Glennville at an elevation of 4600 feet in Kern County, California: *No. 477,* type for foliage and flowers, collected May 13, 1965; *No. 182,* type for fruit, collected June 21, 1964. The two collections came from the same station, a colony occupying about 20 feet by 100 feet and growing on a gravelly slope of decomposed slate along the upper limits of the Douglas oak (*Quercus Douglasii*) woodland.

Other collections made by Mrs. Farnsworth are: *No. 640* and *No. 641* collected at the type station on July 22, 1965, the former new growth on browsed plants, the latter ripe seed; *No. 575* from a small colony growing in slate on high hill north of Lumreau Creek, 4.5 miles southeast of Glennville at an elevation of 4400 feet, collected June 12, 1965; *No. 638* from a colony of very few plants most of which had been eaten (by field mice?), growing on a sunny slope of decomposed slate on Lumreau Creek at an elevation of 4100 feet, collected July 22, 1965. This species is not biennial; no summer seedlings have been found. Mrs. Farnsworth's collections (of which a limited number of duplicates are to be distributed) have come to the herbarium of the California Academy of Sciences from

Mr. Ernest C. Twisselmann, Kern County phytographer and Academy research associate.

Other collections (in CAS unless otherwise indicated): Rush Creek Mill, Fresno Co., *M. McCardle in 1895;* above Trimmer Springs, Fresno Co., *Y. W. Winblad in 1937;* between Three Rivers and Giant Forest, Sequoia National Park, elevation about 3500 feet, Tulare Co., *B. F. Howitt S219 in 1960;* southern Sierra Nevada, *Mrs. Myers* (UC).

This remarkable mustard, belonging to *Streptanthus* subgen. *Pleiocardia* (Greene) Jepson, has been known to me for many years, but because I have never had the lower cauline leaves of well-developed plants, I have only been able to guess at a possible relationship heretofore. The pinnatifid basal leaves of Mrs. Farnsworth's excellent May collection indicate at once another species related to *S. diversifolius* Wats., but one in which the habit, flowers, and fruits are more like those of *S. tortuosus* Kell. This distinguished jewel-flower with its diverse and bicolored foliage is named for Evalyn L. Farnsworth who by her critical knowledge of a distinctive local flora is making known rare plants in the Sierra Nevada of Kern County.

A NEW ALPINE ERIOGONUM FROM NEVADA

BY JAMES L. REVEAL[1]

The Snake Range in east-central Nevada has attracted numerous botanists, but most of them have collected only in the vicinity of Wheeler Peak (13,061 feet), which is the highest in the range. The series of rugged mountains directly south of this peak have rarely been botanized.

During the summer of 1964, Noel H. Holmgren and I visited this region while on a general collecting trip into the Intermountain Region.[2] On a flat ridge top below Pyramid Peak, and on its lower talus quartzite slopes, we discovered a new species of *Eriogonum* growing in association with *Poa Sandbergii* Vasey and *Castilleja nana* Eastwood. On the limestone slopes of Mt. Washington to the south, the new *Eriogo-*

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[1] Present address: Brigham Young University, Provo, Utah.

[2] This trip was largely supported by a NSF grant under the direction of Dr. Arthur Cronquist and Arthur H. Holmgren. I wish to express my appreciation to Professor Arthur H. Holmgren and Dr. Richard J. Shaw for their many helpful suggestions.

num was associated with *Primula Parryi* A. Gray, *Aquilegia scopulorum* Tidestrom, and various grasses under *Pinus aristata* Engelm.

Eriogonum Holmgrenii Reveal, spec. nov. Perenne, caespitosum, foliis densis, oblanceolatis, 3–10 mm. longis, 2–4 mm. latis, albo-tomentosis subter, floccoso-tomentosis supra, stipitato-glandulosis; petiolis 2–6 mm. longis, 2 mm. latis basi, floccosis et stipitato-glandulosis; scapis 1–3 cm. altis, floccosis et stipitato-glandulosis, erectis; inflorescentia capitata, bracteis 4–6, subtentibus involucra, 1–2 mm. longis, lanceolatis, floccosis et stipitato-glandulosis; involucris 2–4, campanulatis, 2–3 mm. longis, tomentosis et stipitato-glandulosis, membranaceis, 5-lobatis, lobis lanceolatis; pedicellis glabris vel sparse glandulosis basi, 1–2 mm. longis; bracteolis lineari-lanceolatis, hirsutulis; perianthiis 2.5–3 mm. longis, elongato-obcordatis, plus minusve glandulosis; filamentis basi minute pilosis; acheniis 2.5–3 mm. longis, glabris.

Perennial, caudex branched from a woody base, cespitose, forming dense thick mats of varying sizes; leaves numerous, oblanceolate to spatulate, 3–10 mm. long, 2–4 mm. wide, densely whitish-green-tomentose below, less so or floccose and green above, with small stipitate glands scattered throughout and intermingling with the long hairs, petiole 2–6 mm. long, with a prolonged, expanded, appressed petiole-base, 2 mm. wide, membranous and hyaline, sparsely floccose and glandular on the margin and outer surface, glabrous within, the petiole floccose and glandular; scapes erect, up to 3 cm. long, floccose and stipitate-glandular, often with one condition more pronounced; bracts 4 to 6, subtending the involucres; involucres many-flowered, membranous, 2 to 4 in each inflorescence, campanulate, 2–3 mm. long, with 5 lanceolate, acutish lobes dividing the tube more than half its length, sparsely tomentose and glandular without, glabrous within, greenish, often with a thin white margin, bractlets few, not exceeding the length of the involucre, linear-lanceolate, hirsutulous with minute acute marginal hairs, pedicels glabrous except for a few scattered glands at the base in some, stout or slender, 1–2 (–2.5) mm. long; perianth 2.5–3 mm. long, sparsely glandular on the outer surface, more so within, becoming nearly glabrous at maturity, segments subequal, the outer segments 2 mm. wide, the inner 1.5 mm. wide, elongate-obcordate, attenuate at the base, white with a red midrib, becoming pink, orange, and a deep red at maturity; stamens included, the filaments pilose at the base, anthers greenish to a reddish-purple, 0.5 mm. long, somewhat oblong, pollen ellipsoidal, 40–45μ long, 30–35μ wide, granular with a single depressed furrow; ovary minutely roughened at the apex, styles 1.5–2 mm. long; achene 2.5–3 mm. long, the ovoid base abruptly tapering to a 3-angled beak, glabrous and minutely roughened at the apex, light greenish-brown to light brown.

Type: *N. H. Holmgren & J. L. Reveal 1576,* west base of Pyramid Peak on the quartzite ridge top above and north of Johnson Lake, elevation 11,280 feet, Snake Range, Humboldt National Forest, White Pine Co., Nevada, Aug. 10, 1964. Holotype at the Intermountain Herbarium, Logan, Utah; 34 iso-

It is a sincere pleasure to name this new species in honor of Noel H. Holmgren of the New York Botanical Garden and a former student at Utah State University. His enthusiasm in the field and his desire to collect in the more difficult places enabled us to find this new alpine *Eriogonum.*

Intermountain Herbarium, Department of Botany,
Utah State University, Logan, Utah

A NEW DUDLEYA FROM CALIFORNIA

BY ROBERT F. HOOVER

California Polytechnic College, San Luis Obispo

Dudleya Bettinae Hoover, spec. nov. Plantae maturae caudicibus ramosis, multas rosulas ferentibus; foliis rosulae glaucis, subteretibus, acutis, 2–7 cm. longis, 3–7 mm. latis; caulibus floriferis erectis, 15–25 cm. altis, simplicibus vel pauciramosis; pedicellis erectis, 1–4 cm. longis; lobulis calycis ovatis, 3–5 mm. longis; petalis 8–12 mm. longis, stramineis, saepe purpureotinctis versum apicem, rectis vel apice paulum divergentibus.

Plants developing a repeatedly branched caudex when fully grown, bearing many rosettes; leaves of the rosettes glaucous, terete to semiterete, acute, 2–7 cm. long, 3–7 mm. wide; flowering stems erect, 15–25 cm. tall, with only a few ascending branches or often simple; pedicels erect, 1–4 mm. long; calyx-lobes ovate, 3–5 mm. long; petals 8–12 mm. long, pale straw-yellow, often purple-tinged toward apex, erect or slightly curved outward at the tips.

Locally plentiful on otherwise barren serpentine outcrops, on ridge one mile west of Cerro Romauldo, San Luis Obispo County, June 27, 1947, *Hoover 7278* (type, CAS No. 453,624). A second probable locality is on serpentine one mile south of Cayucos, *Moran 2277*. There has been no opportunity to study the living plants near Cayucos, but the dried specimens closely resemble the type, and the collector's note "caespitose, forming clumps to 4 dm. in diameter with 100 or more rosettes" leads me to believe that the plants are *D. Bettinae* rather than *D. murina,* as explained below.

The specific epithet honors my wife, in recognition of valuable help in various phases of botanical activity; most appropriately because of her collaboration in the cultivation of various forms of *Dudleya,* which has been one of my special research interests.

The serpentine areas of western San Luis Obispo County are remarkable for the presence of three species of *Dudleya* which are neatly distinct from one another, although closely related. Attempts to differentiate them by comparison of dried specimens are singularly unconvincing, but the aspect of living plants in the field or in cultivation is in each case quite distinctive. A possible close relationship of all three to *D. Abramsii* Rose of the southern California mountains cannot be discussed here because of lack of fresh material of that species.

Of the three species in question, *D. murina* Eastw. is found along the base of the Santa Lucia Range near San Luis Obispo and in and near Perfumo Canyon in the San Luis Range. *Dudleya parva* Rose & Davidson, not previously reported outside Ventura County, is localized along San Bernardo Creek east of Morro Bay, with an additional small colony nearby on a serpentine outcrop on a volcanic hill near the mouth of Chorro Creek. The inflorescences and flowers of *D. Bettinae* are virtually identical with those of *D. parva,* but the caudex and the leaves are markedly stouter. In some respects *D. Bettinae* stands intermediate between *D. parva* and *D. murina,* and it could have originated by hybridization between the two in the past, but there is no indication of present hybridization taking place. The relationships of *D. Bettinae* seem so obvious that comparison with additional species of the genus is unnecessary. The following synopsis summarizes my field observations of these three localized plants.

Plants eventually developing a dense cluster of numerous rosettes; leaves terete to semiterete; petals cream-color or straw-color, often with midrib purple-tinged toward apex.
- Branches of caudex just below rosettes 4–8 mm. in diameter; leaves shriveling in summer[1], in dried specimens less than 2 mm. wide at middle.....*D. parva*
- Branches of caudex just below rosettes 10 to 18 mm. in diameter; leaves evergreen, after drying 3–7 mm. wide at middle.....*D. Bettinae*

Plants usually with a single rosette, rarely more than 4 or 5 even when old; leaves flat, comparatively thin; petals with purple midrib and purple striations on either side.....*D. murina*

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[1] When planted in pots and watered regularly, *D. parva* becomes evergreen like the other species.

TOLPIS IN CALIFORNIA

On June 29, 1965, Robert F. Hoover collected a few plants of a *Crepis*-like annual in Mendocino County, California, that has proven to be a notable addition to our weed flora, *Tolpis umbellata* Bertoloni. Dr. Hoover reports the plant as having been abundant on road banks with southern exposure between Orrs Hot Springs and Montgomery Creek along the South Fork of Big River. His collection, *No. 9469*, is in the herbaria at the California Polytechnic College and the California Academy of Sciences.

In the summer of 1934, Mr. H. D. Hazard sent *Tolpis barbata* (L.) Gaertn. to Miss Eastwood from Pacific Grove, Monterey County. The specimen in the Academy herbarium is noted as "perhaps an escape." It would appear that the plant has not become a common weed on the Monterey Peninsula as it has not been detected since by any of the numerous collectors who have worked in the area. The plant was not included in the flora of Monterey County by Howitt and Howell (Wasmann Journ. Biol. 22:1–184,–1964).

These two kinds of *Tolpis* are closely related and are sometimes treated as varieties of a variable Mediterranean complex [*T. barbata* var. *umbellata* (Bertol.) Rob.; *T. barbata* var. *concolor* Rouy]. Here in California, however, it would seem preferable to follow such botanists as Boissier, Halácsy, and Hayek who recognize *T. umbellata* as a distinct species in their several floras pertaining to regions around the east end of the Mediterranean Sea. In *T. umbellata* the flowering head is 1 to 1.5 cm. across, while in *T. barbata* the heads are 1.5 to 3 cm.

Among the many kinds of chicories in California, *Tolpis* is perhaps most closely related to *Microseris,* from which it can be distinguished by the pappus of its inner achenes which consists of several delicate bristles separated by numerous short scáles. Moreover, these annual species of *Tolpis* differ in their habit which is that of an *herba impia,* one in which the earliest heads on short fistulous peduncles are impiously over-topped by later heads on elongate slender branches. And as a further distinctive mark, the involucre proper is closely subtended by numerous filiform leaves so that we have a kind of love-in-the-mist dandelion.—JOHN THOMAS HOWELL.

LEAFLETS
of
WESTERN BOTANY

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JOHN THOMAS HOWELL

To Honor the California Botanical Club in its Diamond Jubilee Year

When the California Botanical Club was founded on March 7, 1891, the first expressed purpose was "to promote the study of plants, especially those found on the Pacific Coast of North America" (Zoe 2: 93,—1891). Now that the time has come for Leaflets of Western Botany to anticipate and to commemorate the club's Diamond Jubilee, what could be more appropriate than the publication of the botanical journal of one of western North America's foremost plant collectors and botanists, the journal of Marcus Eugene Jones! Moreover, Jones was close to the California Botanical Club at its beginning. Not only was he a charter member of the club, but he was a particular friend of Mrs. Katharine Brandegee under whose aegis the club was founded when she was Curator of Botany at the California Academy of Sciences. We are happy and grateful for the privilege to publish this particularly appropriate piece in the club's Diamond Jubilee year.

LEAFLETS
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WESTERN BOTANY

Acknowledgments

WE ARE GRATEFUL to Dr. Lyman Benson, Professor of Botany and Director of the Herbarium at Pomona College, for making the Marcus E. Jones journal available. Dr. Philip A. Munz first brought the journal to our attention and we are particularly grateful for his invaluable and time-consuming aid in editing Jones' account and for the illuminating Foreword. For stenographic and editorial help we wish to thank Doris Cantou, Blanche Clear, Virginia Moore, Anita Noldeke, and Sallie Norwall. And for financial assistance for the publication received from the California Academy of Sciences and the California Botanical Club, we are most grateful.

JOHN THOMAS HOWELL

November 29, 1965

that the information given therein can be more readily available. Mr. Howell and I have spent several days editing and checking the manuscript. I believe that, since Jones' specimens always have a date, it will be relatively easy from the "Itinerary" to discover just where he was on a given day. Too, he frequently gives what collection numbers he used for the specimens made on that day. We have inserted the name of the state in brackets where necessary and the account of a given trip always gives enough information to disclose what part of that state was involved. It is certainly a real contribution on Mr. Howell's part to make this available instead of having only four, now rather old, typed copies.

The reader may be interested to know that early in his western experience, in the region near Colorado Springs, Colorado, and in the late 1870's, Jones picked up a wallet which contained some valuable papers. He returned these to their owner, General Palmer, a pioneer in the development of that area, in building the Denver and Rio Grande Railroad and in other important projects. After this contact, General Palmer sent Jones out repeatedly to explore regions for their possible mining importance or possible agricultural development, in order to learn whether they should be considered in planning future railroads. In this way, Jones traveled to Montana, Idaho, Nevada, and other western states, and into Mexico as far south as Jalisco and Colima. It was on some of these trips for Palmer as well as on his own that his botanizing was done.

It should be stated that the Jones Herbarium belongs to Pomona College, but that it is now housed in the building of the Rancho Santa Ana Botanic Garden at Claremont. His diaries and various old maps are still extant, although in many cases the diaries are incomplete and the account of his exploration was made possible in part by his memory.

A word might be added for those using this "Botanical Exploration" as to Jones' terms Tropical life zone, Lower Temperate life zone, etc. He had his own system of life zones which is explained in his Contribution to Western Botany, No. 13: 52–58 (1910).

PHILIP A. MUNZ
Rancho Santa Ana Botanic Garden

Botanical Exploration of Marcus E. Jones

In studying the work of other botanists, I have been impressed with the meager information about their work, particularly as to localities and time. We cannot change the past but I have tried for years to get contemporary botanists to put down in writing the record of their work, but modesty or fear of criticism from others, or sheer indifference has made the task hard. It is a practical impossibility to make a correct map of the travels of any of the old botanists, and for that reason it is impossible to find the type localities of their new species. This greatly hampers ecological work. For this reason I have determined that it shall not be the case with my own work, and I care nothing for the criticism or praise of others in doing it.

My mother was a clergyman's daughter and a great lover of Nature. From my earliest day she encouraged us boys in gathering the beautiful and odd in Nature. She always had a vase of flowers on the mantle, the flowers renewed by us as fast as they got stale. In the fall, a vase or two of frosted grasses, gentians, and bittersweet decorated the mantle till the flowers came again. Thus I was brought up to love flowers.

My mother had a copy of Mrs. Lincoln's botany arranged by the Linnaean system by which she tried to puzzle out the names of flowers, and she taught me what she could about it. In the days of the academy preparatory to college in the early sixties, I began to find the names of plants we did not know and followed it up in the early seventies but did not try to make collections for preservation till along in 1875, the year of my graduation from college, when I was appointed to have charge of exchanging plants with eastern botanists in May. Several hundred species were found and analyzed, mostly collected at my home three miles from Grinnell.

1876

In 1876 I began with the season to collect systematically the whole flora at Grinnell, Iowa. It was a prairie country with isolated groves of deciduous trees along the creeks. I lived in one of these called

Jones's Grove, three miles west of town. It had been saved from destruction by prairie fires because the creek (Sugar Creek) had a large bend in it there facing the northwest, the direction of prevailing winds, and the fires rarely jumped along the creek. The grove was one of about 100 acres, the trees mostly shagbark hickory, scrub oak *(Quercus macrocarpa),* black oak, basswood *(Tilia),* crab-apple, plums, soft and hard maple, slippery and American elm, box elder. The shrubbery was almost wholly hazelnut. The blackberries and raspberries were very common. The spring flowers were *Cucullaria,* and *Dentaria, Smilacina, Erythronium albidum, Podophyllum peltatum.* The prairie flora had *Hypoxis, Smilacina, Carex, Salix humilis, Ceanothus americanus,* strawberries, grasses. In the summer were great numbers of *Compositae,* the most conspicuous being *Silphium, Helianthus, Senecio, Liatris, Solidago.* Also *Eryngium,* gentians, *Habenaria, Spiranthes,* and grasses.

Sugar Creek Grove was three miles farther south on the creek. This also had all the rest and *Cypripedium album, Iris, Trillium, Sanguinaria, Claytonia,* butternut; it was a denser grove. Skunk River as some ten miles away to the southwest and had a still moister soil and some plants not found at either place. This region belongs to the Middle Temperate life zone. The topography is a rolling prairie with few places where the underlying limestone crops.

I botanized all around Grinnell in 1876, also at Marshalltown, thirty miles to the north along the Iowa River, also at Iowa Falls in the woods and on the prairies nearby and in the limestone canyon along the river where grew *Pellaea, Camptosorus,* and other comparatively rare plants, also at Ackley, Mason City, Clear Lake, Cherokee, and Lemars where I collected the entire fall flora. This latter place has a number of plains plants like *Liatris punctata.*

1877

Began to botanize at Grinnell April 23rd, Sugar Creek Grove on the 26th, Grinnell on the 30th, also on May 3rd and 4th, Sugar Creek Grove on the 8th, Grinnell on the 9th, 14th, 16th, 17th, 18th, Sugar Creek Grove on the 19th, Grinnell on the 21st, 22nd, 23rd, 24th, 25th, 26th, 28th, Sugar Creek Grove on the 30th, Grinnell on the 31st, Skunk River on June 2nd, Grinnell on the 4th, 11th, 14th, July 17th, 20th, at Montezuma on the 15th of August, Grinnell on the 23rd, at Kellogg on the 30th, at Grinnell Sept. 5th, 21st, and 28th.

1878

I began a systematic study of ecology and flora this year; and collected and distributed in sets. These sets are in many places in this country and Europe and many of the species have been described as new since. I collected a little at Traer, Iowa, in the early spring. April 29th left Grinnell for Colorado. Was at Moberly, Mo., on the

I got 447–460 on timber line on Democrat Mt. On the 17th I got 461–464 at Empire. On the 19th 465–478 at Georgetown, on the 20th 479–483, on the 23rd 484–485 at the same place, 486–489 at Empire, 490–493 at Georgetown. On the 24th got 494–506 at Georgetown, on the 25th 507–512, and the 26th 512–519, and July 29th 520–521 all at the same place.

August 1st got 528–532 at Idaho Springs, 522–523 at Golden. On the 2nd 524–527 on the road to Denver. On the 3rd 533–538 at Denver, also the 5th 539–540 at Denver. On the 7th 541–555 at Morrison. On the 6th 556–562 at Denver. On the 8th 563–575 at Dome Rock in Platte Canyon. On the 12th 576–590 at Denver, and on the 13th 591–605. On the 14th 607–616 on the road to Boulder. On the 15th 617–626 in South Boulder Canyon. On the 16th 627–637 near the canyon. On the 17th 638–649 at Denver. On the 19th 650–655, and the 20th 656, etc. at the same place. Then I returned to Georgetown and went over the Argentine Pass then down the Blue to the junction with the Grand and then up to Breckenridge, Lincoln Pass, Fairview in South Park, then over Weston's Pass to Twin Lakes, and down the Arkansas to Canon City and Pueblo and Colorado Springs. The season was very late from the pass on and vegetation had been frosted, but some plants were found nevertheless, and quite a number at Canon City. Details of the numbers are lost. Then I returned to Iowa. The season's collection about 35,000 specimens and 1100 species.

1879

April 26th accepted place of professor of natural science at Colorado Springs for the rest of the year. Left Grinnell May 16th. Reached Atchison and Topeka on the 17th. On the 19th botanized at Colorado Springs, on the 21st at Manitou, on the 22nd at Mt. Washington, on the 24th at Manitou, on the 29th on the Glen Eyrie mesa getting some new species of fungi. On the 30th and 31st at Glen Eyrie. On June 4th botanized on Bear Creek, on the 5th in Cheyenne Canyon, on the 23rd in Bear Canyon, on the 24th at Glen Eyrie, on the 26th at Monument Park. On the 27th went to Pike's Peak on burros. On the 28th, was at Twin Lakes near the peak and Colorado Springs.

July 1st was in the Garden of the Gods, also on the 9th. On the 11th in Cheyenne Canyon. On the 14th left for Denver, on the 16th was in Cheyenne and in Salt Lake City on the 17th. On the 18th collected at Lake Point [Garfield] and until the 29th and went up City Creek. On the 29th I went to Alta and collected for two weeks. On the 12th climbed Mt. Baldy, on the 15th went over to Brighton, on the 16th Twin Lakes. Went to Salt Lake City on the 19th. On the 22nd botanized around Salt Lake. On the 28th was at Bingham [Canyon]. Sept. 2nd left for Iowa. Sept. 5th botanized at Iowa Falls. Collected 1100 species and 40,000 specimens this year.

1880

I left Iowa Falls, Iowa, February 18th for Salt Lake City and got there the 24th. March 3rd I hired team and started to drive to St. George. I reached Sandy. On the 4th I returned to Salt Lake and back to Sandy. On the 5th reached Pleasant Grove, Spanish Fork on the 6th, Mona on the 8th, and Juab on the 9th, Warm Springs near Gunnison on the 10th, Willow Bend below Richfield on the 11th, Elsinore on the 12th where I stayed three days and went 14 miles up the Clear Creek Canyon on the 18th. Then went seven miles farther on the 19th, then to Pine Creek fifteen miles above Beaver, Beaver on the 20th, Buckhorn Springs on the 22nd, Summit south of Parowan on the 23rd, then to Fort Hamilton on the 24th where I found the first spring flowers. I reached Leeds on the 25th and St. George on the 26th. I botanized all around the city on the plains and mesas until the 9th of April when I went over on the Santa Clara. On the 14th I went to Washington five miles east. On the 20th I started for Salt Lake and reached Bellevue. On the 21st got to Kararrah. On the 22nd Fort Hamilton. On the 23rd Parowan. On the 24th Beaver. On the 27th Corn Creek. On the 28th Fillmore. On the 29th to the ridge north of Scipio. On the 30th I reached Nephi. On May 1st I reached Spanish Fork. On the 3rd, I reached the Point of the Mountain and the 5th Salt Lake City.

On May 6th and 7th I botanized around Salt Lake City. On the 18th I went to snow in City Creek Canyon. On the 20th I went to Lake Point and again on the 29th. June 6th I botanized in City Creek, on the 10th at Warm Springs. On the 12th I went 8 miles up City Creek. On the 16th I was at Milford and botanized there until the 21st when I went to the mountains. On the 22nd I went on first train to Frisco and botanized there until the 25th. Then back to the city on the 26th. On the 28th I went with Parry and Engelmann up City Creek. July 1st I went with them to Uinta above Ogden. On the 2nd to Lake Point with them. On the 8th I went to Antelope Island. On the 15th was botanizing in City Creek Canyon. On the 20th at Bingham. On the 26th I went to American Fork. On the 27th I went up American Fork Canyon to Deer Creek and botanized all over the mountains to the crest until Aug. 4th, then returned to the city. Was up City Creek with Orson Howard on the 20th and up Parley's on the 31st with him. Botanized all around the city the rest of the season. This year I put up 20 sets of plants.

1881

March 3rd I collected around the city, also on the 1st, 2nd, 5th, 16th, of April, and May 6th, 7th, and 14th. I was at Farmington on the 21st, in the city on the 28th, Black Rock on the 30th at Fort Douglas. There are two Black Rocks in Utah, the one always intended is the one at the south end of Great Salt Lake half a mile

east of Garfield as it was then which was a mile east of Lake Point, this latter place being on the lake just at the far end of the Oquirrhs where the railroad comes out into Tooele Valley. There are two Garfields now, neither one of them being the old one. One is the station on the San Pedro [Union Pacific] R. R. some six miles east of Lake Point. The other is the bathing resort out in the lake some 3 miles east of Black Rock. City Creek Canyon is the one just back of Salt Lake City that flows past the capitol and which runs some 14 miles up to the crest of the Wasatch. Dry Canyon is the next canyon north of Fort Douglas, Emigration is the one to the south of the fort and Parleys is next to the south. Mill Creek Canyon is still farther south and lies at the foot of the lofty part of the Wasatch on the north. Big Cottonwood Canyon cuts the main part of the Wasatch next south of Mill Creek and heads in the glacial area just west of Park City called Brighton which is the apex of the Wasatch. Just west of Brighton on the other side of the divide Little Cottonwood starts which figured so much in my work of 1879 at Alta, Mt. Baldy being the big peak just south of Alta which divides the honors with Mt. Clayton (a mile to the east) and Lone Peak (a mile or two to the southwest) as being the highest peaks of the main Wasatch. Little Cottonwood is the only canyon in the Wasatch which had a glacier the whole length which emptied into Great Salt Lake (Lake Bonneville) in glacial times and whose icebergs transported granite boulders out into Salt Lake Valley. On the south flank of Mt. Baldy (the home of *Ivesia utahensis* n. sp.) arises the head of American Fork Canyon, which canyon opens into Utah Valley at American Fork. Little Cottonwood empties into Salt Lake Valley east of Sandy 8 miles. One fork of American Fork Canyon heads back of Timpanogos Peak.

In the spring I botanized around Salt Lake City. June 21st I collected nos. 2201–2216 at Santa Cruz, California, and on the 22nd 2217–2227 at the same place. On the 23rd I got 2228–2238 in the hills nearby. On the 24th 2239–2258 in the same region. On the 25th 2259–2270. On the 27th 2271–2278 at the Big Trees. On the 28th 2279–2295 in the hills. On the 29th 2296–2312 same. On the 30th 2313–2325 same. July 1st got 2326–2339 same. On the 2nd got 2340–2350 same. On the 4th 2351–2357 same. In California, I botanized all around Santa Cruz and as far east as the Big Trees but most of my work was done within three miles of the town.

July 7th got 2358–2367 at Oakland, on the 8th 2368–2371, on the 9th 2372–2378, and on the 15th 2379 at the same place. On the 15th got 2380–2384 at San Francisco at Golden Gate Park and the beach, on the 16th 2385–2394 at the same place, including *Chorizanthe cuspidata* n. sp. All Tropical. On the 17th I collected a number of species at Duncan's Mills.

July 20th got 2394–2410 at Soda Springs, Nevada Co., Spruce

ico. On that trip I discovered *Aesculus Parryi, Lathyrus splendens, Cereus maritimus, Draba unilateralis, Rosa minutiflora, Melica fruticosa,* and *Ribes viburnifolium.* Throughout the entire area we were in the Tropical life zone, so far as I recall.

On April 19th I got 3143–3153 at San Diego. On the 20th 3154–3161 at Soledad. On the 21st I got 3162–3165 at San Diego. On the 24th I got 3166–3171 in San Jacinto Canyon, and on the 25th 3172–3175 on the San Jacinto Plains, including *Astragalus pomonensis.* On the 27th I got 3176–3190 at Colton, and on the 28th 3191–3199 there, and on the 29th 3199–3202 there. On May 2nd I got 3203–3216 at Pasadena. On the 3rd 3217–3220 at Los Angeles. On the 3rd I got 3221–3223 at Pasadena. On the 6th 3224–3236 at San Luis Obispo, including *Layia Jonesii* n. sp. On the 8th 3237–3244 there, on the 9th 3245–3248 there. On the 12th 3249–3253 at San Francisco. On the 13th I got 3254–3258 at Oakland. On the 15th I got 3259–3264 at San Francisco, and on the 16th 3265–3274 at San Francisco. On the 28th I got 3275–3278 at Emigrant Gap, also on the 27th 3279–3283, and on the 28th 3284–3296, and on the 27th 3297–3305, and on the 30th 3306 all at Emigrant Gap. I then went on to Truckee and Reno and collected everything at Carson City and Empire City. I went up to Lake Tahoe. I also took a trip to Candelaria and collected the entire flora then in bloom there, also at Hawthorne, Rhodes, and Walker Lake. I got *Cymopterus corrugatus* on the way out in the early spring at Oreana. I also stopped off at Battle Mountain and went to Austin, and went to Wells again, getting a large number of species.

This season's collection amounted to about 1825 species and some 50,000 specimens. The collections of 1881 and 1882 have been the basis for very many species by others. In the fall of 1882 I also collected at Price, Castle Gate, and Green River, Utah, and at Grand Junction, Colorado. Among the California species that were new are *Thelypodium neglectum, Sidalcea calycosa, Lathyrus splendens, Layia Jonesii, Krynitzkia micromeres, Krynitzkia arizonica, Chorizanthe cuspidata, Melica fruticosa, Poa Jonesii, Notholaena californica,* and six new species of fungi. Among the Nevada plants that were new were *Arabis pulchra* and several others later described, *Stanleya elata, Cymopterus corrugatus, Iva nevadensis, Stipa stricta, Poa nevadensis, P. elongata* and two new fungi. The collection in Utah included *Atriplex corrugata, Astragalus Coltoni, Festuca Jonesii.*

The itinerary after leaving Emigrant Gap was as follows. I returned to Salt Lake City and on the 14th of June was at Palisade, Nevada, Battle Mt. on the 15th where I got the rare *Astragalus tetrapterus,* on the 16th at Austin, on the 19th at Empire City and Reno, the 20th and 21st at Candelaria, 22nd at Rhodes and Hawthorne. At Rhodes I found Watson's rare *Cleomella parvifolia;* was at Hawthorne on the 23rd where I got *Iva nevadensis,* was at Rose

Creek on the 25th. On the 27th was back at Emigrant Gap [California] until July 1st, on the 3rd was at Colfax, and Auburn on the 4th. On the 5th took the stage for St. Lawrence near Placerville and also on the 7th. Was at Sacramento on the 10th, at Duncan's Mills on the Russian River on the 15th, also on the 17th; was on the river the 18th.

August 25th was at the Hot Springs north of Salt Lake City, at Sandy on the 29th and Alta on the 30th and 31st. Sept. 1st I botanized down Big Cottonwood, on the 16th was at Bountiful, on the 21st, 22nd and 23rd was at Alta. I put up 20 sets of these plants and collected about 40,000 specimens.

1883

March 2nd I went to Farmington, Utah. On the 24th I was at Park City. On the 13th of April I was in Hooper. On the 19th and 21st botanized at the Hot Springs. On the 18th of June on Stansbury Island. On the 23rd at Garfield. I went to Lower Crossing July 9th. Was at Grand Junction [Colorado] Aug. 1st to the 4th. On the 18th was in American Fork Canyon [Utah]. On the 20th was a the Point of the Mountain. On the 24th at Alta and Sept. 3rd was in Strawberry Valley for two weeks.

The places mentioned in this year's collecting are mostly well known. Hooper is near the shores of Great Salt Lake southwest of Ogden. The Hot Springs are those 4 miles north of Salt Lake City. Lower Crossing is now called Woodside and is in the Navajo Basin between Sunnyside and Green River. Strawberry Valley is at the head of the south fork of the Duchesne east of Heber and is in the Upper Temperate life zone. Woodside is in the Lower Temperate. Castle Gate is at the portal of the Book Cliffs above Helper.

1884

In April I left Salt Lake City and passed through Pueblo, La Junta, Trinidad [Colorado]. Botanized at Espanola [New Mexico] on the 11th. Reached Albuquerque and stayed a day or so and botanized on the 14th and 13th. Then went to El Paso, Texas, and got a few plants on the way at Socorro and Rincon [New Mexico]. On the 15th I got *Astragalus Bigelovii* at Engle [New Mexico]. On the 16th I got nos. 3700–3712 at El Paso, on the 17th 3713–3722 there. On the 18th 3723–3726; on the 19th 3727–3736; on the 21st 3737–3746; on the 22nd 3747–3757; on the 23rd 3758–3770; on the 24th 3771–3777; on the 25th 3778–3782; all at El Paso. On the 29th I got 3800–3803 at Deming, New Mexico. On the 30th 3804 at Rincon. All in the Tropical life zone. About May 1st I got one species at Canyon Diablo [Arizona].

May 3rd I got 3783–3799 and 3805–3812 at Needles, California. On the 5th 3813–3829; on the 6th 3830–3842; on the 7th 3843–3850;

on the 8th 3851–3864; on the 9th 3865–3869; on the 10th 3870–3872; all at Needles. On the 13th I got 3873–3881 at Yucca, also called Henning for a time, just east of the Needles about 30 miles in Arizona, still in the Tropical life zone. On the 14th I got 3882–3909; on the 15th 3910–3923; on the 17th 3924–3928; on the 19th 3929–3931; on the 20th 3932–3933; and on the 21st 3934–3944; all at Yucca. On May 23rd I got several species at Hackberry just east of Yucca, and on the 24th about a dozen more species at the same place. On the 26th I got about 20 species at Peach Springs in the Lower Temperate life zone.

I then took a trip to Iowa and collected some plants on the plains in Nebraska. I was back at Flagstaff, Arizona, on Aug. 1st. I got 3945–3947 there; on the 2nd 3948–3958; on the 4th 3959–3978; on the 5th I got 3980–3996; on the 6th 3997–4010; on the 7th 4011–4025 there. All in the Middle Temperate life zone except a few on the edge of the Lower Temperate. On the 18th I got 4026–4037 at Cosnino on the lower edge of the Middle Temperate life zone; on the 9th 4039–4047 there; on the 11th 4048–4051 there; on the 12th 4052–4066 there; on the 13th 4067–4070 there. On the 14th I got 4071–4075 at Bellmont west of Flagstaff. On the 27th I got 4088–4089 at Peach Springs in the Lower Temperate life zone. On the 21st I got 4067–4077 at Needles [California]. On the 26th I got 4078 at Hinckley [near Barstow], and 4079–4081 at Mojave. I also got a few species at Pasadena and Los Angeles about this time. On the 28th I got 4090–4092 at Williams [Arizona]. On the 28th I got 4093–4098 at Fairview, Arizona, west of Williams on the upper edge of the Lower Temperate life zone. On the 29th I got 4099–4104 at Flagstaff. On the 30th I got 4105–4108 on the San Francisco Peaks in the Upper Temperate life zone.

On Sept. 1st I got 4109–4112 at Winslow, east of Flagstaff, in the Lower Temperate life zone. On the same day I got 4113 at Holbrook nearby. On Sept. 3rd I got 4115–4131 at Albuquerque [New Mexico]. On the 4th I got 4132–4148 there. On the 5th I got 4149 there. On the 6th I got 4150–4161 in the Sandia Mts., east of Albuquerque. Mostly in the Lower Temperate life zone, Albuquerque being in the Tropical.

Sept. 10th I got 4168–4193 at El Paso, Texas. On the 11th 4194–5106 there. On the 12th I got 5107–5118 there. On the 13th I got 5119–5121 at Stein's Pass [New Mexico], east of Bowie. On the 15th I got 5121–5125 at Bowie and at the foot of the Chiricahua Mts. at Charles' Ranch. Tropical life zone. On the 16th 5126–5142 there; on the 17th 5143–5162 there; on the 18th I got 5163–5181 there; on the 19th 5182–5196 there; on the 20th 5197–5214 there; on the 21st 5215–5228 there. On the 22nd 5229–5230 there; on the 23rd 5231–5234 there. On the 26th I got 5235 at Ochoa, and 5236 and 5237 as Casas Grandes. On the 29th I got 5238–5247 at El Paso, Texas. October 1st I got

1888

I was at Tintic Junction [Utah] in June. I took a trip to the Uintas at the head of the Bear River by way of Chalk Creek and Coalville. Was at Goodman's Ranch at the north foot of the range Aug. 8th. I was in the big meadows at 9,000 ft. alt. by the 10th and on top of La Motte Peak on the 11th and visited the main glacial basins during the next week or two, getting the entire flora. I was on Hayden's Fork on the 21st and on Clak Creek on the 22nd and 28th. In September I took a pack trip from Salt Lake City to Strawberry Valley by way of Daniel's Canyon. Was at Castle Gate on the 21st and Price on the 22nd, Emma's Park on the 28th, Colton on the 29th, Cold Spring Hollow Oct. 1st, Colton on the 2nd.

1889

I botanized in City Creek May 2nd, Coalville on the 14th and Garfield on the 20th. I botanized at Green River and Cisco on June 21st and was at Castle Gate on the 22nd.

1890

I botanized in City Creek April 22nd, Bingham on the 24th, at Fort Douglas on the 28th and 30th. Botanized at Terminus, Utah, which is near the town of Stockton, April 20th and May 6th. Collected at Cisco, eastern Utah, May 2nd and 9th and at Green River on both dates. Collected at Echo which is east of Ogden on the 7th. Botanized at Castle Gate on the 11th.

Took the train for Tucson, Arizona, by way of Pueblo, Colorado, and botanized at Tucson on the 19th. Left Tucson on the 21st and botanized at the pump house north of there. On the 22nd botanized at Willow Spring and Yager's on the road to Riverside. On the 23rd collected at Putnam's Ranch and Riverside. On the 24th went over the Mescal Mts. On the 26th went over the Pinals and down beyond Globe. The next day went over on Salt River. On the 29th botanized at Rye and Tonto Store. On the 30th was at Pine Creek. Botanized at Pine Creek and Baker's Butte on the Mogollons on June 2nd. On the 4th was at Mormon Lakes. Drove thence to Flagstaff and remained there until the 9th when I reached Little Spring, and the Little Colorado on the 9th. Was on the Moencoppa on the 10th and Willow Spring north of there on the 11th. Was at Lee's Ferry on the Colorado from the 12th to the 16th. Drove to House Rock on the 18th passing Jacob's Pool on the way. On the 19th drove to Navajo Well below Johnson and botanized there that evening and the next morning and passed over the Kaibab on the way to the Well. Reached Johnson on the 20th and passed over the summit toward Sink Valley [?Utah] on the 21st. Was in that valley until the 23rd. Reached Panguitch on the 24th and took the stage for Salt Lake City by way of Orton's, Beaver, Milford and the train from there.

July 8th was at Green River. Went to Cimarron, Colorado, in September. Sept. 22nd was at Castle Gate [Utah]. In October was at Price, and Pleasant Valley Junction (now Colton), at Marysvale, and Frisco, and Monroe.

1891

I botanized at Grand Junction [Colorado] April 15th and in the Tintic region [Utah] (Mammoth, Silver City, and Eureka) on the 22nd. Was at Westwater [Utah] on the Colorado line May 6th and at Thompson's on the 7th. On the 14th I left Salt Lake City for an extended trip to western Utah and eastern Nevada on a mining expedition. I was at Sandy on the 14th, at Pelican Point on the west shore of Utah Lake on the 15th. From there I skirted the lake nearly to Goshen and turned west at Homansville Canyon for Eureka where I was on the 16th. From there I drove west to West Tintic, at McIntyre's Ranch, 25 miles on the 18th stopping later at Rockwell's Ranch. On the 20th I drove up Sulphur Spring which is just across the desert on the other side of the old riverbed which leads north through a pass. On the 21st I camped in Death Canyon which is a part of the old riverbed on the edge of the Omega Mts. which lie east of the riverbed pass. This is an old water channel connecting Sevier Lake with Great Salt Lake in glacial times. The next day we swung around the mountains bordering the pass on the west after having gone through the pass and went to Detroit which is about 20 miles due west of Sulphur Springs. Detroit is at the southern end of the Dugway Range and nearly east of the Swazy Range at Antelope Spring (the Swazy Range is the southern extension of the Fish Springs Mountains). On the 25th, 26th, and 27th I botanized at Detroit, on the 28th, 29th, and 30th I was at Dugway which is on the north end of the same range.

June 1st, 3rd, and 4th I was at Fish Springs, at Carney's on the 5th. Carney's is now called Callao and on the east foot of the Deep Creek Mountains on the western side of the desert. On the 6th I was at Ibapah (Devine's Ranch) which lies near the northern end of Deep Creek Valley and on the western side of that range. On the 8th I was at Furber which lies just west of the mouth of Deep Creek in an isolated mountain. On the 9th and 10th I was at Dutch Mountain which is on the other side of the creek east of Furber 10 miles and which is the extreme northern end of the Deep Creek Mountains. I then drove around the foot of Dutch Mountain to the east and followed up the dry wash which leads to Gold Hill which is about 8 miles due south of Dutch Mountain Peak. I botanized there on the 12th, 13th, 15th, and 16th. On the 19th I was at Clifton's three miles south of Gold Hill. From there I went again to Ibapah and on the 22nd was in the southern (upper) end of the valley and ascended Mt. Ibapah to timber line on the 24th. Then back into the valley and west to Dooley's Ranch which is at a spring just out of

the valley to the west. From there I swung around Glencoe Mts. at Antelope Valley and back into the cove at Glencoe being there on the 26th and 27th. On the 29th I was at Aurum [Nevada] which is southwest of Glencoe in the Schell Creek Range and 10 miles north of Muncy and 60 miles north of Osceola.

July 1st went over to Black Mountain east; the 2nd and 3rd Muncy; the 4th in White Cloud in the east mountains (extension north of Jeff Davis Peak, also called Wheeler's Peak). The 6th Muncy in the high hills west. The 7th and 8th at Ruby Hill, the 9th at Aurum. The 10th at Hovell's Ranch near Aurum. The 11th and 12th Schellbourne. I was at Egan Canyon on the 14th and Cherry Creek and the mountains there the 15th and 16th. On the 17th was on the road to Sprucemont and botanized there the 18th to 21st. The 23rd was at Dolly Varden, the 24th at Ferguson Spring, the 25th at Kinsley, the 28th at Ibapah [Utah], the 29th at Carney's and the 30th at Fish Springs, the 31st at Swazy Spring.

August 1st was at Antelope Spring, the 3rd to the 8th at Detroit. The 10th at Riverbed, near Sulphur Spring; the 11th at Simpson's Spring. The 12th at the Kanaka Ranch in Skull Valley, the 14th at the Third Term Mine in the Aqui Range and the 15th at Garfield and Salt Lake City. Aug. 24th was at Salina, the 26th and 27th at Thompson's and Moab, the 28th and 29th in the La Sals, the 31st at Moab and Thompson's. Sept. 8th and 9th was at Cove Creek. The 21st at Pocatello and Red Rock Gap.

1892

April 4th was at Denver, at La Junta the 14th. Rincon, New Mexico, on the 15th, San Marcial the 15th. At Escalon, Coahuila, the 16th and the Sierra Mojada the 18th and 19th. At Zacatecas the 21st and 23rd, and Casualidad east of there the 26th. On the 29th was at La Paz, on the 30th at Ojo Caliente. On May 2nd Pastorilla and Linora, on the 3rd at Ramos. On the 6th at San Miguel and Ojo Caliente on the 9th and back at Zacatecas. On the 19th was in Mexico City, the 22nd at Irapuato, the 23rd at Guadalajara, the 25th at Sayula. On the 27th at Tapalpa north of Sayula and Ferreria, on the 13th and 28th at Chiquilistlan, on the 30th at Santa Maria.

June 1st was at Salcillo, the 3rd at La Palma, the 4th at Santa Cruz, the 7th at La Palma, and back to Tapalpa on the 10th. On the 11th was at Sapotlan west of Sayula; on the 13th at Rio Cuvianes and Santa Cruz, Jalisco, on the 14th at Tamazula, on the 15th at Tuzpan, on the 16th at Rancho Guerrero and Pihuamo, on the 17th and 20th at Pihuamo, on the 20th at Tonila under the Volcano of Colima. On the 21st at San Marcos, the 22nd at Colima, the 23rd and 25th at Manzanillo. The 27th was at General Martinas' Ranch near Armeria.

July 1st was at Jayamite, on the 3rd and 5th was back at Colima,

etc. The seacoast from Armeria was in the cocoanut belt and was a tangle of thorny *Leguminosae,* vines, and the like. On my return I ascended the Volcano of Colima which reaches to the upper limit of the Middle Temperate at about 12,000 ft. From the peak I came back to my outward trail at Sapotlan and went to Guadalajara where I was informed of the fatal illness of my father which took me straight through Celaya and Laredo, Texas, and San Antonio and Little Rock to Grinnell, Iowa.

The plants collected on this trip were put up in 3 sets.

1893

Early in the season I went to eastern Nevada to operate a mine belonging to myself and friends at Aurum and was there three months. I was in Clover Valley and Sprucemont April 21st and at Aurum the 22nd. With Aurum as my headquarters I botanized all over the adjacent range until the last of June. June 29th I went to Duck Creek; July 1st Aurum; July 4th Muncy; then I struck east and was at Bishop's on the 5th and at Antelope Spring on the 6th and at Oasis on the 7th. Aug. 16th, 17th and 18th I was at Alta in the Wasatch.

1894

I accepted a position with the U.S. Government for the season of 1894 to explore the region of the Grand Canyon of the Colorado. The work was arranged by F. V. Coville who knew that I was going to make such a trip and wanted the Government to get the benefit of it. So I was paid $100 a month and paid my own expenses which were about $125 a month, and the Government got half of the material collected.

I outfitted at Salt Lake City with a team and light buggy with a young man as driver and started him out ahead of me early in March. He drove to Holden where he was caught in a snowstorm and telegraphed me that he was stuck and could not go on as the snow was two feet deep. I took the next train for Oasis where I hired a team and reached Holden that night in a blizzard. The young man asked me what I was going to do. I said: "Start in the morning." The next morning we drove out into the snow and toiled all day in a cloudless sky with the sun dazzling in our faces and by night our faces were burnt to a blister and the serum was oozing off our chins. That night we camped on the desert in a foot of spotless snow where there was hardly enough brush to make a fire and no water but snow. A better bed I never slept on. The next morning it was bitterly cold to get out of bed and get a fire started in that snow, but warm tea soon thawed us out. That night we slept in mud near Black Rock and the next day were at Milford. Our faces were now all scabs and sores and we looked as though we were suffering from some loathsome disease.

Then we drove to Parowan and Cedar City, Kanarrh and Bellevue

(Toquerville) by the 29th, dropping down from the bleak and cold plateau at 5500 feet alt. to about 3000 ft. Here we found the first flowers in bloom on the grade above Bellevue five miles, no. 5001e, j was gotten still farther up at the head of the grade, and k was at the foot of the grade, a, b, c, d, were gotten at Bellevue, and 5000 5 miles below Bellevue. My botanizing began on the 30th. My remembrance is that we got to Bellevue by noon the 30th of March and the plants named above were gotten in the forenoon. Nos. 5002 and 5002a were gotten at Harrisburg which is below Leeds a few miles. The order of towns is Bellevue, then a short distance west on the road is Sandy, then Leeds some five miles as I remember it west of Bellevue. Just a mile off the road north, back of Leeds, is Silver Reef, an old mining camp, mentioned later. Then following the state road west on the mesa we drop down into a little depression off the mesa to some springs and here is Harrisburg. Going still west along the main mesa on which we come again and five miles east of St. George, we drop down again to the valley at Washington. Here 5002b was collected. This was in the Tropical life zone.

I went to St. George that night and stayed there until the morning of the 3rd of April when I started for the Beaverdams, going around the point of the mesa south into the Santa Clara Valley where I got 5004e. Then I drove diagonally up the valley and into a long draw on the western side leading up to the spring 16 miles west of St. George where we camped. There I got 5003, 5004, and a, b, c, d including the rare *Pellaea tenera*. The next day I went up to the copper mine on the crest of the range 18 miles west of St. George and got 5005 and 5006, 5006a to j, 5010, 5011. The mine is just on the edge of the oak belt (Middle Temperate). Then I drove around and over the range southward and westward and down onto the desert, road very bad and little used. Got 5007, 8, 9 on the western side of the range some 12 miles from Beaverdam which is also called Beaver and is just below the mouth of Virgin Canyon on the river. 5009a was gotten 4 miles up the road from there (northeast). Camped there and the next day before leaving got 5012 to 24bd except 24ai got the day before on the ridge 12 miles northeast of Beaverdam, 24ar west of the copper mine, and the 24at 4 miles from Beaverdam. All Tropical life zone. The 6th drove to Bunkerville and down to the crossing and over on the mesa toward St. Joe [St. Joseph]. Got 5025 to 5029m at Bunkerville, Nevada, 29n to p 10 miles west on the river and 29ah to aw also. April 7th drove to St. Joe over the mesa. Got 5029q to s 10 miles east of there, 29t to af on the hill east of St. Joe. 28 was gotten 4 miles east of St. Joe on the mesa. The order of numbering is not the order of collecting always as when I have a portfolio full of plants I start with the top sheet to number and this is often collected later in the day than the bottom sheets.

Was at St. Joe some days resting up the team, for the trip was a

hard one through the sand. This place is on the Muddy, a little stream and below Moapa. Left there the 9th and got 5030 to 30o there. Camped on the Virgin River at night, below St. Thomas at the crossing. River was high and dangerous from quicksands. The 10th I think I drove to the Hole in the Wall and camped, on the Rioville road. Very little in bloom. On the 11th drove to Rioville, also called Bonelli's Ferry, rarely now called Stone's Ferry, on the Colorado. Got 5031 to 32r on the lava ridge 10 miles north of there. The 12th retraced our steps to Hole in the Wall and turned east up the slope of the Beaverdams toward the crest at Mica Spring. 5033 to 34i were gotten at the Ferry, 5035 to 36i were gotten at Hole in the Wall. 5036j to 5036as were gotten along the road to 2000 ft. alt., all Tropical. 5036at to bm and 5046 and 49 to 54 were gotten 10 miles west of the Spring. 5047 was 6 miles below, 40 and 42 3 miles below. Botanized there till the 17th. On the 13th got 5037 to 39 and 43 to 45as there. On the 14th got 5055 to 64bj there. Got 5070 to 74m there on the 16th.

On the 17th took a trip west into the narrow box canyon (St. Thomas) and got 5069m to x there. Then started for the Grand Wash in the afternoon and got 5065 to 5069L near Horse Spring [Arizona] which is southeast of Mica Spring on the eastern slope of the range. Mica Spring is just on the upper edge of the Tropical. Dropped down into the Grand Wash [Arizona] about 8 miles above Pierce's Ferry and camped some few miles above there. 5074 to 77v and 5079 were gotten at Pierce's Spring about 15 miles above the ferry going north up the Grand Wash, 5073 was gotten there. The 18th drove up the wash to above Pierce's Spring. Road very heavy. The plants gotten at the spring credited to the 17th were probably gotten the 18th. The Grand Wash is in Arizona. So is Horse Spring. Mica Spring is just west of the line. On the 19th drove to Pagumpa at the head of the Grand Wash, all still in the Tropical. Got 5077w to ar, and 5080 15 miles above the Pierce Spring, 5077as to ay and 5081 and 82 were gotten 20 miles above. Pagumpa is 4000 ft. alt. and just on the edge of the Tropical. April 20th got 5082a to 5082aL at Pagumpa Spring (the same as Pagumpa). All these in the Lower Temperate. April 21st got 5083 to 5089s in a box canyon two miles west on the south side of the main wash. 5090 to 5095ad were gotten at Pagumpa, same date.

April 23rd started over the divide for St. George [Utah]. Got 5095ae to am and 5098 to 98c at top of grade above Pagumpa, 98d to 98L were gotten 10 miles south of Black Rock Spring which is on the road to St. George on the mesa. 98m to r were gotten at the spring. 98s 10 miles south of Price on the mesa, 3000 ft. alt. Lower Temperate. Price is down off the mesa on the Virgin, 3 miles below St. George, at about 2700 ft. alt. 5099 was gotten on a clay flat on the mesa 2 miles above Pagumpa, 97 was gotten just below Black

west of the Smithsonian Butte and a range of red sandstone outcrops and near the Canaan Ranch I got 5262 to 62c there. 5263 and 64 I got on the grade above Rockville. 5264a to 64d I got near Smithsonian Butte. May 21st I got at Pipe Spring (some ten miles west of Kanab) 5265 to 71i. May 22nd, I got 5273 to 86ad at Kanab. This included the rare *Astragalus sesquiflorus*. May 23rd I got 5287 to 89y at Johnson which is the next town east of Kanab eight to ten miles. 5289z to ad I got at Navajo Well which is on the road southeast of Johnson some eight miles, I think, from there, on the way to the pass leading over the Kaibab on the stage road to Lee's, sometimes called Johnson's Ferry, which is on the Colorado River above the mouth of the Little Colorado. Then I went over to the Kaibab and down to the broad valley below, but instead of going to the ferry I turned north over toward the Pahria [Paria] striking it at a little settlement called Adairsville, or Pahria. May 25th 5292 to 5292k I got 20 miles south of Pahria. 5291 to 91j I got 10 miles south of Pahria. 5290 I got at Pahria.

May 26th 5293 to 98i were collected in Pahria Canyon above Pahria. May 28th 5299 to 5309 were collected in the canyon above Tropic. 5310 to 12c I got near Cannonville which is not far from Tropic. This included a new variety of *Aquilegia caerulea* which I found at 7000 ft. alt., near the top of the pass. 5312d to ab were collected in the canyon above Tropic except 5312L which I got at Cannonville. 5312ac to aL were gotten in the canyon above Tropic. May 29th 5312am to ay I found at the head of the canyon in clay. 5313 to 15f were gotten along the road three miles below Coyote. 5315g to i were gotten above Coyote near the pass at the Beavers Coop Ranch, 7000 ft. alt. 5314 was collected three miles below Coyote. As will be understood the road from the Pahria goes through Tropic and leaves Cannonville off to the right. Then it turns up a small canyon westward toward Panguitch and goes up on to the Wasatch Plateau and then leaves the main Panguitch road through the forest and turns north and comes gradually on the head of the south fork of the east fork of the Sevier and the first water is at the Beaver Coop Ranch where there are wet meadows. Then the road follows north down the open country to Coyote, and then a few miles farther it comes to the junction of the two forks and turns abruptly westward passing through Kingston and reaches the main Sevier Valley at Junction. May 30th 5316 to 22n were collected along the road to Kingston. May 31st 5323 to 38ak were collected at Marysvale, mostly Lower Temperate life zone.

June 1st 5339 to 55af were collected at Marysvale. June 2nd 5356 to 88ah mostly on the range west and Middle Temperate. June 5th 5389 to 97ac were collected in Bullion Canyon, many of them Upper Temperate. Bullion Creek runs out of the main range about three miles away and runs east to the Sevier River. At the foot of

the range it ascends rapidly westward in a narrow canyon and then reaches a flat at the Tate Mine and within a half mile again climbs by a series of waterfalls and cataracts 2500 ft. (vertically) to the subalpine meadows near the crest of the range. June 6th I got 5398 to 5405t at Marysvale mostly on the low hills to the east. Here grows *Gilia McVickerae.*

June 7th 5406 was collected at Inverury. This is a little settlement in Sevier Valley just south of Elsinore and nearly due west of Monroe on the western side of this wide valley and over ten miles north of Marysvale. This number is the rare *Astragalus Wardi.* 5407 to 10e were gotten at Monroe which is the first town on the main road north of Marysvale and is in a bight of the valley on the eastern side where there are hot springs and alkali. 5410f to 10k were gotten at the top of the grade between Marysvale and Monroe. 5409 to 9d were gotten at Marysvale. 5411 to 11b were gotten at Richfield which is north of Elsinore. 5411c was collected a few miles south of Salina which is 15 miles north of Richfield. At Salina I left my outfit and went by train to Salt Lake and returned a week later.

June 14th 5412 to 22p were collected along Salina Canyon on the way to the top where Ireland's Ranch is situated. This canyon runs east of the town to the top of the Wasatch Plateau. These plants were gotten at 5300–7000 ft. alt. June 15th 5423 to 41ao were collected at Ireland's Ranch at 9000 ft. alt., mostly Upper Temperate life zone. June 16th 5442 to 45r were collected down on the clay lands of the Navajo Basin off the plateau near Emery, Utah, including the rare *Astragalus Brandegei.* 5447 to 47e were collected at the top of Salina Pass. 5448 and 5449 were gotten at Emery. This is in the Lower Temperate. June 18th 5450 was collected near Castle Dale which is north of Emery. 5451 was collected at Orangeville which is still farther north. 5452 was collected 6 miles north of Ferron which is north of Emery. 5453 was gotten at Ferron. 5454 and 5455 were gotten 2 miles south of Ferron. 5455 to 5f were gotten 2 miles north of Ferron. 5456 to 56d were gotten 3½ miles north of Emery. 5456e to 56k were gotten on Muddy Creek near Emery. 5457 to 58e were gotten at Emery. June 19th 5459 to 64f were gotten at Orangeville. 5464g was gotten 2 miles north of there. 5464h to 64n were gotten at Huntington which is north of Orangeville, also 5460. 5464o was gotten on Huntington Creek. 5460a was gotten at Price. June 20th 5465 to 67c were gotten at Price. The region from Emery to Price and Grand Junction is Lower Temperate.

June 21st took train for Grand Junction [Colorado]. 5468 to 76x were collected at Grand Junction. June 22nd 5477 to 82s were collected at Green River [Utah].

June 23rd took train for Salt Lake City. Stopped off at Castle Gate. 5483 to 86t were gotten there. June 25th 5487 to 5505f were

gotten at Provo. June 27th took train from Salt Lake for Manti and collected 5521 and 5522 at Ephraim which is eight miles north of Manti. 5514 to 20d and 5523 to 26 were collected at Manti. June 28th I got 5506 to 13e at Springville which is five miles south of Provo, and went on to Price. June 29th I was back at Thistle and got 5527 to 37r there. June 30th was at Fairview which is at the head of Sanpete Valley, north of Manti (same valley) and got 5538 to 54o there. I depended on the trains to get my fresh material to Price to dry but it was a failure and some specimens were spoiled.

July 2nd I collected east of Provo numbers 5555 to 68k on the hills. July 3rd I got 5569 to 89i in Slate Canyon east of Provo, and continued on to Price. July 4th I started from Price and drove out on the Myton road and up on to the plateau through Soldier Canyon getting 5590 to 90e near the head of the canyon. Mostly Upper Temperate life zone. July 5th I got 5590f and 5603L in Emma's Park which is west of the head of Soldier Canyon and about half way to Colton. 5590j is also given as of this date collected at Price but was really got the day before at Price. July 6th I also got at Emma's Park 5604. The same day at Kyune which is a short distance east of Colton in Price Canyon I got 5603 to 3k also 5594. I got 5591 at Clear Creek which is west of Soldier Summit about six miles. I also got 5591 to 5610i and 5601L (exclusive of those given above) at Soldier Summit. 5601j and k were gotten at Colton, and 5602. This place is also called on my earlier labels Pleasant Valley Junction. This was the old name until the railroad changed it to Colton. July 7th I got 5605 in the Red Narrows which is a conglomerate canyon about half way between Thistle and Clear Creek on the railroad. 5606 to 7b I got at Mill Fork which is a mile or so below Clear Creek. Then I drove down to Provo.

July 10th 5608 to 13g were collected in Slate Canyon near Provo. July 11th 5614 to 16 were gotten at Springville five miles south of Provo. 5617 to 18a were collected at Provo. July 12th 5619 to 24c were gotten at Asphalt a mile south of Thistle. July 13th 5625 was gotten at Manti. 5626 to 27L at Fairview at the head of Sanpete Valley, and 5627m at Ephraim eight miles north of Manti, and 5627n at Spring City which is north of Ephraim. July 14th 5628 was collected on Six Mile Creek below Manti, and 5629 at Manti. July 16th 5630 to 31c were gotten at Vermilion, a small town on the railroad south of Salina and about half way to Richfield. I think this is now called Sigurd but am not sure. From this place I turned east and went up the canyon and over the Wasatch Plateau to Burrville which is near the head of the north fork of the east fork of the Sevier. I got 5632 and 33 there, and 5634 to 38g at Burrville Sink nearby. July 17th 5639 to 39j were gotten on the pass leading over from Burrville to Loa, 5640 to 42b were gotten at Burrville. July 18th I drove on down the river and where the road crosses to go

ber line. Upper Temperate life zone. Aug. 24th 5894 to 5904f were gotten at Bridal Veil Fall near the Tate Mine. Aug. 25th, 5905 to 11h at Tate Mine. Aug. 27th I was down at Marysvale and got 5912 to 18. Then went back to the Tate Mine and got 5919 to 20c on Bullion Creek and at the Tate Mine. Upper Temperate. Aug. 28th I collected from the Tate Mine to the top of the range near Brigham Peak and got 5921 to 40an. Aug. 29th I collected from Brigham Peak down to the Tate Mine and got 5941 to 58ad. Aug. 30th I was down at Marysvale and got mostly in the Lower Temperate 5959 to 65k. Aug. 31st 5966 to 72g were gotten at Marysvale. Sept. 1st I also got there 5973 to 76h.

September 3rd I started for the south, going up the Sevier Valley past Kingston where I got 5977 to 83g, same life zone. Sept. 4th I reached Orton's Ranch which is at the junction of the road to Panguitch with the road to Beaver City and about 12 miles north of Panguitch. Below Orton's (north) at Circle Valley I got 5989o, Middle Temperate, and at Orton's 5984 to 90d. Sept. 5th drove from Orton's to Panguitch Lake, passing through Panguitch on the way and getting at the town 5995 to 96ab. I got 5991 to 94 on the road to the lake from Panguitch. Sept. 6th 5997 to 6002ay were collected there. Same zone. Sept. 7th 6003 to 15bi were also collected there. Sept. 8th I got at the lake 6016 to 23s. Sept. 10th I got there 6024 to 25e and then started for Kanab, going over to Mammoth Creek south of the lake where I got 6026 to 26c, and then drove to Asa's which is some 25 miles south of Panguitch near the head of the Sevier River and on the river. Mammoth Creek is in the heavy yellow pine forest between the lake and Asa's.

September 11th I got at Asa's 6027 to 30w, and 4 miles below Ranch I got 6031 to 33f. Ranch is the name of the post office at the head of the Sevier and serves a little farming area there. Going over the divide I drove down to the Elk Head Ranch on the upper Virgin which is a few miles above Glendale. This is where there is a remarkable exposure of Tertiary pinnacles caused by erosion. At this place I got 6033g. 6028 to 33n were gotten at the head of the Sevier near Ranch. Same zone. Sept. 12th 6034 to 39s were gotten at the Elk Ranch, still Middle Temperate. 6039t was gotten at Glendale. From there I drove down the Virgin to Carmel and, crossing the river, ascended the grade out of the valley and up on to the plateau to the south. 6042 to 42f were gotten on this grade. 6043 to 47f were gotten on the sand wastes between there and Kanab. 6040 and 41 were gotten in the canyon above Kanab. All these in the Lower Temperate.

September 15th I reached the foot of the Kaibab 35 miles from Kanab south at Nagle's Ranch [Arizona], collected on the 15th 6048 to 50j there. Lower Temperate. Sept. 17th I collected at Nagle's 6053 to 54af, and going up on the Kaibab I got 6051 to 52u, Middle and

Upper Temperate. Sept. 19th I got 6055 to 56x at Greenland Point some 25 miles south of Valley Tan Ranch which is in the middle of the Kaibab and some 25 miles from Nagle's Ranch. 6056y to av were gotten in DeMotte Park which is a few miles south of the Valley Tan Ranch. 6056aw to bi were gotten in Thompson Canyon which runs across the foot of Greenland Point. Sept. 20th I went back to Nagle's Ranch and collected on the road 6056bm to br and got at the ranch 6056bs to 64. Sept. 21st I got at Fredonia (the little town in Arizona five miles south of Kanab) 6057 to 57b, Lower Temperate. 6058 to 63q were collected on the mesa west of the Kaibab going toward Fredonia. Same zone. Sept. 23rd I drove to Pipe Spring [Arizona] from Kanab. Sept. 24th I got 6067 and 6068 at Pipe Spring, and 6065 to 66k at Canaan Ranch about half way to Rockville [Utah]. On Sept. 25th I drove to Springdale and the mouth of Zion Creek getting 6069 to 80n above Springdale. Tropical. Sept. 26th I drove back to Rockville and got there 6081 to 85. Tropical. Sept. 27th I got 6086 at Virgin City, and 6087 and 88 at Toquerville (Bellevue), same zone. Sept. 28th 6089 to 94 were collected at St. George. Sept. 29th I got 6095 to 6100c at St. George and 6100d to f at Washington.

October 1st I left St. George for Salt Lake City by way of Diamond Valley and Mountain Meadows. I got 6101 and 2 below Diamond Valley and above St. George in the Tropical. Oct. 2nd I got 6103a at Chadburn's which is above Diamond Valley toward Mountain Meadows. Lower Temperate. Oct. 3rd I got 6103 near the place where John D. Lee was executed. 6106d to h were gathered at Iron City, which is west of Cedar City and east of Mountain Meadows nearly half way. 6106i was gotten at Cedar City. Oct. 6th 6106 to 6c were collected in Clear Creek Canyon which is directly east of old Fort Cove and on the east side of the mountains and not far from Elsinore. Lower Temperate. Oct. 7th 6104 to 5b were also gotten in the lower part of the canyon. 6106j was gotten at Beaver City about the 5th of the month, and 6106k and 6L on the divide north of Beaver City, same date. Oct. 18th 6106m and n were collected at the Point of the Mountain 20 miles south of Salt Lake City.

The total number collected was 4060, and about 35,000 specimens. Immediately after completing the trip I left for Washington, D.C., and spent the winter there until April, 1895, working up the sets and naming species, but the time was insufficient to complete the work. The agreement was to publish the results in a report at Government's expense.

1895

I collected a few species in the spring around Washington, D.C., and then returned home by way of Virginia and Cincinnati. The year of 1895 was spent almost wholly in completing the work of naming and describing my new species and publishing them in the Proceedings of the California Academy of Sciences, which is my

Contributions No. 7. There were over a hundred new species and varieties.

I did very little botanizing in 1895 because most of the time was taken up in publishing my Contributions No. 7. I was at Green River, Utah, May 25th. I spent a month in American Fork Canyon with a company of students in botany at a summer school and collected considerably then on and near Mt. Timpanogos and the peaks at the head of American Fork Canyon. I was also as far south as the crest of the Wasatch Plateau back of Manti where I botanized. This was in July and August.

1896

I botanized at Silver City in the Tintic region April 4th.

I spent several days in the Green River region of Wyoming. Was at Green River June 23rd and at Carter on the 25th. I took a trip to the base of the Uintas from Carter.

1897

Late in April I took a trip along the east flank of the Sierras to Death Valley. I stopped off at Oreana which is east of Humboldt, Nevada, to get more material of *Cymopterus corrugatus* but found only a few specimens hardly out of flower, then I went to Reno and from there to Keeler [California] April 27th. I botanized at Darwin on the 28th and Shepherd's Canyon on the 29th and 1st of May. I botanized at Ballarat as headquarters until the 7th or 8th going into the Panamints on the 4th and up Pleasant Canyon on the 6th. Was back at Darwin the 10th and 11th and at Lone Pine the 13th and 14th and botanized on the flanks of the Sierras to 7000 ft. alt. From Lone Pine I went to Bishop and the White Mts., going part way to the top. Then I went to Columbus Marsh [Nevada] on the 20th passing through Candelaria. Then back to Summit at the head of Owens Valley [California] on the 22nd. Then I went to Hawthorne [Nevada] and on the 27th botanized in Big Indian Canyon west of there May 29th to June 2nd. I was at Empire and Carson City where I did considerable botanizing, going to Lake Tahoe. June 10th and 11th I was at Reno and botanized in the vicinity several days. I was at Chat [California] and Sierra Valley on the 21st, at Amadee the 22nd, and Susanville the 25th to the 28th, going to the top of Diamond Peak. Then I went over to Prattville July 2nd and made it headquarters until the 9th. Was at Mt. Lassen on the 7th.

From Prattville I went down to Chico and San Francisco, and thence to Portland [Oregon] by boat. I went to The Dalles July 27th to 29th and Mt. Hood July 31 to the 2nd of August going to the timber line at the hotel, and botanizing extensively around the glacier. Returning to Hood River I took the boat to Portland and returned to Sacramento. Thence home to Salt Lake stopping off at Summit, Truckee, Battle Mountain, and Wells, being at Wells Aug.

1900

March 6th was at Union, Oregon; on the 8th at Baker City, and the 9th Weiser [Idaho]. On the 21st was at Harriman, Utah. April 18th and 19th was at Weiser; and Salubria on the 20th; Middle Valley, the 21st; on the 26th in Snake River Canyon; 24th at Mann's Creek Hill; 23rd, 25th, 26th at Weiser. June 6th was at Tooele, Utah, and Cottonwood Spring. On the 7th at Government Well and Granite Mts., on the 9th to 14th at Dutch Mt., on the 15th at Gold Hill, on the 18th at Scribner's.

July 3rd and 5th was at Reno, Nevada, and Willow Creek on the 4th. On the 9th at San Francisco; and the 11th and 12th Pasadena and Long Beach; on the 13th at Temecula and Mt. Beauty Mine; and the 16th at San Bernardino. On the 17th at Clark's Bear Valley for a week. On the 24th was at Cameron, on the 26th at Summit on the Central Pacific Railroad. On the 27th at Wells, Nevada, and climbed the mountains on the 28th. Aug. 8th botanized at Alta, Utah; Sept. 1st on Antelope Is.

1901

May 16th botanized at Parley's Park, Utah; May 15th at Midway. Took a trip to Westwater, Utah, in May. June 22nd botanized at head of American Fork Creek to 10,000 alt. June 5th and 23rd I was at Thistle. June 27th botanized at Elsinore and Fort Cove. July 2nd was in American Fork Canyon. July 5th at Salina. July 24th to 26th was at Wells [Nevada] and went over to Contact and got *Astragalus toanus, etc.* I was at Wells again on Aug. 2nd. Aug. 19th was at Mill City, Unionville and Star Peak, July 30th for three days; then went to Lovelocks and Halleck and drove to foot of the mountain at the old fort and went to crest. Aug. 28th botanized on Gold Mt. [Utah]. Was in Parley's Park same month. Sept. 5th was at Grand Junction, Sunnyside [Utah] on the 10th, and Helper on the 16th. Oct. 8th botanized on Mt. Ibapah [Utah] to 10,000 feet alt.

1902

Early in June I took a trip with the editorial section of the Utah Press Association to Vancouver Island by way of the Oregon Short Line R. R., then down the coast by rail to San Francisco and San Diego and back by way of Sacramento, Reno and Salt Lake City.

I botanized at Baker City, Oregon, June 9th; then at Pendleton, Umatilla, The Dalles, and Portland, rejoining the party there. Then we went to Seattle June 14th where I botanized, and reached Victoria on the 23rd. We took a trip by rail to the mines in the center of the island, then down to the sea on the east at the smelter and back to Victoria. From there we went to Tacoma. I botanized a little at Willamette Falls, Ashland, and stopped off at Glendale [Oregon] June 9th to get *Astragalus accidens.* Was at Castroville [California] June 25th; was at Colfax July 2nd; rejoined the party at San Fran-

cisco and went to Mt. Tamalpais July 5th. Thence we went to Monterey, Paso Robles, Buenaventura [Ventura], Santa Barbara, Pasadena, Los Angeles, Catalina, San Diego. While the editors were indulging in hot air at banquets I browsed the hills for specimens. Returning I left the party and stopped off at Cascade in the Sierras and Soda Springs, going to Castle Peak for some new onions on July 9th and 10th. On the 12th I was at Reno [Nevada], at Battle Mountain on the 13th for more material of *Astragalus pterocarpus*. On the 14th I was at Elko; on the 24th at Wells. Aug. 8th I was at Milford, Utah. Oct. 31st I was at Skull Valley [Utah] (the valley west of the Aqui Range which lies just west of Grantsville). From there I went to Dugway, Fish Springs, Dutch Mountain, and Deep Creek.

1903

I left Salt Lake about April 10th going to Caliente, Nevada, thence to St. Thomas where I botanized half a day. From there I took the stage for Chloride, Arizona, by way of Bonelli's Ferry (Rioville), and passed through White Hills and was at Chloride on the 14th and 15th. Then I went to Kingman and the next day to Franconia on the 17th and took a team for the Chemehuevis Mts. to the south where I stayed until the 23rd collecting the whole flora. Going back to Franconia I went to Manvil and Ivanpah and back to Kingman. I spent the day in the range south of Kingman going up to the Middle Temperate. I was at Hackberry on the 25th. Then I went to Williams and the Grand Canyon and was back at Ash Fork and Jerome Junction on the 28th going as far as Skull Valley where I remained until May 1st. I stopped off one train at Hillside. I was at Congress Junction on the 2nd for 2 days, at Wickenburg half a day on the 5th, Phoenix on the 6th, Yuma on the 7th and Indio [California] on the 8th. I was at Banning on the 8th and 11th. Was at Palm Spring the 10th and Whitewater on the 11th returning to Banning. From there I went to Pasadena and was at Cajon Pass on the 16th. I was at Victor [Victorville] on the 17th for several days, then to Fenner, Mojave and Tehachapi on the 19th where I was in a snowstorm. May 20th to the 22nd I was at Keane going back up the grade almost to Tehachapi. Then I went to Bakersfield for a day, then San Francisco, and was at Reno [Nevada] on the 27th and Mill City the 28th where I got good material of *Cymopterus corrugatus*. I also was at Battle Mountain a day. July 1st I was at Garfield, Utah; the 2nd at Price and the 9th climbed the Aqui Mts. and the 17th climbed Mt. Ibapah and got the high mountain flora.

Early in August I took a trip to the Sierra Madres of northern Mexico by way of San Francisco, Los Angeles, and El Paso. I was at San Francisco the 8th, Los Angeles the 9th and 10th and at Tucson the 14th. The 18th to 20th I was in Sabino Canyon on the south side of the Catalinas, and in the Santa Ritas from the 22nd to the 24th.

I was at Oracle the 27th and 28th. At Vail and ten miles south of Vail on the 31st. From there I went to Fort Huachuca on the 2nd of September and remained a few days. Then I went to Deming [New Mexico] and the Floritas on the 7th and went to El Paso. I took the train for Dublan [Chihuahua] and reached Colonia Juarez [northwestern Chihuahua] on the 11th botanizing at Sapio on the way on the 10th. I hired a team and wagon and went up on to the Sierra Madres going up Soldier Canyon on the 16th, was in Round Valley and Hop Valley on the 17th and Mound Valley on the 18th. Going through Garcia I reached Chuichupa the 21st and botanized there several days making it headquarters. From there I took a three days trip to Guayanopa Canyon and back. The 26th I was in Largo Canyon and Soldier Canyon and back to Colonia Juarez. Thence I went to El Paso botanizing at Sabinal on the way about the 29th. I spent a day at Mesilla Park. This trip netted about 40 new species.

1904

In the latter part of April I took a trip to Meadow Valley Wash, Nevada, going as far as Moapa which I reached April 27th. On the 28th I botanized in Meadow Valley Wash about midway, collecting the whole flora then in bloom. June 24th I was at Scofield [Utah] which lies on the top of the Wasatch Plateau south of Colton. I was there for about a week. August 23rd I was in Little Cottonwood Canyon at White Pine Gulch for three days.

1905

I took a trip to Good Springs, Nevada, west of Las Vegas and botanized there on the 30th of April for two days, then went to Las Vegas and home. May 9th I was at Grand Junction, Colorado.

May 13th I left Salt Lake City for the northwest. The spring was very backward. I botanized a little at Pocatello and Pendleton and reached Spokane on the 16th where the flora was in fine shape. From Spokane I went to Davenport [Washington] and took a team for the mountains 34 miles to the north and reached Deer Trail on the 19th and was back in Davenport the next day. The woods were full of *Calypso*. The following Monday I went to Pullman and stayed about a week. I was at Moscow [Idaho] May 30th and Colfax [Washington] the 31st and then to Riparia where I got *Astragalus inflexus, etc.* Then to Walla Walla. I botanized at Umatilla [Oregon] June 1st where I got fresh material of *Astragalus succumbens, A. sclerocarpus, etc.* Thence I went to Union, Baker City, Weiser, and home.

Late in June I took a trip to western Utah and eastern Nevada. I was at Wells [Nevada] June 22nd going on a bicycle to Cherry Creek on the 23rd, Schellbourne and Aurum on the 24th. I was at Muncy the 29th and at Bambrick's the 30th and back by way of Eureka Spring where I was July 7th; from there I went to Phelan's and Wells.

July 18th I was at Anaconda, Montana, the 19th at Butte, the

The Salton Sink region all belongs to the Tropical life zone. Julian appears to be in the Middle Temperate. The eastern slope produced a number of interesting forms.

1907

In the spring of this year I went to Death Valley and up along the Sierras to Hawthorne [Nevada] making a detailed study of the vegetation from Death Valley to the Colorado. I reached Rhyolite [Nevada] early in April and went to Death Valley on the 10th and 11th. I was back at Rhyolite on the 12th and at Hawthorne on the 13th remaining there and in the mountains to the west until the 22nd. Then I spent half a day at Tonopah and half a day at Fitting and was at Goldfield on the 24th, Rhyolite on the 25th. I was at Amargosa Desert on the 26th for 2 days, Las Vegas 1 day and at Nipton and Searchlight and was at Eldorado Canyon on the 30th. I was back at Nipton May 2nd.

From May 29th to June 19th I was at Aurum, Nevada, the 21st at Cherry Creek whence I went to Ely for 4 days.

December 20th I began testifying for the Government in the great Coal Fraud cases.

The entire region that I visited in southern Nevada and California is in the Tropical life zone except a small area from Goldfield north which is in the Lower Temperate. In the mountains back of Hawthorne I reached the Middle Temperate life zone.

1908

I was botanizing in the Big Cottonwood Canyon May 2nd; May 9th in Colton. I reached Theodore (now called Duchesne) May 13th and remained there till the 19th going far up on the flanks of the Uintas. On the 20th I was at Duchesne a place below Theodore; Myton on the 21st. On the 22nd and 23rd I was at Chepeta Well on the road to Mack in Colorado. On the 24th I was at White River and Dragon; on the 25th at Atchee; the 26th at Carbonero; and the 27th at Mack. All this region of the Navajo Basin except the higher flank of the Uintas is in the Lower Temperate, and has the peculiar clay soil of the basin and the scanty but extremely interesting vegetation.

July 13th I left home for Flathead Lake, Montana. Stopped off at Monida and got one new species of *Carex*. Then went to Lima same day and botanized nearly to top of the mountain southwest and got *Oxytropis viscida* and several rareties. The next day I went to Anaconda and spent a day there. Then went to Ravalli and in the morning took stage for Polson and from there the next morning took launch for Big Fork after botanizing at Somers and finding *Sedum Elrodi*. This was on the 17th. Botanized all over the Big Fork region in the next few weeks. Took a three day trip to the top of McDougal Peak. Spent a week at Yellow Bay and a week at Wild Horse Island.

Spent two days at Swan Lake. Spent a day at the Hemlocks. About Sept. I went with Jordan to McDonald Peak. Got up above timber line. Found *Arabis macrocarpa* and others there. Then I took a trip to the Hot Springs. Left Big Fork Sept. 14 for Whitefish and botanized there and at Rexford and Sand Point Sept. 18th. Then went to Missoula by way of Thompson's Falls. This trip in Montana netted about half a dozen new species and added about 150 species to the known flora of Montana.

1909

I was at Robinson, Utah, June 26th. July 7th and 8th went to Blackfoot, Idaho, and botanized and found several western plants there. Then to Monida [Montana] and botanized. On the 8th and 9th went to Garrison, Montana, and botanized. Then to Ravalli and spent a day. Then to St. Ignatius Mission and the lake and spent a week and went to the glacier at the head of the canyon with Elrod, *etc.* Then to Ronan. Then I took stage for Ravalli and went to Evaro on the 13th; to Missoula and then to Darby and Black's Ranch and spent three days. Then to Alta July 23rd and spent a week and went to the divide over toward the Salmon, and got the whole flora. Then back to Darby and Como Peak. Then to Missoula and botanized a day. Then back to the mission August 16th and up the creek to about 8000 feet alt. on the 17th, spending two days in Lambert Valley. Then to Big Fork and stayed a few days and went with Elrod to Kalispell and Glacier Park, botanizing at Belton and along the road to the lake. Made headquarters at Glacier Hotel and took pack outfit to Sperry Glacier and Gunsight Lake and Blackfoot Glacier spending ten days in the park by Sept. 9th. Then went home [Missoula] by way of Belton and Summit. Sept. 10th I was at Upper Marias Pass and spent a day there and another at Browning and one at Shelby. Spent a few hours at Great Falls and went home by way of Helena and Butte.

1910

April 25th went to Santaquin, Utah, and from there to Nephi and Juab on wheel [bicycle] and over the Sevier Bridge, April 26th to get the new *Cymopterus.* May 9th I was at Champlin at the sand dunes and at Mammoth on May 10th. June 6th went to Gunnison [Utah] and got *Astragalus megacarpus, etc.* On the 7th went to Price and Mounds and got plenty of *Eriogonum Batemani,* and went to Miller Canyon and got *Frasera paniculata, etc.* July 8th I was at Brighton, July 11th went to Alta and Clayton's Peak. July 18th went to top of Mt. Nebo and back the next day.

July 28th went to Glacier National Park by way of Ravalli and Somers. Elrod met me at Big Fork and we left there Aug. 1st reaching the Glacier Hotel that night. On the 3rd we were at Avalanche Lake; on the 6th at Lone Pine, and on the 7th at Mineral Park. On the 8th we went to Grinnell Glacier; on the 9th to Swift Current

Pass; on the 10th to lakes nearby and botanized in the region till the 14th then went to Greenwood's Camp above Waterton Lake on the Hudson Bay slope and stayed two days. On the 16th went to Waterton Lake, botanized on Aug. 17th; on the 18th to Bowman Lake on the west slope. On the 20th to Adair where we were caught in a terrific forest fire. On the 22nd went to Roger's Ranch, and on the 23rd were back at the hotel.

1911

May 6th I was at Deseret, Utah. June 15th went to British Columbia. Stopped off at Glenn's Ferry [Idaho] on June 17th and got *Astragalus Lyallii, etc.* Spent a day at Nampa and another at Weiser. Spent a day at Pullman, Washington; was at Colfax June 21st. Then went to Oroville by way of Spokane, June 24th. Then went to Nighthawk and Conconully by stage and botanized along the way and at Loomis. Then took auto to Omak and stage from there to Brewster where I took boat for Chelan Falls and botanized along the way. Got plenty of *Gilia sinistra.* Spent a week at Chelan Falls and Stehekin at the head of Chelan Lake. I took a three day trip up the canyon toward the head on the 10th. Then took boat down the Columbia to Wenatchee and the railroad to Cascade Tunnel where I spent three days, about July 15th. Then went to Seattle and Portland, July 19th and botanized a little in Portland. On August 25th returned to Oroville [Washington] and spent a month. Botanized there and on the peak near the line above Nighthawk.

1912

Was at Pioche, Nevada, Aug. 31st, Comet Peak, Aug. 30th.

1913

June 1st went to Moab, Utah, for three weeks and up the La Sals to 9500 ft. On Sept. 17th went to Goss Station on the San Pedro Range near Black Rock to examine the pumice deposits. Got a few species. Went back to Hinckley and home.

1914

May 5th went to Green River, Utah, and spent the time until June 12th in the San Rafael Swell and a few days along the Green and at town. Wild Horse, May 17th. Also went with Woodruff to his coal claim up the river. Got *Astragalus rafaelensis* and *A. Woodruffi* on this trip and found several others new to the region. June 10th spent ten days in the Moab region. Went up the La Sals to 8500 ft. alt. and over to Kane Springs and toward Monticello. Spent a day or so at Green River on my return. Went to Brighton the last week in July and spent three days. Got a few plants at various times at Tooele and Salt Lake Valley in June and July.

back of Pleasant Grove. I also took a trip to Lamb's Canyon, a branch of Parley's Canyon and to Pharaoh's Glen in the same canyon, twice.

I began the rubber investigations in September and continued them for two months, going all over Tooele Valley and as far south as McIntyre's Ranch in Tintic Valley below Mammoth. I also traversed Skull Valley, Salt Lake Valley, Utah Valley, Sanpete Valley, and Sevier Valley to Panguitch and Bryce's Canyon.

1919

Late in April I took a trip from Salt Lake City to Holden by way of Nephi and Juab, coming back by way of Delta and Deser [Deseret], Lyndyll [Lynndy], Eureka, and the west side of Utah Lake to Lehi and home. May 11th I left Salt Lake City by auto for Bluff. Going by way of Colton, making a side trip to Ferron and back, thence to Green River and Moab. From Moab I went to La Sal and Monticello, reaching the latter on the 22nd. I was at Blanding (Grayson) on the 23rd and Bluff on the 24th remaining there three days and getting quite a number of interesting things. I took a similar trip to Ogden by way of Coalville, Echo, and Morgan. Late in June I went by auto to Bryce's Canyon by way of Nephi, Levan, and the Sevier Valley, botanizing there June 27th and staying three days.

A fire came near wiping out my whole botanical collection [stored in my garage in Salt Lake City]. As it turned out I only was burned seriously, being laid up for a month. In September I transferred my herbarium to a room in the State University.

[The Marcus E. Jones Herbarium was purchased by Ellen B. Scripps for Pomona College, Claremont, California, in 1923.]

Gazetteer of Marcus E. Jones' Botanical Exploration

IN PREPARING this geographic index, I have followed Jones' spelling and usage even if they vary for the same place mentioned in different parts of his journal (Timpanogos Peak, p. 198; Mt. Timpanogos, pp. 218, 227). Clifton (p. 227) and Clifton's (p. 205) are the same; but Baker (p. 227) and Baker City (pp. 219, 220, 222) are in Idaho and Oregon, respectively. To distinguish between different places with the same name (cf. Colfax, California, and Colfax, Washington), the reader will have to refer to the text of the journal. The size of the gazetteer precluded more detail than I have given. My chief purpose has been to include all of the 800-odd geographic designations used by Jones.—J. T. HOWELL.

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members of the *villosa* group over a wide area. Since hybridization with *M. villosa* is slight and local,[2] it seems advisable to raise it to specific rank; and since the original description was meagre it is described in more detail.

In central Monterey County and in San Benito County, two diploid monardellas have been found which undoubtedly are responsible, respectively, for the *Sheltonii* and *subserrata* traits of some of the ecologic and morphologic segregates of the *villosa* tetraploid complex, at least locally. These are named as new species.

Monardella subglabra (Hoover) Hardham, comb. nov. *M. villosa* var. *subglabra* Hoover, Leafl. West. Bot. 5:181 (1949). Perennis plerumque caespitosa; foliis petiolatis late ovatis usque ad 11 mm. longis et 7 mm. latis, margine serratis, subglabris, subtus minute glanduloso-pubescentibus; bracteis 5- vel 6-jugatis, foliaceis prope apicem et membranaceis prope basin, bracteis infimis valde phylloideis; calyce 7–9 mm. longo, longissimis dentibus 1–3 mm. longis.

Rhizomatous perennial, forming clumps in exposed habitats but in woodland with only one or two stems. The stems have a pubescence of short down-curved hairs. Leaves broadly ovate, about 11 (7–16) mm. long, 7 (4–9) mm. wide at the widest part and 4.5 (3–6) mm. wide at a point one-tenth of the distance from the base to the tip. Petiole 4 (2.5–6) mm. long. Veins usually 8 (6–10) and very prominent. The leaf-blade with thickened serrate margins is thin and firm and nearly glabrous except for dense microscopic glandular pubescence on the lower surface. Oil droplets occur in small shallow depressions on the lower leaf-surface only. The bracts are divided into three series. The outer series consists of one or two pairs, more or less remote, with or without a petiole, with leafy tips and membranous bases. Superficially they resemble the leaves closely. The middle series of bracts is made up of three pairs with leafy tips and membranous bases. The inner series is composed of a few pairs of membranous bracts. The leafy bracts are slightly smaller than the leaves, in age often reflexed. The calyx is 7–9 mm. long with 13 veins and short (1.3 mm.) sparsely pubescent teeth. Chromosome counts of $n=20$ have been obtained in three populations in Monterey County: San Carpoforo Creek, Villa Creek, and Alder Creek, as well as from near the Naval Depot, Tiburon, Marin County.

Monardella subglabra is usually found near the coast from sea level to about 2000 feet, from Cambria, San Luis Obispo County, to Marin County. It occurs both on serpentine and sedimentary formations. It reaches its best development on exposed ridges, and may be relict when it occurs in woodland. The type was collected by Dr. Hoover on Perry Creek southeast of Cambria.

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[2] Interspecific hybridization is apparently rather common in the genus *Monardella*.

This *Monardella* is quite distinctive when it occurs on exposed outcrops because of its tendency to form dense clumps, its small, bright green leaves, numerous leafy-tipped bracts with contrasting membranous bases, and dark purple flowers. When it occurs in woodland it is likely to be overlooked. Furthermore in woodland introgression occurs occasionally with sympatric *Monardella* species. The Alder Creek population occurs on the margins of a grove of *Cupressus Sargentii* Jeps. and is therefore sympatric geographically with the distinctive cypress grove endemic, *M. Palmeri* Gray (n=about 60, unpublished). In spite of the large difference in chromosome numbers, there are a few individuals on the edge of the cypress grove which are apparently hybrids. This Alder Creek *subglabra* population is also sympatric, geographically, with *M. villosa* and shows some signs of introgression with *M. villosa* on the oak-conifer margins of the population. Hybridization between *M. subglabra* and *M. villosa* var. *obispoensis* (n=40) is apparently not uncommon along a narrow ridge near Villa Creek, with good *obispoensis* in the coastal sage community and good *subglabra* on the exposed ridge top.

Monardella benitensis Hardham, spec. nov. Perennis caespitosa 3–5 dm. alta, multiramosa, separate griseis; foliis ovato-lanceolatis, remote serratis, breviter petiolatis, et pilis simplicibus multicellularibus et pilis minutis glandulosis vestitis, venis circa 8, lamina stillas olei numerosas paulo depressas ferenti fere subtus; capitulis basi cuneatis, bracteis folia minoribus, 4-jugatis, juga infima plus minusve phylloidea, aliis prope apicem foliaceis et plus minusve membranaceis prope basin; calyce 6.5–8 mm. longo, dentibus circa 1.6 mm. longis, hirsutulis; n=21.

Perennial, woody at base and somewhat rhizomatous, forming small clumps 3–5 dm. tall. Stems many-branched from above the base and frequently from the upper leaf-axils as well. Leaves lanceolate to ovate-lanceolate, about 14 (7–17) mm. long, 7 (6–10) mm. wide at widest point and about 3 (1.7–4.3) mm. wide at a point one-tenth the distance from the base to the tip. Veins usually 8, alternate, occasionally obscure in unusually pubescent or thick-leaved individuals. Petiole about 3 mm. long, margined by decurrent leaf-blade. Leaf-margins remotely serrate, the teeth usually corresponding to vein endings, the teeth and leaf-tip terminating in a small gland. The pubescence of leaves, stems, and foliar bracts is composed of moderately long curved multicellular hairs which are not obviously jointed at the cell ends. The amount of pubescence varies from moderately thick to nearly felt-like. Numerous microscopic glandular hairs are present beneath the longer hairs and, on the lower leaf surfaces especially, there are numerous large oil droplets in shallow pits. One or occasionally two pairs of leafy bracts subtend the flower-head. In plants with short internodes the last pair of leaves may be modified and slightly bract-like. The outer

pair of bracts may be a few millimeters distant from the head and short-petioled, or sessile and closely subtending the head. At the base of these leafy bracts the midvein is wider than in normal leaves, and the texture of the blade is somewhat leathery-membranous. The next three pairs of bracts are progressively less leaf-like with larger amounts of leathery-membranous tissue at the base. In addition there are typically several pairs of linear, inner, entirely leathery-membranous bracts. The leafy bracts are smaller than the leaves, 8–9 mm. long, 3–4 mm. wide, 6–8-veined. Typically the calyx has 13 nerves and is 6.5–8 mm. long; the corolla is 13–14.5 mm. long, the upper lobes have long free tips. The calyx-teeth are 1.66 mm. long and subequal or definitely unequal, long-bristly-hairy. The flower-heads have a distinctive cuneate base. The flowers are bright purple. $N=21$.

Monardella benitensis is endemic on asbestos-type serpentine soils along Clear Creek in the Diablo Range of San Benito County. Unlike most monardellas of the Coast Ranges it is most abundant on bare soil and absent from chaparral and woodland. Type: *Hardham 12672* (CAS), collected on July 11, 1965.

Monardella benitensis differs from *M. antonina* Hardham (see below) in its narrower, thicker leaves, long hairs, and growth habit. There are also more veins for each unit area of leaf surface in *M. benitensis*. These differences are probably all adaptions to a very xeric habitat. In the various ecological segregates of the tetraploid *villosa* complex in which these two species appear to be involved these ecological and morphological characters stay together. Thus *M. benitensis*-like tetraploids are found on sandstone outcrops west of King City, on south slopes covered with *Salvia mellifera* near Jolon, and in grassy meadowland at Hanging Valley at 3000 ft. elevation on the Arroyo Seco River, all in Monterey County. Populations incorporating *M. antonina* characters are geographically sympatric (*vs.* ecologically sympatric) with some of these populations but are in more mesic habitats, usually mixed oak and digger pine woodland.

In appearance *M. benitensis* is very close to the widespread *M. villosa* ssp. *subserrata* (Greene) Epl. The type locality for Greene's *Monardella* is given merely as "Sonoma County" (Pittonia 5:81,–1902). Since the serpentine formations of San Benito County and the volcanics of Napa, Lake, and Sonoma counties are floristically related, there is a possibility (probably remote) that Greene's type may have been a vicariant of *M. benitensis*.

the bracts are translucent below the leafy tips; in *M. benitensis* the pubescence is composed of relatively long hairs and is comparatively copious, and the bracts are usually opaque below the leafy tips. There are other differences which are harder to evaluate. *Monardella benitensis* has longer calyx-teeth than those in *M. antonina,* but all the monardellas in that geographic area have relatively long calyx-teeth while those of southwestern Monterey County have short teeth. The shape of the flower-head is different in the two species.

The only valid reason for treating these two taxa as distinct species would seem to be because they maintain their identity where they occur as components of the *M. villosa* tetraploid complex. Introgression by *M. antonina* is probably the origin of most of the thin-leaved relatively glabrous *Sheltonii*-like segregates of this complex which are found in some of the oak-pine habitats in the northern Arroyo Seco drainage and perhaps also of similar populations in similar habitats in San Benito County. In like manner, introgression by *M. benitensis* is probably responsible for the *subserrata* segregates of the tetraploid complex in more xeric habitats. Some population samples show that genes from both species may be present. Populations of both these diploid species are geographically sympatric with tetraploid populations characterized by introgression from the other species. As with most of the *Monardella* species, ecological rather than genetic factors seem to be responsible for maintaining the integrity of sympatric species. One population of *M. antonina (Hardham 12065)* which occurs in an oak-chaparral ecotone has, microscopically, some *benitensis*-type hairs.

A CORRECTION. In my "Notes on Arceuthobium on bristlecone pine" (Leafl. West. Bot. 10: 163, 164,–1965), the word "pines" in line 2 from the bottom of page 163 should be "plants." The sentence as it is printed is incorrect. It was correct in manuscript but the error was not detected in proofreading.—FRANK G. HAWKSWORTH, U. S. Forest Service, Fort Collins, Colorado.

ANOTHER MEXICAN DESMANTHUS?

BY VELVA E. RUDD
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With considerable reluctance, but with no better alternate solution to the problem, I am transferring *Anneslia nervosa* Britton & Rose (N. Amer. Fl. 23: 63,—1928) to *Desmanthus:* **Desmanthus nervosus** (Britton & Rose) Rudd, comb. nov.

A flowering specimen of a Mexican leguminous shrub was recently received for determination, *Gillis 3734,* "Mountains southeast of Tehuacán in rocky clay or gypsum on lower slopes, semi-desert, 15 degree slope, 9 July 1960." In general appearance the material suggested an unarmed *Acacia* or *Mimosa.* The specimen was matched, eventually, with the type, *Rose & Rose 11416,* and paratype, *Rose & Hay 5874,* of *Anneslia nervosa* Britton & Rose. Those two collections, both in fruit, certainly do suggest *Calliandra (= Anneslia).* The flowers of the new collection, however, indicate some other genus. The stamens were found to be five, with the filaments separate to the base and the anthers glandless, 1 mm. long or more. The flowers are in subsessile, spherical heads.

By the process of elimination, I arrived at *Desmanthus* as a possibility. The specimens of *D. nervosus* do not look like *Desmanthus,* but the individual characters seem to be those of the genus. The stems of *D. nervosus* are woody, with gray bark, and with shorter internodes than are commonly found in other species of *Desmanthus* but a condition to be expected in desert shrubs. Most similar in that respect are *D. fruticosus* Rose, of Baja California, and *D. Covillei* (Britton & Rose) Wiggins ex Turner, of the Sonoran area of Mexico and Arizona. The leaves of *D. nervosus* consistently seem to have only 1 pair of pinnae and bear a petiolar gland just below the juncture of the pinnae. There are several species of *Desmanthus* that occasionally have leaves bearing only one pair of pinnae, and most species have petiolar glands. In addition to *D. nervosus,* two species of *Desmanthus, D. obtusus* S. Wats. and *D. reticulatus* Benth., both in Texas, have prominently raised secondary venation. The essentially sessile inflorescences of *D. nervosus* are approached in the Texan *D. brevipes* B. L. Turner, characterized as having fruiting peduncles 2–6 mm. long. Other species with 5 stamens are *D. leptolobus* T. & G. and *D. illinoiensis* (Michx) MacM.,

both occurring in Texas and northward, and *D. oligospermus* Brandeg., in southern Baja California. Long anthers as in *D. nervosus* are also found in flowers of *D. Palmeri* (Britton & Rose) Wiggins ex Turner, of Sonora. The 1–6-seeded pods and the seeds of *D. nervosus* resemble those of *Calliandra* more than those of *Desmanthus* in general. However, I believe that the similarity to fruit and seed of *D. leptolobus* and *D. reticulatus* is within generic limits.

Surprisingly, the nearest relatives of *D. nervosus* appear to be species found in southern Texas or in northwestern Mexico rather than species that are geographically closer. Purposeful field investigation could turn up additional material of *D. nervosus* as well as new relatives otherwise overlooked in an area of rather monotonous shrubby vegetation in which plants of several different genera look alike.

Chromosome counts of *D. nervosus* would be especially instructive since species of *Desmanthus* have been found to be consistent in chromosome number, $n=14$, $2n=28$, or tetraploid $2n=56$ (Turner, Field and Laboratory 21: 47–50,–1953; Smith, Madroño 17: 116, 117,–1963).

VISCUM ALBUM IN CALIFORNIA. Specimens of the common Old World mistletoe, *Viscum album* L., were collected from apple trees about a mile north of Sebastopol on Gravenstein Highway, Sonoma County, California, Jan. 2, 1966, by Mr. Stanley Rose in whose apple orchard the mistletoe grows. It has also been detected in the vicinity on big-leaf maple, *Acer macrophyllum*, and may perhaps also grow on native oak trees. No other record of the occurrence of *Viscum album* in the New World has been noted in the literature.

Mr. Rose says that he remembers seeing this sort of mistletoe for 15 or 20 years. He reports that among the apple trees parasitized are some which were planted before the great earthquake of 1906 and which were displaced at that time by local earth movement. It seems entirely probable that *Viscum* was introduced on imported apple stock from Europe and that it may have come to California more than 60 years ago.—J. T. HOWELL.

trate with no tendency toward an upright habit. At the end of McGuffie Road in Prunedale, Monterey Co., *A. Hookeri* can be seen, in abundance, up to 3 m. high with no tendency toward a prostrate habit.

ARCTOSTAPHYLOS HOOVERI P. V. Wells. Although this species was described in 1961, it has for years been called *A. Andersonii* Gray as evidenced on herbarium specimens collected in the Santa Lucia Mountains of Monterey Co. Its affinity to the latter species appears close. Typically, *A. Andersonii,* occurring in more mesic habitats in the Santa Cruz Mountains to the north, rarely attains a stature of much over 2 m. *Arctostaphylos Hooveri,* on the other hand, is a far more robust species. Wells (1961), in his type description, mentions that the plants grow to over 4 m. yet average about 3 m. Approximately 4 to 5 miles along Plaskett Creek Road leading east from the Coast Highway at Pacific Valley there occurs a stand of arborescent individuals of *A. Hooveri.* Numerous plants measure over 6 m. in height, and one shrub measures 7 m. tall with a trunk just short of 1 m. in diameter near the ground below the first branch. A little farther along this road one specimen measured 8.2 m. tall.

Hoover's manzanita is found both in shallow and deep soils occasionally along the ridge and on the west-facing slopes of the central Santa Lucia Mountains of Monterey Co. It is not known in San Luis Obispo Co. to the south where the soils change to serpentine and the species is replaced by *A. obispoensis* Eastw.

ARCTOSTAPHYLOS MORROENSIS Wies. & Schreib. The Morro Bay manzanita has been reasonably accurately described. On Pecho Road, Baywood Park, south of Morro Bay, San Luis Obispo Co., a transoceanic cable was recently put in, and several cuts were made into the dense cover of manzanitas. Along one of these cuts numerous specimens of *A. morroensis* were seen to be no less than 4 m. high. Past descriptions have indicated 1.5–2 m. high.

ARCTOSTAPHYLOS MYRTIFOLIA Parry. The Ione manzanita, a narrow endemic of the central Sierran foothills, has been placed within the keys of various floras and monographs as a low-

growing species with branches prostrate or procumbent with a size range of 3–8 dm. Were this the entire case, however, the San Andreas populations (Gankin, 1963; Gankin and Major, 1964) of this species could not be keyed out because the predominant size in those populations is 1–2.5 m.

ARCTOSTAPHYLOS NISSENANA Merriam. This species is one of the least known of all the manzanitas. It is restricted to certain local areas in El Dorado Co. East of Fowler Lane, about a mile south of Diamond Springs and above Martinez Creek is a not-too-prominent hill the summit of which is covered by a dense growth of *A. viscida* Parry with numerous specimens of *A. Nissenana* as high as 3 m., twice as tall as any previously described.

ARCTOSTAPHYLOS PAJAROENSIS Adams. The auriculate-leaved species of the *A. Andersonii* Gray alliance are among the most interesting of all the manzanitas. In the Pajaro Hills, Monterey Co., one encounters the endemic *A. pajaroensis* which is a segregate of that alliance. In many areas the plants form impenetrable masses where individual shrubs may reach 4 m. In yet other areas, especially near the end of McGuffie Road, Prunedale, there are several specimens which exhibit a completely prostrate habit.

ARCTOSTAPHYLOS PECHOENSIS Dudley. In many areas this species exhibits a divaricate growth habit, and the shrubs are generally about 1–2.5 m. high. On Pt. Sal, Santa Barbara Co., there are several different forms. There we encounter erect forms, procumbent forms, and, near the summit, completely prostrate forms.

Arctostaphylos pechoensis var. **cruzensis** (Roof) Gankin, comb. nov. *A. cruzensis* Roof, Leafl. West. Bot. 9: 218 (1962). In Mr. Roof's original description of this entity (Roof, 1962), there is the indication that it is of prostrate habit and that any upright forms in the area are the result of hybridization probably with *A. tomentosa* (Pursh) Lindl. or *A. Hookeri* G. Don. Thorough examination of the specimens in the Arroyo de la Cruz and Arroyo de los Chinos areas north of San Simeon, San Luis Obispo Co., showed no evidence of F_1 hybrids between these entities. Nor in studying the various forms of *A. pechoensis* var. *cruzensis* was there any evidence of gene infiltration from either *A. tomentosa* or *A. Hookeri* where one would

expect some indication of the following characters typical of those species:

A. TOMENTOSA	A. HOOKERI
1. Tomentose leaves	1. Small shiny leaves
2. Root crown or burl	2. Prostrate habit (San Simeon form)
3. Shaggy bark	3. Small shiny fruit

Except for petiole length, Mr. Roof cites no other evidence of introgression from *A. tomentosa*, and certainly any introgression from the very prostrate, small-leaved *A. Hookeri* is even more out of the question. As in so many populations of other species of *Arctostaphylos*, as appears to be the case in *A. myrtifolia*, the variation in leaf size and shape is merely an indication of a highly heterozygous gene pool and only possibly due to introgression at some past time from a species perhaps now extinct (Gankin, 1957).

In the Arroyo de los Chinos area, only a scant 2 miles north of Arroyo de la Cruz, probably the largest known population of *A. pechoensis* var. *cruzensis* occurs. It is here that one sees a tremendous variation in growth habit with some specimens attaining heights of 1.8 m., highly reminiscent of *A. pechoensis* var. *pechoensis* in the San Luis Range farther south. With the recent publication of *A. luciana* P. V. Wells (Wells, 1965), clarifying an error made by Abrams (1914), it seems clear from the description that it may well belong to the *A. canescens* alliance as defined by Schreiber (1940). Primarily due to differences in fruit, there may still be a distinction between *A. pechoensis* var. *pechoensis* and *A. pechoensis* var. *viridissima* Eastw. It is therefore obvious that the entire *A. pechoensis* alliance will require extensive redefinition. Until such time, however, it is best to treat the San Simeon plants as a variety of *A. pechoensis* to be characterized solely by the lack of hispid hairs on the branchlets and the presence of pubescence on the mature fruit.

It should also be pointed out that *A. pechoensis* var. *cruzensis* has recently been collected from a single individual of decumbent habit approximately 0.5 mile east of the Pacific Valley Ranger Station, Monterey Co. This is a northern extension of range and a first record in Monterey Co.

It is interesting to note that, with the Pt. Sal material mentioned in the paragraph on *A. pechoensis*, there are now three superficially identical prostrate manzanitas highly localized

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Schreiber, B. O. 1940. The Arctostaphylos canescens complex. Amer. Mid. Nat. 23:617–632.

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Cuscuta nevadensis in California. According to a specimen determined in December, 1948, by the late T. G. Yuncker, *Cuscuta nevadensis* Jtn. is to be added to the flora of California: west side of Townes Pass, Panamint Mts., Inyo Co., *Eastwood & Howell 7681,* Mar. 26, 1940 (CAS). It was parasitic on *Atriplex hymenelytra* and *Franseria dumosa.* This species is entirely overlooked in the recent posthumous treatment of North American dodders by Yuncker: N. Amer. Fl. ser. II, part 4, pp. 1–51, Dec. 15, 1965. Since in earlier publications the plant has been variously treated by Yuncker, the following bibliographic synopsis is given:

Cuscuta nevadensis Jtn., Proc. Calif. Acad. Sci. ser. 4, 12: 1133 (1924); Yuncker, Memoirs Torrey Bot. Club 18: 169 (1932, as a synonym of *C. salina* var. *apoda);* Kearney and Peebles, Arizona Fl. p. 669 (August, 1951); Clokey, Univ. Calif. Publ. Bot. 24: 175 (October, 1951); Yuncker, Contrib. toward a Fl. Nevada No. 34: 7 (1954). A new name for:

C. Veatchii Brandegee var. *apoda* Yuncker, Illinois Biol. Monog. 6: 159 (p. 69 of reprint) (1921). *C. salina* Engelmann var. *apoda* (Yuncker) Yuncker, Memoirs Torrey Bot. Club 18: 169 (1932). Type: *Goodding 2296,* Las Vegas, Nevada.—John Thomas Howell.

NEW RECORDS AND OBSERVATIONS ON CROCIDIUM

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Crocidium multicaule Hook. *(Compositae-Senecioneae)* until recently had a known distribution ranging from Vancouver Island and the eastern base of the Cascade Mountains in Kittitas County, Washington, southward in the California Coast Ranges to the Mount Hamilton Range and in the western foothills of the Sierra Nevada to Mariposa County, California. Twisselmann (Leafl. West. Bot. 10:62,—1963) reported a disjunct population in the Greenhorn Mountains of Kern County and Raven and Mertens (Madroño 18:32,—1965) recorded a population in San Luis Obispo County, California. To this list of outlying California populations may be added several sites documented by the following collections distributed to the institutions indicated. The letters FSC are used to denote Fresno State College Herbarium for which Lanjouw and Stafleu (Index Herbariorum,—1959) give no standard symbol.

In a zone of metamorphic rocks, 3 miles northeast of Coarsegold, elevation 2500 feet, Madera Co., April 25, 1965, *John Thomas Howell 41107* with Lewis S. Rose (CAS, FSC, JEPS); moist, red serpentine soil on a steep southeast slope 10 miles east of the Trimmer Springs Road-Pine Flat Road Junction, elevation 1000 feet, Fresno Co., Feb. 26, 1964, *Weiler 64008* (CAS, DS, FSC, JEPS, NY, RM, UC), and Mar. 1, 1964, *Weiler 64012* (CAS, FSC, GH, RSA, US, WS, WTU); moist serpentine soil of a roadbank 2 miles west of the junction of Watts Valley Road and Maxon Road west of Trimmer, elevation 1600 feet, Fresno Co., April 2, 1964, *Weiler 64116* (CAS, DS, FSC, GH, JEPS, RSA, UC, US); mostly on disturbed soil in mixed foothill woodland and chaparral vegetation on the crest of Bear Mountain, elevation 3396 feet, Fresno Co., Feb. 28, 1954, *Charles & Mary Quibell 3614* (FSC unicate); Chimney Gulch, west base of Greenhorn Range, elevation about 2750 feet, Kern Co., April 20, 1965, *Charlotte N. Smith 1336* (CAS, JEPS); scarce in moist sand in Douglas oak woodland, Cedar Creek, elevation 2900 feet, Greenhorn Range, Kern Co., April 25, 1965, *Evalyn L. Farnsworth 445* (CAS, FSC).

The population represented by *Weiler 64008* and *64012* covered an area of about 100 square yards and consisted of several thousand plants in each of the past two years. The second population *(Weiler 64116)* was much smaller occupying no more than a square yard and consisting of a few hundred plants. I have not visited the site of the Quibells' collection but

data included with the herbarium sheet indicate the plant was "locally abundant." Likewise, information on *Howell 41107* indicates the plant was "locally common." No comparable information is available for *Smith 1336*. The recent discovery of such widely scattered populations considerably south of the earlier known range suggests that additional populations are to be expected, particularly in the foothills of Tulare County.

In addition to expansion of known range for this species, the populations cited are interesting for their pappus characteristic. Cronquist (Vascular Plants of the Pacific Northwest 5:157,—1955) stated that forms of this species with pappose and epappose rays may occur in a single population. More recently Ornduff (Leafl. West. Bot. 9:84, 85—1960) concluded that both forms "occur nearly throughout the range of *Crocidium,* the possible exception being collections from the central Sierra Nevada foothills in which no epappose plants have been seen." In my collections 102 plants from the population represented bv *64008* and *64012,* and 56 plants from *64116* were studied for presence or absence of pappose rays. Quibells' collection of 7 plants was also observed. All plants had pappose rays. Information on the Madera and Kern County collections, generously supplied by John Thomas Howell (personal communication) also indicated all plants sampled (seven each for *Howell 41107* and *Smith 1336*) had pappose rays. This is in agreement with Ornduff's observation cited above and with those of Raven and Mertens for the population in San Luis Obispo County. The specimens cited by Twisselmann from Kern County should be studied for this character but it appears that plants having epappose rays are rare or non-existent in the southern portions of the range for *Crocidium.*

A NEW CALIFORNIA STEPHANOMERIA

BY ROBERT F. HOOVER
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Stephanomeria carotifera Hoover, spec. nov. Perennis e radice carnosa carotiforme 4–15 mm. diametro in caulem abrupte contracta, sensim desuper attenuata; caulibus e basi ramis late divaricatis, 3–39 dm. longis; foliis basalaribus prae anthesi evanescentibus; foliis caulinis anguste linearibus, 5–25 mm. longis, integris vel basi auriculata sparse dentatis; foliis superioribus reductis 1–2 mm. longis, triangularibus vel ovatis; capitulis solitariis

be explained that even young plants which have not been grazed show the fleshy root and divaricate branching. Some of these young plants show white-woolly buds where the root and stem join, which presumably would give rise to spreading branches in the second year.

A NEW POTENTILLA FROM THE SIERRA NEVADA, CALIFORNIA

BY JOHN THOMAS HOWELL

Potentilla (§ HORKELIA) **tularensis** J. T. Howell, spec. nov. Herba inodora compacta caespitosa vel laxe pulvinata caudice multicipitali ex radice lignosa, cinereo-pallida, pilis et tenuibus et crassioribus, vel patentibus vel strigoso-subappressis, atque pilis sparsis minimis glandulosis vestita; caulibus tenuibus erectis 3–10 cm. altis; foliis basalaribus rosulatis, 2–4 cm. longis, petiolis 0.5–1.5 cm. longis, foliolis 6–10-jugatis, infimis plus minusve petiolulatis, discretis, supremis confertis vel subimbricatis, 3–5-palmatifidis, segmentis oblongis usque ad obovatis, obtusis vel acutis, stipulis integris triangularibus, acutis vel acuminatis foliis caulinis paucis, reductis, stipulis divisis; cyma laxe pauciflora, ramis ascendentibus; floribus 4–5 mm. longis; hypanthio cupulato, 1–1.5 mm. alto, intus piloso; bracteolis 1–2 mm. longis; sepalis 2–3.5 mm. longis; petalis albis, lineari-oblanceolatis, plerumque sepala brevioribus, 2–3.5 mm. longis, 0.5–1 mm. latis, subobtusis; staminibus 10, filamentis 1 mm. et 1.5 mm. longis, subulato-dilatatis, 0.25–0.5 mm. latis basi, glabris vel raro pilem ferentibus, antheris oblongis, 0.6 mm. longis; stylis circa 11, minute glandulosis basi; acheniis turgidis, 2.5 mm. longis, ferrugineis, paulum reticulatis, nitentibus.

Type: Herb. Calif. Acad. Sci. No. 456,724, collected in metamorphic gravel along the exposed summit ridge of Bald Mountain above a forest of *Pinus Jeffreyi* at an elevation of 9430 feet, Tulare County, California, by Ernest C. Twisselmann, *No. 11472,* on August 19, 1965. Most of the plants are in fruit.

Potentilla tularensis, known only from a rocky ridge top on the Kern Plateau in the southern Sierra Nevada, is closely related to the rare endemic *P. hispidula* (Rydb.) Jepson of the subalpine forest of the White Mountains east of Owens Valley. The Sierran plant differs in its more congested habit and heavier caudex, grayer and denser pubescence, smaller leaves, shorter stems, shallower hypanthium, narrower and shorter petals, and shorter and narrower filaments. In *P. tularensis* the antisepalous filaments are usually glabrous, although very rarely one may bear a hair like those on the hypanthium; in *P.*

hispidula the antisepalous filaments have been observed (in *Jepson 7347*) to be usually hairy (a character at variance with Keck's revisional diagnosis, Lloydia 1: 80,—1938).

There would seem to be no close connection between these more austral interior species and the locally endemic *P. Hendersonii* (Howell) J. T. Howell of Mt. Ashland in southern Oregon which has been distinguished by its pubescent filaments nor with the California Coast Range *P. Micheneri* Greene to which Jepson would ally *P. hispidula* (Fl. Calif. 2: 201,—1936). Although all of these horkelias may represent relictual expressions of a widely dispersed complex, the strongly stoloniferous mat-forming habit of the more coastal species is to me an indication of an evolutionary line quite distinct from the interior Basin-bordering species with which we are here more directly concerned.

CHONDRILLA, A NEW WEED FOR CALIFORNIA. *Chondrilla juncea* L., a European member of the tribe *Cichorieae* of the *Compositae,* is to be recorded floristically as introduced in California. In 1965 it appeared as a roadside weed in western San Luis Obispo County: Cuesta Pass, *Hoover 9545*; San Luis Obispo, *Hoover 9634*. The species (which looks something like chicory with smaller heads of yellow flowers) has also been found at Folsom Reservoir in Placer County (*Phyllis Locher,* in 1964 and 1965, CAS), between Loomis and Penryn on Interstate Hwy. 80, Placer County, and 6 miles east of the Sacramento County line on U. S. Hwy. 50, El Dorado County. The last two records have been received from Dr. T. C. Fuller.—ROBERT F. HOOVER, California Polytechnic College, San Luis Obispo.

TWO AMARANTHS IN SANTA BARBARA COUNTY, CALIFORNIA. On April 27, 1963, Henry M. Pollard collected *Amaranthus arenicola* I. M. Johnston along Southern Pacific Railroad between Figueroa and Carrillo streets, Santa Barbara (CAS 452089). Recently, on September 28, 1965, the writer observed a large colony along State Highway 154 just west of Cachuma Dam (on grade about one mile northwest of Santa Ynez River bridge and junction of road to Happy Canyon at an elevation

of about 600 feet). Plants were two to seven feet tall, reddish in age, dioecious, and abundantly fruiting (*Clifton F. Smith 9065*). According to Sauer (Madroño 13:39–42,–1955), the species has been known from Wyoming to New Mexico and Texas and east to the Atlantic.

On October 18, 1965, Marcus Cravens, Deputy Commissioner of Agriculture in Santa Barbara County, collected *Brayulinea densa* (Humb. & Bonpl.) Small along the south side of the road (Ocean Avenue) to Surf about 0.4 mile west of Lompoc. It occurred as a single dense mat-like plant about two feet in diameter with copious flowers and fruit. Mr. Cravens stated that he stopped because it "caught his eye" from the car. This plant is native from Arizona to western Texas, south to South America (Kearney and Peebles, Arizona Flora, p. 268).

Mr. J. T. Howell has helped with the determination of these two taxa.—CLIFTON F. SMITH, Santa Barbara Museum of Natural History.

AMARANTHUS ARENICOLA IN MONTEREY COUNTY, CALIFORNIA. In August, 1963, while I was botanizing the weedy borders of cultivated fields in Salinas Valley, Monterey County, California, I detected a single odd large bushy amaranth along U.S. Highway 101 at San Lorenzo Creek just south of King City (*No. 40066*). Because the plant was pistillate and almost devoid of fruits the several attempts I made to identify it were unsuccessful and the plant was not reported in the flora of Monterey County by Howitt and Howell (1964). With the recent identification of similar plants from Santa Barbara County as *Amaranthus arenicola* I. M. Johnston, the King City plant has been re-examined and has been so determined in spite of its almost sterile condition.

The same plant that was discovered in 1963 was still thriving on Oct. 18, 1964, when it was again examined and specimens collected (*No. 40962*). Certainly the plant had lived over one winter and appeared as if it might survive still others. This perennial trait in this particular individual is noteworthy since *Amaranthus* is, almost without exception, a genus of annual herbs.—JOHN THOMAS HOWELL.

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ACACIA COCHLIACANTHA OR ACACIA CYMBISPINA IN MEXICO?

BY VELVA E. RUDD
Smithsonian Institution, Washington, D.C.

After more than four decades of using the name *Acacia cymbispina* Sprague & Riley for the Mexican spoon-thorned acacias (known locally by such names as cucharillo, culantrillo, cucharitas, palo de cucharitas, chilahui, cubata, cuisache corteño, binolo, vinolo, guinole, huinole, and espino), I am convinced that we should return to *Acacia cochliacantha* Humb. & Bonpl. ex Willd. as the correct scientific name for the species.

Willdenow published the name *Acacia cochliacantha* (Humb. & Bonpl. ex Willd. Sp. Pl. 4(2): 1081, —1806) based on material collected by Humboldt and Bonpland during their journey to the New World in 1799–1804. He attributed the name to the collectors, added a vernacular name "Löffeldornige Acacie," and a brief description with the locality given as "*Habitat in* America *meridionali.*" The type, in the Willdenow Herbarium of the Botanisches Museum, Berlin, was photographed by J. F. Macbride and prints have been distributed as No. 1273 of the Field Museum (now Chicago Natural History Museum) negative series. The photograph clearly shows the spoon-shaped thorns that inspired the specific name.

Kunth's treatments of the *Leguminosae* collected by Humboldt and Bonpland included *Acacia cochliacantha* (Mim. 93, t. 29,—1821; Nov. Gen. et Sp. 6: 274,—1824), with fairly complete descriptions (except for *fructus ignotus*) and, in the earlier work, an illustration as well. They were based on a specimen now in the Humboldt Herbarium at the Muséum National d'Histoire Naturelle, Laboratoire de Phanérogamie, Paris. The locality was cited as "crescit et floret cum praecedente." The preceding species referred to is *Acacia macracantha* Humb. & Bonpl. ex Willd. which "crescit in Regno Quitensi, prope portum Guayaquil, regione calidissima. Floret Novembri." I have seen the specimen of *A. cochliacantha* at Paris and the label does, indeed, show Guayaquil as the locality. The specimen appears to be a duplicate of the holotype at Berlin.

Poiret (in Lam. Encyc. Suppl. 1: 78,—1810) referred "Acacie á épines concaves" to *Mimosa cochliacantha,* based on Willde-

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now's *Acacia cochliacantha*. DeCandolle (Prodr. 2: 462,—1825) paraphrased the earlier descriptions and cited Guayaquil as the locality for *A. cochliacantha*. Jameson, in his Synopsis Plantarum Aequatoriensium (1: 174,—1865), included *A. cochliacantha*, but only from the literature, with no mention of additional collections. Diels (Fl. Ecuad. 1937, Spanish trans. Espinosa, 1938) omitted *A. cochliacantha*.

In spite of the putative existence of *A. cochliacantha* in Ecuador, the species apparently has never been recollected in that country by any of the numerous botanists who have visited the Guayaquil area in the intervening years. Search among herbarium material of *Acacia* from Ecuador, and South America in general, has failed to reveal any specimens with the strikingly characteristic spoon-shaped thorns of *A. cochliacantha*.

From Mexico, however, especially from the western and southern states, there are abundant specimens with large thorns essentially identical to those collected by Humboldt and Bonpland (map, fig. 1). The fact that many locality citations given for Humboldt and Bonpland collections have been found to be erroneous indicates that such data must be suspect. In this

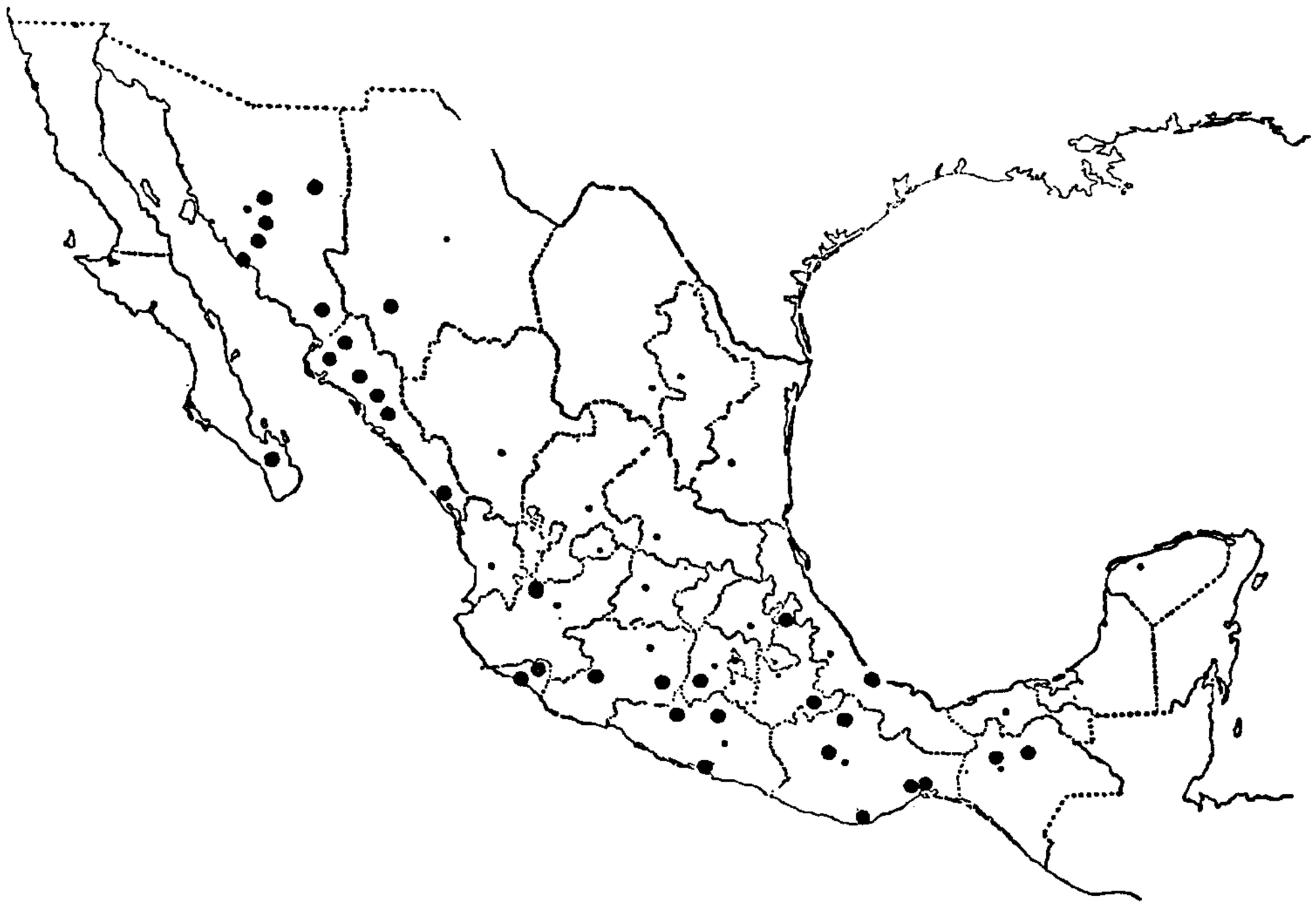

Figure 1. Geographic distribution of *Acacia cochliacantha* based on herbarium specimens with spoon-shaped thorns.

Most subsequent authors have followed Sprague and Riley. Britton and Rose (N. Am. Fl. 23: 90,—1928) transferred the species to the segregate genus *Poponax* but apparently overlooked the fact that *A. cymbispina* was based on Miller's *Mimosa campeachiana.* In addition to *Poponax cymbispina* (Sprague & Riley) Britton & Rose, they published another combination, *Poponax campechiana* (Mill.) Britton & Rose, which, whether or not correctly interpreted, became a nomenclatural synonym. A new species published at the same time, *Poponax Houghii* Britton & Rose, is also synonymous, in my opinion. Another possible synonym is *Poponax attenuata* Britton & Rose (loc. cit.) but material assigned to that species lacks the enlarged thorns.

Standley (Jour. Arn. Arb. 11: 29,—1930), annoyed at the transfer of *Mimosa campeachiana* to *Poponax* and also overlooking the basis for *Acacia cymbispina,* published another new name, *Acacia Milleriana* Standl., based on *M. campeachiana* Miller. Again, as in the case of *Poponax campeachiana,* the identification of the material assigned to *A. Milleriana* may not be correct, but the name stands as an additional synonym.

The following resumé of *Acacia cochliacantha,* with citation of specimens, is based on material bearing characteristic spoon-shaped thorns.

ACACIA COCHLIACANTHA Humb. & Bonpl. ex Willd. Sp. Pl. 4(2): 1081 (1806); Kunth Mim. 93, t. 29 (1821); H. B. K. Nov. Gen. et Sp. 6: 274 (1824).

Mimosa campeachiana Miller, Gard. Dict. ed. 8, *Mimosa* No. 20 (1768), non *Acacia campecheana* Schenck, Fedde Repert. 12: 361 (1913), Engl. Jahrb. I, suppl. 465 (1914).

Mimosa cochliacantha Poir. in Lam. Dict. Suppl. 1: 78 (1810).

Acacia cymbacantha Zucc. ex Benth. in Trans. Linn. Soc. 30: 501 (1875), nomen in synon.

Acacia cymbispina Sprague & Riley, Kew Bull. 1923: 394 (1923), nom. nov. based on *M. campeachiana* Miller.

Poponax cymbispina (Sprague & Riley) Britt. & Rose, N. Am. Fl. 23: 90 (1928).

Poponax Houghii Britt. & Rose, N. Am. Fl. 23: 90 (1928).

Poponax campechiana (Mill.) Britt. & Rose, N. Am. Fl. 23: 90 (1928).

Acacia Milleriana Standl., Journ. Arn. Arb. 11:29 (1930), nom. nov. based on *M. campeachiana* Miller.

Shrub or small tree, up to about 9 m. tall; bark brownish-gray; young twigs puberulent, glabrescent with prominent elliptic transverse lenticels; stipules spinose, terete at first, about 3–4 mm. long and 0.2 mm. in diameter, sometimes becoming cochlear, concave or conduplicate, enlarging to 6

cm. long, 4 cm. broad, and 0.5–1 mm. thick; leaves bipinnate, the axis 2–14 cm. long, canaliculate, commonly with a suborbicular slightly raised gland on the petiole at about midpoint or just below the first pair of leaflets, sometimes additional glands present near the apex of the rachis, or glands sometimes lacking; pinnae about 5–36 pairs; leaflets essentially opposite, about 7–28 pairs, the blades 1–3.5 mm. long, 0.5 mm. wide or less, puncticulate, minutely white-pubescent to glabrous, acute or obtuse, secondary veins not evident; inflorescences globose-capitate, the heads 5–7 mm. in diameter at anthesis, the peduncles slender, about 1–2 cm. long, moderately pubescent, glabrescent, the involucre at apex of peduncle, the bractlets spatulate, about as long as the calyx, pubescent at apex, caducous; flowers yellow, essentially sessile, about 3 mm. long at anthesis, the calyx puberulent to subglabrous, usually less than half as long as the corolla, 0.25–0.5 mm. long, the corolla puberulent to subglabrous, 1–2 mm. long, the stamens numerous, about 50–60, exserted; legume commonly 9–14-seeded, straight or slightly curved, tardily dehiscent, dark brown, glabrous or nearly so, striolate, sometimes minutely glandular-papillose, 9–15 cm. long, 8–12 mm. broad, 2–8 mm. thick, narrowed at base with stipe 6–10 mm. long, acute or acuminate at apex, the margins parallel with little or no construction between the seeds; seeds brown, sublustrous, with U-shaped markings, ovate-lenticular, 5 mm. long, 4 mm. broad, and 1.5–2.5 mm. thick, the hilum apical, elliptic, about 0.5 mm. long.

Distribution: western and southern Mexico at elevations up to about 1800 meters.

Specimens examined, all in United States National Herbarium (US) unless otherwise indicated:

MEXICO. Without exact locality, erroneously given as Guayaquil, Ecuador, *Humboldt & Bonpland* s.n. (Field Mus. Neg. 1273 of holotype at B; P, isotype).

BAJA CALIFORNIA. Cape region, 2 km. northwest of Triunfo, *Moran 7124* (CAS).

SONORA. Alamos, *Rose, Standley & Russell 12732, 12736;* Bacadehuachi, *Hartman 251;* between Cumpas and Moctezuma, *Wiggins 7431;* Guaymas, *Palmer 101* in 1887 (GH, US), *Rose 1269;* between Mina San José and Misa, *Wiggins 6321;* 10 miles northwest of Ures, *Wiggins 7353.*

CHIHUAHUA. Batopilas, *Knobloch 547;* Hacienda San Miquel, 1 mile from Batopilas, *Palmer 71* in 1885 (GH, US).

SINALOA. Without exact locality, *González-Ortega 4193, 4877, 4878, 4879;* El Burro, *González-Ortega 4708;* La Constancia, *González-Ortega 5508;* Culiacán, *Brandegee s.n.* in 1904; Fuerte, *Rose, Standley & Russell 13524;* Labradas, *Ferris & Mexia 5295;* "Los Labrados," *Mexia 924;* Mocorito, *Collins & Kempton 57;* Sinaloa, *González-Ortega 4520;* Topolobampo, *Rose, Russell & Standley 13319.*

JALISCO. Between Bolaños and Guadalajara, *Rose 3733.*

COLIMA. Colima, *Palmer 1353* in 1891; Manzanillo, *Xantus s.n.* in 1859–60, *Palmer 1331* in 1891, *1353* in 1891.

MICHOACAN. Buenavista Tomatlán, San José, *Rzedowski 16656;* Tiquicheo, *Sohns 918.*

MEXICO.Temascaltepec, Ixtapan, *Hinton 1173;* Temascaltepec, Palmar, *Hinton 2124, 4124.*

GUERRERO. Acapulco, *Palmer 305* in 1895; Adama, Temisco, *Mexia 8885;* Coyuca, Chacamerito, *Hinton 6284, 6286;* Coyuca, Jaripo, *Hinton 7868;* Iguala, *Holway 5315;* Placeres, Mina, *Hinton 9140.*

PUEBLA. Calipan, *Smith, Peterson & Tejeda 3711;* Coxcatlan, *Smith, Peterson & Tejeda 3580, 4129;* Tehuacán, *Rose & Hay 5936, Holway 5353;* Tlacuilotepec, *Purpus 3867.*

VERACRUZ. "Vera Cruz," *Houston s.n.* in 1731 (Bailey Hortorium Neg. No. 5162 ex BM of type of *Mimosa campeachiana* Mill.).

OAXACA. Huajuapan, *Janzen 375;* Ixtaltepec, *King 1517;* Juchitán, *King 1569;* Puerto Angel, *Reko 3631;* Tehuantepec, *King 1175, 1218, 1253, 1325, Nelson 2619;* Tomellin Cañon, *Rose & Hough 4669* (US, type of *Poponax Houghii*); La Ventosa, *King 1669, 1700.*

CHIAPAS. San Gerónimo, *Collins & Doyle 30;* between Jalisco and Aurora, *Collins & Doyle 46.*

Acacia cochliacantha is most easily recognized by its spoon-shaped thorns but the stipitate fruit and smaller seeds help to distinguish the species from *A. macracantha* Humb. & Bonpl. ex Willd. sens. lat. and *A. pennatula* (S. & C.) Benth. When thorns and fruit are lacking identification is much less certain, especially since there appears to be a strong possibility that hydridization occurs.

Two other Mexican acacias, from Sinaloa, that might be confused with *A. cochliacantha* are *A. gladiata* Safford, with sword-shaped thorns, and *A. Standleyi* Safford, with similar but subterete thorns. Both species, however, have longer, spicate inflorescences in contrast to the globose heads of *A. cochliacantha*. Their fruits are as yet unknown.

In addition to the nomenclatural question, there are other problems yet to be resolved. The genetic relationships between *A. cochliacantha* and other species of *Acacia* are not understood; the historical and ecological bases for the geographic distribution of the various acacias are unclear; and we do not know the factors responsible for the enlargement of some, but not all, stipular spines to form the characteristic thorns of species such as *A. cochliacantha.*

line, hirsutulous along the five broad and blunt ribs but strigulose in the intervening trenches. Flowering specimens from over nearly the whole range of *B. gracillima* have been examined, and in all there are at least traces of purple pigment in the perianth. Collectors who leave records of flower-color are unanimous on the point, describing it as "red," "maroon," "purple," "deep crimson" or "wine-red." Apart from its bright golden-yellow coloring the flower of *B. chrysantha* apparently differs from that of *B. gracillima* in having five and not either two or three stamens, but this character will need verifying from further collections. The perennial boerhaavia most prevalent in the lower Nazas valley in the same environment as *B. chrysantha* is the related *B. anisophylla* Torr. It is more easily distinguished by its magenta perianth a third larger than that of either *B. chrysantha* or *B. gracillima,* and by its glabrous fruit.

Boerhaavia chrysantha, spec. nov., *B. gracillimae* Heimerl arcte affinis sed perianthio aureo nec rubro-purpureo et staminibus 5 nec 2 vel 3 statim recognita.

Perennis e radice lignosa, caulibus 4–7 dm. longis inferne decumbentibus foliosis puberulis in paniculam glabratam aphyllam iteratim ramosam cito abeuntibus; folia petiolata opposita ovata basi rotundata vel late cuneata margine undulata, inferne pallida pinnatim nervosa puberula, superne viridia glabra, paria valde inaequalia, majori 2–4 cm. longo; panicula ambitu oblonga vel anguste pyramidalis multiflora, ramulis ultimis capillaribus, pedicellis veris subobsoletis; flores singuli binique, bracteis linearisubulatis membranaceis 0.6–1 mm. longis suffulti; perianthium aperte campanulatum circa 4 mm. longum, expansum circa 6.5 mm. latum, 5-crenatolobatum, 5-nervium, supra basin viridescentem laete auratum, extus minute strigulosum; stamina 5, filamentis glabris, longioribus ad 6.5 mm. usque longis, antheris pallidis luteis 0.6 mm. longis; stylus glaber circa 8 mm. longus; anthocarpium clavatum obtusum circa 3.5 mm. longum apicem versus 1.2 mm. latum, obtuse 5-costatum, costis crassis patentim sulcis interpositis laevibus appresse setuloso-hirsutulis eglandulosis.

DURANGO: locally plentiful in rock crevices and on talus under low cliffs, arid limestone hills near 1150 m., with *Fouquiera* and *Cactaceae* of many genera, lower Nazas valley, about 16 km. upstream from Ciudad Lerdo, October 19, 1965, *H. D. Ripley & R. C. Barneby 14,205*. Holotypus, NY; isotypi, CAS, US.

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NOTES ON FRESH-WATER MARSH AND AQUATIC PLANTS IN CALIFORNIA—V[1]

BY PETER RUBTZOFF

The present notes contain some records of interest in dicotyledons.

CYPSELEA HUMIFUSA Turpin. This West Indian annual has been collected by the writer in late summer and fall of 1958 at Laguna de Santa Rosa northeast of Graton, Sonoma County, where it grew abundantly in wet, muddy ground inundated earlier in the summer (*No. 3886* and *3991*).[2] Santa Cruz, San Mateo, and Marin counties, and San Joaquin River are, according to the more recent floristic treatments (Howell 1949, Mason 1957, Munz and Keck 1959, Thomas 1961), the areas in which this plant has been found in California. Milo S. Baker, as early as 1946, listed it as occurring on the shore of Clear Lake at Wygal's Resort in Lake County. Two collections are known to me from that county in the herbarium of the California Academy of Sciences: beach at Clear Lake Highlands, *Baker 11189* in 1945; and margin of Clear Lake about 1 mile south of Lakeport, *Mason 12944* in 1946.

CALLITRICHE HERMAPHRODITICA L. (*C. autumnalis* L. in Jepson, 1936). We find some differences in distributional patterns of *C. hermaphroditica* L. as given in various statewide floristic treatments. Munz (1959) lists Lake, San Joaquin, Madera, and Modoc counties as areas of its occurrence. Mason (1957) gives the range as "northern California (rare)" for the species, and Central Valley and valley of the Russian River for var. *bicarpellaris* (Fenley) Mason. Jepson (1936) lists Gilroy in Santa Clara County, and Sierra County[3] for the species, and Clements in San Joaquin County and Santa Rosa (west of) in Sonoma County for var. *bicarpellaris*. Fassett (1951, p. 217) cites California material from Clements in San Joaquin County (type of var. *bicarpellaris*), Mt. Reservoir, Devil's Garden in Modoc County, and Kelseyville in Lake County. In local floristic treatments we find the plant listed as occurring east of Aurora School in Marin County (Howell 1949),

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[1] The fourth part of the Notes was published in 1965 in the present volume of this journal pages 164 to 168. For a map showing marshes in southern Sonoma County and a list of their names used in these studies, *see* Leafl. West. Bot. 9:73–76 (1960).

[2] Unless otherwise indicated, collections are in the herbarium of the California Academy of Sciences.

[3] Based on Lemmon's material reported in Watson (1880).

near Gilroy in Santa Clara County (Thomas 1961), and between Santa Rosa and Sebastopol in Sonoma County (Baker 1954).

In view of the scattered and localized nature of the known distribution of the plant in the State, as gathered from above data, a Solano County collection is of interest: Lagoon, 2 mi. southwest of Vacaville, in water about 1 ft. deep, *Rubtzoff 5534* on May 26, 1965. The plant in this intermittent lake forms large masses and represents the typical form, with all 4 carpels well developed.

ELATINE HETERANDRA Mason. Described by Herbert L. Mason in 1956, *Elatine heterandra* has not yet been reported from outside the two localities given in the original description: pond 1.5 miles east of Calpine, Sierra Valley, Sierra County[4]; and Snows Lake, Lake County. The writer of this article collected plants belonging to this species in Sonoma County, while the examination of material at the herbaria of the California Academy of Sciences and the University of California revealed further collections of *E. heterandra,* a list of which follows.

LAKE COUNTY: 1 mile north of Salminas Resort along edge of slow-moving streamlet, *Baker 2286a* in 1927 (UC); small creek on south side of Mt. Konocti, *Mason 11554b* in 1937 (UC; the material as represented by the sheet examined contains also *E. rubella* Rydb., and some *E. californica* Gray); Boggs Lake, *Mason 12625* in 1945 (UC); Boggs Lake, wet margin, *Baker 11092* in 1945 (CAS); Boggs Lake, submerged, *Baker 11098* in 1945 (CAS); 5 miles southeast of Middletown, muddy lake shore, *Ripley & Barneby 6918* in 1945 (CAS). SONOMA COUNTY: Bennett Mtn. Lake, in water about 1 ft. deep, *Rubtzoff 5400* in 1964 (CAS). MARIN COUNTY: Laguna, Chileno Valley, *Howell 23258* in 1947 (CAS; the information in Howell, 1949 on the occurrence of *E. brachysperma* Gray in Chileno Valley is based on this collection of *E. heterandra*). SANTA BARBARA COUNTY: vernal pool near Laguna Blanca School, Hope Ranch, *Pollard* on May 17, 1952 (CAS). SAN BERNARDINO COUNTY: margins of lake, Bear Valley, *Abrams 2910* in 1902 (UC; this sheet had already been annotated as *E. heterandra* by Allan Andrews).

The collections listed above demonstrate a stamen situation characteristic of *E. heterandra.* The number of stamens in the material examined ranges from 3 to 6. When only 3 stamens are present, they are attached opposite the 3 carpels; when

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[4] The wording of the distribution in A Flora of the Marshes of California (Mason 1957) gives the impression that two separate localities, Sierra Valley, and a pond 1.5 miles east of Calpine, are listed for Sierra County; checking of the original description, however, reveals that only one locality is dealt with in that county, the pond being located in the Sierra Valley (Mason 1956).

Bridge, Merced Co., *Howell 4336* in 1929 (CAS); San Joaquin River, bridge below Snelling, Merced Co.,[5] *Mason & Smith 8371* in 1948 (UC); Kings River near Hub, Kings Co., *Mason & Smith 8368* in 1948 (UC); San Joaquin River bottom at Airport Way crossing (Tracy-Ripon area), San Joaquin Co., *Rubtzoff 5578* in 1965 (CAS).

HIPPURIS VULGARIS L. The mare's tail seems to be widely scattered and uncommon in the State (Mason 1957, Munz and Keck 1959). An old, 1854 record by Bigelow appears to be the only one for Marin County (Howell 1949). For the Santa Cruz Mountain area Thomas (1961) writes: "Rare in ponds and pools along creeks in San Francisco and northern San Mateo counties." In Howell et al. (1958) the only reference to the plant in San Francisco reads: " 'Dr. Behr says this plant was formerly found near Lobos Creek' (Brandegee, p. 351)." The above observations add interest to recent collections by the writer of *Hippuris vulgaris* from permanent shallow water at two localities in Sonoma County: Bodega Head Marsh, *No. 1667*, and Duncans Mills Marsh, *No. 2042*, in 1954 and 1955. While at the former locality the mare's tail forms extensive colonies, at the latter only a few plants were seen.

MYRIOPHYLLUM HIPPUROIDES Nutt. This milfoil, which Munz (1959) reports from "scattered stations" in Fresno, San Joaquin, Plumas, Lassen, and Lake counties, and Howell (1949) from Marin County, has been collected by the writer in Sonoma County: Bennett Mtn. Lake, *No. 1699, 1966* in 1954 and 1955, and *5247* in 1963; Atascadero Creek Marsh, margin of pond, *No. 5021* in 1962.

MYRIOPHYLLUM BRASILIENSE Camb. This South American escape from cultivation is reported by Mason (1957) from Humboldt, Marin, El Dorado, San Joaquin, Merced, and San Diego counties, by Munz (1959) from Humboldt and Kings counties, and by Howell et al. (1958) and Thomas (1961) from San Francisco. The following two collections by the writer add Sonoma County to the list: Cunningham Marsh, in artificial

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[5] It seems that an error is involved in the designation of this locality. Snelling is actually located on Merced River, and thus either the river or the town on the label is incorrect. If the bridge is on Merced River below Snelling, then the locality is probably identical with or closegto that of Howell's *No. 4336*.

pond, *No. 4770* in 1961; in wet creek bed (terrestrial) in Laguna de Santa Rosa area east of Cunningham, *No. 5195* in 1963.

SIUM SUAVE Walt. In the years 1958 to 1961 the writer collected *Sium suave* at the following localities in Sonoma County: at the Atascadero Creek Marsh (*No. 3747*), and at several stations along the Laguna de Santa Rosa between Sebastopol and Trenton (*No. 3780, 3797, 4508, 4523, 4558, 4737*). These records extend into a new area the range of a plant previously reported from "northern Sierra Nevada and north to Modoc and Siskiyou counties" by Mason (1957), and from Tulare, San Joaquin, and Butte to Modoc and Siskiyou counties by Munz (1959). Jepson (1936) reported it also from Suisun Marshes in Solano County under *Sium cicutaefolium* Schrank var. *heterophyllum* (Greene) Jepson.

In Sonoma County *Sium suave* was found growing in usually large colonies, in marshy and moist, chiefly open places.

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NOTES ON GAULTHERIA IN CALIFORNIA

BY JOHN THOMAS HOWELL

1. GAULTHERIA HUMIFUSA IN THE SIERRA NEVADA

One of the more elusive plants of the Sierra Nevada is the alpine wintergreen, *Gaultheria humifusa* (Grah.) Rydb., which, although it is widely distributed in the southern half of the range, is not often detected because of its depressed habit and small parts. In moist or wet places in subalpine meadows, particularly on mossy banks of brooks and along sodded shores of ponds and lakes, the slender stems of the *Gaultheria* creep through the low dense growth of various herbs and mosses. Once this distinctive habitat is recognized, one can search expectantly for this attractive shrublet in any of the higher Sierran meadows from the Yosemite region southward.

Although this diminutive wintergreen cannot be called common or abundant, neither is it floristically correct to call it local or rare. In the herbarium of the California Academy of Sciences there are now 25 Sierran collections from 8 counties, from Eldorado and Mono counties south to Inyo and Tulare counties, at elevations from 8000 to 11,000 feet (most often 9500 to 10,500 feet). All of these counties have been noted in one or another of some 16 Californian references to the plant, but not more than four counties have been listed in any one reference heretofore.

The following citation of selected specimens brings together these data that should form a basis for further field observations. The numerals following the county names indicate in the literature list the references in which a particular county is recorded.

ELDORADO COUNTY (15): Lake of the Woods, el. 8200 ft., *Stebbins 2064*.

MONO COUNTY (15): Slate Creek Basin, el. 10,400 ft., *Clausen 968, Keck 4490*.

TUOLUMNE COUNTY (8, 10, 15, 16): Tilden Lake, el. 9600 ft., *Mason 14820;* Young Lake, el. 9900 ft., *Howell 20510, 21500*.

MARIPOSA COUNTY (8, 10, 16): Snow Flat, el. 8800 ft., *Howell 20685*.

MADERA COUNTY (5, 7, 13): Sadler Lake, el. 9350 ft., *Howell 34299;* Middle Nidiver Lake, el. 10,200 ft., *Raven 3735;* Gray Peak, el. 9500 ft., *Enid Michael in 1921*.

FRESNO COUNTY (1, 2, 3, 4, 9, 10, 12, 15, 16): Gold Lake at head of Mono Creek, el. 11,000 ft., *Howell 22778;* Hour-glass Lake, 3 miles west of Sixty Lakes Basin, el. 10,500 ft., *Mark Kerr in 1940*.

California it is reported from moist shaded places, but northward, according to Hitchcock (Vasc. Pl. Pac. NW. 4:12,–1959), it may also grow in "fairly dry, yellow pine forests. . . ."

SIERRA COUNTY: Scales Diggings (Jepson, Man. Fl. Pl. Calif. p. 744,–1925, as *G. humifusa;* Abrams, Madroño 2:122,–1934).

BUTTE COUNTY: abundant in one place in seepage from a spring in heavily forested ravine about 2 miles north of Strawberry Valley near Lewis Flat, el. about 3500 ft., July 27, 1965, *C. R. Quick 65–23* (CAS). This station is about 7 miles southwest of Scales, Sierra County, which has just been noted. Lewis Flat is also near the point where Butte County adjoins Yuba and Plumas counties, in both of which this wintergreen may also be expected.

ELDORADO COUNTY: Blodgett Forest (Jepson, Fl. Calif. 3:27,–1939; Mason, Fl. Marshes of Calif., p. 637,–1957).

LOTUS PEDUNCULATUS IN THE PACIFIC STATES

The so-called "large birdsfoot-trefoil" of the Old World has been found as an occasional escape from pastures in Washington, Oregon, and California, but it seems to have been noted in the literature only from Oregon (Peck, Man. Pl. Ore., 471, –1961) and California (Leafl. West. Bot. 4:157,–1945; Howell, Marin Fl., 174,–1949; Munz, Calif. Fl., 850,–1959). In these references the plant was called *Lotus uliginosus* Schkuhr, but it would appear that that name is antedated by *L. pedunculatus* Cav. (cf. Clapham, Tutin, and Warburg, Fl. Brit. Isles ed. 2, 348,–1962). Moreover the Californian "novelty," *L. trifoliolatus* Eastw. (Leafl. West. Bot. 2:265,–1940), must not be overlooked in the overall synonymy.

The following collections of *L. pedunculatus* are in the California Academy of Sciences:

WASHINGTON. Ilwaco on Baker Bay, Pacific Co., *T. Kincaid in 1952;* Nahcotta on Willapa Bay, Pacific Co., *T. Kincaid in 1953;* near Bothell, King Co, *M. J. Forsell in 1950.*

OREGON. Roadside near Warrenton, Clatsop Co., *Peck 24238.*

CALIFORNIA. Del Norte County, *R. Van Deventer in 1934;* 2 miles east of Crescent City, Del Norte Co., *Eastwood & Howell 3777,* type-collection of *L. trifoliolatus* Eastw.; between Crescent City and Oregon line, Del Norte Co., *Y. W. Winblad in 1941;* between Almonte and Mill Valley, Marin Co., *Howell 19525, 19856.*

Neither *L. pedunculatus* nor typical *L. corniculatus* L. is nearly so common as an escape from cultivation as that variant of this complex with narrower, more pointed leaflets, *L. tenuis*

W. & K. That plant is synonymized with *L. corniculatus* in the Vascular Plants of the Pacific Northwest (3:293), but in the Old World it is recognized at least as a variety [*L. corniculatus* var. *tenuifolius* (L.) Gaud.], if not as a spécies.—J. T. HOWELL.

RECORDS OF GAULTHERIA OVATIFOLIA IN MONTANA

BY JAMES R. HABECK

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This is a report of an eastern range extension for *Gaultheria ovatifolia* Gray. Authenticated records for this species indicate that it is found in streamside sites, bogs, moist montane forests and wet slopes at middle altitudes from northern California to British Columbia, and eastward to northern Idaho. A geographical distribution of this type is typical of many Pacific Coast species. Such botanical ranges appear to be fairly well related to an eastern penetration of a climatic peninsula which is characterized in northwestern Montana by higher annual precipitation and more moderate winter weather. The occurrence of *Thuja plicata, Tsuga heterophylla,* and other Pacific Coast floristic elements in northwestern Montana exemplify the nature of this region.

Three separate stations for *Gaultheria ovatifolia* have been established in western Montana since 1962 when the first discovery was made. All three stations are in the general vicinity of Noxon, Montana, located in western Sanders County. The three locations are as follows: T26N–R32W, Sections 27 and 33; T26N–R33W, Section 25. All three areas are occupied by moist forest communities; the soils are deep and contain a high percentage of organic matter. Scattered depressions filled with *Sphagnum* also characterize each site. Two of the forests are similar in being dominated by a young stand of *Larix occidentalis,* with a very dense understory of western red cedar reproduction. In these two communities G. *ovatifolia* was found to be one of the dominant understory species. In the third station, the forest is an old-aged cedar-hemlock community. In this area *Gaultheria* occurred as a single individual during the period of observation.

Gaultheria ovatifolia has been collected from five counties in northern Idaho, with five of a total of nine collections coming from the west shore vicinity of Priest Lake. Hitchcock *et al.* (1959, p. 12)[1] indicated that this species of *Gaultheria* had been reported from Glacier National Park in Montana. However the origin of this report is currently unknown (Hitchcock, per. corres.), and there are no known Glacier Park specimens of G. *ovatifolia*.

1 Hitchcock, C. L., A. Cronquist, M. Ownbey and J. W. Thompson. 1959. Vascular Plants of the Pacific Northwest. Part 4. Univ. of Washington Press, Seattle.

INTERESTING PLANTS FROM NEVADA COUNTY, CALIFORNIA

BY JOHN THOMAS HOWELL AND GORDON H. TRUE, JR.

While ranching in the Sierra foothills near Grass Valley, Nevada County, California, the junior author began collecting local plants and preparing a catalogue of the county flora in 1961. Such a catalogue would have considerable phytogeographic interest since the county represents an almost complete transect of the Sierra Nevada from its lower western foothills to its eastern slopes at the Nevada state line west of Reno. Moreover the county lies in that part of the range where the flora of the lower northern portion gives place to a flora in which both arctic-alpine and austral elements become more conspicuous. The only local list of plants that we know of for this region is that by the senior author, "An enumeration of Norden Plants" (Sierra Club Nature Notes No. 12, pp. 1–35, –1943). That list pertained chiefly to the flora of the higher slopes and summit ridges in the vicinity of Donner Pass.

Among the plants that have been collected in the present survey, the following are worthy of special notice.

New to California

JUNCUS MARGINATUS Rostk. Occasional in wet ground at mineralized seep in the Buckeye Diggings, about 7 miles east of Nevada City between the North and South forks of Greenhorn Creek, 3100 ft. elevation, July 15, 1965, *True & Howell 2321*. This species, which is widespread from the Rocky Mts. east to the Atlantic Ocean and south to Mexico, has not been

we had known we were on the verge of a record Sierran congregation of caryophylls we would surely have found a *Silene* or two!

ROSA PISOCARPA Gray. Shaded stream bank on Celina Ridge between Condon Mill site and Murphy Flat, 11.5 miles northeast of Washington, elevation 6200 ft., Aug. 23, 1965, *True & Howell 2473*. Jepson (Fl. Calif. 2:211) cites stations in the Coast Ranges from Lake County northward but none in the southern Cascade Range of California or in the Sierra Nevada.

VIOLA CUNEATA Wats. In area of serpentine about 1.5 miles north of Washington Junction on road to Washington at an elevation of about 4200 ft. This violet was first observed in 1962 at this station by Robert Bergantz, amateur botanist of Nevada City, who showed specimens to Mrs. Lillian Mott who, in turn, sent material to the California Academy of Sciences for identification. On May 20, 1965, a collection was made by True, *No. 1945*. The plants are relatively abundant over about an acre in open Yellow Pine Forest. Heretofore this attractive violet has been regarded as an endemic of the Klamath Area in the Coast Ranges of northern California and southwestern Oregon.

DIGITALIS PURPUREA L. Although more commonly naturalized in woods near the coast, the following two collections from Nevada County establish the cultivated foxglove as naturalized in the Sierra Nevada: plants numerous on irrigation ditch about 0.5 mile north of Nevada City, *S. G. Smith*, May, 1947 (UC); plants common over a wide area of creek bottom in open yellow pine forest, just north of Liberty Hill Diggings on Lowell Hill Road, elevation 3800 ft., Aug. 25, 1965, *True & Howell 2568*.

SIERRAN RANGE EXTENSIONS

RANUNCULUS ACRIS L. Wet soil in shaded roadside ditch at Langs Crossing, South Yuba River at an elevation of about 4500 ft., July 14, 1965, *True & Howell 2230*. The only other record of this species in California that has been seen is that reported from Humboldt County by Benson (Amer. Midl. Nat. 40:36), and the only record from the Sierra Nevada is that from Ormsby County, Nevada (Benson, l. c.). This buttercup is native in Europe.

DARLINGTONIA CALIFORNICA Torr. Collected by Mrs. Lillian Mott and Gordon True at Fall Creek, about 5 miles north

of Yuba Gap and just east of the road from Bear Valley to Lake Bowman, elevation 5600 ft., July 22, 1964, *No. 1575;* also by True at Willow Spring on Celina Ridge, 2 miles southeast of Graniteville, elevation 6100 ft., Aug. 17, 1964, *No. 1650.*

Jepson (Fl. Calif. 2:102) cites Nevada County localities at Moores Flat and Lake City which are about 5 miles and 15 miles respectively west of Graniteville. The Fall Creek station is apparently the southernmost known for this remarkable plant.

PEPLIS PORTULA L. On the emergent strand of Scotts Flat Reservoir on Deer Creek, about 5 miles east of Nevada City, 3100 ft. elevation, Aug. 25, 1965, *True & Howell 2552;* and on the same day, about 6 miles southeast of the above station, at Liberty Hill Diggings on Lowell Hill Road, 3800 ft. elevation, *No. 2560.* The only other collection known from California (or the United States) is that made by Howell in 1943 in Summit Valley, Placer County (cf. Leafl. West. Bot. 3:266, —1943).

PHALACROSERIS BOLANDERI Gray. Willow Spring on Celina Ridge, about 2 miles southeast of Graniteville, 6100 ft. elevation, Aug. 17, 1964, *True 1657,* and Aug. 27, 1964, *True 1667;* bog at old Marsh Hill, 2 miles east of Graniteville on Lake Bowman road, 5800 ft. elevation, Aug. 23, 1965, *True & Howell 2203.* Munz (Calif. Fl. p. 1294) gives the range of this Sierran endemic as "from Tuolumne Co. to Tulare Co." The collections noted here extend the known range approximately 100 miles northward.

SENECIO CLARKIANUS Gray. In the bog near Fall Creek cited above under *Darlingtonia,* July 14, 1965, elevation 5600 ft., *True & Howell 2267A.* Here again, as with the *Phalacroseris,* there is a northward range extension of about 100 miles, the northern limit heretofore being Mariposa County (Munz, Calif. Fl. p. 1248).

RARE SIERRAN PLANTS

STIPA STILLMANII Bolander. On dry slopes and flats of the yellow pine forest, rare, but in places locally abundant: roadcut on Highway 20 at Skillman Flat 13 miles east of Nevada City, el. 4400 ft., *True & Howell 2307, True 2445;* near site of King Wolford Mill on Chalk Bluff Road, el. 4300 ft., *True & Howell 2343;* near the Omega Diggings, 4 miles northeast of Skillman Flat, el. 4600 ft., *True & Howell 2345.* On Oct. 6,

1965, a collection was made by True, *No. 2674*, on the Omega Road at a point some miles east of the Diggings. At this place Stillman's needlegrass was really abundant, and, for about a mile, its tall stems, topped with attractive plume-like inflorescences, were observed in sunny openings of the yellow pine forest.

Although Crampton (Leafl. West. Bot. 9:158,–1961) gives an overall range for *S. Stillmanii*, the following collections, one from each county in which we know of its occurrence, are cited because of the rarity of this California grass: between Viola and Shingletown, Shasta Co., *Hoover 4614* (UC); Colby Mt., Tehama Co., *Heller 14682* (DS); west end of Humbug Valley, el. 4600 ft., Plumas Co., *Quick 64–79* (CAS); Forest Ranch, el. 2350 ft., Butte Co., *Hoover 9722* (CAS); Nevada Co. (see preceding paragraph); Foresthill district, el. 3000 ft., Placer Co., the southernmost known station, *L. S. Smith 1880* (CAS). The grass usually grows at elevations of about 4000 ft. The highest and lowest elevations noted are as follows: 6300 ft. at 0.5 mile south of Walker Mine, Truckee Quadrangle, *Bolt 175* (UC); 2350 ft. at Forest Ranch, cited above. Only 16 collections have been seen in the herbaria at Berkeley, Stanford, and the California Academy.

CAREX LAEVICULMIS Meinsh. Wet ground on margin of mill pond at Marsh Mill, about 2 miles east of Graniteville on Bowman Lake Road, el. 5800 ft., *True & Howell 2195;* shaded springy spot in yellow pine forest on Excelsior Road about 2 miles west of Bear Valley, el. 5200 ft., *True & Howell 2555.* Heretofore this widespread western American species has been known in the Sierra Nevada only in Butte and Eldorado counties (Erythea 8:34,–1922).

LUPINUS CONGDONI (C. P. Smith) D. Dunn. In shallow rocky soil of drying vernal pools just west of Grass Valley on Marysville Highway, el. 2600 ft., *True 1229* (flowers, May 12, 1963), *True & Mott 1256* (fruit, May 31, 1963), *Mott 6588* (May 24, 1965). This station is one of the three reported for this lupine by Dunn (El Aliso 3:147,–1955), the other two being in Mariposa County, California, and Jackson County, Oregon. A fragmentary specimen made by Howell (*No. 29985A*) on June 7, 1954, on the volcanic puddingstone between Long Barn and Pinecrest in Tuolumne County, California, indicates a fourth station for this rare diminutive lupine.

SPOROBOLUS CRYPTANDRUS (Torr.) A. Gray. The sand-dropseed was collected along the roadside 1 mile northeast of Woodland in October, 1965 *(7536)*.

SOLANO COUNTY

Along the Air Base Parkway Road east-northeast of Fairfield, the following plants were collected in September and October, 1964 (unless otherwise noted), all of the roadside plant community:

ANDROPOGON SACCHAROIDES Swartz var. TORREYANUS (Steud.) Hack. *(7546,* October, 1965)
CENCHRUS INCERTUS M. A. Curtis *(7206)*
CENCHRUS ECHINATUS L. *(7235)*
CENCHRUS LONGISPINUS (Hack. in Kneucker) Fern. *(7233, 7243, T. C. Fuller 12776)*
ERAGROSTIS BARRELIERI Daveau *(7244)*
SETARIA FABERII Herrm. *(7232, 7236)*
SPOROBOLUS CRYPTANDRUS (Torr.) A. Gray *(7238)*
PANICUM HILLMANI Chase *(5985,* September, 1961)

This last was not observed to be common in 1961 but by 1964 the grass had become abundant, along the roads from Fairfield to the west entrance of Travis Air Force Base and north along Peabody Road to Vacaville.

A few plants of the following two grasses have been collected along Vanden Road near the site of Vanden Station, northwest of Travis Air Force Base:

ERAGROSTIS CURVULA (Schrad.) Nees *(6899,* September, 1963)
SPOROBOLUS POIRETII (Roem. & Schult.) Hitchc. *(7210,* September, 1964).

Along Peabody Road north of Air Base Parkway and south of Vacaville, the following were collected in September and October, 1965, all from the roadside:

ANDROPOGON SCOPARIUS MichX. *(7548)*
ANDROPOGON SACCHAROIDES Swartz var. TORREYANUS (Steud.) Hack. *(7547)*
ERAGROSTIS BARRELIERI Daveau *(7518)*
SPOROBOLUS CRYPTANDRUS (Torr.) A. Gray *(7547)*

SPARTINA PATENS (Ait.) Muhl. This eastern American cordgrass was collected and identified by Mr. Rolf E. Mall, California State Department of Fish and Game, Delta Fish and Wildlife Protection Study. The plants were collected in October and December, 1964, in a tidal marsh of Southampton Bay northwest of Benicia. Mr. Mall's collection is the first-known record of the species in California.

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JOHN THOMAS HOWELL

In the type of habitat and in its geographical distribution as well, the new species occupies a somewhat intermediate position between *Castilleja affinis* and *C. linariaefolia. Castilleja affinis,* a species of woodland borders and semi-shaded slopes and banks, is generally distributed throughout the hill country of cismontane California but does not extend into the more arid innermost South Coast Ranges preempted by our new species. *Castilleja linariaefolia,* on the other hand, is largely a Great Basin species of open sagebrush and juniper communities, and barely reaches the range of our new species in the eastern part of the Greenhorn Mountains of Kern County, in the foothills bordering the southern edge of the western Mohave Desert, and very occasionally in the dry interior valleys of northern Ventura County.

It may therefore be concluded that the new species is somewhat intermediate in taxonomic position as well as in its geographical distribution between *C. affinis* and *C. linariaefolia.* A hybrid origin is a possibility, with the resulting hybrid derivative forming a stable self-perpetuating entity over a considerable geographic area. The evidence for hybridization in *Castilleja* is both striking and generally recognized. Indeed, the ease in obtaining artificial hybridizations between species indicates a decided lack of internal barriers to crossing (Heckard, 1964). Cytological data are meager for the species involved in our discussion, but one count of the new species is diploid, indicating that we are not dealing with a polyploid derivative. Several chromosome counts for *C. linariaefolia* are also diploid, but in counts of *C. affinis* from central California, to date only hexaploids have been found (Heckard, unpubl.).

Professor Jepson recognized some of the distinctive features of this *Castilleja* on the basis of a single collection, and had proposed a manuscript name for it which would have suggested its occurrence as limited to Kern County. In view of its far more general geographical distribution, it seems better to reject such a name, and to dedicate this species to Dr. Willis Linn Jepson, who first recognized its distinctiveness.

Castilleja Jepsonii Bacigalupi & Heckard, spec. nov. Herba perennis foliosa insignis tota scabridula pilosaque, caulibus strictis pluribus ex radice plerumque 6–12 dm. altis saepe inter fruticium ramos increscentibus; caulibus striatis, pilosis, foliosis, ramulis axillaribus foliosis plerumque 3–5 cm.

(vel etiam 8–12 cm.) longis bene explicatis; foliis lineari-oblongis vel vere oblongis magna ex parte integerrimis vel rarissime ultra medium in segmentibus linearibus tripartitis, 1- vel 3-nervatis, aspere scabridulis ac pilis mollibus segmentatis obtectis, ad apicem versus plerumque attenuatis, apice obtusiusculis, 3–8 cm. longis, 2–6 mm. latis, eis ramulorum axillarium valde explicatis, pluribus, linearibus, plerumque involutis; inflorescentiis mox elongatis (saepe eis fructiferis usque ad 4 dm. longis), earum axibus striatis, pilis brevibus septatis ac alteris brevissimis minute glanduloso-capitatis obtectis; bracteis floralibus foliis superioribus similibus, integris vel nonnulli eis ad apicem inflorescentiae versus tridentatis, trinervatis, lineari-oblongis, pallide viridibus magna ex parte non coloratis vel eis junioribus tantum ad apicem versus pallide roseis, plus minusve densiuscule pilis septatis obsitis, sub anthesi 2–3 cm. longis, eis fructiferis demum usque ad 5 cm. longis; floribus primo confertis, fere sessilibus, demum inter se distantibus ac saepe pedicellos usque ad 4–5 mm. longos terminantibus; calyce angusto, striato, pilis septatis longiusculis dense piloso, ad apicem versus roseo, sub anthesi 2.5–3 cm. longo, demum basi extrinsecus curvato, latere abaxiali profunde (saltem dimidio) fisso, latere adaxiali aliquantum vel multo minus fisso, eius parte distali plus minusve reflexa, dimidiis duobus distalibus in lobis vel dentibus acutis vel obtusiusculis duobus fissa; corolla ex fissura abaxiali insigniter (saepe etiam parte eius 5–6 mm. infra labium inferius) exserta, basi extrinsecus curvata, 2.5–5 cm. longa, galea dorso viridi, apice obtusa, sub anthesi circa 2 cm. longa, pilis brevibus crassiusculis septatis minute glandulosis plerumque crebris obtecta, marginibus glabris, tenuibus, pallide roseis; labio inferiore rudimentario sed prominente protuberanteque sursum curvato, atropurpureo, 1–2.5 mm. longo; stigmate capitato; stylo demum longe exserto; staminibus minime vel haud exsertis; capsula ovoidea, demum 1.5 cm. longa.

Pilose and scaberulous leafy grayish green perennial herb, usually of many strict stems 6–12 dm. tall, these often growing among the branches of supporting shrubs; stems striate, pilose with straight, septate vitreous hairs and with a finer often more or less matted pubescence on the lower portions; sterile axillary shoots quite leafy, vigorous and well developed, 3–5 (and even some of the lower 8–12) cm. long, their linear leaves scaberulous and usually involute, 1.5–3 cm. long; cauline leaves sometimes oblong but mostly linear-oblong, almost always entire, very rarely tripartite at or above the middle into linear segments, 1- or 3-nerved, clothed with fairly long, segmented, straight, unbranched hairs and with much shorter harsher hairs, usually attenuate with an obtusish tip, 3–8 cm. long, 2–6 mm. wide; inflorescence eventually elongate, becoming as long as 4 dm. in fruit, the striate axis shortly septate-pilose and often covered with much shorter gland-tipped hairs; floral bracts undivided, like the uppermost leaves linear-oblong and gray-green (unicolored), trinerved, more or less densely covered with septate vitreous hairs as well as shortly pubescent, 2–3 cm. long at anthesis, the uppermost bracts in the crowded growing portion towards the tip of the inflorescence often tridentate and rose-pink distally, those subtending the mature capsules often as much as 5 cm. long; flowers

at first crowded and almost sessile, ultimately well separated on the axis and on pedicels 2 (or even 4–5) mm. long; calyx narrow, striate, densely pilose, suffused with rose-pink distally, 2.5–3 cm. long at anthesis, soon curved outward basally, sagittally cleft at least half-way on the anterior side, cleft somewhat but always much less (usually ¼) on the posterior side, the distal portion more or less reflexed, the two distal lobes in turn either shortly bilobed or bidentate, the tips acutish or obtuse; corolla at anthesis conspicuously exserted and curved outward from the anterior cleft, often even the portion as much as 5–6 mm. below the lower lip also protruding, the basal portion, like the calyx, outwardly curved, the whole 2.5–5 cm. long, the galea about 2 cm. long, its upper surface deep green and densely covered with short, thickish, stiff, septate often minutely gland-tipped trichomes, its apex quite obtuse, the narrow rose-pink margins thin and glabrous; lower lip rudimentary but prominent, upwardly curved and dark red-purple, 1–2.5 mm. long; stigma capitate, the style ultimately well exserted; stamens not at all or barely exserted; capsule ovoid, becoming 1.5 cm. long.

Chromosome number: $n = 12$, (*Bacigalupi & Heckard 4256,* 1.6 miles west of Frazier Park, elev. 4200 feet, Kern County).

Type: north-facing slope of side-cañon, among shrubs of *Haplopappus linearifolius,* just north of "Syncline Divide," in narrow valley of Vallecitos Creek, along the road to New Idria, about 10.5 miles south of Panoche, San Benito County, California, elevation about 2000 feet; *R. Bacigalupi, G. T. Robbins & P. C. Hutchison, No. 6343,* May 14, 1958 (Jepson Herbarium No. 22301) (isotypes to be distributed).

Generally distributed in the inner South Coast Ranges from southeastern San Benito County southward to the Sierra Madre of northeastern Santa Barbara County, the Tehachapi Mountains and the mountains of northern Ventura County and of northwestern Los Angeles County, eastward in Kern County to the Piute Mountains and the region about Lake Isabella in the valley of the Kern River, reappearing, after an apparent gap in its distribution, in south-central and southeastern San Diego County, and thence ranging southward in Baja California along the lower western flanks of the Sierra San Pedro Mártir to the region just south of the San Quintin plains. Generally growing on sandy or rocky soil of open dry slopes and flats, the stems often growing among the branches of scattered shrubs, such as *Haplopappus linearifolius, Purshia glandulosa, Artemisia tridentata,* and *Lotus scoparius,* at elevations from 1500 to 7200 feet, but descending to sea-level in Baja California, in the vicinity of Bahia San Quintin.

tendency to be colored purple-red distally.) SAN DIEGO CO.: Pine Valley, *Raven 9618;* west of Potrero, *Bacigalupi & Heckard 4089;* Campo, *Abrams 3606* (DS). BAJA CALIFORNIA: 16 miles south of Ensenada, *M. Hill* (UC); Sierra San Borja, *Moran 8137* (UC); Santa Maria Plains south of Hamilton Ranch, *Wiggins 4318* (UC); San Quintin Plains, *Wiggins 4526* (UC).

A NEW COMBINATION IN A CALIFORNIA CASTILLEJA

BY RIMO BACIGALUPI

Jepson Herbarium, University of California, Berkeley

Castilleja affinis Hook. & Arn. var. **contentiosa** (J. F. Macbr.), comb. nov. *Castilleja Douglasii* Benth. var. *contentiosa* J. F. Macbr., Contrib. Gray Herb. no. 65:44 (1922).

It should be stated at the outset that *Castilleja Douglasii* Benth. is, in the opinion of the writer, essentially a woodland shade form of the earlier published *Castilleja affinis* Hook. & Arn. with broader and more dissected leaves. In his treatment of *Castilleja* in Volume 3 of Abrams' "Illustrated Flora of the Pacific States," Pennell characterized *C. Douglasii* as having the galea dorsally "puberulent or minutely pubescent." On the basis of this character, he excludes this species from his section *Affines*. But even in the type specimen collected by Douglas, on loan from the Royal Herbarium at Kew, England, on which Bentham erected *C. Douglasii* and which is before me as I write, the galeas on all the flowers are densely, shaggily and relatively long-pubescent, as in typical *C. affinis!*

Now to a consideration of the plants we are treating as *Castilleja affinis* var. *contentiosa*. They differ from those in var. *affinis* chiefly in having vitreous, thick-based, cellular trichomes on the leaves, particularly on the margins, which diminish in diameter abruptly at a transverse end-wall and terminate in a delicate bifurcation—so delicate, in fact, that this bifurcation often does not survive the rigors incidental to pressing and drying the specimens and must be looked for in the more protected leaf-axils and other portions of the specimen relatively less subjected to the destructive effects of pressure. This type of trichome is characteristic of those on the margins of the leaves of *C. mollis* Pennell, a species originally thought by him to be confined to Santa Rosa Island but since

then collected repeatedly on the coastal sand dunes of southernmost San Luis Obispo County. The infiltration of genes for this trichome-character from *C. mollis* seems to be accountable for this particular type of forked hairs found in coastally adjacent populations of *C. affinis,* which retain in all other respects, however, the attributes of this latter species. Macbride, strangely enough, made no mention of this trichome-character in his original diagnosis, but the specimens he cited, all from coastal Santa Barbara County, leave no doubt that he was referring to the plant under consideration.

Pennell, who also saw the specimens cited by Macbride, relegated this taxon to synonymy under *Castilleja gleasonii* Elmer, another species with its foliage much more densely covered with much finer many-branched hairs similar to those which characterize *C. foliolosa* and which impart a decidedly grayish cast to the foliage. *Castilleja gleasonii,* however, is quite a different plant, having none of the attributes of *C. affinis* so characteristic of var. *contentiosa* and with a type of branched trichome entirely different from that described for our plant. Moreover, *C. gleasonii* is confined to the upper limits of the western portions of the San Gabriel Mountains, at elevations from 5500 to 7000 feet, while *C. affinis* var. *contentiosa* is a truly seaward Coast Range plant, ranging from Monterey to the western end of the Santa Monica Mountains, occurring also on Anacapa and Santa Rosa islands, but with its area of greatest concentration in western San Luis Obispo and Santa Barbara counties.

A Correction for the Type Locality of Cordylanthus capillaris Pennell

It is unfortunate that, owing to a typist's error on a single herbarium label, and to the circumstance that the duplicate specimen with this misleading label was that which reached Dr. Pennell in Philadelphia, the type locality for *Cordylanthus capillaris,* published by him (Notulae Naturae no. 223: 1,–1950) as "alkaline soil, two miles north of Volta, Merced County, California, Herbert L. Mason, no. 12900", and repeated in Pennell's treatment of *Cordylanthus* in Abrams' Illustrated Flora, is in error. It would be remarkable, even unexpectable,

that any member of the subgenus *Eucordylanthus* should be found in an alkaline site, usually the habitat of members of the subgenus *Hemistegia*.

The type number is, indeed, H. L. Mason 12900, but the specimens actually were collected in a "serpentine area 2 miles east of Occidental", Sonoma County, California,—a type of habitat much more to be expected for such a plant. Reference to Dr. Mason's field notebook amply confirms this latter collection site.

Specimens from this area have usually been referred to *Cordylanthus brunneus* (Jepson) Pennell.—R. BACIGALUPI, Jepson Herbarium, University of California, Berkeley.

NEW LOCALITIES FOR GRATIOLA HETEROSEPALA. For some time known only from its original collection at Boggs Lake, Lake County, California, *Gratiola heterosepala* Mason & Bacig. is shown to have a more general distribution in California by the following cited specimens: in a vernal pool just northeast of Rio Linda, Sacramento County, *Bacigalupi 7374;* at a pool-edge on Kennedy Table (elev. 2412 feet), near O'Neals, Madera County, *Bacigalupi & Heckard 7666*. It was first collected at the last-cited locality by Toyo Shitanishi, a student at Fresno State College, and called to the writer's attention by Professor C. H. Quibell.—RIMO BACIGALUPI, Jepson Herbarium, University of California, Berkeley.

EUSTOMA IN WYOMING. The report of a recent collection of *Eustoma Russellianum* (L.) Griseb. in Wyoming (Leafl. West. Bot. 10:154, –1965) prompts this note. Actually *Eustoma* has been known in Wyoming for many years although it is not common except in spots, and then only in moist, alkaline meadowland in the eastern part of the state. We know of the following: Goshen County, near Pratt, east of Torrington, *Aven Nelson 9666,* collected in 1912; Goshen County, near Fort Laramie (probably the same very handsome patch recently reported), *C. L. Porter & Marjorie W. Porter 7995,* in 1959; Natrona County, near Casper, *Mrs. B. B. Brooks s.n.,* in 1925.—C. L. PORTER, Rocky Mountain Herbarium, University of Wyoming, Laramie.

road. Lodgepole pine [*Pinus contorta* Dougl. var. *Murrayana* (Grev. & Balf.) Engelm.] is common in the valley, becoming 30 to 50 feet high and 12 to 18 inches d.b.h. Limber pine (*P. flexilis* James) and whitebark pine (*P. albicaulis* Engelm.) shade the picnic tables. Nearby and on the ridges are several trees of Jeffrey pine (*P. Jeffreyi* Grev. & Balf.) reaching 50 to 70 feet in height and 20 to 24 inches d.b.h.

The pine forest is best developed on a steep, north-facing gravelly slope with granite boulders, less than 500 feet south of the camp ground and at about 9300 feet altitude. Associated trees are California red fir (*Abies magnifica* A. Murr.), which exceeds 80 feet in height and 40 inches d.b.h., and quaking aspen (*Populus tremuloides* Michx.). White fir [*Abies concolor* (Gord. & Glend.) Lindl.] is in the valley below also. Limber pine (*Pinus flexilis* James) attains 80 feet and 24 inches d.b.h. Whitebark pine (*P. albicaulis* Engelm.) is a small tree 25 feet high and 8 inches d.b.h.

Two species common on the western side of Sierra Nevada apparently have migrated across the saddle to the eastern side here. Foxtail pine (*Pinus Balfouriana* Grev. & Balf.) near its southeastern limit, has a straight axis to 70 to 80 feet and a trunk diameter of 19 to 30 inches. Cones on the ground led to one western white pine (*P. monticola* Dougl.) 80 feet tall and 36 d.b.h., the fourth species of 5-needle white pine in this grove. Others should be sought farther up the ridge.

The seventh pine species, singleleaf pinyon (*Pinus monophylla* Torr. & Frém.), is present along the road about 2 miles airline northeast, at about 7000 feet altitude [Sec. 20 (?), T. 13 S., R. 34 E.]. Here on the steep rocky slopes are scattered bushes and low spreading trees of pinyon up to 15 feet high and 6 to 10 inches d.b.h., associated with sagebrush (*Artemisia*) and other shrubs. No junipers (*Juniperus*) were seen. Less than 2 miles southward is a tributary called Pinyon Creek.

Herbarium specimens including cones were collected of the seven pine species mentioned above. Sets are being distributed to these herbaria: Forest Service Herbarium, Washington, D. C.; Institute of Forest Genetics, Placerville, Calif.; University of California, Berkeley, Calif.; Arnold Arboretum, Cambridge, Mass.; California Academy of Sciences, San Francisco, Calif.; North Carolina State College, Raleigh, N. C.

The eighth pine species, ponderosa pine *(Pinus ponderosa* Laws.), forms a grove known as Seven Pines (also in Sec. 20) along the road at Independence Creek, approximately 6100 to 6300 feet altitude, about 2.5 miles east-northeast of Onion Valley. John R. Haller (Variation and hybridization in ponderosa and Jeffrey pines. Calif. Univ. Pubs. Bot. 34: 123–166, illus., —1962; p. 143, fig. 1, 2) has reported and shown on a map this stand on Independence Creek.

Bristlecone pine *(Pinus aristata* Engelm.), the only species closely related to foxtail pine, reaches its southwestern limit in Inyo Mountains about 20 miles airline eastward. The Ancient Bristlecone Pine Natural Area containing the oldest known dated living trees is in the White Mountains less than 45 miles north-northeast.

On the western slopes of Sierra Nevada in Kings Canyon National Park directly west of Onion Valley are humid coniferous forests with most of these pine species. One additional species there, sugar pine *(Pinus Lambertiana* Dougl.), probably is present at lower altitudes within 10 miles west of Onion Valley.

An eleventh species, digger pine *(Pinus Sabiniana* Dougl.), is scattered on the lower margins of the mixed conifer forest about 45 miles west of Onion Valley.

Obviously, these wind-pollinated species of the same genus occupying the same area (sympatric) do not hybridize commonly. If so, they would not remain distinct but would be connected by many intermediate individuals and would lose their separate identities. The eight pine species in this valley are classified in six different subsections (or series) of the genus, and most are not closely related. Only those in the same subsection, *Pinus flexilis* and *P. monticola,* and *P. Jeffreyi* and *P. ponderosa,* have been crossed artificially. Most of the others apparently have genetic barriers against hybridizing.

A few other areas may have nearly as many native pine species. Mount Rose on the east side of Sierra Nevada in the Tahoe National Forest in Washoe County, Nevada, has five pine species: *Pinus albicaulis, P. Jeffreyi, P. Lambertiana, P. monticola,* and *P. washoensis* Mason & Stockwell. Not far distant are two others, *P. monophylla* and *P. ponderosa.*

In many forests of Mexico, four or five species of pines

mostly in different subsections of the genus grow together. Often in mountainous areas additional species can be found at lower or higher altitudes not far away. For example, eight species (one with two varieties also regarded as species) can be seen in western Durango along the highway from Durango to El Salto within a distance of about 40 miles and an altitudinal range between 7900 feet and 8900 feet. These are: *Pinus cembroides* Zucc., *P. Cooperi* Blanco, *P. durangensis* Martinez, *P. Engelmannii* Carr., *P. leiophylla* Schiede & Deppe [var. *leiophylla* and var. *chihuahuana* (Engelm.) Shaw], *P. Lumholtzii* Robins. & Fern., *P. strobiformis* Engelm., and *P. Teocote* Schiede & Deppe. Only one, *P. strobiformis,* is a 5-needle white pine.

Six species of southern yellow pines have overlapping ranges in the coastal plain of southeastern United States, though occupying partly different sites. These closely related hard pines of the subsection (or series) *Australes* are: *Pinus echinata* Mill., *P. Elliottii* Engelm., *P. glabra* Walt., *P. palustris* Mill., *P. serotina* Michx., and *P. Taeda* L. Several natural hybrids have been observed among these species, and many combinations of artificial hybrids have been made. The main barrier to crossing is difference in time of pollination.

Forest Service,
U.S. Department of Agriculture,
Washington, D.C.

THE TYPE LOCALITY OF ASTRAGALUS MONUMENTALIS BARNEBY. On August 6, 1951, Prof. Bertrand F. Harrison, of Brigham Young University, wrote me: "In recording the identifications in my fieldbook and checking them against the plants, I find that when the plants were labelled the county given for a location listed earlier in my fieldbook was carried too far and the wrong county has been specified on a few labels. This applies to nos. 11595, 11596, and 11610. I am enclosing three correct labels." At the time I had just returned from a field-trip to Honduras and was busy labelling my own collections, and Professor Harrison's letter and the corrected labels did not get associated with the specimens and have only just recently turned up. One of these numbers turned out to be the type of

MIRABILIS PUDICA POPULATIONS IN SOUTHERN NYE COUNTY, NEVADA

BY JANICE C. BEATLEY
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Mirabilis pudica was described as a new species by R. C. Barneby (1) from collections made by him and H. D. Ripley in 1942 in Lincoln and Nye counties, Nevada; it was noted by these collectors to occur in Clark County, also. The species is apparently restricted to southern Nevada and as noted by Barneby, is "a remarkable and distinct species, and one, moreover, that is abundant over quite a large area in southern Nevada. . . ."

Mirabilis pudica is a constituent of the plant communities of Yucca Flat and Frenchman Flat of the Nevada Test Site in southern Nye County. In Yucca Flat it is associated with communities in which *Grayia spinosa, Lycium Andersonii, Eurotia lanata, Larrea divaricata,* or *Atriplex confertifolia* are the dominant perennials, at elevations of 3900 to 4400 feet; in Frenchman Flat to the south, it is associated with communities in which the dominants may be any of these species or *Lycium Shockleyi, L. pallidum, Franseria dumosa,* or *Atriplex canescens,* at elevations as low as 3100 feet. It is rare or absent in other drainage basins within the boundaries of the 1000-square-mile area of the Test Site.

The species is common, but never abundant and seldom conspicuous, in undisturbed vegetation. It is prominent only on disturbed soils, where, as is true of most native species, density and size of the plants greatly exceed that on undisturbed sites. High-density stands of *M. pudica* occur over many acres in Yucca Flat, where much of the basin floor has been disturbed by test activities of the past 15 years. In both basins it is a prominent "weed" species in areas where it occurs in the nearby undisturbed vegetation, and like other native species, where absent in the undisturbed communities it is absent also on disturbed sites.

The species is described, as in the type description, as "pale glaucous-green or whitish on all parts, sometimes the filaments

*Work performed under Contract No. AT(04-1) Gen-12 between the University of California and the Division of Biology and Medicine, Atomic Energy Commission.

and perigonium obscurely puberulent or very smooth" (4). The extremely smooth and glaucous, pale whitish-green leaves and stems distinguish it vegetatively from the other *Mirabilis* species of the Test Site area, *M. Froebellii* (Behr) Greene and *M. Bigelovii* Gray. However, in the populations on the northeast and lower east slopes of Frenchman Flat, *i.e.*, north and east of the playa, there are many individuals (estimated to be probably thousands in total) which are densely puberulent throughout: leaves, stems, and involucres are covered with a close pubescence consisting of short, whitish, non-glandular hairs (0.5 mm. or usually less). Individuals are either pubescent or entirely glabrous and glaucous, and the two kinds are readily distinguishable in the field by the eye. Over the several square miles of these bajadas, the plants occur in a ratio of one pubescent plant to an estimated 25–50 glabrous plants. Pubescent plants have not been observed in the Yucca Flat populations, or elsewhere in Frenchman Flat.

The pattern of occurrence of pubescent individuals is unlike that in *M. Froebellii* in this region, in which there is sufficient variability in the pattern and density of the leaf and stem pubescence among plants of a given local population, or sometimes among the branches of a single individual, that none is clearly referable either to the typical variety ["densely and viscid-pubescent throughout" (4)] or to var. *glabrata* (Standl.) Jeps. ["glabrous" (3)]; all occur in *Artemisia*-Pinyon Pine-Juniper vegetation at 6000 to 7000 feet elevation. The expression of pubescence in *M. pudica* is also unlike that in *M. Bigelovii,* in which the densely glandular-puberulent typical variety is essentially restricted to *Coleogyne* and *Artemisia tridentata* vegetation at the middle and higher elevations (4500 to 7000 feet), and the var. *retrorsa* (Heller) Munz, with a modified pubescence, is identified with *Larrea* communities at 3000 to 4000 feet; the habitat ranges of the two varieties apparently do not overlap. Pubescent plants of *M. pudica* are scattered individuals in an otherwise glabrous population, and the non-viscid pubescence is of essentially uniform density over the stems, leaves, and involucres.

Collections of pubescent *M. pudica (Beatley & Rickard 2168; Beatley 2116, 3275, 3280, 3281)* are on file at the Nevada Test Site Herbarium, Mercury, Nevada. Duplicates *(3280, 3281)*

have been deposited at the California Academy of Sciences, Stanford University, and University of Nevada, Reno.

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NOTES ON DISJUNCT FOOTHILL SPECIES NEAR BURNEY, CALIFORNIA

BY JAMES R. GRIFFIN

The southern part of the Cascade Range in California forms a physiographic barrier across Shasta County, separating the low Sacramento Valley plain from the higher interior plateau. Several woody species common in the Central Valley foothills also occur east of the main ridge near Burney on the edge of the plateau. The geographic isolation across this ridge is not great—20 to 30 air-line miles. The ridge is also broken by the narrow, winding gorge of the Pit River. However, the ecological relationships of these disjunct species to each other and to their geographic situation have never been clearly outlined.

The basin surrounding Burney is about 15 miles wide and from 3000 to 4000 feet in elevation. The ridge to the west is mostly above 4500 feet. To the east a low ridge separates the basin from the Fall River Valley. The Pit River cuts through the western range near Lake Britton. The climate is transitional between that of the Sierra Nevada and the Great Basin. Annual snowfall at lower elevations may be 25 to 50 inches. Total precipitation is about 20 inches.

The higher slopes support a mixed conifer forest which includes *Quercus Kelloggii* Newb. Pine forests cover much of the lower slopes and flats. In the pine forest *Q. Kelloggii* is largely replaced by *Q. Garryana* Dougl. In more xeric habitats *Q. Garryana* dominates a variable mixture of woodland and chaparral. In the eastern part of the basin *Purshia tridentata* DC. and other Great Basin species begin to appear.

gether in the Burney basin the aspect of the woodland is remarkably similar to that of the Central Valley foothills. The floristic similarity is strengthened by the occurrence of such other chaparral species as *Lonicera interrupta* Benth., *Rhamnus crocea* ssp. *ilicifolia* (Kell.) C. B. Wolf, and *Cercocarpus betuloides* Nutt.

Mr. James Mallory of the Soil-Vegetation Survey found a small patch of *Rhus diversiloba* T. & G. on a rocky ledge in the pine forest near Lake Britton. After searching the *Q. Douglasii* area more closely, I also found a few small colonies of *Rhus* under the oaks. This is a distinct eastward extension of *R. diversiloba* as far as Shasta and Tehama counties are concerned. It does, however, grow along the central Klamath River canyon.

Mr. Mallory also found several shrubs of *Arctostaphylos viscida* Parry on the shore of Lake Britton. This species is not otherwise known in the basin; however, it may not be entirely absent along the Pit Canyon. At several localities in the mixed conifer forest near Burney, green-leafed manzanita bushes appear which are upright in form and only weakly burl-forming. They may be more closely related to the *A. Manzanita* Parry of the western slope mixed conifer and pine forests than to the locally common *A. patula* Greene.

Nine miles southeast of the *Q. Douglasii* area, I found one large sprouting clump of *Q.* × *moreha* Kell. One parental species of this hybrid, *Q. Kelloggii,* is common nearby, but *Q. Wislizeni* A. DC., the other parent, is found currently only 30 miles to the west.

The last species to be mentioned is *Chamaebatia foliolosa* Benth. A narrow strip of this low shrub runs southwest of Lake Britton for ten miles under the pine and mixed conifer forest. It then skips south across the rest of Shasta and Tehama counties to start its main distribution in Butte County.

This Burney-Fall River Mills woodland provides an interesting opportunity to study the merging of floristic elements of the Sacramento Valley and Modoc Plateau. Further study here may also help in understanding the northern and eastern limits of the California woodland and chaparral vegetation.

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HELLEBORINE IN CALIFORNIA

BY JOHN THOMAS HOWELL

Now that *Epipactis Helleborine* (L.) Crantz has been found growing sponaneously in wild areas of the Santa Cruz Mts., it is time to report it as a new introduction in the California flora and to outline what I know of its spontaneous occurrence during the past decade in gardens of the San Francisco Bay area. This attractive small-flowered Old World orchid has been found by Mr. and Mrs. J. Ed. McClellan in three localities along wooded roads and on steep slopes in San Mateo County, quite away from gardens and cultivated ground: on Sawyer Camp Road; on Tunitas Creek Road (on shoulder of road in hard clay soil); and on Star Hill Road (on edge of road and on steep dry slopes below it). Specimens of the helleborine collected by Mr. and Mrs. McClellan at the last two localities in August, 1966, are in the herbarium of the California Academy of Sciences.

This interesting orchid first became known to Mr. and Mrs. McClellan several years ago when it appeared spontaneously in the wild plant area of their garden in Burlingame, San Mateo County. Watching for it as a wild plant in the hills, they have discovered the three stations noted above.

It was also as a garden volunteer that I first became acquainted with the helleborine, when, in 1956, a volunteer plant was brought to me by Mrs. Irving Frank from her garden in Mill Valley, Marin County. Subsequently in 1961, the late Mr. Frithjof Holmboe sent me a specimen collected by Miss Frances Fullerton in whose Mill Valley garden it also grew spontaneously. In 1962, Miss Cicely M. Christy brought it to the Academy from a San Francisco garden where it grew weedily in shrubbery. And finally, this peripatetic orchid appeared as a volunteer in a garden in Piedmont, Alameda County, where it was collected for identification by Dr. Karl W. Koerper in 1965.

In the Academy herbarium there is a 1950 specimen from the Christensen Nursery in Belmont, San Mateo County, where presumably it was cultivated but where it may also have appeared spontaneously. The plant is widely naturalized in the eastern United States and, according to Correll, occurs as far

west as Montana. It is easy to surmise that it was introduced into central California either intentionally or accidentally with imported plant materials; but there is yet the intriguing question: how can one account for its distinctly saltatory dispersal about the San Francisco Bay area?

A NEW SPECIES OF SANICULA FROM CALIFORNIA

BY ROBERT F. HOOVER
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Sanicula simulans Hoover, spec. nov. Caulibus ramosis ex basi, erectis vel patentibus, 2–6 dm. longis; laminis foliorum basalium tripartitis ad basin vel proxime, partibus pinnatilobatis et laciniatis; foliis caulinis similaribus sed minoribus, superioribus sessilibus; umbellis caulium principalium plerumque 5–7 radiis, umbellis lateralibus reductis; involucris foliaceis; bracteolis ovatis usque ad oblongis, 1.5–2 mm. maxima latitudine, non cuspidatis ut in *S. arguta;* floribus pallide luteis; fructis 3–4 mm. longis, non evidenter stipitatis, spinis prope basin (in portio basale) nullis.

Stems branching from base, erect or spreading, 2–6 dm. long; blades of basal leaves 3-parted nearly or quite to the base, the divisions pinnately lobed and laciniate; cauline leaves similar but smaller, the upper ones sessile; umbels on main stems mostly with 5–7 rays, the umbels on the side-branches reduced; involucres foliaceous; bractlets ovate to oblong, 1.5–2 mm. in maximum width, not cuspidate as in *S. arguta;* flowers pale yellow; fruit 3–4 mm. long, not evidently stipitate, with prickles absent from basal portion.

Type in Herb. Calif. Acad. Sci.: Steiner Creek at mouth of "Serrano Canyon" (a place-name commonly used locally but not appearing on maps), San Luis Obispo County, California, March 3, 1958, *Hoover 8411.* The plants at this locality were erect. Plants growing on an ocean bluff between Morro Bay and Cayucos, *Hoover 7839* and *8412,* differed in having spreading stems, as in maritime variants of a great many other species. The following collections, because of their broad obtuse bractlets, are believed to belong here rather than to *S. arguta.* MONTEREY COUNTY: without locality, *E. K. Abbott.* SAN LUIS OBISPO COUNTY: 3 miles north-northeast of Cayucos Point, *Belshaw 1752;* serpentine knoll at east end of Los Osos Valley, *Constance, Holm, & Wood 3270,* "petals very pale yellow." SANTA BARBARA COUNTY: Figueroa Mountain road, *Mathias & Lewis* in 1949; head of Fir Canyon, Figueroa Mountain, *C. F. Smith 2329.*

seems likely most of those native to California have been present but remained undetected until now. Included in these species are plants representing rather large extensions of range, some showing only slight northern or southern extension of formerly known range, and some which partially fill "gaps" in known ranges suggesting that more sites are yet to be found in intervening regions.

While recording the occurrence of plants formerly unknown in a region is of value to phytogeographers and students of the flora, the observations reported below take on added significance when considered in conjunction with reports based on other collections such as those by Raven (1957, 1960, 1962) from several areas of central California, Twisselmann (1963) from Kern County, or Hardham (Dempster 1962, Hardham 1964) from the Santa Lucia Mountains in the Coast Ranges of central California. In addition, numerous records documented by collections of Charles H. Quibell or those of his students, as yet unpublished but on file at Fresno State College Herbarium, point to the fact that the flora of this region is imperfectly known and in need of considerable further study.

The occurrence of plants outside their known distributional range for central California is documented by the following cited collections. Unless otherwise indicated, all collections are represented in the Fresno State College Herbarium, and many duplicates have been widely distributed. The nomenclature used and sequence in which plants are listed follow the treatment given in Munz's Flora (1959).

RANUNCULUS MURICATUS L. MADERA COUNTY: in margins of Cottonwood Creek about 5 miles north of Friant, elevation 600 feet, *Weiler 65020,* April 13, 1965. FRESNO COUNTY: in margins of Little Dry Creek 1.7 miles east of the junction of Auberry Road and Millerton Road northeast of Fresno, elevation 550 feet, *Weiler 65025,* April 13, 1965. This introduced species, formerly known to be established at several sites in northern California as far south as Mariposa County, is abundant along the course of both creeks cited for a distance of several miles. Since both creeks empty into the San Joaquin River below Friant Dam, it seems likely additional populations will be found along the river.

LIMNANTHES DOUGLASII R. Br. var. ROSEA (Hartw. in Benth.) C. T. Mason. FRESNO COUNTY: Fresno area, *Miss Pool 847,* May 6, 1928; west end of Big Table Mountain northeast of Fresno, *Charles H. Quibell 1482,* April 17, 1930; east arm of Big Table Mountain northeast of Fresno, elevation 1700 feet, *Weiler & H. Walker 65034,* May 14, 1965. These collections repre-

sent a slight southern extension of the previously known range south from Madera County. While there no longer are apparent populations in the immediate Fresno area, the species is abundant in depressions on the basaltic top of Big Table Mountain.

SISYMBRIUM IRIO L. FRESNO COUNTY: 8 miles south of Fresno in a small ditch, *Simon Simonian 1401,* March 14, 1954; weedy roadside along highway 180, 3 miles east of Kerman, *Weiler 6313,* March 17, 1963; in a vineyard near the intersection of South Rio Vista Avenue and Manning Avenue, Fresno, *Jake Krahn 64-09,* February 27, 1964; 5 miles southwest of Reedley, *Gary Peterson 008,* March 7, 1964. KINGS COUNTY: vacant lot at Brown and 9th streets, Hanford, *Minako Mizote 64/8,* March 13, 1964. This introduced species, common in southern California, is becoming well established in central California. In Fresno County it is abundant as a weed of sidewalks, gardens, vineyards, and orchards. In addition to the specimens cited above, there are sheets in the Jepson Herbarium documenting occurrence of the species in Alameda and in Monterey counties and a single sheet in the University of California Herbarium recording its presence in Alameda County. In the herbarium of the California Academy of Sciences further collections are from San Luis Obispo, Kern, San Joaquin, and Glenn counties.

DRABA VERNA L. MADERA COUNTY: 0.5 mile east of Bass Lake Ranger Station, *John Meldeen 8,* April 7, 1956. FRESNO COUNTY: along the creek in Jose Basin northeast of Auberry, elevation 3000 feet, *Weiler 64112,* March 28, 1964; Cedarbrook near Todd Eymann Road, elevation 4200 feet, *Jake Krahn 64-99,* April 26, 1964; at the town of Miramonte, elevation 3095 feet, *Robert Linderman,* May 1, 1960. Twisselmann (1963) reported a site for this species in Kern County, whereas previous records indicated a southern limit of distribution in Mariposa County. It seems likely that additional populations will be found in Tulare County.

SIBARA VIRGINICA (L.) Roll. FRESNO COUNTY: 7 miles northwest of Kerman in an alkaline waste area, *Allen O'Berg Jr. 34,* February 12, 1956; alkaline field 7 miles west of Kerman, *Weiler 6378,* April 10, 1963. This species known in California only from a few scattered populations near drying vernal pools, is locally abundant west of Kerman. Since large acreages of alkaline soil are being leveled and reclaimed in the Kerman area, it is likely this population will be obliterated in a few years. Also the plant is a common weed in vineyards at Fresno State College.

ERYSIMUM CHEIRANTHOIDES L. FRESNO COUNTY: a garden weed in northwest Fresno, elevation 350 feet, *Carolyn Torosian 192,* April 4, 1965. According to Munz's Flora this species is apparently known in California from a single site where it was "collected long ago along a railroad in Placer Co." The collector of the Fresno material thinks the plant was introduced accidentally in peat added to the garden.

POLYGONUM CALIFORNICUM Meissn. MADERA COUNTY: 0.25 miles south of South Fork in decomposed granite at the lower edge of yellow pine forest, elevation 3000 feet, *Howard Latimer,* June 29, 1965; *Weiler & Latimer 65048,* July 2, 1965. FRESNO COUNTY: Big Sandy Valley near the foot of Black Mountain, elevation 2000 feet, *Ella Carter 232,* June 23, 1957. Formerly

known from northern California in the North Coast Ranges and in the Sierra Nevada as far south as Mariposa County, this small and inconspicuous annual was uncommon at the site in Madera County and has apparently been collected only once in Fresno County. This extends the known range approximately 100 miles southward.

VERBASCUM VIRGATUM Stokes ex With. FRESNO COUNTY: north of Fresno near Little Dry Creek 3.6 miles north of Copper Avenue, *Howard Walker 124,* May 16, 1965. I have also seen a large population of this species on the alluvium of Kings River near Avocado Lake but no collection was made. Two additional collections from Fresno County are on file at Jepson Herbarium.

SANGUISORBA MINOR Scop. MADERA COUNTY: common in a pasture along Highway 41 on bluffs overlooking the San Joaquin River, *Norman Blair 64075,* April 8, 1964. FRESNO COUNTY: 1.5 miles from Clovis Avenue on Olive Avenue in a cultivated field grown back to weeds, Fresno, elevation 300 feet, *Donna Davis 64,* April 18, 1965. This introduced species has been regarded as established only occasionally in California. However, its occurrence is documented for Santa Cruz and Shasta counties in the Jepson Herbarium and for El Dorado, Humboldt, Marin, Monterey, Santa Clara, Santa Cruz, Siskiyou, and Tehama counties in the University of California Herbarium at Berkeley. At the California Academy of Sciences there are also specimens from Butte, Los Angeles, Napa, San Francisco, San Luis Obispo, Santa Barbara, Sonoma, Ventura, Yolo and Yuba counties.

TRIFOLIUM INCARNATUM L. MADERA COUNTY: along a road around Lake Millerton, *V. L. Holland,* April 20, 1965; in a field 0.75 miles north of Madera Air Force Station, *W. M. Horder 65074,* April 15, 1965. FRESNO COUNTY: Sandcreek Road near its junction with fire control road 29, *Rita Middleton 3,* April 29, 1961; Hills-Valley Road 1 mile north of American Avenue north of Orange Cove, *Jake Krahn,* May 2, 1964; in a pasture along Fruit Avenue between Jensen Avenue and Anadale Avenue southwest of Fresno, *Janice Hurado 65137,* April 24, 1965. Formerly considered rare in California, this species is becoming established in several portions of the State. Both Howell (1957) and Raven (1960) noted sites where it had become established. There are additional specimens in the Jepson Herbarium recording this species in Contra Costa, Amador, and Marin counties.

TRIFOLIUM HIRTUM All. MADERA COUNTY: 1 mile northeast of O'Neals, *Charles H. Quibell & Barbara Brock,* April 30, 1957; 2 miles west of Raymond, *Judith Adams 77-64A,* May 3, 1964; 7 miles north of Madera, *Carolyn Torosian 119,* April 21, 1965. FRESNO COUNTY: Wish-i-ah Road 1 mile north of Auberry Road, *Robert Paul 33,* April 9, 1964; along Willow Avenue 3.5 miles north of Fresno State College, *Weiler 64151,* May 1, 1964; 0.75 mile south of Highway 180 along Ruth Hill Road near Squaw Valley, *Elaine Sudjian 134,* May 2, 1965. SANTA BARBARA COUNTY: Gayley Walk, Goleta, *Maureen Mizote 64111,* April 26, 1964. At the time Munz's Flora was published this species was reported as established at one site in Butte County. Raven (1960) reported two additional sites with information that seed of this species is frequently sown on burns by the U.S. Forest Service. In Fresno and Madera counties it is becoming common along roadsides. In

POA BULBOSA L. MADERA COUNTY: 4 miles north of Oakhurst off Highway 41, elevation 3000 feet, *Adele Bissett & Dale Sanders 64195*, May 18, 1964. FRESNO COUNTY: at Miramonte near a creek, *Dora Ashbury*, May 12, 1951; off Highway 180 on Dunlap Road 0.5 mile west of Deer Crossing, *David Bohrman 154*, May 8, 1963. Munz stated this species was rare south of Shasta County. Raven (1962) reported it was "becoming common in the foothills, and ranging south to Fresno County," and Twisselmann (1963) reported it from Kern County.

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NOTES ON FRESH-WATER MARSH AND AQUATIC PLANTS IN CALIFORNIA–VI [1]

BY PETER RUBTZOFF

The present notes continue with information of interest in dicotyledons, after which follow noteworthy records in monocotyledons accumulated since the publication of parts dealing with the respective groups.

MYRIOPHYLLUM BRASILIENSE Camb. The parrot feather has been discussed in the preceding notes (cf. Leafl. West. Bot. 10: 268, —1966); a specimen, however, recently received by the herbarium of the California Academy of Sciences from the herbarium of the University of California at Davis extends the

[1] The fifth part of the Notes was published in the preceding number of this journal (vol. 10, no. 14, May, 1966), pages 265 to 269. For a map showing marshes in southern Sonoma County and a list of their names used in these studies, *see* Leafl. West. Bot. 9: 73–76 (1960).

reported range of the plant into Monterey County: in slow-flowing stream, Corral de Tierra Canyon area, about 9 miles west of Salinas, *Agamalian,* Oct. 29, 1965.[2]

NAVARRETIA BAKERI Mason. This vernal pool navarretia, described by Herbert L. Mason in 1946 and reported by him (1946, 1951, 1957) as ranging in the inner North Coast Ranges from Lake County to Trinity County, has been collected by the writer of the present note at stations north of Sebastopol in Sonoma County. Although Munz (1959) includes Sonoma County in the distributional picture, he also states that the species occurs in the inner Coast Ranges. Thus, the Sebastopol occurrences are of interest being situated in a section of the outer North Coast Ranges with a quite prominent oceanic influence. Specimens collected earlier in the same general region and filed under *N. leucocephala* Benth. were checked at the herbaria of the California Academy of Sciences and the University of California, and all were found to key to *N. Bakeri* in more recent treatments (Mason 1951, Crampton 1954, Mason 1957, Munz and Keck 1959), but would key (although not quite satisfactorily) to *N. leucocephala* in Jepson (1943, published before *N. Bakeri* was described). A Windsor, Sonoma County, collection and a Calistoga collection cited in Jepson (1943) under *N. leucocephala* both key to *N. Bakeri,* and the Calistoga collection extends the known range of the species into Napa County. More collections of *N. Bakeri* are likely to turn up as a result of more extensive checking of material filed under *N. leucocephala,* much of which was determined before *N. Bakeri* was described. Following is a list of collections of *N. Bakeri* known to the writer from Sonoma and Napa counties.

SONOMA COUNTY: railroad track between Sebastopol and Santa Rosa, *Baker,* May 6, 1899 (UC); between Santa Rosa and Sebastopol, *K. Brandegee,* June, 1905 (UC); drying pool along railroad tracks, Wright School on Sebastopol road, *Ewan 9249* in 1935 (CAS); rain pools of *Quercus lobata* meadow, near Wright School on Sebastopol road, *Ewan 9265* in 1935 (UC); moist situations along railroad right-of-way near Wright School, *Robbins 186* in 1937 (UC);[3] Santa Rosa, *Eastwood 10360* in 1921 (CAS); meadows, Mark West Creek, *Bolander 3893* in 1866 (UC); fields, highway between Healdsburg and Santa Rosa, *Mason 8094* in 1934 (UC); Windsor, *Jepson*

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[2] Unless otherwise indicated collections are in the herbarium of the California Academy of Sciences.

[3] Milo Baker's (1954) reference to *N. leucocephala* occurring in "low ground near Wright School" undoubtedly applies to the present species.

9302 in 1921 (JEPS); 2 miles north of Windsor, *Eastwood & Howell 2520* in 1936 (CAS, UC; the UC sheet was annotated by B. Crampton as *N. Bakeri* in 1950); 2 miles north of Windsor, *Eastwood & Howell 6083* in 1938 (CAS); vernally wet ground at the Laguna de Santa Rosa east of Graton, *Rubtzoff 5167* and *5204* in 1963 (CAS); vernally inundated ground along the Laguna de Santa Rosa northeast of Graton, at end of Piner Road, *Rubtzoff 5745* and *5773* in 1966 (CAS). NAPA COUNTY: dry bed of winter pond, near Calistoga, 300 feet, *Tracy 1853* in 1903 (UC).

The corolla of *N. Bakeri* is generally described as being white (Mason 1946, 1951, 1957; Munz and Keck 1959). The writer, however, found occasional plants in largely white-flowered colonies to have pale-blue corollas, a situation reflected also in a number of herbarium sheets.

NAVARRETIA PLIEANTHA Mason. This navarretia, also described by Dr. Mason in 1946, has not been reported from outside of Boggs Lake in Lake County, the type locality (Mason 1946, 1951, 1957; Munz and Keck 1959). Beecher Crampton collected the plant at Loch Lomond (*No. 1494* in 1953, CAS; *No. 3670* in 1956, CAS, UC), and 1.8 miles east of Loch Lomond on the road to Seigler Springs (*No. 3683* in 1956, CAS, UC), in the same region of Lake County in which Boggs Lake is located. The writer of the present note collected the species at Bennett Mtn. Lake in Sonoma County, (*No. 4650, 4672, 4888,* and *5179* in 1961 to 1963, CAS), where it grows on the lake margin inundated in winter, boggy in spring, and gradually drying out in the course of the summer. Mr. Crampton kindly checked the determinations of the Bennett Mtn. Lake material, for which the writer is very grateful.

NAVARRETIA COTULAEFOLIA (Benth.) H. & A. This navarretia of low ground, according to both Mason (1951, 1957) and Munz (1959), ranges from Mendocino County to San Benito County in the inner Coast Ranges. The following material at the herbarium of the California Academy of Sciences represents the plant from the outer Coast Ranges in Sonoma County: Santa Rosa, *Heller 5638* in 1902; Laguna de Santa Rosa east of Graton, *Rubtzoff 5715* and *5740* in 1966. At the latter locality *N. cotulaefolia* grows in proximity to *N. Bakeri,* discussed earlier in the article, just slightly up the gentle, vernally wet slope from the colony of the latter species.

POGOGYNE SERPYLLOIDES (Torr.) Gray subsp. INTERMEDIA J. T. Howell. Plants agreeing morphologically with this sub-

NOTEWORTHY RECORDS IN MONOCOTYLEDONS

POTAMOGETON CRISPUS L. Reported earlier in these notes for Sonoma County from a plant fragment (cf. Leafl. West. Bot. 9: 76,–1960), this species has subsequently been found in abundance at the same station (pond at Atascadero Creek Marsh, *Rubtzoff 5020* in 1962) and has also been collected in Salmon Creek about 1 mile up the stream from the town of Salmon Creek, Sonoma County (*Rubtzoff 5375* in 1964).

ALISMA LANCEOLATUM With. Reported from Sonoma, Colusa, and Placer counties in California, and from Lane County in Oregon (Rubtzoff 1964), this Old World species has subsequently been collected in Marin County, California: Marin College, Kentfield, *Miss Lilian McHoul* in August 1965 (CAS).

CALAMAGROSTIS CRASSIGLUMIS Thurb. This rare northern, coastal reedgrass, reported south as far as Marin County (Howell 1949, Mason 1957, Munz and Keck 1959)[4] and known there only from Point Reyes Peninsula (Howell 1949), has been recently collected by the writer in the Pitkin Marsh, Sonoma County, where it grows in a marshy meadow *(No. 5741)*. The inland occurrence of this coastal grass in the Pitkin Marsh is actually not surprising, the area being under considerable oceanic influence, as discussed in Rubtzoff, 1953, pp. 206–209.

PHALARIS ANGUSTA Nees von Esenbeck. Since Munz (1959) reports this grass as uncommon in the State from Solano and Butte counties south to San Diego County, Howell (1949) from Marin County, and Major (1963) from Napa and Solano counties, the following Sonoma County collections by the writer present interest: Freestone Marsh *(No. 4851)* and Occidental Marsh *(No. 4921)*, both collected in 1962 in open, marshy and wet ground. Milo Baker, as early as 1937 and 1941, listed *Phalaris angusta* for Sonoma County from south of Sebastopol and from Wright School.

PANICUM DICHOTOMIFLORUM Michx. Reported in Munz and Keck (1959) as a weed of moist places at Loma Linda, Fresno, and Modesto, and by Howitt and Howell (1964) from Monterey County, this eastern North American panic grass seems

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[4] In the herbaria of the California Academy of Sciences and the University of California, California material has been known heretofore only from Del Norte, Mendocino, and Marin counties.

to be spreading in the State. The following collections at the herbarium of the California Academy of Sciences, in conjunction with the above information, give an idea of its present-day dispersal in California.

SAN DIEGO CO.: Lake Hodges, about 5 miles south of Escondido, *Nobs & Smith 620* in 1948. VENTURA CO.: Parkway near Buena Vista and Daly roads, Ojai, *Pollard,* July 30, 1964. SANTA BARBARA CO.: Southern Pacific Railroad yards, Santa Barbara, *Pollard,* Aug. 10, 1957. KERN CO.: moist sandy flats along Cedar Creek just below the mouth of Lumreau Creek, Greenhorn Range, 2600 feet, *Twisselmann 11654* in 1965. SAN JOAQUIN CO.: Union Island, *Stacey,* Oct. 8, 1922; in alkaline soil of irrigated pasture 6.4 miles south of Thornton, *Crampton 3153* in 1955; moist ground in San Joaquin River bottom at Airport Way crossing (Tracy-Ripon area), *Rubtzoff 5580,* in 1965. SACRAMENTO CO.: levee of the Sacramento River at Miller Park, Sacramento, *Howell 41418* in 1965. CALAVERAS CO.: roadside, Burson Road between Hwy. 26 and Burson, *Norris,* Aug. 17, 1965. NEVADA CO.: edge of reservoir in irrigated pasture, G. H. True Ranch, 7 miles southwest of Grass Valley on McCourtney Road, 1800 feet, *True 296* in 1961; dry roadside ditch, north side of road to Grass Valley, just west of the limits of Nevada City, 2500 feet, *Fuller 12759* in 1964; damp roadside ditch, Spring Hill between Grass Valley and Nevada City, 2700 feet, *True & Howell 2571* in 1965. BUTTE CO.: edges of and in rice paddies, Biggs Rice Experiment Station, 5 miles northwest of Biggs, *Crampton 4627* in 1957; lower Sierran foothills, eastern outskirts of Oroville, about 200 feet, *Howell 34646* in 1959. PLUMAS CO.: near Virgilia, about 2750 feet, *Howell 35065* in 1959. SISKIYOU CO.: Klamath River bar on Spink's Ranch at Rogers Creek about 8 miles above Somesbar, *Pollard,* Oct. 7, 1956.

CYPERUS FUSCUS L. This Eurasian and North African species, known as a local adventive from Massachusetts to western New York and Virginia (Fernald 1950), but not reported heretofore from the West, has been found growing amply along the wet margin of Stanislaus River in Caswell Memorial State Park, San Joaquin County, *Rubtzoff,* Sept. 20, 1964.

ELEOCHARIS RADICANS (Poir.) Kunth. Reported on earlier in the notes (cf. Leafl. West. Bot. 10: 69,—1964), this tiny spike rush has subsequently been collected in Mendocino County (wet sand of Navarro River bottom in Hendy Woods State Park, 2 miles northwest of Philo, *Rubtzoff 5417* in 1964) which represents a northward extension of the known range and a new county record.

* * *

To conclude these notes, I would like to express my deepest gratitude to Mr. John Thomas Howell, Curator of Botany

at the California Academy of Sciences and the publisher and editor of this journal, for his invaluable assistance, advice, and encouragement in the course of the present work, as well as throughout my botanical activity at the Academy.

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NEW SORTS OF LESQUERELLA, EUPHORBIA, AND VIGUIERA FROM KANE COUNTY, UTAH

BY R. C. BARNEBY
New York Botanical Garden

Lesquerella Hitchcockii Munz ssp. **tumulosa** Barneby, ssp. nov., omnibus fere notulis nisi habitu cum ssp. *rubicundula* (Roll.) Mag. & Holmg. congruens, caudice autem confertissime ramosissimo multicipiti plantam depresso-pulvinatam ad 1.5 dm. usque latam efficienti insignis.

UTAH: scattered over summits and gullied sides of bare white shale knolls, with *Gilia subnuda* Torr. and Utah junipers, 5700 ft. el., locally abundant but sharply confined to its particular bedrock, 6.5 miles southeast of Cannonville, just south of the Garfield County line in Kane County, in fruit but without ripe seeds June 12, 1966, *R. C. Barneby 14,424*. Holotype, NY; isotypes, BRY, CAS, GH, UC, US, UTC.

As defined by Maguire and Holmgren (in Madroño 11: 172–175, –1951), *Lesquerella Hitchcockii* embraced three geographic subspecies: ssp. *Hitchcockii* endemic to the Sheep and Charleston ranges in Clark County, Nevada; ssp. *confluens* Mag. & Holmg., known only from the Quinn Canyon Mountains in northeastern Nye County, Nevada; and ssp. *rubicundula* (Roll.) Mag. & Holmg., reported from several stations on the upper Sevier River in Garfield and Piute counties, Utah. The three subspecies, differing principally one from the other in average length and width of the leaves, form a chain of morphologically intergradient but geographically disjunct forms, the leaves becoming progressively narrower eastward. All are montane plants, found only on limestone bedrock in the yellow pine belt between 6700 and 11,000 feet. The discovery of ssp. *tumulosa* extends the chain another link southeastward and down into a decidedly desert environment at 5700 feet. As would be expected, ssp. *tumulosa* most closely resembles ssp. *rubicundula*, geographically nearest, in the length-width ratio of the leaves, which are about 3–10 mm. long and only 0.7–1 mm. wide, with blade and petiole scarcely differentiated. It differs chiefly in its remarkable life-form. I have seen populations of ssp. *rubicundula* in two microhabitats on the Paunsagunt Plateau: on stable gravel hilltops in Long Valley (on the upper East Sevier), where the plants

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form diminutive loose tufts of leaves consisting of two to ten, rarely twenty stems contracted into rosettes sessile or nearly so on the root-crown; and on mobile gravel-slides in Red and Bryce canyons where the rosettes are of the same number but are gradually over-run by movement of the surface materials and finally develop slender rhizome-like caudex-branches. In neither situation are the plants of long duration, and no specimen at NY of any subspecies known to Maguire and Holmgren has a taproot over 2.5 mm. in diameter at soil-level. By contrast the plants of ssp. *tumulosa* consist of densely compacted, depressed or low-domed cushions of foliage built up on an elaborately forking caudex which may go out into over a hundred flowering crowns, and the taproot of older plants reaches a diameter of more than a centimeter. The axis of the stems and of the racemes are condensed into a usually subsessile false-umbel nestling into the leaves. As a result the growth-habit is that of *Lepidium nanum* Wats. In *Lesquerella* only *L. condensata* A. Nels. also achieves this genuine cushion-form of growth but that is a softer plant with quite different silicles and an allopatric range north of the Uinta Mountains. According to the protologue of *L. rubicundula* (Rollins in Contrib. Dudley Herb. 3: 178, –1941), its ovules number four to each chamber of the silicle. In ssp. *tumulosa,* as ordinarily in *L. condensata,* the ovules are only two in each chamber, but the constancy and taxonomic value of this character requires confirmation. The western species of *Lesquerella* are still in need of monographic study.

Euphorbia (subgen. AGALOMA) **nephradenia** Barneby, spec. nov., *E. hexagonae* Spreng. affinis sed cyathiis omnibus bisexualibus et praesertim involucri glandulis transverse reniformibus nec ovato-deltoideis absimilis. Ab affinibus *E. exstipulata* Engelm. foliis integris nec serrulatis et *E. bilobata* Engelm. glandularum forma capsulisque majoribus ulterius distat.

Herbae annuae erectae subsuccculentae tenerae 1–2.5 dm. altae praeter capsulas obsolete papillatas glabras pilis brevibus appressis parce conspersae saturate virides, caulibus e radice carnosula nunc solitario nunc e cotyledonibus 3 tota longitudine fastigiatim dichotome ramosis, cyathiis in omnibus fere dichotomiis breviter pedunculatis solitariis; folia omnia opposita exstipulata, lamina lineari-oblanceolata vel anguste elliptica acutiuscula integerrima 1–3 cm. longa basin symmetricum versus in petiolum 2–5 mm. longum gradatim contracta, subtus prominule 1-costata; pedunculi 1–2 mm. longi; involucri tubus turbinatus extus subappresse hirtellus maturus subexacte 1 mm. longus, lobi 5 transverse reniformes 0.5–0.7 mm. longi, 0.7–1.4 mm. lati, appendiculis glandula saepe subaequilatis carnosis lute-

and giving rise to few lateral rootlets, in this respect resembling that of *Phacelia demissa* Gray, one of its companions on the gumbo. Plants of either species can be lifted with little resistance from the ground, the root carrying with it a polygon of cracking clay.

Viguiera (sect. HELIOMERIS) **soliceps** Barneby, spec. nov., radice annua, involucro biseriato cinereo-strigoso, achaeniique nudi forma *V. annuae* (Jones) Blake persimilis sed ab ea necnon ab affinibus *V. longifolia* (Robins. & Greenm.) Blake et *V. ciliata* (Robins. & Greenm.) Blake caulibus veris abbreviatis, foliis majoribus ovatis nec linearibus lanceolatisve et praesertim pedunculis elongatis monocephalis facillime separata.

Herbae annuae 1–3 dm. altae, caulibus veris 1–3 abbreviatis 2–9 cm. tantum longis pedunculo terminali monocephalo 3–5-plo brevioribus, pilis appressis nunc cum longioribus laxioribus septatis immixtis striguloso-hispidulae, foliis cinereo-virescentibus; folia inferiora opposita, lamina ovata vel rhombico-ovata obtusa integerrima 1.5–2.5 cm. longa, 0.8–1.4 cm. lata subtus prominule 3-plinervia basi in petiolum subaequilongum vel dimidio breviorem cuneatim contracta, superiora alterna breviora ac brevius petiolata, lamina angustius ovata vel lanceolato-elliptica; pedunculi 1–2.5 dm. longi graciles inferne glabrescentes nitiduli infra capitulum striguloso-hispiduli; involucri bracteae 2-seriatae subhomomorphae lanceolato-acuminatae acutae 5–6 mm. longae dorso saturate virides sed striguloseae (apice nonnumquam glabratae) intus glabrae 7-nerviae; receptaculi demum hemisphaerici glabri paleae circa 5 mm. longae oblongo-naviculares submembranaceae 7-nerviae dorso hispidulae, margine hyalina ad apicem utrinque in dentem deltoideam producta; radii (steriles) 10–12, lamina late lanceolato-elliptica apice brevissime 2-dentata 10–11 mm. longa, 4.5–5 mm. lata, aurea nervis fuscis 7 (9) percursa; flosculi interiores 4 mm. longi, tubo 0.4 mm. longo in limbum profunde campanulatum abrupte ampliato; antherae 2.5 mm. longae; styli ramuli 1.5 mm. longi lanceolati; achaenium anguste claviforme subcompressum nec angulatum nec marginatum 2.8–3 mm. longum, 0.7–1 mm. diametro, atrum nitidum multistriolatum glaberrimum pappo destitutum.

UTAH: locally plentiful on gumbo-clay knolls and bluffs, el. 4500 ft., lower Cottonwood Canyon near its confluence with the Pahria River, about 41 road miles southeast of Cannonville, Kane County, June 12, 1966, *R. C. Barneby 14,435*. Holotype, NY; isotypes, CAS, GH, US, UTC.

A detached head of *V. soliceps* would pass easily for *V. annua* (Jones) Blake, such are the similarities in the form and vesture of the involucral bracts, of the receptacular pales, and in the disc- and ray-flowers and the achenes. There seems little doubt therefore that the species is correctly referred to sect. *Heliomeris* (Nutt.) Blake (in Contrib. Gray Herb., new ser. 54: 108, —1918), even though it differs greatly in habit not only

from *V. annua* but also from the allied species mentioned in the diagnosis above. All of these are bushily branched and, when vigorous, much taller plants with leafy stems passing upward into a more or less corymbose or paniculate inflorescence. By contrast the stems (usually three from the root-crown) of *V. soliceps* are simple and very short in proportion to the plant's whole stature, each giving rise to a terminal monocephalous peduncle three to five times as long. Furthermore the leaf-blades, at least of the lower, opposite pairs, are ovate or rhombic-ovate, of much broader outline than in allied species.

So far as I observed, *V. soliceps* was abruptly restricted to a small range of gumbo-clay hills, where it was, however, a dominant herb over an area of several acres. Abundance of individuals within a specialized habitat is often an attribute of rare and local species and it seems likely that *V. soliceps* is another of those Great Basin endemics whose genesis and dispersal are intimately bound up with the clay mounds that are such a curious feature of the sandstone country.

IMPATIENS CAPENSIS IN OREGON: NATIVE OR NATURALIZED?

BY ROBERT ORNDUFF

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Some years ago while I was collecting late-summer plants in the vicinity of Portland, Oregon, I encountered an orange-flowered *Impatiens* that I had not seen before. Subsequently I identified the plants as *I. capensis* Meerb. (= *I. biflora* Walt.), a species native to the central and eastern portions of North America. Recent examination of herbarium specimens reveals that this spotted touch-me-not also occurs in a small area of northwestern Washington and southwestern British Columbia, where it is probably native. Its presence in the Pacific Northwest is generally unacknowledged in regional manuals and it has never been recorded from Oregon.

Additional field trips in Oregon aimed at determining the range of *I. capensis* in the state indicated that it is distributed from the mouth of the Tualatin River, Clackamas County, northward along the Willamette River to its confluence with

the Columbia and slightly northward along the western side of Sauvie Island. Additional plants referable to *I. capensis* were found in a disjunct area along the Columbia in eastern Clatsop County, but these plants occur in mixed colonies with the spurless, unspotted *I. ecalcarata* Blankinship and various hybrid derivatives.

It seems possible that *I. capensis* is not native to northwestern Oregon but has been introduced into the state in relatively recent times. The reasons for this statement are as follows. There are no specimens of *I. capensis* in regional herbaria that were collected in Oregon prior to my own collections of it first made in 1958, despite the fact that the plant is common and conspicuous along the lower Willamette River in a populated area relatively well explored by botanists. It seems unlikely that such a plant would have escaped the attention of collectors in the area, although it must be admitted that the species flowers late in the summer (August and September) when there are few other angiosperms in flower and therefore little reason for collectors to be active. Furthermore, the equally conspicuous and undoubtedly native *I. ecalcarata* was known in Oregon only from the lower Columbia River prior to my collecting it several times along U.S. Highway 101 from Astoria southward well into northern Tillamook County. Perhaps the lack of collections of *I. capensis* in Oregon prior to the last decade is really an indication of non-collection rather than absence of this species before this time.

It is obvious that by the middle 1950's *I. capensis* had already occupied its present small range in Oregon, since the first collection indicating its presence in the state was made by Hotchkiss in 1957 (WTU) along the lower Columbia River. Hotchkiss' plant is not pure *I. capensis,* but one of the spurred, unspotted hybrid segregates of *I. capensis* × *I. ecalcarata* that are common in this area. The following year I collected the species at the other end of its present known range, namely along the Willamette from the vicinity of Oregon City upstream to the mouth of the Tualatin River. Therefore by the middle 1950's *I. capensis* had not only occupied its present range, but it had already participated in interspecific hybridization. These facts indicate that if *I. capensis* was introduced into the area, the introduction must have occurred a number of years before the species was first collected.

TWO MORE DIPLOID SEGREGATES OF THE MONARDELLA VILLOSA COMPLEX

BY CLARE B. HARDHAM
Paso Robles, California

During the last few years a beginning has been made on the task of discovering which variants of the chiefly Californian complex of *Monardella villosa* Benth. are diploids and which belong to the widespread allotetraploid series derived from these diploids. Earlier this year I described as species three diploids that occur in the South Coast Ranges (Leafl. West. Bot. 10: 237–242). Two of these were previously unnamed taxa whose allotetraploid derivatives are widespread in the South Coast Ranges. The hybrid derivatives of the third species, *M. subglabra* (Hoover) Hardham, are, apparently, restricted to ecotones between the habitats occupied by the parental taxa, and this species, therefore, should probably be considered to be rather distantly related to the *M. villosa* complex. In the present paper I shall describe two more diploids, one from the Klamath Mountains of northern California and one from the middle California coast. The first will be proposed as a new diploid species, the second of these has already been named as a species, *M. franciscana* Elmer. The allotetraploid derivatives of both these diploids are widespread.

Monardella siskiyouensis Hardham, spec. nov. Herba perennis; foliis anguste ovatis, circa 2 cm. longis, moderate pubescentibus pilos breves curvatos et stillas olei fere numerosas ferentibus utrinque, supra stillis in lacunis parvis, subtus glanduloso-puberulis; petiolis circa 5 mm. longis; bracteis infimis foliaceis reflexis et foliis prope aequilongis; bracteis mediis in 3 jugis apices magnos foliaceos ferentibus vel raro prope omnino foliaceis; bracteis intimis membranaceis nullis; calycibus circa 8 mm. longis, 11–15-nervosis; $n = 20, 22$.

Leaves narrowly ovate, about 2 cm. long, glandular-puberulent on the lower surface and with a moderate amount of short curved hairs on both surfaces, usually with many oil droplets on both surfaces, the oil droplets on the upper surface in small pits. Petiole about 5 mm. long. Leafy bracts nearly as long as the leaves, reflexed. The middle series of three pairs of bracts with large, reflexed, leafy tips, rarely nearly entirely leafy. No innermost series of membranous bracts. Calyx about 8 mm. long, with 11 to 15 nerves (veins). $N = 20, 22$.

Type in Herb. Calif. Acad. Sci., collected near Happy Camp on road to Sulphur Springs, Siskiyou County, California, August, 1965, *Hardham 13080*.

Chromosome counts from three populations have been made on this species. All three had chromosome counts with

$n = 20$, $n = 22$. Misdivisions were common and tetrads with cells which had 21, 23, and rarely, 19 chromosomes were seen. This nearly glabrous Klamath Mountain endemic may be (probably is) one of the ancestors of those populations of the *M. villosa* complex in the North Coast Ranges which are subglabrous or puberulent and are referred to *M. villosa* ssp. *Sheltonii* (Torr.) Epl.

Morphologically these three populations were not identical. This lack of identity could be due to those factors which operate to make widely separate populations of a taxon dissimilar, but, since sterility barriers in the genus *Monardella* are mainly ecological, it is more likely that the differences between these populations are due to introgressions by other sympatric taxa. *Monardella purpurea* Howell and several forms of *M. odoratissima* Benth. are known to be more or less sympatric with *M. siskiyouensis*. Hybrids between *M. purpurea* and *M. siskiyouensis* have been found along Patrick Creek, Del Norte County, California (*Breedlove*).

Two of the population samples are from Siskiyou County and were found on shale banks in deciduous oak woodland. One of these (the type) came from the foothills of the Marble Mountains on the Sulphur Springs road along the Klamath River south of Happy Camp. The other population from Siskiyou County was collected in the hills a few miles south of the Klamath River on the road from Orleans to Eureka. The third population was in oak-digger pine woodland on serpentine near Dinsmore close to the Humboldt-Trinity county line. Table I gives the main morphological characters of a small sample of each population.

Table I. MONARDELLA SISKIYOUENSIS

	Happy Camp	Orleans	Dinsmore
Calyx-length (mm.)	7	7.8	8.5
tooth-length (mm.)	1.5	1.6	2.0
vein-number	12–13	11–15	12–14
Total corolla-length (mm.)	13.3	15	16.7
Leaf-length (mm.)	16.6[1]	22	20.7
length: width	2.1	2.5	2.3
length: basal width	4.4	5.9	3.3
vein-number	7–8	7	7–8
Outer leafy bract-length (mm.)	10[1]	13.6	14.5
length: width	2.1	2.5	2.0
vein-number	7–8	7	7–8
Sample size	10	5	2

[1] In three individuals the outer pair of leafy bracts was longer than the leaf. In all cases one of the largest leaves was measured.

In most taxa of the *M. villosa* complex there are three sets of bracts in a flower-head. The outer set of bracts consists of two pairs of bracts which are leaf-like in texture except at the base where there is usually a small amount of membranous tissue. These bracts can be distinguished from true leaves by this small, sometimes microscopic, amount of non-leafy tissue and by their broad mid-veins. Leafy bracts may be petioled and/or somewhat distant from the flower-head. The middle series of bracts consists of three pairs of bracts. These are usually membranous, although the outer pair, or all three pairs, may have a leafy tip. The third or inner series of bracts is always translucent-membranous. The number and shape of these inner bracts vary. Usually there are several pairs of ovate bracts and several pairs of lanceolate or linear bracts. *Monardella siskiyouensis* is unique among the members of the *M. villosa* complex which I have studied in that it lacks the third or inner series of bracts. Exceptionally an occasional individual at Dinsmore near the southern limits of the range of the species had one or two linear inner bracts. It is probable that the more xeric population of *M. siskiyouensis* at Dinsmore owes its existence in that habitat as well as its possession of occasional bracts of the inner series to introgression by a tetraploid member of the *M. villosa* complex.

In *M. siskiyouensis* the bracts of the outer series are reflexed and leaf-like. Three of the individuals from the population near Happy Camp which were scored had leafy bracts which were longer than the true leaves. In this species all the bracts of the middle series have reflexed leafy tips. In some individuals especially in the populations from Orleans and Dinsmore, these bracts had hardly any membranous tissue at the base.

The leaves of *M. siskiyouensis* are moderately pubescent on both surfaces with short curved hairs. They are microscopically glandular-puberulent on the lower leaf surface. In addition there are numerous oil droplets, usually on both leaf surfaces, but occasionally only on one. The oil droplets on the upper leaf surface are in small pits. This character recurs in *M. viridis*, a tetraploid from Napa County, California.

Monardella franciscana Elmer is restricted to the coastal summer fog belt from Sonoma County to Monterey County.

Rohlf of the Department of Entomology, University of Kansas.

Although the populations of *M. franciscana* from the San Francisco area typically have 15 calyx-nerves while those from the Santa Lucia Mountains have 13, this is probably not another instance of polymorphism. It is not unusual for the populations of *Monardella* species to differ from each other in number of calyx-nerves. In other genera of *Labiatae* the number of calyx-nerves are implied to be stable within a species and a useful indication as to whether a species is ancestral with calyx-nerves 15, or derived, with calyx-nerves 13 [Scoria, R. W. 1966. The Evolution of the genus Monarda (Labiatae). Evolution 20: 185–190]. In *Monardella* the number of calyx-nerves which is present in a population is probably determined, at least in part, by the calyx-nerve number of those sympatric species with which some hybridization may have occurred. As a result, the species within a given area tend to have the same calyx-nerve number.

Table II is a summary of some of the data which I used for the computor analysis of *M. franciscana*. It shows that it is a variable species characterized by wide-ovate leaves with many lateral veins, large leafy bracts, and short calyces.

Table II. MONARDELLA FRANCISCANA

	Mill Creek	San Bruno Hills and Lake Merced
Calyx-length (mm.)	7.4	8.2
tooth-length (mm.)	1.3	2
vein-number	13 (11–14)	15 (13, 14, 15, 15)
Total corolla-length (mm.)	14.6	14.0
Absolute leaf-length (mm.)	13	19
Leaf-length: width	1.3	1.1
length: basal width	2.4	1.5
vein-number	8	10
Leafy bract-length (mm.)	11.4	24
Leafy bract-length: width	1.7	2.1
vein-number	8	10
Chromosome number	20	22
Camphor	+	0
Sample size	24	4

The following is a revised description of this species:

MONARDELLA FRANCISCANA Elmer. *M. villosa* Benth. var. *franciscana* (Elmer) Jepson. The leaves are widely ovate, about 1–3 cm. long, thin and nearly glabrous to thick and villous, but intermediates are common. Leaf-

pubescence, if present, varies from short to long, but on most individuals it is intermediate. These hairs are usually somewhat angled in the vicinity of the cell walls; they are unbranched unless there has been some introgression from *M. villosa* var. *obispoensis*. The two pairs of petioled reflexed leafy bracts are slightly shorter than the leaves in southern populations and slightly longer than the leaves in northern populations. The length of the petiole of the leafy bracts is very variable. The blades of the leafy bracts have only a small trace of membranous tissue at the base. The next three pairs of bracts (the middle series of bracts) have leafy tips and vary from opaque-membranous to translucent-membranous at the base. There are several pairs of translucent inner bracts which vary in shape from ovate to linear. The calyces are 9 mm. long or less and have 11 to 15 veins.

The differences between the southern and northern populations of this species are undoubtedly due to introgression from geographically sympatric taxa. In the south introgression is predominantly from *M. villosa* var. *obispoensis*, in the north the sympatric taxa have not yet been studied.

Although the type of *Monardella villosa* Benth. was said to have been collected at Bodega Bay ("in portu Bodega") in 1837 by Richard Brinsley Hinds on the voyage of the *Sulphur* (Eastwood, A. "In portu Bodega." 1949. Leafl. West. Bot. 5: 162–167), W. L. Jepson (in a Flora of California, 1943, page 435) states that the type, which he examined at Kew, represents a plant from the interior[2]. His description of the type, as well as his illustration, Fig. 441[3], indicates that *M. villosa* has leaves which are obtuse at the base, rather than truncate or subcordate. This figure, which I take to represent Jepson's concept of *M. villosa*, also shows a plant with large reflexed leafy bracts. From all this it would seem as if *M. villosa* might have been a hybrid between *M. franciscana* and some interior form of the *villosa* complex and that it was probably part of the widespread allotetraploid complex which is found back from the coast in the central California Coast Ranges.

It is interesting, though not in theory unexpected, that the *M. villosa* complex should have several diploid taxa which are ancestral to the widespread and variable allotetraploid complex, and, as one would expect, these diploid taxa are found in habitats with a high frequency of endemic taxa. (Cf. Jepson,

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[2] If the type of *M. villosa* actually had come from Bodega Bay it would undoubtedly have been of good *M. franciscana*. *Monardella* apparently no longer occurs on Bodega Head.

[3] According to Dr. R. Bacigalupi, data in the Jepson Herbarium indicate that this figure is based on *Jepson No. 9969* which was collected at Calistoga, Napa County, June 3, 1923.

Manual of the Flowering Plants of California, pp. 11–14; Stebbins and Major, Ecological Monographs 35: 1–35, –1965.) Two of the diploids, *M. antonina* Hardham and *M. benitensis* Hardham are narrow endemics in xeric habitats on special soils in the South Coast Ranges, while *M. franciscana* and *M. siskiyouensis* are found in two of the larger more mesic endemic areas.

OENANTHE PIMPINELLOIDES L. IN NORTH AMERICA

The genus *Oenanthe,* of *Umbelliferae,* has hitherto been known from North America on the basis of the ubiquitous, semi-aquatic *O. sarmentosa* Presl ex DC. of the Pacific Coast, the rarely collected *O. Pringlei* Coult. & Rose of the high mountains of Oaxaca, southern Mexico, and the European *O. aquatica* (L.) Lam., which reportedly has been introduced in the vicinity of Washington, D.C. The rhizomatous *O. globulosa* L. has been detected several times in Uruguay, South America, where it is adventive from Europe, but I have no record of its occurrence in North America.

Another species of the genus, *O. pimpinelloides* L., is now to be reported as new to North America. The report is perhaps overdue, since there are herbarium specimens going back nearly thirty years, all from the same general locality, in Humboldt County, California. The first collection was apparently made 8.5 miles from Blocksburg on the road to Bridgeville, June 22, 1937, *Eastwood & Howell 4749* (CAS). It was subsequently obtained near Larrabee Creek on the same Blocksburg road, June 23, 1950, *Joseph P. Tracy 18,874* (UC), and August 18, 1950, *19,330* (UC). The species is distinctive by virtue of the enlargement of the marginal petals of its white flowers, its strikingly dimorphic leaves, and the fact that each of its spreading roots bears a swollen tuberous thickening.—LINCOLN CONSTANCE, University of California, Berkeley.

CONCERNING TWO ASIATIC ELMS

BY JOHN THOMAS HOWELL

For several decades two small-leaved Asiatic elms have been widely planted in California along streets, in parks, and about homes. At higher elevations and in interior transmontane valleys where winter temperatures may be quite low, the Siberian elm, *Ulmus pumila* L., is the usual or only one grown, whereas in coastal parts with milder climate the more common one is the Chinese elm, *U. parvifolia* Jacq. Although the weedy propensities of these elms are not so conspicuous as in the English elm, *U. procera* Salisb., nevertheless the two Asiatic elms do reproduce both from seeds and from root-suckers and may become a nuisance if not controlled.

For a number of years I have been noting the occurrence of the Asiatic elms growing without cultivation and believe that both species should now be included in our western floras, at least as adventitious, if not as naturalized. In this opinion Mr. H. M. Pollard concurs, after observing the reproduction of the two species in Santa Barbara and in Ventura County. The distinctive characters of the two trees are described in the following synopsis and the notes that follow list the specimens collected from spontaneous individuals.

Bark nearly smooth and scarcely fissured, shedding in thin irregular plates; trees flowering and fruiting in late summer or autumn; lenticels often numerous and conspicuous; stipules usually narrowly lanceolate and not lobed at base ..... *U. parvifolia*

Bark thick, roughly and deeply fissured, not shedding in plates; trees flowering and fruiting in spring; lenticels usually few; stipules on vigorous shoots usually broad and asymmetrically lobed at base..... *U. pumila*

ULMUS PARVIFOLIA Jacq. Chinese Elm. Native in China, Korea, and Japan. Spontaneous in California as seedlings near planted trees, also weedy as root-suckers.

CALIFORNIA. Trousdale Avenue, Burlingame, San Mateo Co., *Howell 41997;* young elm about 12 ft. tall on fence-line, Fulton St., Oak View, Ventura Co., *Pollard in 1964;* Riverside Road, Oak View, Ventura Co., *Pollard in 1963, in 1964;* San Gabriel Blvd., Pasadena, Los Angeles Co., *Howell 40965*. The following leafy shoots from seedlings probably belong here too: "garden volunteer," Modesto, Stanislaus Co., *M. K. Bracco in 1957;* in railroad ballast between Oak Park and Las Positas Road, Santa Barbara, Santa Barbara Co., *Pollard in 1956.*

ULMUS PUMILA L. Siberian Elm. Native in Siberia, Turkestan, and China. Spontaneous as seedlings and root-suckers near planted trees and as seedlings quite distant from parent trees.

ARIZONA. Garden weed, Kingman, Mohave Co., *Howell 26330.*

CALIFORNIA. Markleeville, Alpine Co., *Howell 40927;* Bishop, Inyo Co., *Howell 33624;* Lone Pine, Inyo Co., *Howell 37090;* Roads End, Tulare Co., *Howell & True 41603;* roadside near Kernville, Kern Co., *Howell 38917;* garden weed, Mojave, Kern Co., *Howell 26645, 40967;* garden weed, Rosamond, Kern Co., *Howell 40966;* reproducing freely by root-suckers, Ojai, Ventura Co., *Pollard in 1963, in 1965.*

NEVADA. Waste ground along highway, 3 miles south of Reno, Washoe Co., *Howell 37929.*

A NEW SPECIES OF ARCTOSTAPHYLOS FROM GLENN COUNTY, CALIFORNIA

BY ROMAN GANKIN
University of California, Davis

Arctostaphylos Roofii Gankin, spec. nov. Frutex erectus 1–3 m. altus, caudiciferus; cortice laevi, ramulis leviter et appresse pubescentibus; foliis viridibus, plerumque ellipticis vel lanceolatis, 2–4 cm. longis, 1–2 cm. latis, mucronatis, basi cuneatis vel obtusis, coriaceis, tenuiter pubescentibus, stomatibus aequaliter utrinque distributis, petiolis 0.5–1.5 cm. longis; inflorescentiis reflexis, ramosis, interdum usque ad 5-ramosis, appresse pubescentibus; bracteis deltoideis, inferioribus acuminatis et 3–5 mm. longis; pedicellis glabris, 4–10 mm. longis; calyce ciliato, 2 mm. longo; corolla 4–6 mm. longa, alba; stigmate saepe exserto et 1–2 mm. quam corolla longiore; ovario pubescenti usque ad glabro, nonnumquam glandulifero; fructu depresse globoso, 8–12 mm. diametro, sparse pubescenti; nuculis discretis vel plus minusve connatis.

Erect shrub with basal burl, 1–3 m. high, 2–4 m. broad. Bark smooth, chocolate-brown; branchlets pale green with a light adpressed pubescence. Leaves yellow-green to bright green, variable in shape, mostly elliptic to lanceolate, somewhat thick, coriaceous, very finely pubescent and with stomata equally distributed on both surfaces, mucronate, the bases mostly cuneate or obtuse; blades 2–4 cm. long, 1–2 cm. wide; petioles 0.5–1.5 cm. long. Inflorescence branched, occasionally as much as 5-branched, adpressed-pubescent, reflexed; bracts short, deltoid, the lower acuminate, 3–5 mm. long; pedicels glabrous, 4–10 mm. long. Calyx whitish, ciliate, 2 mm. long. Corolla urceolate, 4–6 mm. long, white, lobes recurved. Stigma capitate, often exserted 1–2 mm. beyond the orifice of the corolla; ovary variously pubescent to glabrous, sometimes glandular; fruit light brown at maturity, pulpy, depressed-globose, 8–12 mm. across, sparsely pubescent; nutlets separable or variously united. Flowering time, early April.

Type: *Gankin 733* (flowers, Apr. 6, 1966) and *Gankin 838* (fruit, June 23, 1966) collected from same shrub, on Hull Road 11.5 miles northwest of its junction with Road 306, Glenn County, California. Holotype in Botany Department Herbarium, University of California, Davis; isotypes to be distributed.

This species of western Glenn County occurs at elevations from about 3200 to 4300 feet along Hull Road from near Doe

Peak to the junction of Hardin Hole Ridge Road all in the vicinity of the head of Grindstone Canyon. Throughout this region of the Mendocino National Forest which has been mapped by the Soil and Vegetation Survey of California (1957), *Arctostaphylos glandulosa* Eastw. has been entered on the survey maps and most of those portions marked Agl (symbol for *A. glandulosa*) in this region are quite likely *A. Roofii* sites[1]. The type locality is an area just to the east and below Hull Road at the junction of Hardin Hole Ridge Road, Glenn County, at an elevation of 4224 feet above sea level (Sec. 21, T. 22 N., R. 7 W.). The soils of this area are of the Maymen series, are of the shallow phase overlying metamorphosed sandstone (schistose shale), and are slightly acid and a gravelly loam in texture. *Arctostaphylos Roofii* is sometimes the dominant cover in a given area, but it is also associated with other dominant vegetation types. It is most commonly found with *Quercus chrysolepis* Liebm., *Q. Wislizeni* A. DC. (shrub form), *Pinus attenuata* Lemmon, *Garrya Congdonii* Eastw., *Arctostaphylos canescens* Eastw., *A. elegans* Jeps., *Adenostoma fasciculatum* H. & A., *Cercocarpus betuloides* Nutt. ex T. & G., and *Pseudotsuga Menziesii* (Mirb.) Franco.

This species was first seen by the author and W. R. Hildreth, of the Arboretum staff, on March 17, 1966, and was initially considered a hybrid between either *A. elegans* or *A. Manzanita* Parry and *A. patula* Greene, which indeed may be its origin. The variability of the indument on the ovary and the shape of the leaves clearly indicate a heterozygous condition. However the large size of the colonies and the relatively homogeneous nature of the populations in other respects lead one to suspect that even if this species is of hybrid origin, fixation and stabilization has taken place to set it off morphologically from its supposed parents. The hybrid origin of manzanita species seems to be a fairly common occurrence, as appears to be the case in *A. Edmundsii* J. T. Howell (Lens 1963), *A. Mewukka* Merriam (McMinn 1939: 401–403), *A. glutinosa* Schreib. (Stebbins, oral communication), and *A. parvifolia* Howell (Munz 1959: 425), to name a few.

Arctostaphylos Roofii is one of the most handsome of the crown-sprouting manzanitas, having a very distinctive nascent inflorescence which has a dark reddish color that contrasts

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[1] There have been recent reports by Soil and Vegetation Survey personnel of a manzanita resembling *A. Roofii* near Cohasset in northern Butte County.

BEITRÄGE ZUR KENNTNIS VON RUMEX XVI: LECTOTYPES FOR CERTAIN NORTH AMERICAN TAXA OF RUMEX

BY K. H. RECHINGER, FIL.
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It has appeared desirable to indicate types for the various taxa of North American *Rumices* that I have named as new. Since all of these are figured in my monograph, the North American Species of Rumex (Field Museum of Natural History, Botanical Series, Vol. XVII, No. 1, pages 1–151, figures 1–25,—1937), I propose to designate as lectotypes those particular specimens that served as the basis for the illustrations in that work. The taxa are listed below with pertinent literature references, citation of the proposed lectotypes, and symbols for the herbaria in which the specimens are deposited.

RUMEX CALIFORNICUS Rech. f., Fedde Repert. Sp. Nov. 40: 297 (1936).
Figure. Field Mus. Bot. 17: 87 (1937), fig. 18.
Type. *D. Demaree 10514,* Sunol, Niles Canyon, Alameda County, California (MO).

RUMEX CRASSUS Rech. f., Fedde Repert. Sp. Nov. 40: 295 (1936).
Figure. Field Mus. Bot. 17: 81 (1937), fig. 16.
Type. *Skottsberg s.n.,* San Mateo County, California (UPS).

RUMEX FLEXICAULIS Rech. f., Fedde Repert. Sp. Nov. 39: 172 (1936).
Figure. Field Mus. Bot. 17: 135 (1937), fig. 24.
Holotype. *Schmitz s.n.,* Mexico (W), lost.
Lectotype. *Bourgeau 200,* près Mexico, Mexico (K).

RUMEX FUEGINUS Philippi
Var. BRACHYTHRIX Rech. f., Field Mus. Bot. 17: 143 (1937).
Figure. L.c., p. 111, fig. 22/d.
Type. *Butler 1877,* Butte Valley, Siskiyou County, California (US).
Var. OVATO-CORDATUS Rech. f., Field Mus. Bot. 17: 143 (1937).
Figure. L.c., p. 111, fig. 22/e.
Type. *B. Davy 7804,* Oxnard, Ventura County, California (UC).
Var. TANYTHRIX Rech. f., Field Mus. Bot. 17: 143 (1937).
Figure. L.c., p. 111, fig. 22/f.
Type. *Sheldon 8718,* "The Meadows," Wallowa County, Oregon (US).

RUMEX ORTHONEURUS Rech. f., Fedde Repert. Sp. Nov. 40: 294 (1936).
Figure. Field Mus. Bot. 17: 97 (1937), fig. 19.
Type. *Blumer 1449,* Chiricahua Mts., Arizona (NY).

RUMEX PAUCIFOLIUS Nutt. var. GRACILESCENS Rech. f., Field Mus. Bot. 17: 27 (1937).
Figure. L.c., p. 25, fig 1/b.
Type. *Hall & Babcock 5456,* Volcano Creek, Tulare County, California (UC).

RUMEX PYCNANTHUS Rech. f., Fedde Repert. Sp. Nov. 38: 372 (1935).
Rumex subalpinus Jones, Proc. Calif. Acad., ser. 2, 5: 720 (1895); non *Rumex subalpinus* (Schur) Simonkai (1886).
Type collection. *Jones 5957*, Brigham Peak, Marysvale, Utah (UC).

RUMEX TRANSITORIUS Rech. f., Fedde Repert. Sp. Nov. 40: 296 (1936).
Figure. Field Mus. Bot. 17: 69 (1937), fig. 12.
Type. *Tracy 1157*, vicinity of Eureka, Humboldt County, California (UC).

RUMEX TRIANGULIVALVIS (Danser) Rech. f., Fedde Repert. Sp. Nov. 40: 297 (1936).
Figure. Field Mus. Bot. 17: 59 (1937), fig. 10.
Rumex salicifolius Weinm. ssp. *triangulivalvis* Danser, Nederl. Kruidk. Archief 1925: 415 (1926), with fig.
Type. As the species is based on the above-mentioned subspecies by Danser and as he indicates no type specimen nor the origin of the specimen figured by him, the specimen figured by me can be taken as a lectotype: *Lunell s.n.*, Butte, Benson County, North Dakota (S).

RUMEX UTAHENSIS Rech. f., Fedde Repert. Sp. Nov. 40: 298 (1936).
Figure. Field Mus. Bot. 17: 77 (1937), fig. 15.
Type. *Jones 5603j*, Prince Canyon at Kyune, Utah (US).

RUMEX VIOLASCENS Rech. f., Fedde Repert. Sp. Nov. 39: 171 (1936).
Figure. Field Mus. Bot. 17: 133 (1937), fig. 23.
Type. *Parry, Bigelow, Wright & Schott 1173*, Valley of Rio Grande, New Mexico (US).

TRIENTALIS ARCTICA, A MEMBER OF CALIFORNIA'S FLORA. A recently mounted specimen in the Jepson Herbarium validates the occurrence of *Trientalis arctica* Fisch. ex Hook. in California. This species, which has been known to occur as far south as Curry County, Oregon, may now be recorded from adjacent Del Norte County, California, where it was collected by Ruby Van Deventer *(No. 89)*, May 30, 1939, in Bower's Swamp, about a mile southeast of Crescent City.—R. BACIGALUPI, Jepson Herbarium, University of California, Berkeley.

AVAILABILITY OF THE J. W. BLANKINSHIP HERBARIUM. The herbarium of the late J. W. Blankinship, formerly Professor of Botany at Montana State College at Bozeman and long a resident of Lake County, California, has been incorporated into the Milo S. Baker North Coast Counties Herbarium at Santa Rosa Junior College. Containing a rich collection of Lake County plants, it was presented by the Lake County Library which had had its custody.—R. BACIGALUPI, Berkeley.

NOTES ON ERIOGONUM—I

BY JAMES L. REVEAL
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Recent studies at the New York Botanical Garden and the U.S. National Herbarium have shown a number of problems centering around the misapplication of names because of the little or no regard to types. One such example is that of *Eriogonum nodosum* described by J. K. Small (Bull. Torr. Bot. Club 25: 49, —1898) from a series of specimens collected by Orcutt at Dos Cabesas near Coyote Wells, San Diego Co., California. Specimens of *E. nodosum* have been called *E. Wrightii,* but the name *E. nodosum* has been generally applied to a different species, *E. Kearneyi.* It seems best to continue to associate those specimens which are *E. nodosum* with *E. Wrightii,* and thus the name **E. Wrightii** Torr. ex Benth. in DC. var. **nodosum** (Small) Reveal, stat. & comb. nov., is proposed. The var. *nodosum* which is found in extreme southern California and adjacent northern Baja California differs from var. *membranaceum* S. Stokes ex Jeps. in lacking the distinctly clasping, membranaceous petiole bases, and may be separated from **E. Wrightii** var. **Pringlei** (Coult. & Fish.) Reveal, stat. & comb. nov. (based on *E. Pringlei* Coult. & Fish., Bot. Gaz. 17: 351, —1892) by its larger flowers (2–3 mm. long) and fewer branches. The var. *Pringlei* which has flowers 1–1.5 mm. long and several, divaricate, erect branches, occurs only in southern Arizona.

The concept of *E. nodosum* has, at least mainly in California, been applied to ssp. *monoense* S. Stokes (described in Leafl. West. Bot. 3: 201, —1943). This taxon seems better treated as **E. Kearneyi** Tidest. var. **monoense** (S. Stokes) Reveal, stat. & comb. nov. The var. *Kearneyi* ranges from western Utah and adjacent northwestern Arizona westward across central Nevada to Washoe Co., and enters California in the Mono Lake Basin. The var. *monoense* extends southward from the Sierra Nevada above Owens Valley to the San Bernardino Mountains, and differs in its longer, more clustered involucres and in the larger, more robust habit of the plants.

While preparing the *Eriogonum* treatment for the White Mountain Flora, it was again necessary to investigate the rela-

Calyx gamosepalous, somewhat swollen at base below each lobe, enclosing the base of the corolla-tube, its lobes triangular-ovate with long-attenuate, recurved tips, one to two times as long as the tube. Corolla-lobes papillate, triangular-ovate, dorsally convex, bow-shaped in side view, with long-attenuate, recurved tips, about as long as the long-campanulate to somewhat urceolate tube. Stamens with very large (0.5–0.7 mm. long), ovate anthers on very short (to half as long as the anthers) filaments. Infrastaminal scales oblong-ovate, reaching to well above the middle of the corolla-tube, fringed with long processes. Stigmas capitate, brown; styles distinct, slender, from one-fourth to nearly as long as the capsule, usually somewhat unequal in length; ovary subglobose. Capsule globose, sometimes slightly flattened at top, about 1.5 mm. in diameter, not circumscissile, with seeds shining through the very thin, transparent wall, carrying the withered corolla at the top. Seeds orange, 1 to 4 in a capsule, their shape globose, hemispheric, or constituting roughly one-third or one-fourth of a sphere, depending on whether one, two, three, or four seeds are present in a capsule, 1–1.5 mm. long.

Type: Herb. Calif. Acad. Sci. No. 461,824, from Boggs Lake, Lake County, California, August 20, 1966, *Rubtzoff 5792* (collected with Paul H. Arnaud, Jr.). Numerous duplicates to be distributed. An earlier collection, *Rubtzoff 2813*, was made at the same locality on September 2, 1956. Named for John Thomas Howell, Curator of Botany at the California Academy of Sciences.

Cuscuta Howelliana is known only from the margin of Boggs Lake which is flooded in winter, boggy in spring, and more or less dries out in the course of the summer. It was found to be parasitic principally on *Eryngium aristulatum*, but to some extent also on a few other plants growing nearby, as on *Polygonum Kelloggii, Boisduvalia glabella,* and *Navarretia plieantha.* The flowers of *C. Howelliana* were found to be confined almost entirely to the inflorescences of *E. aristulatum,* which makes the dodder inconspicuous in the field, especially after its stems have disappeared later in the season.

Of the California dodders, *C. Howelliana* resembles somewhat *C. Suksdorfii* Yuncker var. *subpedicellata* Yuncker. It is similar to that variety in the small size of flowers and fruits and in the very slender stems, but it is even more delicate. It also resembles the variety in having subsessile, 4-merous flowers, and, furthermore, in the general shape of the calyx- and corolla-lobes, the shape of the capsule, and the number, shape, and color of seeds. It differs from *C. Suksdorfii* var. *subpedicellata* in the more slender corolla-tube, the apically

recurved calyx-lobes, the papillate, bow-shaped, and apically recurved corolla-lobes, the larger anthers on relatively much shorter filaments, the well-developed infrastamineal scales, the usually longer styles, and the apical position of the withered corolla on the capsule.

The separate styles and globose stigmas place *C. Howelliana* in the subgenus *Grammica,* and the capsule which does not open by circumscission places it in the section *Cleistogrammica* (Yuncker 1932, 1965). I cannot decide, though, in which subsection to place the plant. By the shape of the capsule, which is globose or slightly flattened at the top in some instances, the plant keys to the subsection *Acutae.* As pointed out above, however, the plant is similar in some characters to *C. Suksdorfii* (especially to its var. *subpedicellata*) which its author puts in the subsection *Subinclusae* (Yuncker 1932, 1965). Although that subsection is in the group of subsections with ovoid, conic, or beaked capsules (Yuncker 1932, 1965), *C. Suksdorfii* var. *subpedicellata* has the capsule "globose or depressed globose" (Yuncker 1935, 1965), just as it is in *C. Howelliana.*

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MISCELLANEOUS NEW NAMES FOR CALIFORNIA PLANTS

BY ROBERT F. HOOVER

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PINUS MURICATA D. Don f. MURICATA. Jepson in the Silva of California quotes Don as stating that the species was "found by Dr. Coulter at San Luis Obispo . . . at an elevation of 3000 feet above the sea." Although the highest summits of the San Luis Range reach only about 1800 feet, there can be no doubt that Coulter's specimen came from that range. Even in the region of its type locality, the species is highly variable in its cones. Such variation has been noticed in

various stands of the trees. One illustrative example will suffice.

On the sandy slope south of Los Osos (south side of Morro Bay) is a tiny grove of perhaps twenty full-grown pines. Some of these trees bear cones of the typical *P. muricata* type, others correspond to *P. remorata* Mason, and the remainder are intermediate. All are identical in vegetative features. Individual cones on some of the trees show considerable variation among themselves. The argument that this one small grove includes more than one species of pine is, in the circumstances, wholly unacceptable. In view of the facts that the trees differ from one another only in their cones and that the cone character is often not constant even on a single tree, the proximity of relationship is such that the taxonomic category of "forma" seems appropriate. Therefore I propose that the trees bearing *remorata*-type cones be called **P. muricata** f. **remorata** (Mason) Hoover, comb. nov. *P. remorata* Mason, Madroño 2: 9 (1930).

FESTUCA MICROSTACHYS Nutt. Under this name, chosen because it was first published, I place three groups of plants as varieties, believing that their relationships are too close to warrant higher taxonomic rank. They differ as follows.

Pedicels of spikelets appressed or ascending, the main panicle-branches divergent.....var. *ciliata* Gray

Pedicels divergent to reflexed at maturity.

Spikelets 1- to 3-flowered.....var. *microstachys*

Spikelets mostly 3- to 6-flowered (except in drought-dwarfed plants) ..... var. *simulans*

The "species" of annual *Festuca* which have been differentiated solely on the basis of pubescence are often found mingled together in such a way as to indicate complete interfertility and very small genetic differences. There is complete intergradation between var. *microstachys* and var. *ciliata,* although var. *ciliata* often occurs where the other is absent.

Festuca microstachys var. **simulans** (Hoover) Hoover, comb. nov. *F. pacifica* Piper var. *simulans* Hoover, Madroño 3: 228 (1936). This is the only variety of *F. microstachys* which has much geographic significance. The other two varieties are widespread over western North America, but var. *simulans* is restricted mainly to the hills and plains on the west side of the San Joaquin Valley in California, extending eastward across the valley in Kern Co. and westward into interior San Luis Obispo Co. Just as in the other two varieties, the

subsecundum Link, Hort. Berol. 2: 190 (1833). San Luis Obispo County plants which I am including under this name are doubtfully distinct from *E. laevis,* though having markedly shorter spikes and smaller spikelets. Their appearance also suggests a starved form of *E. glaucus,* from which they differ in having spikelets solitary at all the nodes of the spike.

Elymus trachycaulus (Link) Hoover, comb. nov. *Triticum trachycaulum* Link, Hort. Berol. 2: 189 (1833). *E. pauciflorus* (Schwein.) Gould (1947), not Lam. (1791).

Stipa miliacea (L.) Hoover, comb. nov. *Agrostis miliacea* L., Sp. Pl. 61 (1753). *Oryzopsis miliacea* (L.) B. & H. This European weed seems wholly unlike the native species of *Stipa;* yet there are other species, both European and American, which bridge the gap completely. Quite apart from the significant fact that several natural and artificial hybrids between *Stipa* and *"Oryzopsis"* are known, the separation of a group of species as the "genus" *Oryzopsis* does violence to the relationships of the plants. The key-characters which are conventionally used to separate the two genera simply do not hold when applied to all the species. To cite but one example from the Sierra Nevada, the close relationship between *Stipa Webberi* (referred to *Oryzopsis*) and *S. pinetorum* is obvious to anyone who knows them in their native habitat, as expressed by Professor B. L. Johnson (Bot. Gaz. 107: 25, —1945).

Juncus dubius Engelm. f. **rugulosus** (Engelm.) Hoover, comb. nov. *J. rugulosus* Engelm., Bot. Gaz. 6: 224 (1881). *Juncus rugulosus* has been attributed to San Luis Obispo Co., apparently first by Coville (in Abrams, Ill. Fl. Pac. St. 1: 365). Extensive but fruitless search has been made in an effort to confirm this record, although *J. rugulosus* has been collected in both Monterey Co. and Santa Barbara Co. On the other hand, *J. dubius* (identification confirmed by F. J. Hermann) is quite common in the upper Salinas River watershed. The replacement of *J. rugulosus* in the middle of its range by *J. dubius,* which differs in no respect except its lack of microscopic transverse epidermal ridges, leads one to believe that a biologically realistic classification would include the two in the same species. The trivial nature of the difference between them is expressed by the use of forma rather than subspecies or variety.

Juncus **xiphioides** E. Meyer var. **glomeratus** (Engelm.) Hoover, comb. nov. *J. phaeocephalus* var. *glomeratus* Engelm., Trans. St. Louis Acad. 2: 484 (1868). *J. phaeocephalus* Engelm., l. c. Monterey is the type locality of both *J. xiphioides* and *J. phaeocephalus*. The two intergrade completely, intermediate plants probably being more numerous than the extreme form of var. *glomeratus*. Whereas var. *glomeratus* occurs only near the coast, var. *xiphioides* extends far into the interior of California. I believe that *J. phaeocephalus* var. *paniculatus* Engelm. should be considered a synonym of var. *xiphioides*. Plants referred to that name by botanists include all gradations from specimens entirely typical of *J. xiphioides* to specimens which closely approach var. *glomeratus*.

Mariposa Palmeri (Wats.) Hoover, comb. nov. *Calochortus Palmeri* Wats., Proc. Am. Acad. 14: 266 (1879). Since separating *Mariposa* from *Calochortus* as a genus (Leafl. West. Bot. 4: 1–4, —1943), I have encountered no evidence for classifying the plants differently. Rather, my study of the mariposas has reinforced my opinion as to their distinctness. Because I am opposed on principle to routine changes of names without study of the plants involved, I published only a limited number of combinations under the genus *Mariposa*. Subsequently I have become acquainted with *M. Palmeri* in the field and determined it to be a valid species of *Mariposa*.

Cyclobothra Weedii (Wood) Hoover, comb. nov. *Calochortus Weedii* Wood, Proc. Acad. Philad. 20: 169 (1868). The group including this species is quite as distinct from true *Calochortus* as *Mariposa* is, and there is far better reason for placing it in a different genus than, for example, the segregation of some of the trivial and intergrading genera recognized by authorities on the *Gramineae*. Following the opinion of Ownbey as to its nearest relationships (Ann. Mo. Bot. Gard. 27: 515), I here place *C. Weedii* and its near relatives in the largely Mexican genus *Cyclobothra*.

Cyclobothra Plummerae (Greene) Hoover, comb. nov. *Calochortus Plummerae* Greene, Pitt. 2: 70 (1890).

Cyclobothra vesta (Purdy) Hoover, comb. nov. *Calochortus Weedii* Wood var. *vestus* Purdy, Proc. Cal. Acad., Ser. III, Bot. 2: 133 (1901). This remarkable endemic of the Santa Ynez Mountains is geographically separated from *C. Weedii*

by the area of *C. Plummerae* and, as evidenced by comparison of fresh flowers in the field and in the garden, differs more from genuine *C. Weedii* than *C. Plummerae* does. A noteworthy feature of this species is its late flowering season. The flowers do not begin to open until late in July, and in cultivation may continue through September. No recent collector has confirmed the record of a collection from the Santa Lucia Range (Ann. Mo. Bot. Gard. 27: 519), and an error is suspected.

Cyclobothra obispoensis (Lemmon) Hoover, comb. nov. *Calochortus obispoensis* Lemmon, Bot. Gaz. 11: 180 (1886).

Lithocarpus densiflorus (H. & A.) Rehder var. **parvus** Hoover, var. nov. Frutex (vel arbor parva); laminis foliorum serratis vel crenatis, plerumque 3–4 cm. longis, petiolis 2–5 mm. longis.

Shrub (or small tree); leaf-blades serrate or crenate, mostly 3–4 cm. long, petioles 2–5 mm. long.

North-facing slope above and south of Coon Creek, San Luis Obispo Co., *John V. Stechman* in 1965 (type: "this specimen from shrubby forms up to 8 feet high; no trees observed"); summit of Mt. Tranquillon, Santa Barbara Co., *C. H. Muller 10,429* ("trees to 1.5 × 45 ft. forming dense groves").

These plants are excluded from var. *echinoides,* which they otherwise resemble, by their conspicuously toothed leaf-margins. As the tan-oak approaches the southern limit of its distribution, reduced shrubby individuals become increasingly prevalent. The two specimens cited, especially in their short petioles, represent an extreme of variation which is not matched at other localities.

Lastarriaea coriacea (Goodman) Hoover, comb. nov. *Chorizanthe coriacea* Goodman, Leafl. West. Bot. 3: 230 (1943). *Lastarriaea* seems to me to differ as much from the bulk of *Chorizanthe* as do *Mucronea* and *Centrostegia,* both of which Goodman (I believe correctly) keeps as distinct genera.

Chorizanthe diffusa Benth. var. **nivea** (Curran) Hoover, comb. nov. *C. pungens* Benth. var. *nivea* Curran, Bull. Cal. Acad. 1: 274 (1885). *C. nivea* Jepson. Characterized by broad showy white margins on the involucral teeth, this variety is prevalent in the southern part of the range of the species. The type locality was given as "mountains near San Luis Obispo." From what is now known of the plant's occurrence, the "mountains" in question must have been the hills on the south side of

original description Mrs. Sharsmith stated that "their colonies do not intermingle."

Stylomecon heterophylla (Benth.) G. Taylor var. **micropetala** Hoover, var. nov. Petalis fugaciis, 5–13 mm. longis.

Petals fugacious, 5–13 mm. long.

Type: Kettleman Hills, 3.4 miles south of State Highway 41, Kings Co., *D. E. Breedlove 2010* (CAS No. 436726).

This variety occurs through the inner South Coast Ranges, in coastal southern California, and in Baja California. It is unknown in the North Coast Ranges, coastal central California, and the Sierra Nevada foothills. Large-flowered *S. heterophylla,* by contrast, extends from coastal southern California into the southern Sierra Nevada foothills and reappears in a disjunct area of the Coast Ranges from Lake Co. to Contra Costa and San Mateo counties; it is absent from the inner South Coast Ranges. Under the original description of *Meconopsis heterophylla* and *M. crassifolia,* Bentham stated that "the flowers of both are of an orange red, about the size of those of *Papaver Argemone.*" Therefore both of Bentham's names apply to the large-flowered form (*i.e.,* var. *heterophylla*), and var. *micropetala* has remained unrecognized until now.

Streptanthus anceps (Payson) Hoover, comb. nov. *Caulanthus anceps* Payson, Ann. Mo. Bot. Gard. 9: 303 (1923). *Thelypodium Lemmonii* Greene, not *Streptanthus Lemmonii* Jepson. Attempts to identify certain *Cruciferae* from current floras lead only to frustration and force one to the conclusion that Jepson was entirely correct in including certain species of "*Caulanthus*" in *Streptanthus* (Fl. Cal. 2: 21). It is equally clear that all of the species included by authors (notably Payson) in *Caulanthus* are so closely related to one another that no useful purpose is served by transferring only a few of them (on what seems to be a completely arbitrary basis) to *Thelypodium*. Because *Caulanthus* as defined by Payson is a logical and coherent group, and because it is separable by no feature whatever from *Streptanthus,* the biologic facts call for merging the whole group with *Streptanthus.*

Streptanthus lasiophyllus (H. & A.) Hoover, comb. nov. *Turritis lasiophylla* H. & A., Bot. Beechey 321 (1841). *Thelypodium lasiophyllum* Greene. Small plants of this species can hardly be distinguished from pale-flowered and dwarfed specimens

of *Streptanthus heterophyllus*. The relationship between the two species is obviously very close.

Streptanthus lasiophyllus (H. & A.) Hoover var. **inalienus** (Rob.) Hoover, comb. nov. *Thelypodium lasiophyllum* var. *inalienum* Rob. in Gray, Syn. Fl. 1[1]: 177 (1895).

Streptanthus rigidus (Greene) Hoover, comb. nov. *Thelypodium rigidum* Greene, Pitt. 1: 62 (1887). *T. lasiophyllum* var. *rigidum* Rob. The plants are quite different in appearance from *S. lasiophyllus* when they occur in the same locality. Fresh flowers of the two need to be carefully compared to make their differentiation more convincing.

Lepidium Jaredii Bdg. subsp. **album** Hoover, subsp. nov. Petalis albis. Type: Arroyo Hondo wash north of Cantua Creek, Fresno Co., *Hoover 4243* (UC). Other records are as follows: FRESNO CO.: Little Panoche wash, *Hoover 419* in 1935; mouth of Big Panoche canyon, *Hoover 4787* in 1941; Arroyo Hondo wash, *Hoover 1877* in 1937. SAN BENITO CO.: roadside in heavy soil, 6 miles south of Peralta School, between Panoche and Idria, *Wiggins & Rollins 18*. On the average, the plants are larger than in yellow-flowered *L. Jaredii* of Carrizo Plain, with taller and stouter stems, but the color of the petals is the only constant difference.

Typical *L. Jaredii* is a strictly localized endemic of Carrizo Plain south of Soda Lake, San Luis Obispo Co. The flowers are uniformly light yellow and the plants locally plentiful enough to color the landscape at flowering time. In western Fresno Co. there have been found similar plants with white petals. This color difference led Jepson to believe that the original description of *L. Jaredii* was in error. Because the two are closely related but distinct and geographically separated, "subspecies" seems the most appropriate category for classifying them.

Ribes **Menziesii** Pursh f. **Victoris** (Greene) Hoover, comb. nov. *R. Victoris* Greene, Pitt. 1: 224 (1888). This form with pale green rather than deep purple calyx grew with typical *R. Menziesii* in Sycamore Canyon, San Luis Range, San Luis Obispo Co. (*6609*). Finding this variant at the southern end of the range of the species takes away the geographic significance which it previously seemed to have.

POTENTILLA KELLOGGII (Greene) Greene. *P. Lindleyi* Greene var. *sericea* (Gray) J. T. Howell. *Potentilla Lindleyi* (a renaming of *Horkelia cuneata* Lindl.) and *P. Kelloggii* were published on the same page (Pitt. 1: 101, —Nov. 8, 1887). How-

ever, *P. Kelloggii* was based on the earlier *Horkelia Kelloggii* Greene (Bull. Cal. Acad. 2: 416, —May 28, 1887). Thus "*Kelloggii*" is the earliest specific epithet available in *Potentilla*. Various species of *Horkelia* seem so closely related to species which contemporary authors retain in *Potentilla* that attempts to segregate them generically are unprofitable. The two following names are therefore in order.

Potentilla Kelloggii (Greene) Greene var. **cuneata** (Lindl.) Hoover, comb. nov. *Horkelia cuneata* Lindl., Bot. Reg. 23: under pl. 1997 (1837). *H. californica* var. *cuneata* Gray, Proc. Am. Acad. 6: 529 (1865). *P. Lindleyi* Greene.

Potentilla Kelloggii (Greene) Greene var. **puberula** (Greene) Hoover, comb. nov. *P. puberula* Greene, Pitt. 1: 102. 1887.

Rosa spithamea Wats. f. **pinetorum** (Heller) Hoover, comb. nov. *R. pinetorum* Heller, Muhl. 1: 53 (1904). This form differs strikingly from typical *R. spithamea* in the absence of stalked glands on the receptacle, but the genetic difference between them must be very slight. At Los Osos, San Luis Obispo Co., the plants constituted a uniform population, identical in all respects except that some had the receptacle entirely devoid of glands while others showed sparse to dense glands. The same sort of variation can be found elsewhere. The "*pinetorum*" form has also been found at Cambria. The presence of this form in San Luis Obispo Co. makes the geographic distribution of *R. pinetorum* coextensive with that of typical *R. spithamea*. Inspection of specimens reveals no basis for separating *R. sonomensis* Greene even as a variety.

Prunus punctata (Jepson) Hoover, comb. nov. *P. fasciculata* (Torr.) Gray var. *punctata* Jepson, Fl. Cal. 2: 230 (1936). This low-growing coastal shrub is sufficiently distinct from the taller "desert almond" and is well separated from it geographically. The glabrous leaves of *P. punctata* constitute the most obvious diagnostic feature. The petals of the coastal plant are probably shorter and broader, but fresh flowers of *P. fasciculata* from various desert localities should be compared before a confident statement to that effect is made.

Lotus Biolettii Greene var. **spiralis** Hoover, var. nov. Umbellis subsessilibus vel pedunculis non longioribus quam 5 mm.; bractea nulla; rostro siliquae in circulum torto.

Umbels subsessile or with a peduncle less than 5 mm. long (except in intergrades to var. *Biolettii*), never with a bract; beak of pod coiled into at least a complete circle.

Lotus scoparius (Nutt.) Ottley var. **perplexans** Hoover, var. nov. A var. *scopario* differt: caulibus decumbentibus vel procumbentibus; umbellis pedunculatis.

Stems decumbent or procumbent; umbels peduncled; otherwise similar to many plants which are included in var. *scoparius*. The calyx-teeth in Monterey Co. plants of this variety are long and flexible and tend to curve outward, but this is not a differentiating character, as it sometimes is seen in var. *scoparius* (*e.g.*, Oak Park district, San Luis Obispo Co., *Hoover 6199*).

Type: hill just north of Malpaso Creek, Monterey Co., trailing over road-bank, *Hoover 9486*.

Other representative collections. SONOMA Co.: Timber Cove, *Hoover 9288, 9289;* Fort Ross, *Heller 6597* (leaflets abnormally large, as if growing under moist conditions). SAN FRANCISCO Co.: sandy lot along car track from car barns at 37th Avenue, *McMinn 308* (many of umbels sessile, thus intermediate toward var. *scoparius*). SAN MATEO Co.: Devil's Slide, *Hoover 9290*. MONTEREY Co.: Pacific Grove, *Heller 6643;* mouth of Little Sur River, *Hoover 9203*.

Lotus scoparius (Nutt.) Ottley var. **scoparius** forma **prostratus** Hoover, f. nov. Caulibus prostratis.

Stems prostrate, mat-forming, radiating from the tap-root; otherwise like typical *L. scoparius*.

Type: Marina Beach, Monterey Co., on dunes, *Hoover 9302*. This is a widespread coastal form of the species.

Lupinus albifrons Benth. var. **Abramsii** (C. P. Smith) Hoover, comb. nov. *L. Abramsii* C. P. Smith, Bull. Torr. Bot. Club 51: 308 (1924). These plants are marked by having the hairs on the leaflets wavy rather than straight; that is, the pubescence is more woolly than silky. This variant intergrades completely with the low woody-based form of *L. albifrons* which is common in the Santa Lucia Range.

Astragalus didymocarpus H. & A. subsp. **Milesianus** (Rydb.) Hoover, comb. nov. *Hesperastragalus Milesianus* Rydb., Bull. Torr. Bot. Club 53: 167 (1926). *A. didymocarpus* var. *Milesianus* Jepson. If perhaps not differing enough to warrant specific status, this large-flowered plant is entirely distinct from typical *A. didymocarpus,* and I believe that the degree of relationship is not quite so close as varietal status would imply. Possibly future garden experiments will show the two to be interfertile, but no instance of apparent hybridization has yet been reported. Furthermore, typical *A. didymocarpus* has not been found in the environmental conditions to which subsp. *Milesianus* is adapted.

VICIA AMERICANA Muhl. var. TRUNCATA (Nutt.) Brewer. The earliest varietal name applying to Pacific Coast plants is var. *truncata,* although it was first used for a comparatively uncommon leaf-form. The variants which differ only in the shape of the leaflets are not separated geographically and often grow together. Not because they are regarded as significant, but only because these forms have been emphasized in the literature, the following new names are proposed under var. *truncata.*

Forma TRUNCATA. Leaflets truncate at apex, mostly relatively broad.

Forma oblonga Hoover, nom. nov. Based on *Vicia oregana* Nutt. in T. & G., Fl. N. Am. 1: 270 (1838). Leaflets oblong, elliptic, or lanceolate, acute to obtuse. The great majority of plants are referable to this form.

Forma angusta Hoover, f. nov. Foliolis linearibus vel anguste lanceolatis, acutis vel acuminatis.

Leaflets linear or narrowly lanceolate, acute or acuminate.

Type: Cambria, San Luis Obispo Co., in Monterey pine woods, *Hoover 6630a;* associated with f. *oblonga,* which was more plentiful.

Plants of the sort here named f. *angusta* have been called var. *linearis,* but that name properly belongs to *Lathyrus linearis* Nutt. from "plains of the Platte." Although this plant of the Great Plains is also generally considered to belong to the species *V. americana,* I believe it to be recognizably different from the Californian plant which has been known by the same name.

Lathyrus Jepsonii Greene var. **californicus** (Wats.) Hoover, comb. nov. *L. venosus* var. *californicus* Wats., Proc. Am. Acad. 11: 133 (1876). *L. Watsonii* White. *L. Jepsonii* subsp. *californicus* (Wats.) C. L. Hitchcock. The relationship to *L. Jepsonii* seems to me closer than implied by either specific or subspecific status.

Ceanothus oliganthus Nutt. var. **sorediatus** (H. & A.) Hoover, comb. nov. *C. sorediatus* H. & A., Bot. Beechey 328 (1839–40). Shrubs known by this name differ from typical *C. oliganthus* only in the lesser degree of hairiness on the branchlets and leaves, and this one slight difference is subject to extensive intergradation. The maintenance of *C. sorediatus* as a species separate from *C. oliganthus* can therefore not be defended

on any rational basis. Even the difference in geographic distribution is less well defined than has been supposed. *J. T. Howell 14,750* from Skyline Boulevard near Saratoga Gap, Santa Clara Co., is in every respect like southern Californian specimens which have been without qualification included in *C. oliganthus*. Even more notable, a collection from Pope Creek Canyon, 8.5 miles from Monticello, Napa Co., *J. T. Howell 6133*, is representative of that form of *C. oliganthus* which differs most widely from *C. sorediatus*, even to the presence ot hairs on the upper leaf-surfaces. Both collections, if they lacked a locality label, would be identified as *C. oliganthus* without the slightest hesitation. The occurrence of *C. oliganthus* far within what has been assumed to be the exclusive territory of *C. sorediatus* further degrades the taxonomic significance of the latter.

Ceanothus cuneatus (Hook.) Nutt. var. **fascicularis** (McMinn) Hoover, comb. nov. *C. ramulosus* (Greene) McMinn var. *fascicularis* McMinn, Ceanothus 250 (1942). Blue-flowered shrubs of *C. cuneatus* are called *C. ramulosus*. In most localities where they are found, the color varies to very pale blue or white. Therefore I include all such plants in *C. cuneatus*, a species which is highly variable in features of greater significance than flower-color. The variety *fascicularis* is recognizable by its combination of short internodes and narrow leaves. Plants outside the limited coastal area of var. *fascicularis*, although often having rather narrow leaves, are excluded from this variety by their long internodes. Just as in var. *cuneatus*, the flowers of var. *fascicularis* vary from white to blue or lilac.

Ceanothus cuneatus (Hook.) Nutt. var. **rigidus** (Nutt.) Hoover, comb. nov. *C. rigidus* Nutt. in T. & G., Fl. N. Am. 1: 268 (1838). On coastal sand-hills near Hazard Canyon, San Luis Obispo Co., where var. *fascicularis* is the prevailing form, some shrubs resemble very closely, if they do not exactly duplicate, the Monterey Co. plants which have been called *C. rigidus*. The distinguishing mark of this variety is that the leaves on full-grown shrubs are dentate, like miniature holly leaves. There is complete intergradation to var. *fascicularis* in this area. Some of the shrubs near Hazard Canyon are low and mat-forming, a form of growth which has rarely been noted in *C. cuneatus* elsewhere.

var. *oblanceolata* differs in its narrower leaves, in much the same way that typical *P. galapageia* Hook. f. differs from its wider-leaved var. *insularis* (Bennett) Robinson.

Sesuvium Eastwoodianum J. T. Howell, spec. nov. Herba tegeticulata, caulibus procumbentibus et radicantibus, non suffrutescentibus, caulibus foliisque globulis crystallinis obtectis, in exsiccatis minute foveolatis; foliis anguste oblanceolatis, 1.5–3 cm. longis, 2–4 mm. latis, subacutis, basi dilatata et amplectenti; pedicellis crassis, 0.5–1 cm. longis, in fructu erectis; calyce 7–8 mm. longo, lobis 5 mm. longis; staminibus numerosis, filamentis 4 mm. longis, lanceolato-dilatatis, antheris oblongis, circa 1 mm. longis; stylis 3; capsulis 4–5 mm. longis, 3 mm. diametro basi; seminibus subrotundis, circa 1 mm. diametro, hebetibus, conspicue rugulosis, rugis paulum interruptis et plus minusve tuberculatis latere aliquantum complanato, dorso lineatis.

Type: CAS No. 207,606, collected by Templeton Crocker on low sandy islet off southeast end of North Seymour Island, Galápagos Islands, June 12, 1932. Another Galápagos collection is *Howell 10,135* which was found on the shore of the lagoon back of the beach at Darwin Bay, Tower Island, June 16, 1932.

This species is intermediate in character between the other two species of *Sesuvium* known from the Galápagos Islands, the pantropic strand plant, *S. Portulacastrum* L., and the endemic rock plant, *S. Edmonstonei* Hook.f. From the first it differs in its vesicular crystalline epidermis, from the second in its herbaceous mat-forming habit, and from both in the distinctive markings of its seeds. In *S. Portulacastrum* the seeds are smooth and shiny, in *S. Edmonstonei* densely and finely tuberculate, and in *S. Eastwoodianum* conspicuously wrinkled.

It is entirely appropriate that the name of Alice Eastwood be associated with a plant of the Galápagos Islands. With almost no assistance she prepared the extensive Alban Stewart collection for the Academy herbarium and the distribution of duplicates. Many thousands of specimens were involved. Personally, insofar as my Galápagos experience is concerned, I owe Miss Eastwood two debts: first, she granted me leave to accompany the 1932 Templeton Crocker Expedition as botanist; and second, she made it financially possible for me to study historical collections of Galápagos plants in England, France, and Sweden in 1935.

Moreover, as I know close this little journal, it is most appropriate that she be remembered. LEAFLETS OF WESTERN BOTANY would not have been without Alice Eastwood.

INDEX

COMPILED BY ANITA M. NOLDEKE

VALE!

Alas, that Spring should
vanish with the Rose!

That Youth's sweet-scented Manuscript
should close!

The Nightingale that
in the Branches sang,
Ah, whence, and whither flown again,
who knows?

Ah, Moon of my Delight
who know'st no wane,

The Moon of Heav'n is rising
once again:

How oft hereafter rising
shall she look

Through this same Garden after me —
in vain!

Edward FitzGerald's RUBÁIYÁT . . .