

STUDIES IN THE HERBARIUM AND THE FIELD.—No. 2.

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I.—NOTES ON THE PLANTS OF SAN NICOLAS ISLAND.

The plants upon which this report is based were collected in April, 1897, by Mrs. Blanche Trask. It is the first collection from this island of which any record has been made, and like all insular floras possesses peculiar interest.

Among the eighty or more species, nine are described as new species, three as new varieties. There are besides six insular types, though almost all the species are well represented on the other islands of the Archipelago as well as on the mainland. At least fifteen have been introduced, being plants of wide distribution and generally recognized as weeds. It is somewhat surprising to find *Rumex acetosella*, *Polygonum aviculare*, and *Erigeron Canadensis* absent from the list.

Under each species is given its distribution on the other islands, this information having been obtained from the

Herbarium of the Academy and from the list published in "Zoe," Vol. I, p. 129, in an article by T. S. Brandegee on "The Flora of the Californian Islands." The islands given are San Miguel, Santa Rosa, Santa Cruz, Santa Catalina and San Clemente. At the end is given a table similar to that in "Zoe," and a summary.

The following interesting account of San Nicolas has been copied from the report of Dr. Stephen Bowers, issued in the Ninth Annual Report of the State Mineralogist (1889, page 57):—

"San Nicolas Island belongs to Ventura County. It is nearly eighty miles south of the town of Ventura, the southeastern end being in latitude 33° , $14'$ north and longitude 119° , $25'$ west from Greenwich.

"The island is about nine miles long and four miles wide, containing 32.2 square miles, or twenty-thousand six hundred and eight acres. Its longer axis is northwest by west.

* * * * *

"There is an abundance of water on the island but it is slightly brackish.

"San Nicolas is entirely destitute of timber, but evidently has not always been so. At the present time there is not even a bush growing on it except a stunted kind of thorn, scarcely two feet high, and a few species of the tree cactus.

* * * * *

"Nearly all round the island, the shore-line is steep and about fifty feet high, from which the ground gradually rises in a sort of mesa or table-land, say one hundred to five hundred yards wide and terminates in a steep escarpment, which reaches an altitude of from five hundred to eight hundred feet. The high land is about seven by three miles in extent and sufficiently level to till. Much of it contains what appears to be good soil and ought to yield abundant crops if brought under cultivation. There are but few exposures of rock on the elevated portion of the island

excepting near the upper termination of the escarpment mentioned, where they have been denuded by wind and rain. In a few places the sand-stone is capped with limestone bleached to chalky whiteness. Patches of small water-worn boulders and pebbles of quartzite, porphyry, etc., are occasionally met with on the table-land. The escarpment is most abrupt on the south side of the island and in some cases is washed into picturesque cañons. The western end of the island is exposed to westerly winds which often blow for many days without intermission; as a result one meets with many sand dunes, with an occasional outcropping of shell heaps which have resisted the wind's force. In many places may be seen impressions or casts of roots of trees, ranging in size from coarse fibers to several inches in diameter. The loose soil and sand have been blown from around them leaving the casts of semipetrifications intact. They are so hard as to sound metallic when thrown on the ground or when struck with a hard substance. In other places thousands of columns of indurated sand, ranging in height from a few inches to several feet, may be seen. At a distance they look like stumps of small trees.

* * * * *

“The only animals found on San Nicolas are a small fox, a kangaroo mouse, and a diminutive sand lizard. * * Seals, sea-lions, and other varieties of *Phocæ* are still found here but in limited numbers. In this connection, I may speak of the remains of two species of dogs found all over the island. One of them, which seems to have resembled the bull-terrier, is probably a distinct species, and, if I mistake not, was identified by Professor Baird. It was domesticated by the Indians, and found living here as late as 1853. * * * * *

“Several species of land birds are found. Amongst them may be mentioned the bald eagle, ground owl, raven, crow, and plover. Water fowl are abundant. * * *

“A noticeable feature of this island is the vast number of dead land shells strewn over the surface. * * *

“They are almost as numerous as the grains of sand driven before the wind, but not a living specimen is to be found. When they flourished there was vegetation on the island sufficient to support them, and their large size and vast numbers indicate anything but the arid waste that the surface now presents.

“Mr. Nidever speaks of a portion of the island covered forty years ago with trees, brush, and moss.

* * * * *

“San Nicolas Island must have once supported a large population. In whatever direction one turns, he comes in contact with human skeletons, broken mortars, pestles, ollas, bone implements, ornaments, etc., and shell heaps.”

The entire description is full of interesting facts, the account of the fossils being especially good. Dr. Bowers estimates that about two-thirds of the island is cultivable, the soil being apparently rich and fertile and the surface comparatively level.

Mrs. Trask to whom I sent Dr. Bowers' account finds conditions somewhat different now. This is what she writes: “I do not wholly agree with Dr. Bowers' account. There is no soil on the broad level top; but tons of pebbles, round as shot and of a like size. Even here the ice-plants flourish and an occasional gay patch of *Hordeum* or fox-tail is seen. Everywhere the rocks are visible and the soil thin.

“There are three routes which can be followed entirely around the island; one over the reefs, another on a flat or mesa, a third on the comparatively level top.

“The cañons are not what we usually call cañons; arroya is a fitter term. In them we hear no sound of bird, no whirr of wing; we see no bright flowers, only the ice-plants. There is no ripple of stream, only the briny tidal waters which glide but do not flow and gliding sink. Many

a cañon, monster-capped and sculptured by sand and wind, is literally snowed-in by vast banks of sand. These are exquisitely marked by the action of the wind, as are the snow banks of colder climes.

“The shell heaps and rancherías are chiefly at the West End, thousands of them, while at the East End there may be a half dozen. One may tramp for miles at the West End upon nothing but shell sand, gathering bone implements, abalone ornaments, and other relics of the former inhabitants. The reason of the signs of habitation being concentrated at the West End is evident; there the fresh water drips from the rocks above the reefs, while no water is found at the East End, though Dr. Bowers says that there was an abundance of water on the island when he visited it. A tiny lake fringed with *Eleocharis* surprised me one day; near by were found *Lupinus micranthus*, several clovers, *Pectocarya* and *Orthocarpus*.

“In all the kitchen middens large heaps of charcoal yet remain. Great mortars, too heavy for a white man to lift, are found on the highest peaks, miles from fresh water; yet water they must have had near by.

“It is said that forty years ago the little harbor where we landed, known as Corral Harbor, was filled with sand—now, our schooner anchored in the surf outside, we took the waves at just the right moment, shooting in between the reefs where there was barely room, and entering the sand-bound bit of a key inside. I have seen seven breakers twenty feet high, without a lull, plunging in over the reefs into this same Corral Harbor. ‘Harbor?’ you say as you stand watching them.

“Another landing place is marked ‘Anchorage’ on the sea charts, situated near the sand spit on the south side; but there, a run has to be made through the breakers which are often so heavy that landing is impossible.

“Day after day, there is the cry of the gull and shag, the voice of otter and seal, the boom of the heavy surf, and the wind and fog and sand toiling on at their unending tasks.”

GRAMINEÆ.

I am indebted to the great kindness of Dr. F. Lamson Scribner, Chief of the Division of Agrostology, U. S. Department of Agriculture, for the identification of these grasses.

1. *Bromus Trinii* Desv.

Trisetum barbatum STEUD.

Reported under the latter name from Santa Cruz Island. Found growing on San Nicolas in one locality, about *Opuntia Engelmanni*.

2. *Bromus Hookerianus* Thurb.—Reported from all the islands except San Miguel. On San Nicolas found growing about *Opuntia* and on a flat at about 100 ft. elevation.

3. *Bromus virens* Nutt.—This species has not before been reported from the islands. It also was found growing about *Opuntia*.

4. *Cynodon Dactylon* Pers.—This is the first record from the islands. It grew on a height above the brackish stream.

5. *Stipa setigera* Presl.—Reported from all the islands except San Miguel. On San Nicolas it was found in one locality, about *Opuntia*.

6. *Stipa robusta* Vasey.—The first record from the islands, growing in one locality, about *Opuntia*.

7. *Hordeum murinum* L.—Reported from Santa Rosa, Santa Cruz, and Santa Catalina. On San Nicolas it was found in fertile spots amid sand, at an elevation of 800 to 1000 ft.

8. *Avena barbata* L.—This is the first record from the islands. It also was found only about *Opuntia*.

9. *Phalaris Canariensis* L.—Reported from all the islands except Santa Rosa. This grew in one locality, a fertile flat 100 ft. above the sea.

10. *Distichlis spicata* (L.)—As *D. maritima*, this has been reported from all the islands except San Clemente. It grew only in the sand spit region.

11. *Polypogon Monspeliensis* Desv.—Reported from all the islands except San Clemente. Found growing in sand-swept arroyas.

CYPERACEÆ.

12. *Eleocharis* (probably *E. palustris* R. Br.)—This was collected on the borders of a small lake at 1000 ft. elevation.

LILIACEÆ.

13. *Brodiaea capitata* Benth., Pl. Hartweg., p. 339, "In sylvis, prope Monterey."

Found on all the islands; infrequent on San Nicolas, in one locality, on a slope.

URTICACEÆ.

14. *Parietaria debilis* Forster, Weddell, DC. Prodr., Tome XVI, p. 235⁴⁵.

Reported from all the islands except San Miguel; found in one locality on San Nicolas in a clump of *Opuntia Engelmanni*.

CHENOPODIACEÆ.

15. *Chenopodium Californicum* Wats., Bot. Cal., Vol. II, p. 48.—First mentioned by Moquin in DC. Prodr., Tome XIII², p. 74, as variety "? *hastatum*" of *C. anthelminticum*. "In California."

Reported from all the islands except Santa Rosa. On San Nicolas found only about *Opuntia* which occurs sparingly.

16. *Chenopodium murale* L., Sp. Pl., p. 219, "In Europæ muris aggeribusque."

Reported from San Miguel, Santa Cruz, and Santa Catalina.

17. *Atriplex Californicum* Moq., DC. Prodr., Tome XIII², p. 98, "California, Coulter."

Reported from San Miguel, Santa Cruz, Santa Catalina, San Clemente. Mrs. Trask found this growing on the beach. Different plants varied greatly in size. The specimen from which the determination is made is larger in all its parts than any specimen in the Herbarium of the Academy. The leaves and other parts are less hoary.

18. *Atriplex decumbens* Wats., Proc. Am. Acad., Vol. XII, p. 275, "near San Diego."

The plants from San Nicolas are too young for certainty. The species has been reported from Santa Catalina. On San Nicolas it grew on seashore sands.

19. *Suæda*.—Two species of this seem to have been collected, but the specimens are too young for determination. One resembles *S. Californica* Wats. *S. Torreyana* is the species reported from the other islands, but the plant from Santa Rosa Island, so labelled in the Herbarium of the Academy, is more like *S. Californica*. This is also true of one recently sent from Santa Catalina by Mrs. Trask.

20. *Aphanisma blitoides* Nutt., Moq. in DC. Prodr., Tome XIII², p. 54, "near San Diego."

This has rarely been collected. Besides the type locality it has been found on San Clemente and San Pedro (near Los Angeles). On San Nicolas it grew only at the foot of *Leptosyne gigantea*.

NYCTAGINACEÆ.

21. *Abronia maritima* Nutt., in Herb. Bot. Cal., Vol. II, p. 4.—"On the sea coast, from Santa Barbara to San Diego."

Reported from San Miguel, Santa Cruz and Santa Catalina. Mrs. Trask records it on San Nicolas as “covering vast numbers of sand-mounds, the bright red flowers conspicuous.”

22. *Abronia umbellata* Lam.—This is doubtful as the material is insufficient, the specimen being too young. Reported from all the islands except Santa Catalina. On San Nicolas it covered vast areas of drifted sands. Leaves shining, flowers red and fragrant.

23. *Abronia alba*, sp. nov.

PLATE VIII, FIGS. 4a AND 4b.

Viscid-pubescent; stems brittle, prostrate or ascending; leaves orbicular to broadly ovate, obtuse, cuneate at base, sinuate, 1-3 cm. long, 10-16 mm. wide, with petioles equalling or longer than the blades; heads on slender peduncles 5-7 cm. long, about 12-flowered, with small involucre consisting of five thin, ovate, acute bracts 4 mm. long, 2 mm. wide; perianth white, very fragrant, with glandular, hirsute tube about 1 cm. long, and a border 6 mm. in diameter, of five divisions, each with two lobes, resembling rabbit's ears; fruit with ligneous body, at first rhomboidal in outline, becoming cuneate, more or less acuminate at apex, with four unequal wings, each 2 or 3 mm. wide above, narrowed to the base.

This belongs to § I. *Abronia* of the Bot. Cal.

It grew in sandy lowlands along the beach, but never on the sand-hills nor the true beach sands as do the other species. It was also less abundant.

CARYOPHYLLACEÆ.

24. *Silene Gallica* L., Sp. Pl., Vol. I, p. 417. “Habitat in Gallia.”

Reported from all the islands except San Clemente. On San Nicolas it was seen in one locality, a cliff overhanging a brackish stream.

25. *Spergularia macrotheca* Heynh., Nom., Vol. II, p. 689; Robinson, Proc. Am. Acad., Vol. XXIX, p. 310.

Reported from all the islands as *Tissa macrotheca* Britt. The San Nicolas plant agrees with the form common on the Coast. It was collected on the beach.

PAPAVERACEÆ.

26. *Platystemon Californicus* Benth., Trans. Hort. Soc., N. S., Vol. 1, p. 405. (Index Kewen.)

Reported from all the islands. On San Nicolas it covered sand-flats by the sea.

CRUCIFERÆ.

27. *Lepidium bipinnatifidum* Desv., Journ. Bot., Vol. III, p. 165. (Index Kewen.)

This is the *L. Menziesii* reported from Santa Cruz Island. The San Nicolas plant is more loosely leaved and branched than the plant common around San Francisco, along roadsides. It was found in one locality, on a slope.

28. *Lepidium nitidum* Nutt., Torr. & Gr., Fl., Vol. I, p. 116, "near Santa Barbara, Upper California."

Reported from Santa Catalina, San Clemente, Santa Cruz. The pods in these specimens are dull instead of shining as is usual with this species. Mrs. Trask found a few single individuals in two or three localities.

29. *Dithyrea Californica* Harv., var. *maritima* Davidson. First described as *Biscutella Californica*, var. *maritima* Davidson, "Erythea," Vol. II, p. 179. "Sand dunes of Coast, Los Angeles County."

This is the first record of the above species or variety from the Coast Islands. Mrs. Trask collected it in "Kitchen Middens" in one locality. There were few individuals. The flowers are white tinged with pink, purple, or rose red.

RESEDACEÆ.

30. *Oligomeris glaucescens* Cambess. in Jacquem. Voy., Bot., Tome XXIV, T. 25. (Index Kewen.)

Oligomeris subulata WEBB, Fragm. Fl. Æthiop., p. 26 and Boiss. Fl. Orient, Vol. I, p. 435. (Index Kewen.)

As *O. subulata* it has been reported from all the islands except Santa Rosa. There are specimens from Guadalupe Island in the Herbarium of the Academy collected by Dr. F. Franceschi. On San Nicolas it was frequent, found on dry cliffs overhanging arroyas.

LEGUMINOSÆ.

31. *Lupinus micranthus* Dougl., Bot. Reg., T. 1251.

This has been reported only from Santa Rosa and Santa Catalina. On San Nicolas, it grew on the borders of the small lake, 1000 ft. above the sea. The flowers are bluish white with black dots. This is similar to *L. micranthus* as defined by Watson, Greene, and others. Professor Greene has raised a doubt as to whether this common Californian plant is the true *L. micranthus*. Agardh's description, in Synopsis Gen. Lupini, page 14, drawn from Douglas' specimen in Herb. Lindl., differs first in respect to the leaves, which are said to be glabrous above, spreading pilose below, while this has leaves pilose on both surfaces; secondly in the seeds, which in Lindley's specimen were one colored, while these are mottled with brown. In Hook. Fl. Bor., Vol 1, p. 162, the following quotation from Douglas occurs: "It has much affinity with *L. bicolor*, differing in flowering from 4-6 weeks earlier, in being more slender, in the shortness of its alæ, its nearly sessile flowers, fleshy leaves, granulated roots, larger pods, and the color and size of the seeds." The leaves of the commonly accepted *L. micranthus* can scarcely be called fleshy.

32. *Lupinus albifrons* Benth., Trans. Hort. Soc., N. S., Vol. I, p. 440.

The original description of this species is not available. That of Agardh,¹ drawn from Douglas' specimens in Lindley's Herbarium, agrees with this in almost all particulars. In Douglas' specimens, the bracts are said to be shorter than the flowers and the raceme is described as short. This has bracts surpassing the flowers in the bud, deciduous when the flowers are in full bloom, while the raceme is nearly a foot long. Mrs. Trask reports this as infrequent on San Nicolas, growing on bare stretches of sand; flowers bright blue. It is probably included under *L. Chamissonis* from San Miguel, Santa Rosa, Santa Cruz, and Santa Catalina.

33. *Trifolium microdon* H. & A., var. *pilosum*, var. nov.

Entire plant, especially the young parts, pilose with soft, white, curly hairs; involucre woolly both interiorly and exteriorly, with the teeth of the divisions almost equal, entirely without the long middle tooth of the typical form; calyx viscid, but free from pubescence. The surfaces of the leaves are sparsely pilose. The plant is less robust and has smaller heads and flowers than the common form.

This was compared with the description and figure in Bot. Beech, p. 330, T. 79. *T. microdon* has been reported from Santa Cruz Island and collected on Santa Catalina by Mrs. Trask.

As represented in the Herbarium of the Academy, this species is variable. The specimen most nearly like this is one from near Tennessee Cove, Marin Co., Calif., collected by the writer. This variety was collected in two localities on moist slopes.

34. *Trifolium gracilentum* T. & G., Fl., Vol., I, p. 316. "California, Douglas."

Not reported from the islands, but collected on Santa Catalina by Mrs. Trask. On San Nicolas two forms were

¹ Syn. Gen. Lupini, p. 33.

found: one with purplish flowers and with each leaf marked with an inverted V-shaped white spot that disappears when the plant is dried; the other with whitish flowers and a more robust habit of growth.

35. *Trifolium stenophyllum* Nutt., Journ. Phila. Acad., N. S., Vol. I, p. 151. "Island of Santa Catalina and San Pedro."

This is the true *T. stenophyllum* of Nuttall. It differs from *T. amplexens* T. & G.,¹ as Professor Greene has shown in Fl. Francis., Vol. I, p. 34. *T. amplexens* of the list in "Zoe" is probably this species.

36. *Trifolium Palmeri* Wats., Proc. Am. Acad., Vol. XI, p. 132. "Guadalupe Island."

Also reported from Santa Catalina and San Clemente. On San Nicolas it was found in one locality, a moist slope.

37. *Trifolium dichotomum* H. & A., Bot. Beech., p. 330. (Type locality not given.)

This has not before been reported from the islands, though *T. Catalinae* is near it. The heads are smaller than the common form. It was collected in only one locality, a moist slope.

38. *Medicago sativa* L., Spec. Pl., p. 778.

Stem, lower surface of leaves, and calyx pilose with long soft white appressed hairs; leaflets linear-oblong, apiculate from a truncate apex, about 2½ cm. long, 5-10 mm. wide, peduncles 8-9 cm. long, equalling the racemes; flowers 10-12 mm. long, with the filiform divisions of the calyx twice as long as the tube.

Reported only from San Miguel, but collected also on Santa Catalina by Mrs. Trask. On San Nicolas it was found in one locality, a flat above a brackish stream.

Since this island plant differs from the common form it seems best to give a general description.

¹ Fl., Vol. I, p. 317.

39. *Medicago denticulata* Willd., Sp., Vol. III, p. 1414. (Index Kewen.)

This has been reported from all the islands except Santa Rosa. On San Nicolas it was found on two slopes. The specimen at hand is unusually luxuriant. The leaflets are from 2-2½ cm. long and about 2 cm. wide; petioles 3-4 cm. long; peduncles 2-3 cm. long.

40. *Astragalus didymocarpus* H. & A., Bot. Beech., p. 334, T. 81. "California."

This has been reported only from Santa Cruz. It has been collected on Santa Catalina recently by Mrs. Trask. On San Nicolas it was found only on the cliffs of a briny stream.

41. *Astragalus Traskiæ*, sp. nov.

PLATE VIII, FIGS. 6a-6d.

Stems densely white-tomentose, slightly viscid, several growing in a clump about 3 dm. high; leafy and branching: leaves shorter than the peduncles; leaflets canescent with appressed hairs, 20 or 25, alternate or opposite, oblong or obovate, obtuse, 10-15 mm. long, 3-5 mm. wide, one-nerved; stipules distinct, narrowly linear, 2 mm. long; peduncles 12-15 cm. long, erect, obscurely ribbed: raceme short when in bloom, elongating in fruit to about 9 cm.; bracts persistent, nigrescent, subulate; pedicels 2 mm. long, equalling or a little shorter than the bracts; calyx nigrescent, campanulate, 7-10 mm. long, with subulate divisions shorter than the tube; corolla yellowish white, glabrous; keel deeper yellow than the enfolding and surpassing wings, 5 mm. long without the claw; wings narrower, auriculate at base, 8 mm. long, with a claw 7 mm. long, equalling that of the keel; banner oval, attenuate to the claw, abruptly narrowing towards the emarginate apex, 15 mm. long, 6 mm. wide: legume coriaceous, transversely reticulate under the white wool, erect or spreading, exserted from the calyx on a stipe 5-8 mm. long; 2-celled from the intrusion of the dorsal suture, subfalcate, attenuate at apex to the long, persistent style; seeds immature.

This is closely allied to *A. Nevinii* Gray¹, which was collected on San Clemente Island by Nevin and Lyon. It differs from this species in its more robust habit, shape and size of the leaflets, and character of the pod. The specimen of *A. Nevinii* in the Herbarium of the Academy

¹ Proc. Am. Acad., Vol. XXI, p. 412.

is one of the original collection. It has narrower, more falcate pods, perfectly glabrous and glossy. These two species are excellent types of insular variation; for undoubtedly they had a common origin. They seem most closely related to *A. arrectus* judging from the character of the pod.

It was collected in two places, in high, dry gulches, where it was abundant.

To name this in honor of the discoverer, the zealous collector, Mrs. Trask, is a small tribute to her courage and enthusiasm. It is one of the most showy plants on the island and perhaps the most interesting. The contrast between the white stems and leaves and the nearly black calyx would at once attract the attention of even careless observers.

42. *Hosackia venusta*, sp. nov.

PLATE VIII, FIGS. 2a-2d.

Sericeous-tomentose, loosely branching from near the base, with stems 2-3 dm. long: leaves scattered at internodes of 2-3½ cm.; lower leaves unequally odd-pinnate, with two leaflets on the upper side of the rhachis, three below, and one terminal; upper leaves with five leaflets, two on each side and one terminal; rhachis 5-15 mm. long; leaflets oblong to obovate, obtuse or mucronate, 10-12 mm. long, 3-5 mm. wide: heads 2 cm. in diameter, on peduncles 2-3 cm. long, with one simple bract subtending the head; flowers yellow streaked with brown and turning brownish red in fading, on pedicels 1 mm. long; calyx densely villous, especially the narrow, linear divisions, which are longer than the campanulate tube; corolla surpassing the calyx by about 5 mm.; standard bright yellow, brown-veined near the base of the obovate-pandurate, emarginate blade; keel and wings brownish yellow, short clawed: immature pods densely pilose with ascending hairs, interiorly mottled with brown, exserted from the calyx and inclined to be falcate; immature seeds two, elliptical.

This species is one of several insular types closely related to *H. argophylla*. Two have been described by Professor Greene; one, as *Syrmatium niveum*¹, "Santa Cruz Island," and *Hosackia Ornithopus*², "Guadalupe Island." On San Clemente and Santa Catalina two others occur.

¹ Bull. Cal. Acad. Sci., Vol. II, p. 148.

² Bull. Cal. Acad. Sci., Vol. I, p. 185.

A comparative study of these with drawings of similar parts would be a most interesting illustration of insular variation.

In the figures, the differences in the floral organs of this species and *H. argophylla* are given. It also differs in foliage and inflorescence.

Mrs. Trask reports this as rare and collected in the one moist flat above the brackish stream.

GERANIACEÆ.

43. *Erodium cicutarium* L.'Her., ex Ait., Hort. Kew., ed. I, Vol. II, p. 414. (Index Kewen.)

Described first by Linnæus under *Geranium*, Sp. Pl., p. 680.

This has been reported from all the islands, uncommon on San Nicolas, collected on a moist slope. The specimen is a long, slender branch; the gynophore measures 4 cm. According to Mrs. Trask the flowers are bright red instead of the common magenta hue.

44. *Malva pusilla* Smith, Eng. Bot., T. 241. (Index Kewen.)

As *M. borealis* this was reported as common on all the islands. On San Nicolas it grew in one locality, a flat above the brackish stream.

ONAGRACEÆ.

45. *Oenothera viridescens* Hook., Fl. Bor., Vol. I, p. 214. "Northwest Coast of America, Menzies."

There are specimens of this in the Herbarium of the Academy from San Miguel, Santa Rosa, and Santa Cruz Islands. It grew on San Nicolas on the sands of the shore and on the sand cliffs at 500 to 1000 feet elevation.

This is one of the forms included under *Æ. cheiranthifolia* in Bot. Calif., Vol. I, p. 225. It varies especially in the size of the flowers, amount of pubescence, and the

margins and shapes of the leaves. These island specimens have smaller flowers than the mainland forms common along the southern coast of California; but they agree in the flowers fading green, in having similar capsules, and in the leaves forming small rosettes at the ends of the branchlets.

Since the original description of *Æ. cheiranthifolia* is not available and according to Professor Greene does not fit either this or *Æ. spiralis*, it seems best at present to leave these island plants under Hooker's name.

FICOIDEÆ.

46. *Mesembryanthemum nodiflorum* L., Sp. Pl., p. 480.

The specimens from San Nicolas are identical with those collected elsewhere in Southern California. They differ somewhat from a plant collected in Sardinia by Reverchon, (ex. Herb. Ball.) in the Herbarium of the Academy. In this genus it is very difficult to be certain of dried specimens where the species are closely related. On San Nicolas it was frequent on the beaches. The flowers are white.

46a. *Mesembryanthemum crystallinum* L.—This was abundant, growing on cliffs 1000 ft. high. No specimens were collected. Mrs. Trask writes that it grew knee high and that in walking through it her boots and leggins were soaked thoroughly with the sap. It rendered climbing dangerous as the rocks became very slippery and there were precipices everywhere on the cliffs. It is found on all the islands.

CACTACEÆ.

47. *Opuntia*.—This is probably *O. Engelmanni* Salm., var. *littoralis* Engelm.

Mrs. Trask reports it as identical with this species as she knows it on Santa Catalina. The specimen consists of a flower only and that without the ovary. It is reported from all the islands except San Clemente.

Wherever this cactus grew, it protected a small colony of grasses and tender herbs.

47a. *Opuntia prolifera* Engelm.—This also was seen but no specimens were collected. It has been reported also from Santa Catalina and San Clemente.

UMBELLIFERÆ.

48. *Daucus pusillus* Michx., Fl., Vol. I, p. 164. “In campestris Carolinæ.”

This has been reported from all the islands. It was collected on San Nicolas in sand gulches near the sea. Mrs. Trask reports the flowers as reddish purple.

This is the *Yerba del Vibora* of the early settlers of California and is widely accepted as an antidote for the poison of the rattlesnake.

49. *Apiastrum angustifolium* Nutt., Torr. & Gr. Fl., Vol. I, p. 644. “San Diego, California.”

Reported from San Miguel, Santa Cruz, and Santa Catalina. On San Nicolas it was found in one locality, a dry, riven sand flat.

50. *Sanicula Menziesii* H. & A., Bot. Beech., p. 142. “California.”

This is the first record of this species from the islands. It is a poor specimen but yet shows the characteristic pedicellate fruit and erect stem of this common species. It was frequent on dry rocky heights. Mrs. Trask has collected it also on Santa Catalina.

51. *Peucedanum insulare*, sp. nov.

PLATE VIII, FIGS. 1a-1d.

Acaulescent from a long, rather stout, woody root, sheathed at summit by persistent, dilated petioles which become fibrous with age; leaves from biternate to biquinate; leaflets cuneate, sharply dentate or incised, veiny;

petioles shorter than the blades: umbel with from 10–18 fruiting rays 3–8 cm. long; peduncles stout, solid, dilated at summit, 15 cm. tall, 5 mm. in diameter, slightly glandular-pilose when young, becoming glabrous and striate with age; involucre a single, elongated bract, palmately divided at the apex; involucels several, linear-attenuate, 5–10 mm. long, equalling the fruiting pedicels; sepals fleshy, triangular, inconspicuous; corolla yellow, petals ovate-acuminate, strongly nerved and incurved: fruit elliptical, cordate at each end; wings equalling or a little broader than the body; ribs filiform, inconspicuous; oil tubes variable in size and number, generally two in the intervals, six on the commissural surface, one occasionally in a wing. On the dorsal side the tubes vary from six to nine. Sometimes there will be one large tube between the ribs, sometimes two, either large or small, and occasionally one occurs, as in the figure, at the intersection of the wing. The oil is very abundant and has an odor almost identical with that of the oil of bergamot.

It was collected on sand cliffs overhanging briny arroyas and the plants were in flower but still retained the fruiting stems of the preceding season.

POLEMONIACEÆ.

52. *Gilia Nevinii* Gray, Syn. Fl., p. 411. “Guadalupe Island.”

Reported from Santa Rosa, Santa Cruz, Santa Catalina, and San Clemente. On San Nicolas it was found on sandy heights above a brackish stream.

This specimen is too poor for certainty and seems to approach *G. multicaulis*. It differs from the plant common on Guadalupe and the other islands. The glandular, hairy pubescence is denser, the leaves less finely divided, with shorter divisions, the calyx and its divisions shorter, and the corolla smaller. The appearance is that of a depauperate specimen of *G. Nevinii*. The fruit is not ripe. The flowers were pale blue.

CONVOLVULACEÆ.

53. *Convolvulus macrostegius* Greene, Bull. Cal. Acad. Sci., Vol. I, p. 208. “Guadalupe Island, in the crevices of basaltic rocks.”

This is found on all the islands. Mrs. Trask discovered but one plant on San Nicolas.

It is questionable whether this should be included under *C. occidentalis* or left as a distinct species. It looks quite unlike the common mainland form, but Mr. Brandegee in "Zoe," Vol. I, p. 85, describes plants that seem to inseparably connect the two. At present, it is most convenient to leave it under the above name.

Mrs. Trask writes as follows about this: "*C. macrostegius* is utterly different in every way from *C. occidentalis*, seen on Santa Catalina by hundreds. *C. occidentalis* is never two or more flowered within the bracts."

BORAGINACEÆ.

54. *Heliotropium Curassavicum* L., Sp. Pl., p. 130.

Reported from San Miguel, Santa Cruz, and Santa Catalina. Collected on San Nicolas on the beach, seen in two localities.

These San Nicolas plants are singularly robust. The leaves are crowded towards the summit of the short stems, apparently very fleshy, oblong-spatulate, 2-5 cm. long including the broad petiole which equals or is twice as long as the blade, 10-15 mm. wide; flowers somewhat larger in all their parts than the common form.

55. *Pectocarya linearis* DC., Prodr., Tome X, p. 120.

In Syn. Fl., Vol. II, p. 182, Gray mentions two forms. This resembles that under *P. Chilensis*. It has narrower and more pectinate teeth to a somewhat incurved wing and the nutlets arcuate, recurved in age. The type locality is in Chili, as the name indicates.

This is the first record from the islands. It was collected on the ridge 1000 ft. above the sea.

56. *Cryptanthe maritima* Greene, Pitt., Vol. I, p. 117.

Krynitzkia maritima GREENE, Bull. Cal. Acad. Sci., Vol. I, p. 204. "Guadalupe Island."

This from San Nicolas agrees almost exactly with a specimen collected by Prof. Greene on Guadalupe Island, the nutlets being identical on both plants. However, they are a line long instead of half a line, as in Greene's description. This difference is due probably to the varying age of the nutlets, which differ in size on the same plant and often seem ripe when they are dry but immature.

Mrs. Trask reports this plant as rare, growing in arroyas swept bare by sand and wind.

57. *Cryptanthe Torreyana* Greene, Pitt., Vol. I, p. 118.

Krynitzkia Torreyana GRAY, Proc. Am. Acad., Vol. XX, p. 271.

Type range: nearly throughout California and east to Nevada and southwestern parts of Idaho.

This is the first record from the islands; but it has recently been collected by Mrs. Trask on Santa Catalina. It was infrequent, found on bare, wind-swept heights. The nutlets are mottled with two shades of brown and slightly papillose towards the apex.

58. *Amsinckia* St. Nicolai, sp. nov.

PLATE VIII, FIGS. 7a-7e.

Stems decumbent, branching at the base and at the inflorescence, somewhat viscid, very hispid with horizontally spreading, shining white bristles, pustulate at base, often yellowish at apex, from fine and short to stout and more than 1 mm. long: radical leaves broadly linear to oblanceolate; cauline ovate-lanceolate, 1-2 cm. long, 5-10 mm. wide at the sessile base, undulate, bristly ciliate, obtuse: spikes with bracts 5 mm. long; calyx with two oblong divisions free almost to the base, the other three united, 4 mm. long: corolla yellow, about twice as long as the calyx; limb short with uneven, rounded lobes; tube narrow, without folds, spots, or hairs in the throat; stamens versatile on very short filaments inserted in the throat of the corolla but not exerted; style extending to the stamens, surpassing the calyx; stigma capitate: nutlets ovate-triangular, carinate, incurved, granulate, irregularly muriculate especially on the keel and at the edges, indistinctly rugose, pale brown, mottled with darker brown.

This as well as the following species or variety was collected on seashore sands and dry cliffs at 1000 ft. elevation, growing in company with *Oenothera viridescens*.

59. *Amsinckia maritima*, sp. nov.

PLATE VIII, FIGS. 8a-8c.

Stouter than the last, more erect, with pubescence stiffer and foliage similar but larger: radical leaves wanting; cauline 3 cm. long, 2 cm. or more wide at base, scattered: spikes ebracteate except occasionally at the lowest flowers; calyx with three divisions united but cleft, the other two divided, 3 mm. long; corolla 5 mm. long with more spreading divisions than the preceding, throat without folds, hairs, or spots; stamens in the throat of the corolla similar to the preceding; style about equalling the calyx or slightly surpassing it: nutlets similar to the preceding but black and indistinctly transversely rugulose.

This appears similar to the common coast *Amsinckia* which has been called *A. lycopsoides* by both Dr. Gray and Professor Greene.

A. lycopsoides was named by Lehman without description or locality.¹ The earliest description is that of Fisher and Meyer,² for the following copy of which I am indebted to the Gray Herbarium: "*Amsinckia lycopsoides*.—A corolla fauce, barbata, limbo tubo triplo brevior; staminibus corollæ tubo paulo supra basin insertis.—*A. lycopsoides* Lehm., delect Sem. b. Hamburg, 1831.—Tubus corollæ 3½ lin. longus; limbus 2 lin. in diametro vix latior." De Candolle³ gives the same description, adding "caule laxa ramosa" and "§ nukulæ rugosæ, inter rugos albo granulata, dorso convexa, angulis parum distinctis."

The corolla with bearded throat and stamens inserted a little above the base of the corolla, as well as the rugulose nutlets, white granulate between the folds, excludes this island *Amsinckia*, as well as the plants described by Dr. Gray and Professor Greene under *A. lycopsoides*.

Recently, the writer collected specimens agreeing with the description of *A. lycopsoides*. They were found on a hillside on the range of hills separating Piedmont from Maragua Valley in Alameda County, Calif. The type locality is near Fort Ross, Sonoma Co., Calif. It would

¹ Semina in Horto Bot. Hamb., p. 7, (1831.) (Index Kewen.)

² Ind. Sem. Hort. Petrop., Tome II, p. 26.

³ Prodr. Tome X, p. 117.

not be unlikely to find the species in Alameda County, growing in the vicinity of *Vaccinium ovatum* and *Castanopsis chrysophylla*.

In a genus like *Amsinckia* where there are so many closely related forms, nothing definite can be discovered concerning the limitation of species until these various forms are represented growing in a botanic garden under similar conditions; nor is it possible to be sure of what characters are constant.

In view of all these doubts, it seems best to describe these two closely related island plants as distinct species. If the last proves upon further investigation to be similar to the common maritime species found all along the coast, the name will appropriately include them; while the other, perhaps Gray's *var. bracteosa* of his *A. lycopsoides*, is named in honor of the Island's saint.

SOLANACEÆ.

60. *Lycium verrucosum*, sp. nov.

PLATE VIII, FIGS. 3a-3d.

Glandular-puberulent, shrubby, 6-8 ft. high, divaricately branching, spinescent, bark light gray; branchlets verrucose at leaf axils from downy tufts at base of petioles: leaves spatulate, 5-15 cm. long, narrowing to the petiole, thick, obsolete one-nerved: flowers small, solitary in the axils, on peduncles 2-7 mm. long; calyx campanulate, irregularly 4-cleft, divisions oblong, obtuse, thickish, reticulate, 1 mm. wide; corolla lavender, 8 mm. long, with tube slightly surpassing the calyx, hairy within below the throat, border of four rounded, spreading divisions, each 2 mm. wide; anthers thick, sessile in the throat of the corolla; ovary somewhat crested at summit; stigma capitate on a level with the anthers; immature fruit reddish.

This belongs to the same group as *L. Californicum* and *L. barbinodum* from which it can be readily distinguished by the floral organs.

It grew in several localities on arroya cliffs, with its branches hanging over the arroyas in many an inaccessible erosion.

61. *Lycium Californicum* Nutt., in Herb. Bot. Cal., Vol. II, p. 542, "near San Diego."

This grew in sheltered, moist nooks with *Opuntia*. Reported from Santa Catalina and San Clemente.

SCROPHULARIACEÆ.

62. *Orthocarpus purpurascens* Benth., in DC. Prodr., Tome X, p. 536. "Nova California, Douglas."

Reported from Santa Cruz and Santa Catalina. This from San Nicolas is a very poor specimen, not more than three inches tall, the spike about an inch long. It was collected in one locality, a moist flat on the ridge.

PLANTAGINACEÆ.

63. *Plantago insularis*, sp. nov.

Canescent with long, fine, silky hairs, very dense on the peduncles below the spikes: leaves broadly lanceolate-acuminate, narrowed to a broad petiole, a few callous teeth on the margin, 3-nerved, 5-9 cm. long, 5-12 mm. wide; peduncles 4-10 cm. long, rather stout: spikes oblong-linear, 1-2 cm. long, 8-10 mm. wide, densely flowered; bracts broadly ovate, about equaling the calyx; corolla $2\frac{1}{2}$ mm. in diameter, with ovate-orbicular, abruptly acuminate lobes, brown at base; stamens and style exserted; seeds two, cymbiform as in *P. Patagonica* and its allies.

Found on sea-shore flats.

This might be included as a variety of the very polymorphous *P. Patagonica*, but owing to its different appearance, though the flowers are similar, it seems most convenient to consider it a distinct species.

COMPOSITÆ.

64. *Malacothrix indecora* Greene, Bull. Cal. Acad. Sci., Vol. II, p. 152. "Islets close to the northern shore of Santa Cruz Island."

This covered large areas on the ridge. It is almost identical with Professor Greene's type.

65. *Malacothrix implicata*, sp. nov.

Stems woody, purplish, glabrous or slightly viscid, branched above: leaves numerous and close together, irregularly bipinnatifid into numerous narrow, linear divisions which form a tangle so that individual leaves cannot be separated in the dried specimens; length of entire leaf about 6 cm., with divisions beginning at the base, varying in length from 4 mm. to 3 cm.: heads 2 cm. in diameter, closely cymose at the ends of the branches on short peduncles; ligules white, unevenly toothed and lobed; tube pilose with upwardly spreading hairs; akenes $2\frac{1}{4}$ mm. long, four or five angled, with one or two ribs between the angles, brown, minutely tuberculate, scar at base prominent, apex with white denticulate border. The receptacle, as in *M. saxatilis* becomes capitate, with the bracts of the involucre deflexed.

“Queens's Dairy,” sand and wind carved cliffs.

It has been extremely puzzling to know what to do with this. It might just as well be made a variety of *M. saxatilis*.

From an inspection of allied *Malacothrix* from the other islands and the mainland it is found that all are more or less alike, differing in leaves, habit of growth, size of heads, and character of akenes. They are all evidently the offspring of a common parent and having been isolated, have developed peculiarities of their own. They are excellent examples of Darwinian species. This one from San Nicolas is most similar to one collected by W. G. W. Harford on San Miguel, but differs in having smaller heads and a more compact habit. There are no seeds on the San Miguel plant and we shall probably remain forever ignorant of its fruit, since, according to Dr. Gustav Eisen, who visited the island during the summer of 1897, the vegetation has been entirely destroyed by goats and the island has become a desolate waste of drifting sand.

I have provisionally included the San Miguel plant as well as specimens from Santa Rosa and Santa Cruz under this name. The last two have the divisions of the leaves broader and thicker, the inflorescence an open cymose panicle, and the heads smaller.

66. *Microseris linearifolia* Gray. Described first as *Calais linearifolia* DC., Prodr., Tome VII, p. 85. "California, Douglas."

Reported from Santa Rosa, Santa Cruz, Santa Catalina. On San Nicolas it was collected in one locality, a fertile flat. The few plants seen were in flower and fruit, with stems almost a foot in height and leaves varying from run-cinate-pinnatifid to almost entire.

67. *Sonchus asper* Hill, Herb. Brit., Vol. I, p. 47. (Index Kewen.)

Reported from Santa Rosa, Santa Cruz, and Santa Catalina; collected on San Nicolas on a moist slope.

68. *Sonchus tenerrimus* L., Sp. Pl., p. 794. "Montpellier., Florentiæ."

Reported from Santa Catalina. Two forms of this species were collected. In each the divisions of the leaves differ in width and both are much broader than in specimens from San Diego. One was found on cliffs of a water course, the other on moist slopes.

This species was first collected in North America by Nuttall in the vicinity of San Diego, and by him was named *S. tenuifolius*.¹

69. *Sonchus oleraceus* L., Sp. Pl., p. 794.

Reported from Santa Rosa and Santa Cruz. Collected on San Nicolas on a moist slope.

The leaves are much broader than in the form of this species common around San Francisco.

70. *Centaurea Melitensis* L., ?—This has nothing but leaves. A spiny bud can be discerned among the uppermost leaves that suggests this species.

71. ? *Artemisia* ———.—The odor and taste of the foliage of this plant suggest *A. Californica*; but the leaves

¹ Trans. Am. Phil. Soc. N. S., Vol. VII, p. 438.

are quite different. There are no flower buds even. If an *Artemisia*, it is probably undescribed.

72. *Achillea Millefolium* L., Sp. Pl., p. 899. “In Europæ pascius pratisque.”

Reported from all the islands. On San Nicolas found on a cliff over a briny water way.

73. *Amblyopappus pusillus* H. & A., Journ. Bot., Vol. III, p. 321. “Coquimbo,” Chili.

This species has a peculiar distribution. It is represented in almost all the coast islands both of Southern and Baja California. On the mainland it extends as far north as Pt. Sal, where it grows in company with *Leptosyne gigantea*; while on the south it reaches the coast of South America, where it was first discovered. The following localities are known to the writer either from specimens in the Academy's Herbarium or from reports:

Coast of California, mainland—San Luis Rey, Coronado, Pt. Sal.

Coast Islands—Cedros, Santa Cruz, Santa Rosa, San Miguel, Santa Catalina.

Baja California—Lagoon Head, Carysito, Aqua Dulce, San Regius.

Chili—Macuma, Huasco.

There is some variation among all these specimens, those from San Nicolas being unusually large. The stem is about a foot high and becomes quite woody. It was frequent on uplands along the ridge.

74. *Baeria gracilis* Gray, Proc. Am. Acad., Vol. IX, p. 196. First described as *Burriela gracilis* DC., Prodr., Tome V., p. 664, “Nova-California, Douglas.”

Cinereous with strigulose pubescence; leaves linear, 2–6 cm. long, 1–2 mm. wide; pappus of four upwardly barbellate awns almost equalling the corolla and gradually spreading to a paleaceous base; achenium strigose, especially on the angles; rays surpassing the involucre by about 4 mm.

It has been reported from Santa Rosa, Santa Cruz, and Santa Catalina. It covered the uplands on Santa Catalina.

A brief description of this island plant seems desirable owing to the great variability of this species.

75. *Hemizonia Streetsii* Gray, Proc. Am. Acad., Vol. XII, p. 162. "San Benito Island, Baja California."

Reported also from San Clemente, Santa Catalina, and Anacapa. On San Nicolas it was found on sea cliffs in only one place. These specimens have a more compact form than those from the other islands. This may be due to immaturity.

76. *Leptosyne gigantea* Kellogg, Proc. Cal. Acad. Sci., Vol. IV, p. 198. "Near Cuyler Harbor, San Miguel Island."

It is also found on the following islands: Santa Barbara, Santa Rosa, Santa Cruz, Santa Catalina, and Guadalupe. On the mainland, Mrs. Blochman discovered it at Pt. Sal and Mr. W. G. Wright obtained fine specimens from the coast of Ventura County.

When the stem is broken it exhales a strong odor of turpentine which, around Pt. Sal, has given it the name "Turpentine weed."

Mrs. Trask reports this as growing in four or five localities. About three plants were seen with eradiate heads, growing amid the ordinary plants with radiate heads. These eradiate heads are sterile and in the specimens examined appeared to be composed entirely of bracts, forming a globular head.

Mrs. Trask notes the leaflets of the San Nicolas plant to be fleshy and filiform, those on the Santa Catalina plant are not fleshy.

Franseria Chamissonis and *F. bipinnatifida* are two species inhabiting the sand hillocks along the coast and are almost always found associated together. They are most puzzling to the systematist who endeavors to make boundary lines, because they not only appear to run into each other but each is variable even in regard to what are supposed to be its own individual characteristics. Especially is this true as regards foliage, pubescence, and size of the heads.

F. bipinnatifida was first described in "Linnea" as variety *bipinnatisecta* of *F. Chamissonis*, and it may yet again be restored to its former position when all the forms are better known. Each of these is represented on San Nicolas, both differing from each other and the typical forms. One seems to fall under *F. Chamissonis* while the other is nearer *F. bipinnatifida*.

It is with hesitancy that I describe these forms as new varieties even; but after much deliberation it seems the best course.

77. *Franseria Chamissonis* Less., var. *viscida*, var. nov.

Stems stout, striate, loosely villous with white hairs, viscid; leaves extremely variable; upper ones oblanceolate and entire to ovate-spatulate, cuneate at base, crenate-dentate; lowest leaves broadly ovate in outline, deeply parted with divisions crenate-dentate or incised and even becoming bipinnatifid; pubescence sericeous, dense, and appressed: sterile involucres 5 mm. in diameter, almost sessile; fruit with keeled, and channeled, spreading spines viscid even to the apex.

It is the viscid character of the spines to which the name is due.

78. *Franseria bipinnatifida*, var. *dubia*, var. nov.

Stem ribbed, less villous and viscid than the preceding; leaves broadly ovate in outline, bipinnatifid with divisions about 2 mm. broad, silvery silky with appressed hairs but less dense than the preceding; sterile heads 6 mm. in diameter on slender pedicels 4-8 mm. long; fruit with spines slightly villous and viscid.

Mrs. Trask notes these two as common on the sand-hills and as keeping their peculiarities even when growing together.

79. *Baccharis consanguinea* DC., ? Prodr., Tome V., p. 408. "California, Douglas."

This is reported as the only tree and but one individual. It more properly ought to be considered as an arborescent shrub. It grew to a height of seven feet on a fertile flat. There were no signs of fruit or flower, so, though the foliage

is exactly of the above species, there is some uncertainty about the identification.

As *B. pilularis* this has been reported from all the islands except San Miguel and San Clemente. Since this is the form described as *B. consanguinea* it seems advisable to list it under this name.

80. *Bigelovia veneta* Gray, or *Grindelia* ———.

This is fragmentary without flowers or even buds. It grew in a fertile flat near the sea in one locality. The only plant seen was about two feet in height.

TABLE OF SPECIES.

SPECIES.	San Miguel.	Santa Rosa.	Santa Cruz.	Santa Catalina.	San Clemente.	Mainland.
1. <i>Bromus Trinii</i> DESV. (<i>Trisetum barbatum</i> STEUD.)			*			*
2. <i>Bromus Hookerianus</i> THURB.		*	*	*	*	*
3. <i>Bromus virens</i> NUTT.						*
4. <i>Cynodon Dactylon</i> PERS.						*
5. <i>Stipa setigera</i> PRESL.		*	*	*	*	*
6. <i>Stipa robusta</i> VASEY						*
7. <i>Hordeum murinum</i> L.		*	*	*		*
8. <i>Avena barbata</i> L.						*
9. <i>Phalaris Canariensis</i> L.	*		*	*	*	*
10. <i>Distichlis spicata</i> L. (<i>D. maritima</i>)	*	*	*	*		*
11. <i>Polypogon Monspeliensis</i> DESV.	*	*	*	*		*
12. <i>Eleocharis</i> (<i>E. palustris</i> R. BR.)			*			*
13. <i>Brodiaea capitata</i> BENTH.	*	*	*	*	*	*
14. <i>Parietaria debilis</i> FORSTER		*	*	*	*	*
15. <i>Chenopodium Californicum</i> WATS.	*		*	*	*	*
16. <i>Chenopodium murale</i> L.	*		*	*		*
17. <i>Atriplex Californicum</i> MOQ.	*		*	*	*	*
18. <i>Atriplex decumbens</i> WATS.				*		*
19. <i>Suaeda</i> sp.? (<i>S. Torreyana</i> ?) found on	*	*	*	*		*
20. <i>Aphanisma blitoides</i> NUTT.					*	*
21. <i>Abronia maritima</i> NUTT.	*		*	*		*

SPECIES.	San Miguel.	Santa Rosa	Santa Cruz.	Santa Catalina.	San Clemente.	Mainland.
22. <i>Abronia umbellata</i> LAM. ?	*	*	*		*	*
23. <i>Abronia alba</i> sp. nov.						
24. <i>Silene Gallica</i> L.	*	*	*	*		*
25. <i>Spergularia macrotheca</i> HEYNH. (Tissa.)	*	*	*	*	*	*
26. <i>Platystemon Californicus</i> BENTH.	*	*	*	*	*	*
27. <i>Lepidium bipinnatifidum</i> DESV. (<i>L. Menziesii</i> of Bot. Cal.)			*			*
28. <i>Lepidium nitidum</i> NUTT.			*	*	*	*
29. <i>Dithyrea Californica</i> var. <i>maritima</i> DAVIDSON (<i>Biscutella</i>)						*
30. ¹ <i>Oligomeris glaucescens</i> CAMBESS. (<i>O. subulata</i> WEBB.) . .	*		*	*	*	*
31. <i>Lupinus micranthus</i> DOUGL.		*		*		*
32. <i>Lupinus albifrons</i> BENTH. (<i>L. Chamissonis</i>)	*	*	*	*		*
33. <i>Trifolium microdon</i> H. & A. var. <i>pilosum</i> var. nov.						
* <i>Trifolium microdon</i>			*	*		*
34. <i>Trifolium gracilentum</i> T. & G.				*		*
35. <i>Trifolium stenophyllum</i> NUTT.				*		*
36. ¹ <i>Trifolium Palmeri</i> WATS.				*	*	
37. ⁴ <i>Trifolium dichotomum</i> H. & A.						*
38. <i>Medicago sativa</i> L.				*		*
39. <i>Medicago denticulata</i> WILLD.	*		*	*	*	*
40. <i>Astragalus didymocarpus</i> H. & A.			*	*		*
41. <i>Astragalus Traskiae</i> sp. nov.						
42. <i>Hosackia venusta</i> sp. nov.						
43. <i>Erodium cicutarium</i> L'HER.	*	*	*	*	*	*
44. <i>Malva pusilla</i> SMITH (<i>M. borealis</i>)	*	*	*	*	*	*
45. <i>Oenothera viridescens</i> HOOK.	*	*	*			*
46. <i>Mesembryanthemum nodiflorum</i> L.				*	*	*
46a. ⁵ <i>Mesembryanthemum crystallinum</i> L.	*	*	*	*	*	*
47. <i>Opuntia Engelmanni</i> SALM. var. <i>littoralis</i> ENGELM? . . .	*	*	*	*		*
47a. ⁵ <i>Opuntia prolifera</i> ENGELM.				*	*	*
48. <i>Daucus pusillus</i> MICHX.	*	*	*	*	*	*
49. <i>Apiastrum angustifolium</i> NUTT.	*		*	*		*
50. <i>Sanicula Menziesii</i> H. & A.				*		*
51. <i>Peucedanum insulare</i> sp. nov.						
52. ¹ <i>Gilia Nevinii</i> GRAY ?		*	*	*	*	
53. ¹ <i>Convolvulus macrostegius</i> GREENE	*	*	*	*	*	
54. <i>Heliotropium Curassavicum</i> L.	*		*	*		*
55. <i>Pectocarya linearis</i> DC.						*

SPECIES.	San Miguel.	Santa Rosa.	Santa Cruz.	Santa Catalina.	San Clemente.	Mainland.
56. ¹ <i>Cryptanthe maritima</i> GREENE						
57. <i>Cryptanthe Torreyana</i> GREENE				*		*
58. <i>Amsinckia St. Nicolai</i> sp. nov.						
59. <i>Amsinckia maritima</i> sp. nov.						?
60. <i>Lycium verrucosum</i> sp. nov.						
61. <i>Lycium Californicum</i> NUTT.				*	*	*
62. <i>Orthocarpus purpurascens</i> BENTH.			*	*		*
63. <i>Plantago insularis</i> sp. nov.						
64. <i>Malacothrix indecora</i> GREENE			*			
65. <i>Malacothrix implicata</i> sp. nov.	*	*	*			
66. <i>Microseris linearifolia</i> GRAY		*	*	*		*
67. <i>Sonchus asper</i> HILL		*	*	*		*
68. <i>Sonchus tenerrimus</i> L.				*		*
69. <i>Sonchus oleraceus</i> L.		*	*			*
70. <i>Centaurea Melitensis</i> L. ?						*
71. <i>Artemisia</i> ?						
72. <i>Achillea Millefolium</i> L.	*	*	*	*	*	*
73. ² <i>Amblyopappus pusillus</i> H. & A.	*	*	*	*		*
74. <i>Baeria gracilis</i> GRAY		*	*	*		*
75. ³ <i>Hemizonia Streetsii</i> GRAY				*	*	
76. ¹ <i>Leptosyne gigantea</i> KELLOGG	*	*	*	*		*
77. <i>Franseria Chamissonis</i> LESS. var. <i>viscida</i> var. nov.						
* <i>Franseria Chamissonis</i> LESS.	*					*
78. <i>Franseria bipinnatifida</i> NUTT. var. <i>dubia</i> var. nov.						
* <i>F. bipinnatifida</i>	*		*	*		*
79. <i>Baccharis consanguinea</i> DC. ? (<i>B. pilularis</i>)		*	*	*		*
80. <i>Bigelovia veneta</i> or <i>Grindelia</i> ?						

*Closely related species found on some of the other islands but different from the form on San Nicolas.

¹ Guadalupe Island, Baja California.

² Cedros Island, Baja California and S. America.

³ San Benito Island and Anacapa Island, Calif.

⁴ This might more correctly be considered a form of *T. Macraei* with the heads on long peduncles.

⁵ Species reported but not collected.

SUMMARY.

82. Species recorded.

64. In common with the mainland, of which about 30 are Californian.

53. In common with Santa Catalina Island.

48. In common with Santa Cruz Island.

31. In common with Santa Rosa Island.

31. In common with San Miguel Island.

6. In common with Guadalupe Island; 1 with Cedros Island, 1 with San Benito Island and 1 with Anacapa Island; 7 species and 3 or 4 varieties peculiar to San Nicolas.

II.—NEW SPECIES OF CNICUS FROM SOUTHERN COLORADO AND UTAH.

1. *Cnicus bipinnatus*, sp. nov.

Cnicus Drummondii var. *bipinnatus* EASTWOOD, Zoe, Vol. IV, p. 8.

Glaucous and glabrous except for some slight arachnoid tomentum on the stems, petioles, and involucre bracts: stems stout, erect, leafy, 6 dm. or more high, branching from the base and also above; leaves with numerous linear-lanceolate divisions which are 2-6 cm. long, 5 mm. wide and irregularly parted near the base, generally on one side only, into similar lobes varying in length and sometimes as long as the main division, margin lacinate-dentate, spiny, lateral spines 2 mm. long, terminal 4-5 mm.; radical leaves petiolate, 1½-3 dm. long, 6-10 cm. wide; cauline, sessile, 10-15 cm. long, 5-6 cm. wide: heads corymbose at the ends of the leafy branches, almost sessile, narrow, cylindrical, 4½ cm. long, 1 cm. or more wide; involucre of appressed, imbricated bracts, successively shorter, in seven ranks, the lower ones pointed with a weak prickle 3-5 mm. long, the upper attenuate to a scarious tip, minutely puberulent; flowers purple; corolla with tube about half as long as the throat and divisions, throat about one-third as long as the linear, clavate-tipped divisions; stamens surpassing the corolla; style straight with the node 2½ mm. from the tip; akenes glabrous, shining, flattened, obovate-oblong, 6 mm. long, 3 mm. wide, surmounted with a yellow ring.

This is nearer to *Cnicus Rothrockii* than to *Cnicus Drummondii* but differs from the former in its foliage, narrower heads, short, weak spines, and general appearance. It formed a clump two feet or more in height and almost two feet in diameter.

Collected in Colorado in Johnston Cañon, near where it joins the Mancos River, in a locality but rarely visited by white men.

Closely related to this is the plant which the writer¹ described under the name *C. Rothrockii* var. *diffusus*. I take this opportunity of giving this, too, specific rank.

2. *Cnicus diffusus*, sp. nov.

Similar to the above in habit and surface: leaves narrower, less deeply divided, with more regular and triangular lobes; spines at the tips of the lobes 1 cm. long, stiff, yellow, those along the margins 1-3 mm. long; heads somewhat broader than the last, with outer involucre bracts tipped with stiff spines from 1-2 cm. long, deflexed-spreading in fruit, inner bracts attenuate

¹ Proc. Cal. Acad. Sci., Ser. 2, Vol. VI, p. 303.

to a long spiny point; flowers purple; corolla with tube four-fifths of the throat and divisions; throat about one-third of the tube, divisions linear, abruptly acuminate, 18 mm. long; stamens surpassing the corolla; node of the stigma 2 mm. from the apex; coma $2\frac{1}{2}$ cm. long.

Willow Creek, San Juan Co., Utah, Aug. 13, 1895.

3. *Cnicus Hesperius*, sp. nov.

Stem stout, simple, erect, leafy from the base, ribbed, almost glabrous, 3-4 dm. in height, 2 cm. in diameter: leaves 10-15 cm. long, $1\frac{1}{2}$ -2 cm. wide, upper surface glabrous, lower tomentose, ascending, linear-lanceolate, with numerous rounded lobes, spiny-margined with two to three large, yellow, subulate spines, 5 mm. long, and several shorter ones: heads sessile, crowded, in an oblong, terminal, erect, leafy, glomerule; involucre 2 cm. long, $2\frac{1}{2}$ cm. wide, with bracts 3 mm. broad at the yellow, glabrous, ovate base, tapering to a long brown-purple spine 1 cm. long, arachnoid with silky wool except at the glabrous yellow apex: flowers light purple; corolla tube almost equalling the throat and divisions; throat fusiform, contracted under the divisions which are linear with thickened apex and about half as long as the throat; anthers surpassing the petals by 3 mm., sparingly arachnoid except at the pointed tips; style with inconspicuous node concealed by the anthers and stigma, exerted 2 mm.; coma 1 cm. long.

Mt. Hesperus on the Bear Creek Divide above timber line, La Plata Mountains, southwestern Colorado, Aug., 1892. Collected by the writer.

This *Cnicus* is nearest to *C. eriocephalus* Gray, under which it was placed by the writer in "Zoe," Vol. IV, p. 8. A recent inspection of the specimens of *Cnicus* in the Herbarium of the Academy has convinced me that this deserves to have specific rank and that it is not a hybrid with *Cnicus Parryi*, as I had formerly conjectured.

The involucral bracts are less densely tomentose than in *C. eriocephalus*, the glomerule erect, the flowers light purple or pink, the entire plant less arachnoid, and the stamens have not only the filaments wooly but also the anthers.

I have named it in honor of the mountain on which it is found, the highest in the La Plata Range. There were few individuals growing along the trail leading to the summit of the ridge.

III.—THE COLORADO ALPINE SPECIES OF SYNTHYRIS.

One alpine species of *Synthyris* is now recognized from the mountains of Colorado. This has been aptly named *S. alpina*.

1. *Synthyris alpina* Gray.

PLATE IX, FIGS. 1a-1d.

This is found on most of the high peaks of Colorado, growing above timber line, in loose, rocky soil. Its low stature and short spike of dark purple flowers superficially distinguish it from the other species. There are always four calyx divisions, variable in shape and size even in flowers from the same spike, and conspicuously fringed with long white hairs. The corolla consists of two parts, united at the base; the upper broadly obovate, entire, and slightly concave; the lower two or three cleft, with laciniate or entire divisions varying in length and breadth. The stamens and style are moderately exserted and the flowers are erect.

In the little-explored mountains of southwestern Colorado two different species are found above the tree limit. One of these is so distinct that in a group so closely related as that to which *Synthyris* belongs, it might be taken as the type of a new genus; the other approaches *S. alpina*.

The placing of these two species in *Synthyris* necessitates a change in the generic characterization of the calyx. Instead of "calyx with four divisions" it must become "calyx with two, three, or four divisions." This difference in the number of calyx divisions arises probably from a union of parts not infrequent in other genera.

2. *Synthyris Ritteriana*, sp. nov.

PLATE IX, FIGS. 2a-2e.

Sparingly pubescent with short, scattered hairs; scape stout, nearly 3 dm. high, closely covered from the middle of the stem to the spike with foliaceous bracts: leaves radical, 8-10 cm. long, $3\frac{1}{2}$ cm. wide, oblong-elliptical, obtuse,

cuneate and decurrent at base, crenate; petioles stout, 8-12 cm. long; bracts of the scape alternate, $1\frac{1}{2}$ -2 $\frac{1}{2}$ cm. long, 10-18 mm. wide, ovate-acuminate, sessile by a subcordate base, crenate-dentate near the apex; floral bracts rhomboidal, acuminate, tapering at base to a short petiole which surpasses the pedicels: flowers white, erect on short pedicels in a spike 5 cm. long; calyx of three divisions varying in shape and size in flowers from the same spike, 4 mm. long, orbicular to obovate, entire, toothed or cleft, obtuse or acute, fringed with white hairs less dense and shorter than those on the preceding species; corolla of two divisions, surpassing the calyx by 2 mm.; upper part broadly obovate, acute, indistinctly spurred at base, ciliate; lower variously cleft with two to three lacinate, ciliate divisions; stamens with orbicular-ovate anthers 1 mm. broad and filaments inserted at the base of the corolla, surpassing it by 2 mm.; fruit unknown.

Collected by the writer in Cumberland Basin, La Plata Mountains, Aug., 1892. It grew in the alpine meadow where moisture was abundant. It is named in honor of Mr. and Mrs. B. W. Ritter of Durango, Colo., to whose kindness I owe the opportunity of visiting these mountains.

The plate shows the differences in the floral organs of the three species, all drawn to the same scale.

3. *Synthyris reflexa*, sp. nov.

PLATE IX, FIGS. 3a-3d.

Glaucous and somewhat viscid; scape erect, $1\frac{1}{2}$ -2 dm. high, clothed below the spike with broad, foliaceous bracts: leaves radical, 7 cm. long, elliptical-oblong, obtuse, truncate or cuneate at base, finely crenate, thin in texture; petiole 3-5 cm. long; bracts of the scape alternate, crowded, 2 $\frac{1}{2}$ cm. long, 2 cm. wide, sessile by a broad subcordate or truncate base, broadly ovate, acute, entire or serrulate near the apex, diminishing upwards; floral bracts ovate to linear, fringed with long white hairs: flowers greenish white, reflexed on pedicels 1 mm. long; calyx of two divisions 5 mm. in diameter, orbicular, fringed like the bracts; corolla of two parts united at base, the upper broad, somewhat hood-shaped, 5 mm. broad, 8 mm. long, sparingly fringed; the lower two-cleft 5 $\frac{1}{2}$ mm. long, 4 mm. wide, divisions lacinate, 2 mm. long; stamens two, anthers cordate, with cells not confluent, filaments inserted at the base of the corolla, surpassing it by 4 mm.; style shorter than the filaments, stigma capitate; fruit unknown.

Collected by the author in Kendall Basin, in the San Juan Mountains, near Silverton, Aug., 1890. It was quite rare.

This is the only *Synthyris* known to have reflexed flowers and two divisions to the calyx.

It is very doubtful if the genus *Synthyris* will stand in the future as it is now set forth in the Synoptical Flora; nor is it more certain that Professor Greene's transference of all the species to *Wulfenia* will be final.¹ In a group of genera so closely related and so polymorphous as those included under subtribe Veroniceæ in Bentham and Hooker's Genera Plantarum, botanists will always differ in regard to generic limits.

A difference in the arrangement of the leaves and habit of growth primarily separated *Wulfenia* from *Veronica*; the form of the corolla, the number of calyx divisions, the dehiscence of the anthers and the shape of the seeds separated *Synthyris* from *Wulfenia*. Professor Greene has shown the worthlessness of considering the number of calyx divisions as a generic character, and his position is reinforced by the two new species described in this paper and by two described under *Wulfenia* by Aven Nelson.² Professor Greene, however, does not give a diagnosis of *Wulfenia* nor tell why it, also, should not be included under *Veronica*.

If habit of growth is taken as a generic distinction, then *Synthyris* naturally falls into two genera, one containing *S. rotundifolia* and *S. reniformis*; the other, the remaining species and perhaps the original *Wulfenia*. If other characters are to be taken, many genera would result and the synonymy become much involved. It seems simplest to follow Bentham and Hooker and Gray and leave these uncertain problems to the future; so the new species of the Colorado mountains have been described as *Synthyris*.

¹ Erythea, Vol. II, p. 80.

² Torr. Bull., Vol. XXV, pp. 281, 282.

IV.—FURTHER OBSERVATIONS ON THE MANZANITAS OF MT. TAMALPAIS.

Since the publication of the article on the “Manzanitas of Mt. Tamalpais,”¹ I have been able to explore parts of the mountain and the neighboring hills hitherto unknown to me. Scarcely a week has passed that I have not spent Sunday on the hills of Marin County. As a result of these frequent visits and the new territory explored, new facts concerning the distribution, time of blooming, and characteristics of the different species of *Arctostaphylos* have been observed.

1. *Arctostaphylos nummularia* Gray.—This I have found only on Mt. Tamalpais proper. It does not seem to grow on the hills around Fairfax, where the Big Carson and the Little Carson Creeks take their rise, nor on the ridge between Bear Valley and Bolinas. It is abundant on the Boot-jack and Throckmorton Trails, also on the trail leading directly from Mill Valley up the mountain and on the trail from the Potrero to the head of Cataract Gulch. While well formed fruit can be found at almost any time of the year, ripe fruit is seldom seen and never persists as does the fruit of all the other species.

2. *Arctostaphylos canescens* Eastwood.—This, too, seems to be confined to Mt. Tamalpais and apparently grows only on the southern slope. It loves bleak, gravelly hillsides, where it often holds exclusive possession. On the Throckmorton Trail a few bushes are to be seen, a few more on the Bill Williams Trail; but on the West Point Trail it is abundant, adorning the slopes during the winter with its blooming bushes.

On November 7th, the first flowers were seen. The plants on the Throckmorton Trail were beginning to bloom. The delicate pink blossoms have their beauty much enhanced by the gray-green foliage. From this date until

See this Vol., p. 81.

February 20th, it was seen in bloom every Sunday. Well formed fruit was observed on the bushes on the Throckmorton Trail before those on the higher West Point Trail had ceased blooming. Some plants only a few inches high, easily pulled up by the roots, and with but one or two branches, were laden with blossoms. The number of these small plants indicates a species full of vigor, seeking new territory for habitation. The roots of the larger plants are spreading rather than deep and are easily pulled up. During May the berries become ripe, and before the other species show ripe fruit this has usually lost all its berries.

3. *Arctostaphylos glandulosa* Eastwood.—On December 19th the first plant of this species was found in bloom. It may have been blooming also elsewhere on the mountain; but two weeks earlier flowers were not seen on the plants near the foot of the Boot-jack Trail, where I have always found them first in bloom. On May 1st, fully grown fruit was observed on bushes on the Boot-jack Trail. This species is the most abundant, found everywhere on the slopes and ridges of Mt. Tamalpais and the Fairfax hills. I am still uncertain whether two species ought to be recognized where I have described but one or whether, with all its forms, it ought not to be considered a variety of *A. tomentosa*.

4. *Arctostaphylos montana* Eastwood.—This has a wide range in Marin County. It is usually found only on the uplands and is especially partial to the bluish gray volcanic areas. Wherever *Cupressus Goveniana* and *Quercus dumosa* var. *bullata* are to be found this also will be seen. Besides Mt. Tamalpais, it is found on the Fairfax hills, where it covers large sections of country, being the most abundant manzanita there. It was first seen in flower February twenty-second, on the trail to the source of the Big Carson. Only one bush was in bloom, situated in a warm and sheltered spot. On May 1st it was still blooming

on Mt. Tamalpais, but evidently nearing the end of its season. Having had an opportunity of examining fresh specimens of *A. Hookeri* in bloom, sent me from Monterey by Miss Marion Rouse, I am confirmed in my belief in the identity of this species as distinct from *A. Hookeri*. The flowers of the latter are much smaller, the leaves not so thick, and the fruit, as noted before, has much thinner pulp.

V.—TWO SPECIES OF ERIODICTYON HERETOFORE INCLUDED UNDER ERIODICTYON TOMENTOSUM.

The genus *Eriodictyon* was founded on *E. crassifolium*, collected near San Diego, Calif., and described by Benth in the Botany of the Sulphur, page 37. Previous to this, another species had been described and figured by Hooker and Arnott as *Wigandia Californica*.¹ In the Botany of the Sulphur, Benth transferred this to *Eriodictyon*, giving it the appropriate name *E. glutinosum*. It again suffered a change of name when Torrey² restored its earliest specific name, calling it *E. Californicum*.

Benth described still another species in the Botany of the Sulphur as *E. tomentosum*, differing from *E. crassifolium* in having pedunculate dense cymes, broader leaves, and very numerous, smaller flowers. This Dr. Torrey took as the type under which *E. crassifolium* should be included, and suppressed the former name, giving, as his reason, the numerous intermediates observed by Dr. Parry and himself around San Diego and elsewhere.

Gray accepted Torrey's view with the remark: "*E. crassifolium* Benth. was doubtless rightly united with this by Dr. Torrey, and this name should have been preferred, but the other is good and of the same date."³

Greene described a plant from Monterey County, Calif., collected by Mr. Brandegee in 1885, as true *E. tomentosum*, and restored the name *E. crassifolium* to the plant of Southern California.⁴

The attention of the writer was attracted to this puzzle by the rediscovery of Mr. Brandegee's plant near Jolon, in the San Antonio Valley, Monterey County, Calif. Truly it seemed that Professor Greene had solved the mystery; but to be certain, specimens of this from Monterey County and of the large flowered *E. crassifolium* from San Diego were sent to Kew for comparison with the types. The following

¹ Bot. Beech., Pl. LXXXVIII, p. 364.

² Bot. Mex. Bound. Sur., p. 148.

³ Proc. Am. Acad., Vol. X, p. 331.

⁴ Bull. Cal. Acad. Sci., Vol. I, p. 201.

reply was received: "*Eriodictyon crassifolium* and *E. tomentosum* are conspecific and your plant named *tomentosum* is apparently an undescribed species which we also possess from J. G. Lemmon without locality, and from G. R. Vasey, Monterey, 438, coll. July, 1880."

Since Lemmon, Vasey, and Brandegee have all passed through Jolon when on their way to the Santa Lucia Mountains in search of *Abies bracteata*, doubtless the region of the writer's collection of this species coincides with theirs and will be considered as the type locality of the new species.

1. *Eriodictyon niveum*, sp. nov.

PLATE X, FIGS. 3a-3d.

Densely white-tomentose or flavescent; stems three or four feet high, growing in clumps, very leafy below the inflorescence: leaves thick, elliptical-ovate or obovate, 4-6 cm. long, 1-3 cm. wide, entire or crenate, except on the cuneate base, apex acute or obtuse, lower surface reticulate-rugose, upper with veins scarcely discernible; petiole broad, 5-10 mm. long: panicle terminating a long, naked peduncle, compactly or widely branched, the stout branches varying much in length on different plants; cymes densely flowered, with the lower bracts obovate or spatulate, tapering to broad petioles, the upper oblanceolate to linear; flowers small, almost sessile; calyx equalling the corolla tube, divisions linear-subulate, densely clothed with white silky hairs; corolla white or tinged with lavender, 4 mm. long, urceolate, glandular-hirsute externally, glabrous within, tube furrowed longitudinally, slightly contracted under the five small spreading lobes; stamens with the free portion short, inserted below the throat, anthers oval, 1 mm. long; styles shorter than the sepals; capsules orbicular, obtusely 5-angled, tomentose, especially on the angles; seeds four or sometimes five, brown, minutely favose, variable in shape, often keeled, more than 1 mm. long.

Collected by the writer near Jolon, Monterey County, Calif., in flower June 1, 1893, and in fruit Sept. 22, 1894.

The following specimens, besides, are in the Herbarium of the Academy:—

Lobb, San Antonio Valley (date not given); T. S. Brandegee, Monterey County, 1885; Dr. Palmer, "Perhaps from Monterey County," 1876.

There is also a specimen without flowers or fruit collected by T. S. Brandegee at Zapato, Fresno County, Calif. The foliage and pubescence are exactly of this species.

2. *Eriodictyon Traskiæ*, sp. nov.

PLATE X, FIGS. 2a-2c.

Densely white-tomentose, except the dark-colored, glandular-hirsute calyx: leaves elliptical, 5 cm. long, 15 mm. wide, acute at apex, the base narrowed to a petiole 5mm. long, margins dentate except near the base, veins distinct on the lower surface, barely evident on the upper: panicle slightly surpassing the leaves, with branches spreading or curving upwards, rather slender, glandular and tomentose, bracts from elliptical with dentate margins to lanceolate or linear with margins entire; cymes densely flowered: flowers small, on pedicels 1 mm. or more in length; calyx divisions five, narrowly linear, not uniform in length, 4-5 mm. long; corolla purple, the tube equalling the calyx, 5 mm. long, contracted at base and throat, furrowed longitudinally, divisions of the limb irregularly orbicular, not uniform in size, glandular-hirsute externally as well as the upper part of the tube; stamens inserted half way down the tube, almost sessile; style branches glabrous, 1½ mm. long; ovary ovoid, glandular-hirsute; fruit unknown.

This was discovered May, 1897, on one volcanic upland on Santa Catalina Island, Calif., at an elevation of about 1500 feet, by Mrs. Blanche Trask, the indefatigable local botanist in whose honor it is named. Probably, this is the plant collected by Lyon on Santa Catalina, referred by Dr. Gray to *E. tomentosum*.¹ It approaches *E. niveum* but is undoubtedly a distinct species.

A plant slightly differing from the above was collected in the Santa Inez Mountains, Calif., by T. S. Brandegee, in 1888.

The peduncles are stout, with thicker and more spreading branches, leaves larger and coarser, pedicels much longer, 4 mm. long, while the filaments are short but distinctly evident, the corolla has the same shape, the lobes of the border being not quite so broad. As this, too, is in flower only and very young, comparisons of the fruit and seed cannot be made.

The plate shows the floral organs of *E. crassifolium* from San Diego, part of the collection sent to Kew, and also those of *E. niveum* and *E. Traskiæ*, all drawn to the same scale, five times the actual size.

¹ Suppl. Synop. Fl., p. 420.

VI.—NEW SPECIES OF PACIFIC COAST PLANTS.

1. *Campanula angustiflora*, sp. nov.

PLATE XI, FIGS. 2a-2c.

Annual, scabrous-hispid; stems slender, angled, 1-3 dm. high, branching diffusely from the base to the top with upwardly spreading branches: leaves sessile, ovate to orbicular, acuminate or acute, deeply dentate, 5-15 mm. long, 3-10 mm. wide: flowers axillary on stout, upwardly spreading peduncles, twice to four times the length of the flower; divisions of the calyx linear-subulate, almost equalling the corolla, connivent in fruit; corolla tubular, with five triangular lobes; stamens included, the anthers linear, longer than the thin, broadly triangular-subulate filaments; ovary obovoid, slightly constricted at the apex, ribbed; style short, thick, with three revolute stigma lobes; fruit strongly ribbed, irregularly humped with the three valves above the middle; seeds numerous, minute, shining, light brown, with a small darker spot at one end, 3-sided or keeled.

This has been included under *C. exigua* Rattan by Mrs. Brandegee, who first discovered it on Mt. Tamalpais, July 5, 1886, collecting it again in the same locality June, 1890, and July, 1893. She also found it on Mt. St. Helena, May to July, 1889.¹ It was rediscovered on Mt. Tamalpais by Mr. J. W. Congdon, and by the writer near the water tank at the head of the East Fork of Sequoia Cañon on the railroad track.

Besides the points of difference shown by the figures of the two species, there are differences in habit of growth and general appearance. *C. exigua* is lower, more slender, less branched, and with the branches divaricately spreading; the leaves are smaller and narrower, and almost hug the stem. The figures are drawn from a specimen collected by Volney Rattan on Mt. Diablo, Calif. It is probably part of the type. In the Herbarium of the Academy there are specimens from Mt. Hamilton, Calif., collected by W. W. Price, similar to those of the Mt. Diablo *Campanula*.

From Priest Valley in Monterey County, Calif., very young specimens of an annual *Campanula* were collected by the writer, May 12, 1893, resembling *C. angustiflora* in

¹ Zoe, Vol. I, p. 83.

habit of growth, shape of corolla, and character of stamens and style. The leaves are much narrower, and the calyx divisions vary in length in the same flower and surpass the corolla. This I leave under *C. angustiflora*, as these small annual *Campanulæ* may be more common than is now supposed and the two species may vary a good deal among themselves. Their season is short, they grow in out-of-the-way places, and they are inconspicuous; so the chances of their discovery and collection are small.

2. *Romneya trichocalyx*, sp. nov.

PLATE XI, FIGS. 4a-4c.

Perennial, glaucous and glabrous except for the scattered, spreading setæ on the peduncles, rhachis, petioles, and lower margins of the leaves; stems many, suffruticose, laxly spreading from the base as they grow older, leafy, branched: leaves rather thin, with conspicuous venation, ovate-orbicular in outline, variable in size and divisions, pinnately 3-5 parted, the lower divisions entire, toothed or lobed, the terminal larger, cuneate, 3-5 cleft; leaves on the peduncle closely surrounding the bud, much smaller, the divisions linear, narrower, more numerous, and more setose-ciliate; petioles flat, 5 mm. to 2 cm. long: calyx of three imbricated sepals covered with upwardly appressed, scabrous setæ, except near the margins and on the underlapping parts; corolla white, texture crape-like, 8-15 cm. in diameter, variable in the shape, size, and number of the petals; stamens numerous, with linear-oblong anthers and slender filaments, the lower half brownish purple, the upper yellow; styles 10-11, viscid, incurved; ovary ovoid, densely setose; capsule oblong-ovate, the walls breaking irregularly from the stout, straight ribs of the framework; seeds not seen.

This has long been included under *Romneya Coulteri*, from which it is most markedly distinguished by the setose calyx. There is no doubt of the plant with smooth calyx being true *R. Coulteri*, since the description and figure of the type confirm it.¹

Miss Kate E. Cole of Oakland first drew my attention to the fact that there were two kinds of *Romneya* in cultivation, describing the marked differences between them; but it was not until last fall when I myself saw the two kinds growing side by side in Golden Gate Park, San Francisco, that I began to look up the matter.

¹ Lond. Journ. Bot., Vol. IV, p. 75, Tab. III.

So far as I have been able to discover, there are but two plants of *R. trichocalyx* in the Park. Both grow back of the statue of Halleck where two paths meet. *R. Coulteri* grows there too; but the best specimen is to be found near the Haight St. entrance. It is also very abundant in other parts of the Park, being more desirable as a cultivated plant owing to its greater size and compact habit.

Taking the plants in the Park for comparison, supplemented by the specimens in the Herbarium of the California Academy of Sciences, the following are the points of differences:—

Habit.—*R. Coulteri* forms large, erect, close clumps, with many strong branches from along the stems. *R. trichocalyx* does not form close clumps because the stems as they grow tall have a tendency to lean over as if too weak to stand; they are more leafy, less branched, and neither so tall nor so stout.

Leaves.—The leaves of *R. Coulteri* are thicker in texture, with fewer and larger divisions, becoming simple on the peduncle but never growing close under the flower, thus leaving the upper part of the peduncle naked. The differences in the leaves, however, are not always to be depended on as the leaves of *R. trichocalyx* are so variable, often closely approaching those of *R. Coulteri*. The upper leaves of *R. trichocalyx* however always become more dissected on the peduncle and grow close under the flower.

Inflorescence.—The peduncles of *R. Coulteri* are stouter and more spreading than are those of *R. trichocalyx*.

Calyx.—*R. Coulteri* has a smooth calyx; that of *R. trichocalyx* is setose.

Corolla.—In the specimens in the park, *R. Coulteri* has larger flowers, with the texture less crape-like than in *R. trichocalyx*. We have specimens of the latter in the Herbarium with corollas fully as large as any of *R. Coulteri*.

Fruit.—When the walls of the capsule break away leaving the skeleton of the pod, the ribs of the pod of *R. Coulteri* are more slender, becoming attenuated towards the apex and convolute; those of *R. trichocalyx* are stouter, uniform, and do not twist around.

The figures show the differences in the buds and the leaves of the peduncle. They were drawn from fresh specimens from Golden Gate Park, smaller than ordinarily because they were the last of the season. Both species bore fruit, but as it did not ripen, I was unable to compare the seeds. The pods from which the comparison was made came from herbarium specimens.

The following specimens of each species are in the Herbarium of the California Academy of Sciences:—

- Romneya Coulteri*, Anaheim, July, 1885, M. K. Curran, (with fruit and buds).
 Baja California, W. G. Wright, (in flower).
 Golden Gate Park, San Francisco, (cultivated).
 Santiago Creek, near Orange, Orange Co., Calif., Miss Agnes Bowman, June, 1898, (with flowers and buds).
- Romneya trichocalyx*, Aliso, Baja Calif., T. S. Brandegee, May 30, 1893, (in flower and dry fruit).
 Sausal, Baja Calif., T. S. Brandegee, June 4, 1893, (in flower).
 Cañon de Gato, Baja Calif., T. S. Brandegee, June 5, 1893, (stem only).
 Near Temecula, Riverside Co., Calif., No. 393, S. B. Parish, Oct., 1882, (in flower).
 Matilija Cañon, Ventura Co., Calif., F. W. Hubby, May 18, 1895, (in flower).
 Santa Maria R., Santa Barbara Co., Calif., Mrs. Ida E. Blochman, (a bud only).
 Golden Gate Park, San Francisco, (cultivated).

3. *Sedum Congdoni*, sp. nov.

PLATE XI, FIGS. 5a-5d.

Stem 1-6 cm. high, simple or branched from near the base, with slender, erect, tortuous branches: leaves alternate, 2-4 mm. long, 1-2 mm. wide: very fleshy, ovate, obtuse, sessile, the place of insertion above the base; flowers yellow tinged with red, sessile in sparingly branched, few-flowered cymes terminating the branches; calyx with five short, broadly triangular divisions, acute and red-tipped; petals five, ovate-lanceolate, less than 2 mm. long, red at the apex; stamens ten, with thread-like filaments shorter than the petals; anthers kidney-shaped; ovaries five, tuberculate near the apex, 1-ovuled; styles curved outwards; fruit unknown.

This might be mistaken for *Sedum pumilum*, since both are small and have one-seeded follicles. The latter has much larger yellow flowers, linear-lanceolate petals, erect styles, and glabrous ovaries. The fringe of hairs at the suture of the follicle is much longer and finer in *S. pumilum* than in *S. Congdoni*. The former is farinose when young, becoming glabrous with age. The figures are designed to show the differences in regard to the petals and pistils of the two species.

This was discovered by Mr. J. W. Congdon, at Grant's Springs, Mariposa County, Calif., and collected April 9, 1898. It adds another to his namesakes in Mariposa County, appropriately associating his name with the flora which he has done so much to make known.

4. *Cercocarpus Traskiæ*, sp. nov.

PLATE XI, FIGS. 7a-7e.

Tree, 10 to 25 feet high; trunk 2 to 10 inches in diameter, 6 to 8 feet to the lowest branches; bark rough, grayish brown externally, reddish on the inside; upper branches covered with a thin, downy tomentum: leaves orbicular to oval, 2-6 cm. long, 1-5 cm wide, with obtuse or acute apex, subcordate, truncate, or cuneate base; margin revolute from deeply dentate to entire; upper surface dark green, glossy, glabrous, except the downy young leaves; lower surface densely white-tomentose, veins large and conspicuous on both sides; petiole stout, about 5 mm. long. Inflorescence androgynous, the polygamous flowers numerous in axillary umbels; calyx white-tomentose, with tube 1 cm. long and border 5-toothed, open campanulate, 5-8 mm. in diameter, glabrous within; stamens numerous, anthers tomentose, with two linear-oblong cells united only at the insertion of the slender filament; perfect flowers with stigmas curved like shepherd's crooks, style exserted; akenes 1 cm. long, linear-oblong, covered with upwardly appressed silky hairs, tipped by the circinate, persistent style, about 5 cm. long, clothed with long, fine, silky hairs spreading horizontally.

This, the most beautiful of the Pacific Coast *Cercocarpi*, was discovered by Mrs. Blanche Trask at the southern part of the island in a volcanic region known as "Salte Verde." It is a wild place, too rough for men on horses, with no trails but those made by the goats. Even in winter the heat is great. She writes as follows concerning the place and the trees: "There are about forty or fifty trees in an arroya so small that there is but room to squeeze through, a southern exposure where Ruin and Earthquake have passed and in whose footprints but few plants have dared to rise." The sea dashes at the base of this arroya, the walls of which rise to a height of from 100 to 500 feet. The trees are all isolated, not at all forming thickets.

That any one should have found a new tree on an island that so many botanists have visited is surprising; but it is due to the great enthusiasm, the wonderful power of

exploration, and the intense love for Santa Catalina Island and its flowers which Mrs. Trask possesses. It is with pleasure that I give her name to this tree.

Photographs of several of these trees taken recently by Mrs. Trask show them to have widely spreading branches and graceful habit, and to be well worthy of cultivation. The branches are abundantly adorned with rosettes of white tomentose flowers at all the leaf axils, the contrast of which against the dark, glossy green of the upper leaf surface is striking and beautiful. The same contrast occurs between the upper and lower surfaces of the leaves, the beauty of which is enhanced by the strong, even venation and revolute margins of the leaves.

This tree is unlike the other Pacific coast species and perhaps approaches *C. fothergilloides* H. B. K., the Mexican species, more nearly than any other. It seems to be a type of *Cercocarpus* isolated and distinct.

5. *Calochortus Purdyi*, sp. nov.

PLATE XI, FIGS. 8a-8f.

Glabrous and glaucous; stem 2-3 dm. high, rather stout, erect, branching, two to many-flowered, not bulbiferous at base: radical leaf solitary, sheathing the stem, linear-lanceolate, acuminate, 2 dm. long, 1 cm. wide, the upper surface bright green, the lower glaucous and ribbed with the filiform nerves; bracts foliaceous, lanceolate-acuminate, amplexicaul, upper ones opposite; pedicels equalling or slightly surpassing the bracts, erect in flower, recurved in fruit: flowers broadly open-campanulate; sepals from elliptical to narrowly ovate, abruptly acuminate, tinged with purple on the outer surface, purple-veined on the inner, two-thirds as long as the petals; petals broadly obovate-cuneate, acute or rounded at apex, creamy white or tinged with purple, bearded all over the inner surface with long hairs which are white on the upper half of the petals, purple on the lower, somewhat arched by the narrow, transverse, semicircular, conspicuous gland, the shallow pit of which is covered by a densely hairy narrow scale; anthers lanceolate, abruptly acuminate, cream color or purplish, shorter than the filaments, which broaden to the base; capsule 3 cm. long, 2 cm. wide, broadly elliptical, with the three thin wing-like valves transversely veined.

This belongs to the § *Eucalychortus* according to Watson's arrangement in the Botany of California. In habit it resembles *C. albus*, but in general is more like a giant *C.*

Maweanus. Its nearest relative is, however, *C. Tolmiei*, which belongs to the same region and from which it can readily be distinguished by the absence of the scale covering the gland of the latter. Most of the *C. Tolmiei* in herbaria is probably this species. It was compared with the original specimen of *C. Tolmiei* at Kew by J. G. Baker who says: "The Willamette plant differs a good deal from the original *C. Tolmiei*. *C. Tolmiei* has pale lilac petals bearded all over the face, no spot, no scale, no obtuse anthers." There is no true *C. Tolmiei* in the Herbarium of the Academy. We have specimens collected by Thos. Howell, from Grant's Pass, Oregon, from Prairies, Western Oregon, April 1881, and from Hillsboro, Oregon, May 1881, all marked *C. Tolmiei*, but each with a scale covering the gland and with flowers creamy rather than blue. It would seem as if the anthers were variable, since all of *C. Purdyi* that I have examined have acuminate anthers; but evidently the specimens sent to Kew had obtuse anthers.

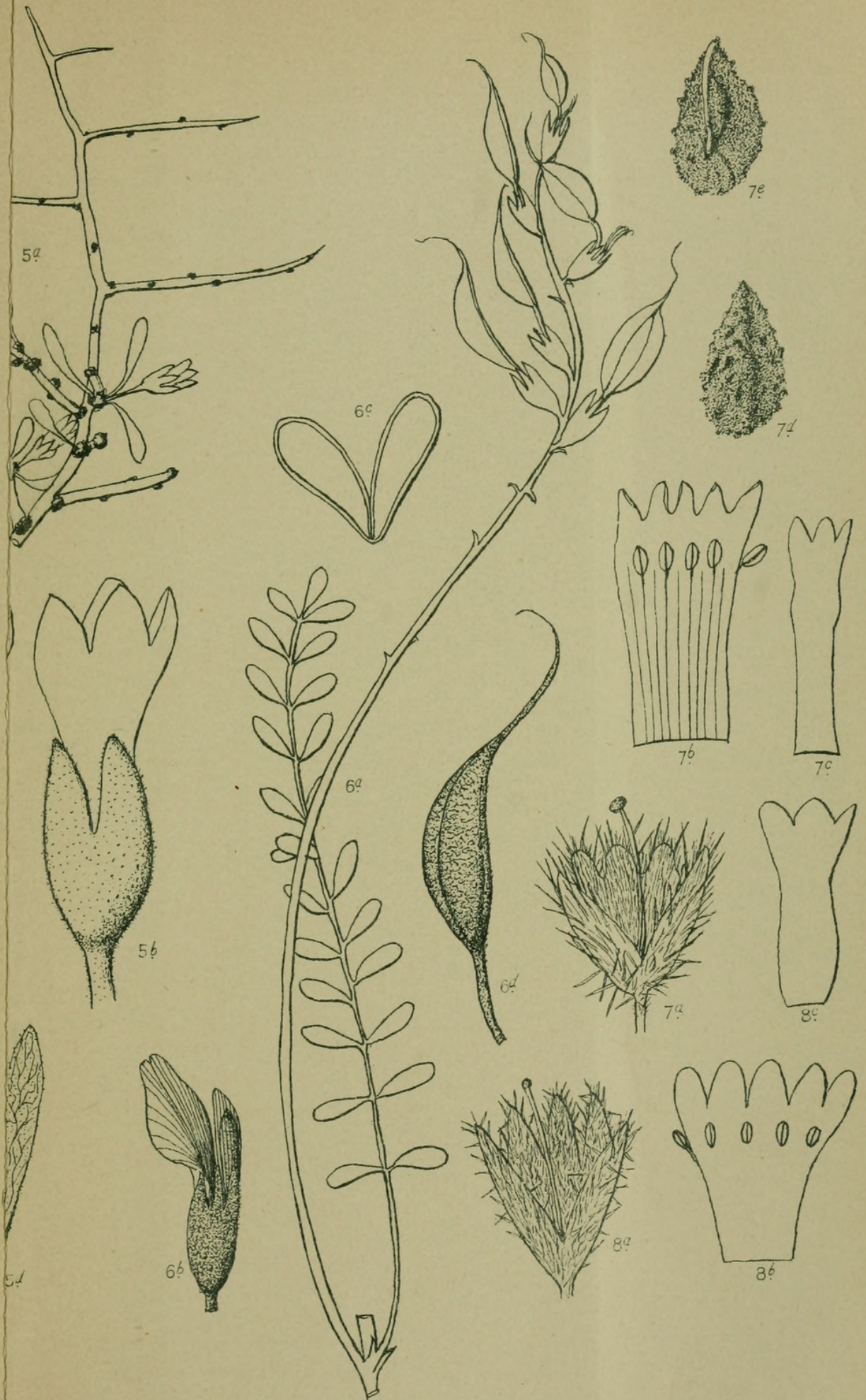
C. Purdyi grows in the Willamette Valley, in the foothills on dry gravelly soil. It is never found in shaded woods.

It is named in honor of Carl Purdy who knows *Calochorti* more intimately than anyone, and whose work on the genus in the garden, the field, and the study has accomplished so much towards determining the true specific limits in this difficult and variable genus.¹

¹ Since the above description was written and the drawings made, a beautiful figure of this species has appeared in "The Gardeners' Chronicle," Vol. I, 1898, p. 305, fig. 147. The flower is much larger than that of any specimen seen by me. It is not unusual, however, that plants have larger flowers under the more favorable surroundings that cultivation produces. It is a well known fact that Pacific coast species vary considerably in the size and vigor of individuals according to the amount of moisture and fertility of the soil.

EXPLANATION OF PLATE VIII.

- Fig. 1. *Peucedanum insulare*, sp. nov.
 a. and *b.* Parts of the same leaf, actual size.
 c. External view of carpels, magnified as shown in figure.
 d. Cross-section of a carpel, magnified as shown in figure.
- Fig. 2. *Hosackia venusta*, sp. nov.
 a. Calyx. *b.* Standard. *c.* Keel. *d.* Wing. Figures magnified 5 times.
- Fig. 3. *Hosackia argophylla* GRAY.
 a. Calyx. *b.* Standard. *c.* Keel. *d.* Wing. Figures magnified 5 times.
- Fig. 4. *Abronia alba*, sp. nov.
 a. Flower. *b.* Immature fruit. Figures magnified 5 times.
- Fig. 5. *Lycium verrucosum*, sp. nov.
 a. Tip of branch, actual size.
 b. Flower magnified 5 times.
 c. Interior of corolla showing the position of the stamens.
 d. Interior of the calyx showing the pistil.
- Fig. 6. *Astragalus Traskiae*, sp. nov.
 a. Fruiting branch, actual size.
 b. Flower, twice the actual size.
 c. Cross-section of the pod.
 d. Mature pod.
- Fig. 7. *Amsinckia St. Nicolai*, sp. nov.
 a. Calyx. *b.* Corolla spread open. *c.* Outline of corolla. *d.* and *e.* two views of the akene. Figures about 5 times the actual size.
- Fig. 8. *Amsinckia maritima*, sp. nov.
 a. Calyx. *b.* Corolla spread open. *c.* Outline of corolla. Enlarged as in fig. 7.



5. *AM SINCKIA* ST. NICOLAI, EASTWOOD.
6. *AM SINCKIA* MARITIMA, EASTWOOD.

7. *AM SINCKIA* ST. NICOLAI, EASTWOOD.
8. *AM SINCKIA* MARITIMA, EASTWOOD.



1. PEUCEDANUM INSULARE, EASTWOOD.

2. HOSACKIA VENUSTA, EASTWOOD.

3. HOSACKIA ARGOPHYLLA, GRAY.

4. ABRONIA ALBA, EASTWOOD.

5. LYCIUM VERRUCOSUM, EASTWOOD.

6. ASTRAGALUS TRASKIAE, EASTWOOD.

7. AMSINCKIA ST-NICOLAI, EASTWOOD.

8. AMSINCKIA MARITIMA, EASTWOOD.

EXPLANATION OF PLATE IX.

All parts of the flowers are 5 times actual size.

Fig. 1. *Synthyris alpina* GRAY.

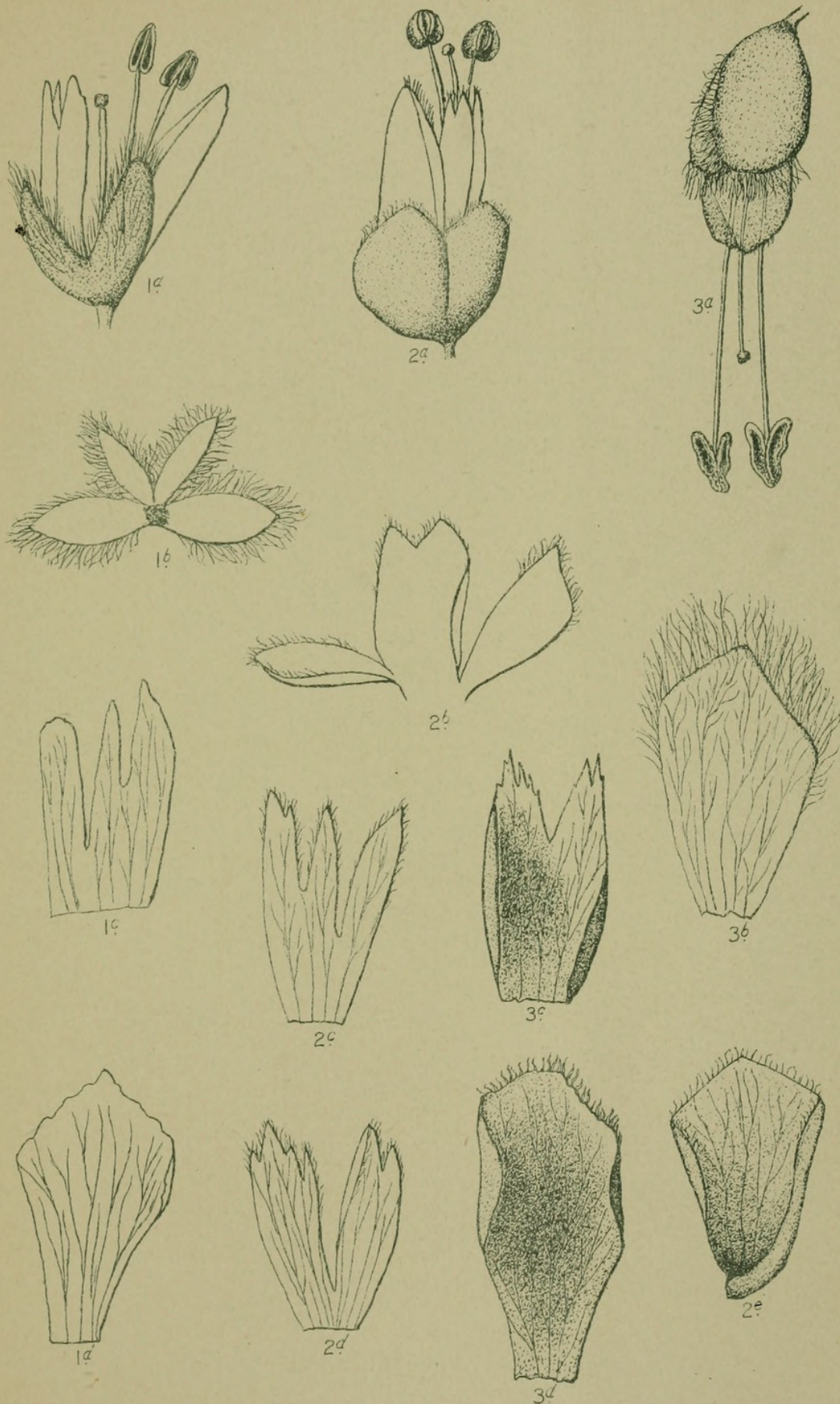
- a.* Flower.
- b.* Calyx.
- c.* Lower part of corolla.
- d.* Upper part of corolla.

Fig. 2. *Synthyris Ritteriana*, sp. nov.

- a.* Flower.
- b.* Calyx.
- c* and *d.* Lower part of two different corollas.
- e.* Upper part of corolla.

Fig. 3. *Synthyris reflexa*, sp. nov.

- a.* Flower.
- b.* One of the equal divisions of the calyx.
- c.* Lower part of corolla.
- d.* Upper part of corolla.



1. SYNTHYRIS ALPINA GRAY.

2 SYNTHYRIS RITTERIANA EASTWOOD.

3. SYNTHYRIS REFLEXA. EASTWOOD.

EXPLANATION OF PLATE X.

All figures are 5 times actual size.

Fig. 1. *Eriodictyon crassifolium* BENTHAM.

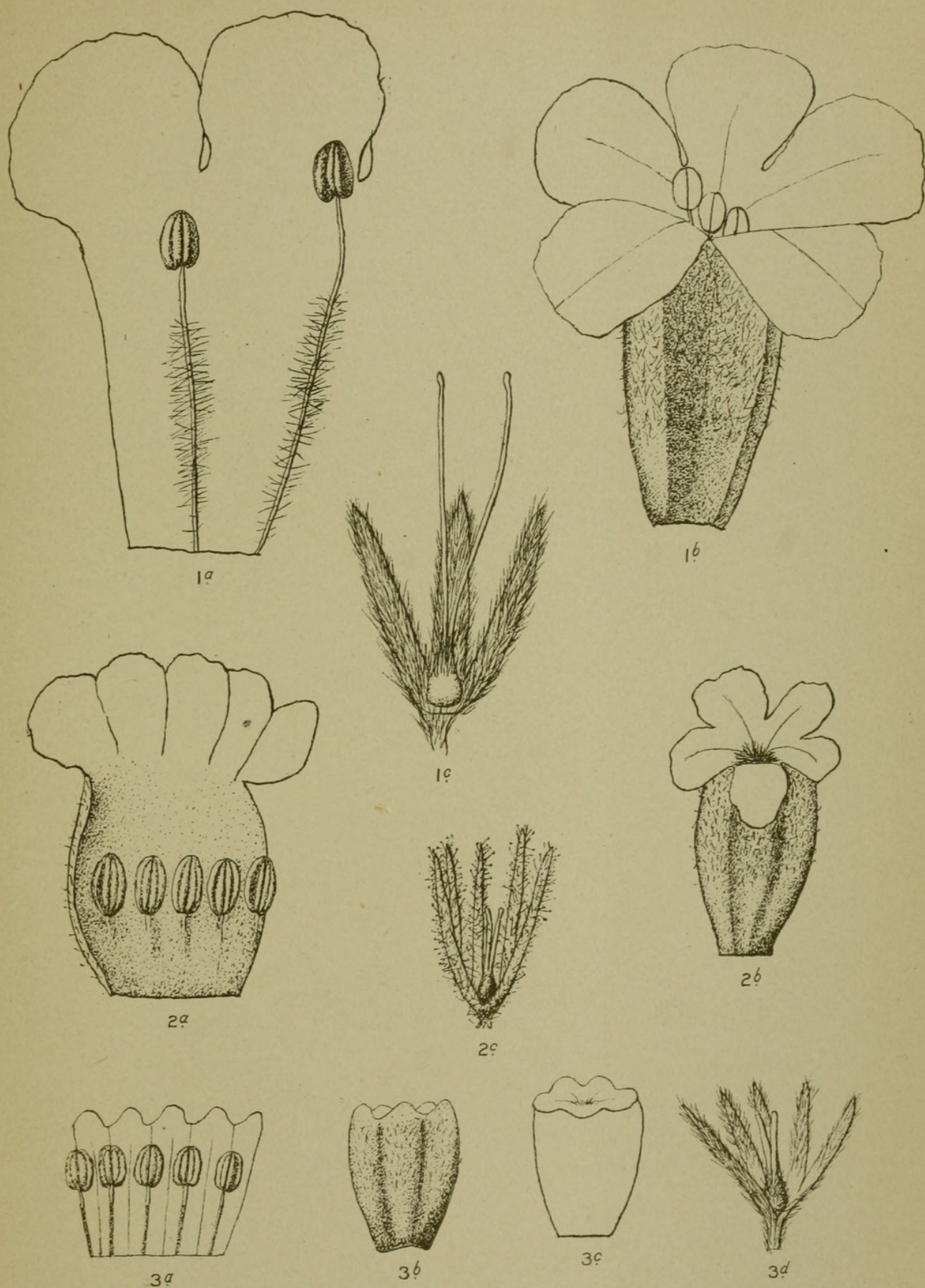
- a. Part of corolla showing the stamens.
- b. Corolla.
- c. Part of calyx showing the pistil.

Fig. 2. *Eriodictyon Traskiæ*, sp. nov.

- a. Interior of corolla showing the stamens.
- b. Corolla.
- c. Calyx spread open showing the pistil.

Fig. 3. *Eriodictyon niveum*, sp. nov.

- a. Interior of corolla showing the stamens.
- b. Corolla of a young flower.
- c. Corolla with lobes fully expanded.
- d. Calyx spread open showing the pistil.



1. ERIODICTYON CRASSIFOLIUM BENTHAM. 2. ERIODICTYON TRASKIAE EASTWOOD.
3. ERIODICTYON NIVEUM EASTWOOD.

EXPLANATION OF PLATE XI.

- Fig. 1. *Campanula exigua* RATTAN.
a, Flower fully expanded. b, Fruit. c, Pistil and stamen.
Figures 5 times actual size.
- Fig. 2. *Campanula angustiflora*, sp. nov.
a, Flower expanded. b, Corolla spread open. c, Fruit. d,
Pistil and stamen. Figures 5 times actual size.
- Fig. 3. *Romneya Coulteri* HARVEY.
a, Bud. b, Immature pod. Figures actual size.
- Fig. 4. *Romneya trichocalyx*, sp. nov.
a, Bud. b, Immature pod. c, Leaf. Figures actual size.
- Fig. 5. *Sedum Congdoni*, sp. nov.
a, Plant actual size. b, Flower. c, Follicle. d, Petal and stamen.
The flower and its parts enlarged 10 times.
- Fig. 6. *Sedum pumilum* BENTHAM.
a, Petal and stamen. b, Follicle. Enlarged 10 times.
- Fig. 7. *Cercocarpus Traskiæ*, sp. nov.
a. Tip of a twig, actual size.
b. One of the larger leaves, showing the lower surface.
c. Anther enlarged.
d. Fruit.
e. Flower.
- Fig. 8. *Calochortus Purdyi*, sp. nov.
a. Plant, actual size.
b. Petal.
c. Scale on petal enlarged.
d. Sepal.
e. Stamen enlarged.
f. Ripe pod.



1. *CAMPANULA EXIGUA* RATTAN.

2. *CAMPANULA ANGUSTIFLORA* EASTWOOD.

3. *ROMNEYA COULTERI* HARVEY.

4. *ROMNEYA TRICHCALYX* EASTWOOD.

5. *SEDUM CONGDONI* EASTWOOD.

6. *SEDUM PUMILUM* BENTHAM.

7. *CERCOCARPUS TRASKIAE* EASTWOOD.

8. *CALOCHORTUS PURDYI* EASTWOOD.

PHYCOLOGICAL MEMOIRS.

BY DE ALTON SAUNDERS.

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I.—SOME PACIFIC COAST ECTOCARPACEÆ.

Family ECTOCARPACEÆ *C. Ag.*

Ectocarpaceæ C. AG., Syst. Alg., XXX, 1824. Emend. Thur. Le Jol. List.
Alg. Mar. Cherb., 1863.

Plant body arising from a mass of creeping filaments or a disk-like mass of cells mostly monosiphonous, more or less branched; reproductive bodies of two kinds—plurilocular sporangia formed of numerous small, densely aggregated, linear, lanceolate, or ovoid cells; unilocular sporangia cuboidal or globose.

SYNOPSIS OF GENERA.

The basal part of the plant consisting of branching filaments.

The plurilocular sporangia intercalary with the cells of the vegetative filaments..... *Pylaiella*.

The plurilocular sporangia not intercalary.

Basal filaments mostly superficial..... *Ectocarpus*.

Basal filaments ramifying through the tissue of the infested plant
Streblonema.

The basal part of the plant consisting of a cellular, disk-like mass.

No paraphyses..... *Phycocelis*.

I. *Phycocelis* *Stræmf.*

Phycocelis STRÆMF., Not., III, 1888, 383.

Plant small epiphytic, the basal part consisting of one or two layers, more or less circular in outline, increasing by peripheral growth. Erect filaments present; unilocular sporangia and paraphyses unknown; plurilocular sporangia sessile or stout; zoosporal cells mostly erect in a single row.



Eastwood, Alice. 1898. "Studies in the Herbarium and the Field, II."
Proceedings of the California Academy of Sciences 1, 89–146.

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