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CHAS. G. YALE,
Recording Secretary.

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No. 1.

FEBRUARY, 1884.

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No. 1.

FEBRUARY, 1884.

SAN FRANCISCO, CAL.:
GEORGE SPAULDING & CO., Printers, 414 Clay Street

THE TYPES OF ALL THE SPECIES DESCRIBED HEREIN ARE DEPOSITED IN THE MUSEUM OF THE CALIFORNIA ACADEMY OF SCIENCES.

BULLETIN.

DESCRIPTION OF A NEW SPECIES OF SQUALIUS.

BY ROSA SMITH.

Squalius lemmoni.

Head, $3\frac{1}{2}$ ($4\frac{1}{3}$); depth, $3\frac{5}{6}$ ($4\frac{4}{5}$); length, $5\frac{1}{2}$ inches; D, 8; A, 8.

Body not much compressed, but rather slender; the dorsal and ventral outlines about equally arched. Head subconical, little compressed, nearly as wide as deep, and flat on top; maxillary oblique, reaching front of eye, lower jaw barely included; diameter of eye not quite equal to snout, $1\frac{1}{3}$ in interorbital space, $4\frac{1}{3}$ in head. Teeth, 2, 5—4, 2, with evident grinding surface on three in the greater row. Pseudobranchiæ present. Isthmus narrow.

Scales, 68. Lateral line decurved, but not strongly. Scales largest on sides anteriorly; much smaller on dorsal and ventral surfaces. Scales not very firm, a few rubbed off from each of the four examples studied. Insertion of dorsal fin very slightly behind ventrals, nearer snout than base of caudal. Pectorals, $1\frac{2}{3}$ in head; ventrals 2 in head, very nearly reaching vent. Depth of caudal peduncle 2 in its length.

Color generally smutty. Top of head, from tip of snout to occiput, evenly bluish black, sharply separating the head from the trunk; a median blackish streak from occiput to base of caudal, paler behind dorsal. A leaden band about as wide as eye from upper angle of opercle to base of caudal, running higher than the lateral line except at its posterior fourth, where it is upon the lateral line. Sides of head and body dusky from numerous dark punctulations. Below plain white from chin to insertion of anal. Fins all dusky. Peritoneum blackish.

Described from four specimens (the largest $5\frac{1}{2}$ inches long) collected in Arizona by Mr. J. G. Lemmon, for whom the species is named. These specimens have been donated by the collector to the California Academy of Sciences.

Mr. Lemmon states that he found these fishes in Rillitto Creek, a small stream of the Santa Catalina Mountains, seven miles north of Tucson, Arizona, and that the largest ones caught were about ten inches in length.

Academy of Sciences, San Francisco, Cal., December 1, 1883.

BOTANIC SECTION.

VEATCHIA nov. Gen. Anacardiacearum.

BY ASA GRAY.

Flores dioci: ♂ ignoti: ♀—Sepala 5, brevia, deltoideo-ovata; æstivatione subvalvata, immutata. Petala 5, ovato-oblonga, æstivatione imbricata; costa extus prominente carinata, evenia, scarioso-accrescentia, persistentia. Stamina sterilia 10, minuta, sed antherifera, sinubus disci pateræformis 10-crenulati inserta. Ovarium ovatum, sub-obliquum: styli 3, subulati: stigmata capitata. Ovulum funiculo elongato supra-basilari adscendente pendulum. Fructus immaturus utriculatus (corollam marcescentem haud superans), compressus, apice hinc exciso obliquus, pericarpio prorsus membranaceo haud alato. Frutex pinnatifolius; floribus parvis paniculatis rubellis vel (ut dicitur) laete rubris.

Veatchia Cedrosensis.

Foliis canescenti-puberulis; foliolis 3—5-jugis cum impari ovatis ovalibusque parvis (lin. 1—3-longis) integerrimis, vel obsolete paucidentatis, terminali quandoque trilobo;

pedicellis et ovario villosulis; petalis calyce plus duplo longioribus demum ¼-pollicaribus.—*Rhus Veatchiana*—Kellogg, in Proc. Cal. Acad. ii. 24. Cedros Island, Lower California. Dr. J. A. Veatch.

In his recent monograph, Prof. Engler suggests that this plant, judging from the figure, may be a Bursera. But no figure is given or referred to in our copy of the Proceedings of the California Academy, in which Dr. Kellogg, although describing it as a Rhus, thought it was closely allied to *Sapindaceæ*. An original specimen, kindly communicated by the California Academy, enables me to bring to view its real characters, and to found on it a new genus; the fruit of which (though quite immature) cannot be either drupaceous or samaroid, but is obviously utricular.

We may dedicate this genus to the memory of its discoverer, the first and perhaps still the only botanical explorer of Cedros Island. The genus *Veitchia* among the Palms need not stand in the way of this merited honor, for the two names, when Latinized, will differ in pronunciation as well as in orthography.

BY H. H. BEHR — A. KELLOGG.

Anemone Grayi, sp. nov.

Radice sarmentacea; foliis radicalibus ambitu reniformi trifidis, segmentis serratis; involucralibus ternatis, petiolo laminam folii superante, trifoliolatis, foliolo terminali trilobo, lateralibus sub-bilobis; omnibus grosse serratis; flore solitario, sepalis sub-senis, ovatis, utrinque glabris; achenia plurima, in capitulum globuliforme dense spissum collecta.

♃. Floret vere primo petalis ex-albo purpurascentibus in monte Tamalpais, prope Lagunitas.

Differt ab A. nemorosa et forma foliorum radicalium, et petiolo foliorum involucralium semper longiori quam in A. nemorosa, in qua dimidium folii involucralis nunquam superat; nec non numero acheniorum semper majori, quam in A. nemorosa.

Plantam gracilem amœnam in honorem viri illustrissimi Asa Gray, æque de Flora Californica ac de omni re herbaria bene meriti, nominaverimus.

NEW SPECIES OF CEDROS ISLAND PLANTS.

A. KELLOGG, M. D. COLLECTED BY D. J. A. VEATCH.

[Read before California Academy of Sciences June 4, 1877.]

Astragalus insularis.

Stem much branched from the crown of the caudex, branches ascending canescent with white appressed hairs on all parts except the calyx, on which they are blackish. Stem and branches striate, and by the decurrent petioles somewhat angled.

Leaflets 7 to 9 pairs, distant on long petioles slightly grooved, odd leaflet oblanceolate, stipules free, foliaceous triangular subulate-acuminate; leaflets lanceolate, mucronate-acute white appressed hairs above and beneath, petiolulate on short translucent points or articulations.

Flowers violet, blue, in sub-capitate racemes; racemes about as long as the leaves when in mature fruit.

Calyx teeth subulate, hirsute with blackish appressed hairs.

Legumes membranaceous, inflated, ovoid, keeled, apex ascending, stoutly acuminate or divergent-acute, about six-seeded, clustered at the pedicillate or stipitate point of the suture, short-hirsute with white appressed hairs, pods small ($\frac{1}{4}$ to $\frac{1}{2}$ an inch in length) on short stipes, at length somewhat reflexed.

Phacelia ixodes.

Perennial suberect, 1—2 feet high, hispid with shining spreading, often scabrous, rarely barbed or hooked hairs, intermixed with dense soft villi throughout, shorter hairs more or less viscid-glandular, chiefly above; appressed erect branching near the summit; leaves short petioled, 1—2 inches long or about $\frac{1}{3}$ the rachis, compound pinnate-pinnatified by 3—4 pairs below, and confluent bipinnatified by 3—9 lobes above, the lobes nerveless, obtuse, and unequally toothed; general outline broadly lanceolate, 4—6 inches long, 2—2½ wide, diminishing above, but never entire, nor lobes parallel or straight-veined; compound spikes densely thyrsoid-clustered, inflorescence unilaterally cymose and scorpoid, at length elongating into straightish secund spikelets, pedicels short, about 1 line long; calyx lobes spatulate, becoming about 6 lines long, hispid and hispid-ciliate glandular; corolla blueish to whitish, broadly bell-shaped or about 4 lines long, and somewhat broader, exceeding the calyx, border of 5 rounded lobes, appendages manifest between filaments enclosing their base, stamens and style exserted, filaments naked, attached to the base of the corolla, style, united to the middle, base hirsute; capsule oblong oval, 4 lines in length, 1—1½ lines broad, shorter than the calyx lobes, acute, hairy at the summit, many seeded—about 20; seeds equilaterally trianguloid, a little oblique at the free end, conspicuously or deeply pitted in longitudinal lines, ½ a line long.

NEW PLANTS OF THE PACIFIC COAST.

BY EDWARD LEE GREENE.

Sidalcea tenella.

Annual, very slender, nearly glabrous, a foot or two high and much branched; lower leaves not seen, those of the branches digitately 5—7 parted, the segments linear, entire; flowers pale rose-color, small, in loose, slender racemes; calyx 3 lines long, the lobes lanceolate, acuminate; carpels not hairy, alveolate-reticulate.

Collected in the gravelly bed of Little Chico Creek, Butte County, Cal., 1883, by Mrs. R. M. Austin. A peculiar species, the carpels rather alveolate roughened than reticulate.

Astragalus Rusbyi.

Minutely and very sparingly puberulent: stems slender and mostly simple, 2 feet high; stipules small and subulate; leaflets, 17—27, oblong, $\frac{1}{4}$—$\frac{1}{2}$ inch long; racemes virgate, long-peduncled, pedicels soon pendulous; calyx-teeth subulate, nearly as long as the tube; corolla yellowish, $\frac{1}{3}$ inch long; pod 2-celled, obcompressed, straight, linear-oblong, an inch long, narrowed to a stipe slightly exceeding the calyx. On Mt. Humphreys, in the northern part of Arizona, collected July 2, 1883, by Mr. H. H. Rusby.

The plant has the aspect of *A. filipes*, Dougl., but belongs to a different section of the genus, having its pods 2-celled and not compressed, but rather obcompressed.

Brickellia multiflora, Kellogg in herb.

Near *B. Californica*, but glabrous and glutinous; leaves ovate-lanceolate, 2 inches long, entire, strongly 3-nerved; heads small, $\frac{1}{3}$ inch long, 3—5 flowered, very numerous and closely condensed on the branches of the ample panicle. Remarkable for the small, few-flowered and exceedingly numerous heads.

The species was collected in King's River Cañon by Dr. Kellogg in 1866, and was named as above by him, but does not appear to have been published. A near relative of the common *B. Californica*, it is still a very distinct species.

Laphamia peninsularis.

Viscid pubescent; leaves broadly ovate, often slightly cordate, irregularly and doubly incised, 7—10 lines long, on petioles of an inch or more in length; heads solitary or in threes, on peduncles an inch long; involucres hemispherical, about 40-flowered, rays apparently white; akenes glabrous, linear, sharply quadrangular; pappus wanting.

The specimens show only the upper parts of the stem, with leaves and flowers. They are from Scammon's Lagoon, on the peninsula of Lower California, and thus the range of the genus is extended still farther westward. The name of the collector is unknown.

Wyethia reticulata.

Near *W. ovata*, green and shining, scabrous but not pubescent; stems 2 feet high, mostly simple, rigid but slender, leafy to the summit: leaves broadly ovate, often somewhat cordate, acute, 3—5 inches long, on petioles an inch in length, scabrous above, strongly veined and reticulated beneath, in texture coriaceous: heads small, terminating the stem and its few corymbose branches: involucral scales broadly lanceolate, more or less spreading: akenes 3 lines long, glabrous, and bearing for a pappus a very short, lacerate-toothed crown, without awns.

Collected on Sweetwater Creek, in El Dorado County, Cal., July, 1883, by our most zealous and successful Mrs. Kate Layne Curran.

Mimulus barbatus.

Annual, glandular puberulent, an inch high and much branched: leaves oblong: pedicels, 4—8 lines long, exceeding the leaves: calyx-teeth broadly triangular-ovate, mucronate-tipped, nearly or quite equal and spreading: corolla yellow, the very slender tube nearly twice as long as the calyx, the limb ample, the lower lip strongly and conspicuously bearded, the upper less so.

A very dwarf species, probably of the *Eunanus* section, though the flowers are conspicuously pedicellate. The densely bearded corolla is a marked peculiarity. There is but a single specimen known, and that exists in the herbarium without date or locality or name of collector.

Mimulus mephiticus.

Near *M. nanus*, but only an inch or two high and very slender; lowest leaves ovate, the upper from oblong to lanceolate; teeth of the calyx triangular-lanceolate; corolla yellow, the tube very narrow and much exceeding the calyx, the limb ample and broad.

Collected on Cloud's Rest, Yosemite, June, 1883, by that jealous guardian of Yosemite, Mr. J. M. Hutchings; also, perhaps, by others who may have referred it to *M. nanus*, from which it differs in the shape of the calyx-teeth, the form and color of the corolla, and the very offensive, skunky odor which is exhaled by the glandular herbage.

Mimulus moniliformis.

Near *M. moschatus*, wholly scentless, villous but scarcely viscid, 3—8 inches high from a perennial root, with subterranean shoots bearing moniliform strings of small tubers: leaves oblong-ovate, an inch long, on short petioles: calyx-teeth short and nearly equal: corolla an inch long, the tube with a pair of conspicuous folds beneath on the outside; the limb only slightly irregular, yellow, often with a copper-colored center: seeds broadly ovate, reddish without obvious markings.

Common in the higher Sierras, often collected and heretofore referred to *M. moschatus*, from which it is very distinct. It grows among rocks on dry ground; not in wet places.

Polemonium pectinatum.

Inflorescence rather densely viscid-pubescent, the stem and leaves glabrous; stems clustered, a foot or more high, slender, leafy to the summit; leaflets linear, filiform, an inch long, in about five pairs; flowers corymbose-cymose; calyx cleft beyond the middle, corolla a half inch broad, white or cream-colored. seeds wingless. Collected in the eastern part of Washington Territory, in June, 1882, by Prof. E. W. Hilgard.

A species related to *P. foliosissimum*, Gray, of the Colorado Mountains, or still nearer *P. flavum*, Greene of New Mexico.

Gilia hetorodoxa.

Near *G. viscidula*, but slender and more branching, and extremely viscid: cauline leaves thin, acerose-pinnatifid; the the floral ones, broadly ovate, not much cleft, hardly spinescent; tube of corolla, very slender and not exceeding the calyx-lobes, the limb broad: stamens exserted and strongly declined; seeds small, 4–5 in each cell.

Hills west of Calistoga, Napa County, collected by the writer in June, 1881, and again in August, 1883.

Intermediate between *G. filicaulis* and *G. viscidula*, the species, is, nevertheless, an uncommonly well marked one, being much more viscid than either of its near relatives, having a shorter tube and broader limb to its corolla, and producing from four to five or more seeds in each cell, whereas neither of the others aboved named has more than two, usually only one. Its stamens are as strongly declined as in any *Polemonium*, in which respect it is a most peculiar member of the *Navarretia* section of the genus.

Eriogonum arborescens.

Shrubby and stout, several feet high, with a stem 3—4 inches thick; leaves crowded at the ends of the numerous branchlets, coriaceous, linear-oblong, an inch or more long, strongly revolute, white tomentose beneath, glabrate above: peduncles stout and rigid, naked, six inches long, bearing an ample compound cyme: flowers small, rose-colored, the lower outside portion densely white-villous.

Probably the largest species of the genus; very strongly marked, but little known. The specimens were brought from Santa Cruz Island by Messrs. Kellogg and Harford in 1874.

Sparganium Californicum.

Erect, rather slender, 3—9 feet high, with branching inflorescence; leaves flat and thin; heads 4—10: fruit sessile, wedge-shaped, many angled, 3—4 lines long, with a broad, nearly hemispherical summit, tipped with the short style.

First observed by Dr. C. C. Parry and the writer, in June, 1881, in a swampy place in the western portion of the village of Calistoga; occurring also in the tules near Sacramento, and at West Oakland formerly, on ground now occupied by the Judson Iron Works.

It is, perhaps, too near *S. eurycarpum*, Engelm. of the Atlantic Coast, but is twice as large, its herbage of softer texture, its branches less angular, and its fruits have a rounded (not depressed or flattened) summit.

NEW SPECIES OF CALIFORNIAN PLANTS.

BY MARY K. CURRAN.

Boisduvalia cleistogama.

Puberulent, or sometimes nearly glabrous, simple or branching from the base, 4—9 inches high: leaves linear to linear-lanceolate, slightly narrowed at the base, 1—2 inches long, sparingly serrate: flowers rather loosely spicate, 1—2 lines long: rose color, the earlier ones fertilized in the bud and never expanding: capsule coriaceous, 4-angled, curving outward from the stem; partitions adherent to the valves: seeds numerous in two rows, minute.

Collected by the writer—the smooth form near Mt. Diablo in May, the pubescent one near Elmira, in the strip of wild land bordering the railway, in August, 1883.

Gilia (Dactylophyllum) Harknessii.

Erect diffuse, 3—10 inches high, nearly glabrous: leaves divided to the base into filiform segments, 3—10 lines long: flowers paniculate; pedicels filiform, 6—12 lines long; calyx minutely pubescent; corolla white, 1—2 lines long, tube equaling the lobes: capsule oval, exceeding the calyx; ovules solitary: seeds turgid, oblong, smooth, a line long, one in each cell.

Collected by Dr. Harkness, at the summit of the Sierra Nevada, August, 1883. Differs from all other species of the section by its solitary ovules.

Acanthomintha lanceolata.

Annual, branching from the base, about a foot high, pubescent, and the leaves and bracts ciliate: leaves lanceolate, few-toothed, an inch long; petiole slender, shorter than the lamina: axils nearly all floriferous: bracts two in each axil: oblong oval, coriaceous, with callous margin, the midrib, and usually three pairs of lateral ribs terminating in strong prickles; each pair of bracts subtending 10—15 sessile flowers: calyx exceeding the bracts: corolla rose color, about an inch long, tube exceeding the calyx, bilabiate: upper lip pubescent externally, two-lobed, the lobes oblong; lower lip broader, three-lobed; middle lobe oblong, longer than the outer triangular ones, all entire.

Collected (a single specimen) by Mr. E. Brooks, in Calaveras Valley, Alameda County, June, 1878.

MICROSCOPIC SECTION.

FUNGI OF THE PACIFIC COAST.

BY M. C. COOKE, M. A., AND H. W. HARKNESS, M. D.

Since the publication of the Catalogue of Fungi, under the auspices of the Academy, three years ago, the ninety-one following new species have been described and published in Grevillea, a London journal devoted to cryptogamic botany, and only the name, habitat and locality given here as a record of California species:

1. **Corticium pactolinum.**

On naked wood of Quercus, Healdsburg, May. 1521.

2. **Macroplodia asterina.**

On leaves of Madroño (Arbutus Menziesii), Corte Madera, April. 1317.

3. **Macroplodia ovalis.**
On Locust twigs, Woodland, May. 1589.

4. **Chætophoma atriella.**
On bark of Acer macrophyllum, Healdsburg, May. 1549.

5. **Phoma capsularum.**
On legumes of Robinia, San Rafael, April. 1448.

6. **Phoma eucalypti.**
On inner bark of Eucalyptus globulus, San Rafael, April, 1476.

7. **Phoma Hosackiæ.**
On stems of Hosackia glabra, San Francisco April. 1424.

8. **Phoma librincola.**
On liber of Acacia, San Rafael, April. 1444.

9. **Phoma pini.**
On bark of Coniferæ, Healdsburg, May. 1548.

10. **Phoma xylostei.**
On twigs of Lonicera hispidula, Healdsburg, May. 1551.

11. **Septoria helianthicola.**
On stems of Helianthus, Kearney Junction, May. 1600.

12. **Phyllosticta Garryæ.**
On living leaves of Garrya elliptica, Sausalito, April, 1294.

13. **Phyllosticta heteromeles.**
On living leaves of Heteromeles arbutifolia, Sausalito, April. 1296.

14. **Phyllosticta innumera.**
On living leaves of Fraxinus Oregana, Tamalpais, September. 1184.

15. **Vermicularia sub-glabra.**
On stems of Helianthus, Kearney Junction, May. 1599.

16. **Hypocenia herbarum.**
On stems of Aster, Tamalpais, April. 1373.

17. **Asteroma dianthi.**
On leaves and stems of Dianthus, San Rafael, April. 1451.

18. **Ceuthospora brevispora.**
On leaves of Heteromeles arbutifolia, Sausalito, April. 1296.

19. **Cryptosporium ceuthosporoides.**
On dead leaves of Eucalyptus, San Francisco, January. 2005.

20. **Cryptosporium eucalypti.**
On twigs of Eucalyptus globulus, San Fiancisco, April. 1286.

21. **Cryptosporium falcatum.**
On leaves of Arctostaphylos, pungens Tamalpais, April. 1470.

22. **Cryptosporium punctiforme.**
On leaves of Arbutus Menziesii, Corte Madera, April. 1317.

23. **Discella olivacea.**
On stems of nettle, San Francisco, April. 1325.

24. **Discella tenuispora:**
On Juncus, San Francisco, April. 1301.

25. **Sphæropsis amenti.**
On catkins of Alnus, Tamalpais, April. 1375.

26. **Sphæropsis maculæforme.**
On leaves of Arbutus Menziesii, Corte Madera, April. 1318.

27. **Glæosporium leguminis.**
On legumes of Robinia, Sacramento, March. 1203.

28. **Sphæronema eucalypti.**
On bark of Eucalyptus, San Francisco, February. 2145.

29. **Melanconium globosum.**
On twigs of Eucalyptus, San Francisco, January. 2041.

HARKNESSIA GEN. NOV. COOKE.

30. **Harknessia eucalypti.**
On leaves and twigs of Eucalyptus globulus, San Francisco, November—May. 1280.

31. **Diplodia cyparissa.**
On Cupressus macrocarpus, San Francisco, April. 1269.

32. **Diplodia eucalypti.**
On bark of Eucalyptus, Palo Alto, March. 2000.

33. **Diplodia extensa.**
On Acer macrophyllum, Healdsburg, May. 1492.

34. **Diplodia laurina.**
On leaves of Umbellularia Californica, Martinez, April, 1302.

35. **Diplodia lupini.**
On stems of Lupinus arboreus, San Francisco, April. 1308.

36. **Diplodia maculata.**
On living leaves of Madroño, Tamalpais, January. 1316.

37. **Diplodia microscopica.**
On stems of Scrophularia, Californica, San Francisco, 1267.

38. **Diplodia periglandis.**
On acorns, San Francisco, February–April. 1433.

39. **Diplodia phyllodiæ.**
On phyllodia of Acacia, San Francisco, April. 1251.

40. **Diplodia rhuina.**
On stems of Rhus diversiloba, San Francisco, July. 1328.

41. **Diplodia sedicola.**
On Sedum, Tamalpais, April. 1408.

42. **Diplodia symphoricarpi.**
On Symphoricarpus racemosus, Tamalpais, March. 1361.

43. **Diplodia tenuis.**
On decayed bark of Eucalyptus, San Francisco, February. 2195.

44. **Hendersonia eucalypti.**
On twigs of Eucalyptus, San Francisco, February. 2200.

45. **Hendersonia corynoidea.**
On branches of Eucalyptus, San Francisco, January. 2012.

46. **Hendersonia galiorum.**

On stems of Galium, Tamalpais, April. 1389.

47. **Hendersonia lupini.**

On Lupinus Chamissonis, San Francisco. 1431.

48. **Dichomera compositarum.**

On stems of Achillea and Artemisia, San Francisco, April. 1238.

49. **Dichomera phaceliæ.**

On stems of Phacelia, San Francisco, April. 1427.

50. **Dichomera rhuina.**

On stems of Rhus diversiloba, San Francisco, April. 1327.

51. **Dichomera viticola.**

On Vitis Californica, Healdsburg, April. 1489.

52. **Torula glutinosa.**

On living leaves of Eriodictyon glutinosum (Yerba Santa) Coast Range, Autumn. 1442.

53. **Coleosporium baccharidis.**

On branches of Baccharis pilularis, Martinez, November, April. 1257.

54. **Fusidium albo-carneum.**

On dead leaves of Eucalyptus, San Francisco, January. 2027.

55. **Fusarium eucalyptorum.**

On bark of Eucalyptus, San Francisco, January. 1021.

56. **Fusarium gallinaceum.**

On chicken feathers, Sausalito, April. 1292.

57. **Fusarium mesentericum.**

On bark of Eucalyptus, San Francisco, January. 2020.

58. **Volutella coronata.**

On twigs of Eucalyptus, San Rafael, January. 1984.

59. **Tubercularia eucalypti.**

On dead leaves of Eucalyptus, San Francisco, January. 2040.

60. **Macrosporium culmorum.**

On culms of maize, Sacramento, March. 1200.

61. **Septosporium scyphophorum.**

On bark of Eucalyptus, San Francisco, January. 2019.

62. **Menispora hyalina.**

On dead wood of Eucalyptus, San Francisco, February. 2159.

63. **Monilia virido-flava.**

On dead leaves and twigs of Eucalyptus, San Francisco, February. 2163.

64. **Polyactis fusca.**

On twigs of Eucalyptus, San Francisco, January. 2028.

65. **Trichægum opacum.**

On wood of Acer macrophyllum, Healdsburg, May. 1556.

66. **Leotia ochro-leuca.**

On damp ground, San Rafael, March, 1371.

67. **Peziza (Mollisia) carneo-rosea.**

On twigs of Eucalyptus, San Francisco, February. 2164.

68. **Dermatea eucalypti.**

On Eucalyptus bark, San Francisco, February. 2148.

69. **Ascomyces fulgens.**

On living leaves of Arctostaphylos pungens, Healdsburg, May. 1513.

70. **Diatrype eucalypti.**

On branches of Eucalyptus globulus, San Francisco, April. 1419.

71. **Diatrype prominens.**

On branches of Mimulus glutinosus and Arbutus Menziesii, Healdsburg, April. 1321.

72. **Valsa eucalypti.**

On twigs of Eucalyptus globulus, San Francisco, April. 1287.

73. **Disporthe Æsculi.**

On Æsculus Californica, San Rafael, April. 1463.

74. **Disporthe phaceliæ.**

On stems of Phacelia Douglasii, San Francisco, April. 1347.

75. **Gibbera ficini.**

On bark of Ficus, San Rafael, April. 1472.

76. **Dothidea corylina.**

On twigs of Corylus rostrata, San Rafael, April. 1381.

77. **Dothidea rugo-disca.**

On leaves of Madroño (Arbutus Menziesii), Healdsburg, April. 1528.

78. **Dothidea sequoiæ.**

On foliage of Libocedrus decurrens, Alta, November. 1182.

79. **Sphæria acuum.**

On leaves of Pinus insignis, San Francisco, April. 1349.

80. **Sphæria anisometra.**

On dead twigs of Mimulus glutinosus Cupressus macrocarpus, Eucalyptus globulus, Acer macrophyllum, Rubus ursinus, Cornus pubescens, Dracæna, and on legumes of Robinia. 1445.

81. **Sphæria epipteridis.**

On stems of Pteris aquilina, Sausalito, April. 1288.

82. **Sphæria (Pleospora) labiatarum.**

On stems of Marrubium vulgare, Healdsburg, April. 1480.

83. **Sphæria (Pleospora) vitrispora.**

On Lonicera hispidula, Sausalito, February. 1311.

84. **Sphærella acaciæ.**

On leaves of Acacia, San Francisco, April. 1415

85. **Sphærella araliæ.**

On stems of Aralia Californica, Sausalito, April. 1246.

86. **Sphærella dendromeconis.**

On stems of Dendromicon rigidum, Tamalpais, April. 1386.

87. **Sphærella dryophila.**

On leaves of Quercus agrifolia, San Rafael, April. 1471.

88. **Sphærella Harknessii** (Cooke) **Sacc.**

On stems of Convolvulus, Tamalpais, April. 1386.

89. **Sphærella Hosackiæ.**

On stems of Hosackia glabra, Tamalpais, April. 1395.

90. **Asterina anomala.**

On living leaves of Umbellularia, Californica, San Rafael, April. 1461.

91. **Polyporus leucospongia.**

On logs of Pinus Contorta. 1012.

The two following species, by J. B. Ellis and H. W. Harkness, have been published in Bulletin of the Torrey Club, VIII, 5.

1. **Mytilidion Californicum.**

On Sequoia gigantea, Mariposa Big Tree Grove.

2. **Sphæria consociata.**

Same habitat and locality.

FUNGI OF CALIFORNIA.

BY WILLIAM PHILLIPS, F. L. S., AND H. W. HARKNESS, M. D.

The following species of fungi, mainly belonging to the *Discomycetes*, were collected in California during the year 1882.

Peziza (Dasyscypha) tautilla.

Scattered, stipitate, minute, white, cup-shaped, clothed to the base with slender hyaline hairs; asci broadly clavate, sporidia eight, ovate, .004 × .001 mm.; paraphyses slender, filiform.

Growing on the tomentum on the under side of living leaves of *Garrya elliptica*. 3167.

This resembles in size and habit *Peziza epitephra* B. & Br., but is more decidedly hairy, and devoid of the granules observed on the cup of that species.

Peziza (Dasyscypha) labrosa.

Scattered, sessile, olive-brown, clothed with short brown septate hairs, margin involute; hymenium pale yellow; asci cylindraceo-clavate; sporidia eight, ovate, .01—.014 × .003—.006 mm.; paraphyses linear, stout, septate.

On both sides of dead leaves of *Arctostaphylos pungens*. 3226.

Cups 1 mm. diameter, when dry nearly black and much compressed. Somewhat like *P. Godroniana*.

Peziza (Hymenoscypha) sphærophoroides.

Very minute, scattered, stipitate, subturbinate, glabrous, horny, fuliginous; disc at first plane, then slightly depressed, immarginate; asci broadly clavate; sporidia eight, cymbiform, with a large central nucleus, .014—.019 × .006 mm.; paraphyses 0.

On the under side of dead leaves of *Sequoia sempervirens*. 3170.

It resembles outwardly a *Sphœnophoron*.

Peziza (Hymenoscypha) eschscholtziæ.

Scattered, shortly stipitate, cyathiform, cinereous, pruinose; margin torn, disc same color; asci cylindrical, sporidia fusiform, nucleus at each extremity, .01 × .002 mm., paraphyses not seen.

On dead stems of *Eschscholtzia Californica*. 2615.

½ to ¾ mm. across.

Peziza (Mollisia) atrata, **P. var. liliaceara.**

Minute, scattered, erumpent, nearly black, shining; asci cylindrical; sporidia eight, narrowly elliptical, obtuse; paraphyses not seen.

On dead stems of *Lilium pardolinum*. 3155.

Peziza (Mollisia) subcornea.

Scattered or crowded, sessile, patellate, reddish horn-color; margin thick, even; asci clavate; sporidia eight, biseriate, oblongo-fusiform, spuriously uniseptate, .01—.012 × .003 mm.; paraphyses filiform, slender.

On dead branches of *Eucalyptus globulus*. 2705.

Varies in size from ½ to 1 mm. across, and in the old individuals, there is a tendency to coalesce and become very irregular in outline.

Peziza (Mollisia) nigritella.

Minute, scattered, sessile, spherical, then patelliform, blackish, margin serrated; asci broad, clavate, sporidia eight, ovate, constricted in the center, two nuclei; .015 × .006 mm.; paraphyses 0.

On dead stems of *Galium boreale*. 3185.

This has at first the semblance of a *Sphæria*.

Peziza (Mollisia) emergens.

Scattered, erumpent, when dry compressed, blackish-brown; margin involute, striate; disc bluish-gray; paraphyses clavate-cylindrical; sporidia eight, ovate, .007—.009 × .003—.004 mm.; paraphyses slender, thickened at the summits.

On the under side of dead leaves of *Eucalyptus globulus*, raising the epidermis of the leaf. It has the habit of *P. protusa*, B. Cups .5 mm. across. 3186.

Calloria myriospora.

Minute, scattered, erumpent, convex, immarginate, pale rose red; asci clavate; sporidia excessively minute, innumerable; paraphyses slender, abundant.

On dead stems of *Psoralea macrostachya*. 2779.

Calloria eucalypti.

Minute, scattered, patellate, reddish flesh-color; margin paler, glabrous; asci cylindrical; sporidia ovate-elliptical, .007 × .0035 mm.; paraphyses filiform with pyriform summits.

On decorticated wood of *Eucalyptus globulus*.

2872.

Belonidium fuscum.

Scattered, stem short, stout; cup sooty-brown, perpendicularly striate; disc same color; asci broadly clavate, pointed at the summit; sporidia eight, oblong or oblongo-fusiform, straight or slightly curved, with one to three septa, .015—.02 × 084—.006 mm.; paraphyses filiform, stoutish, branched.

On dead stems of *Sanicula Menziesii*. 3163.

Phillipsiella nigella.

Scattered, punctiform, grayish-black: disc same color; asci clavate; sporidia eight, oblong, obtuse at the ends, constricted in the center, uniseptate; .01—.015 × .003—.005 mm.

On the under side of dead leaves of *Quercus agrifolia*.

3198.

Differs from *Phillipsiella atra*, Cooke, of which it may be only a form, mainly in the sporidia. Cups .1 mm. in diameter.

Phillipsiella purpurea.

Scattered, punctiform, black, purple within; asci broadly clavate; sporidia fusiform, slightly curved, acuminate, 3-septate, .02 × .005 mm.; paraphyses branching repeatedly, curved at the tips.

On the under side of leaves of *Garrya elliptica*. 3145.

Helotium furfuraceum.

Scattered, minute, shortly stipitate or sessile, cyathiform, alutaceous, furfuraceous; asci clavate; sporidia 8, oblongo-elliptic, slightly curved, two nuclei, sometimes three; .015 × .005 mm.; paraphyses 0.

On the under side of dead leaves of *Quercus agrifolia*. 3171.

Boudiera marginata.

Crowded, at first orbicular, then patelliform, with a serrated margin, dull-ochraceous; asci broadly clavate, sporidia 8, spherical, becoming rufous, areolate .02 mm., paraphyses linear, rather stout.

On rabbits' dung. 2985.

The cells of the receptacle are remarkable for their thick walls, and the young sporidia for the same thing. This is quite as striking a species as *B. areolata*, C & Ph.

Patellaria nigro-cyanea.

Medium size, scattered, applanate, margined, blue within; asci cylindraceo-clavate, sporidia 8, oblong, obtuse, curved, one to three septa, paraphyses not seen.

On dead stems of *Audibertia stachyoides*. 3097.

Similar to *Patellaria atro-vinosa* B. & Br. in size and form of sporidia, but differs in color and in the absence of paraphyses.

Midotis plicata.

Cups oblique, externally granular, blackish-brown, hymenium same color, sub-plicate, asci cylindrical, sporidia 8, ovate-elliptical, slightly curved, binucleate, 005—007 × .007 mm., paraphyses 0.

On wood of *Umbellularia Californica*. 2743.

Resembles *M. irregularis* (Schwz) but differs in the smaller, binucleate, curved sporidia, and the longitudinally plicate hymenium.

Stictis lupini.

In groups or scattered, emergent orbicular, urceolate; margin white, prominent, entire or laciniate; disc white; asci cylindrical; sporidia clavate-cylindrical, numerously septate, constricted at the septa, .05 × .0025—.004 mm., paraphyses filiform.

On *Lupinus arboreus.* No. 3164. Externally similar to *S. Olearis*, Wall., in Rhem's Asco., No. 22, but sporidia not so long and constricted at the septa.

Triblidium turgidulum.

Scattered, sessile, oblong-elliptic, turgid, nearly smooth, black; asci clavate; sporidia oblong-elliptic, uniseptate, strongly constricted in the centre, 5 to 6 pseudo septa in each half, reddish brown. .06—.09 × .013—.02 mm.

On dead stems of *Pentstemon breviflorus* No. 3236.

The sporidia are nearly as large as those of *Ostreichnion Americanum*, Duby, but it is a true *Triblidium.*

Hysterium prominens.

Scattered, prominent, oblong-elliptic, smooth, rarely striate; asci broadly clavate; sporidia fusiform or oblong-fusiform, curved or straight, uniseptate, constricted at the septum, muriform, brown, .03—.048 × .007—.01 mm.

On stems of *Salix lasiolepis.* No. 2647.

Resembling *H. pulicare*, Pass., but sporidia altogether unlike.

Ailographum reticulatum.

Ovate, adnate-superficial, scattered, lips thin; perithecia reticulated; asci pyriform; sporidia 8, obovate, uniseptate, hyaline, .014 × .004 mm. On underside of leaves of *Quercus agrifolia*. No. 3046.

NEW SPECIES OF CALIFORNIAN FUNGI.

BY C. B. PLOWRIGHT AND H. W. HARKNESS, M. D.

Nectria Galii.

Perithecia scattered, immersed, then erumpent, obtuse, pale red; asci cylindrical very delicate. μ 60 $\times$ 5—8, sporidia eight, uniseriate, pale straw-coloured, oblong-oval, with bluntly-pointed ends. μ 10 $\times$ 5 on Galium trifolium.

Mr. Phillips figures the sporidia as being uniseptate. I was unable to make out any septum, but the specimen examined may have been less mature than Mr. Phillips'.

3070.

Nectria umbellulariæ.

Perithecia, superficial, scattered. μ 200—230. Globose, sub-hyaline, with a pale tinge of flesh color, beset with a few hyaline mycelial threads externally; ostiola obtuse; asci clavate, μ 50 $\times$ 10—15. Sporidia hyaline, ovate, uniseptate μ 10—12 $\times$ 5—8.

On Umbellularia Californica. 2882.

NEW CALIFORNIAN FUNGI.

BY J. B. ELLIS AND H. W. HARKNESS, M. D.

Puccinia congregata.

I. II. Hymenium and Stylospores. Unknown.

III. Teleutospores. Hypophyllous, but staining the upper surface; sori densely clustered in the middle of a brown spot, 4—6 mm. in diameter; spores oblong, slightly constricted, with a distinct sub-hyaline papilla at the apex, μ 38—45 $\times$ 13—15.

On living leaves of Heuchera micrantha, Berkeley, Cal., August. 2740.

Nearly allied to *P. tiarellæ* B. & C. and *P. spreta*. Differs from *P.* (*Uredo*) *heucheræ*, Schw. in having spores ⅓ larger, with a more distinctly pointed tip.

Puccinia digitata.

I. II. Hymenium and Stylospores. Unknown.

III. Teleutospores. Hypophyllous; sori round 1—4 mm., solitary, dark brown, prominent, surrounded by the ruptured epidermis, and marked by pale depressions on the upper surface: spores remarkably persistent, clavate, lower cell much the longer, pale; the upper red-brown; epispore thickened upward and terminating in 1—7, digitate processes; pedicel ⅓ as long as the spore, stout, persistent. μ 45—54 × 15—18.

On living leaves of Rhamnus crocea.

Tamalpais—all the year. 3257.

Differs from *P. coronata* in the much larger and more prominent sori, in the darker upper cell, and relatively shorter process of the epispore.

Puccinia melanconioides.

I. Hymenium. Æcidium amphigenous; peridia scattered on faded spots, or arranged in an interrupted circle round the margin.

II. Stylospores. Unknown.

III. Teleutospores. Sori round, scattered quite evenly over the surface, covered at first by the epidermis which soon ruptures in a circumscissile manner, leaving a round white peridium-like base about which the dark brown, broadly elliptic, slightly constricted spores, breaking from their short pedicels, accumulate, presenting much the appearance of a Melanconium. μ 28—50 × 16—28.

On the upper surface of living leaves of Dodecatheon Meadia. Antioch, Cal. April. 3104.

Allied to *P. primulæ*, but spores larger and darker.

Puccinia nodosa.

I. II. Hymenium and Stylospores. Unknown.

III. Teleutospores. Sori linear 1—3 mm. long, solitary or gregarious; spores from broadly-oblong to nearly orbicular, constricted; septum scarcely visible, stipe stout, hyaline, as long as the spore, deciduous. μ 36—42 × 22—28.

On living leaves of Brodiæa capitata. Antioch. April. 3106.

Uromyces Brodieæ.

I. Hymenium. **Æcidium Brodieæ.** Ell. & Hk. Amphigenous, on pale yellowish spots, 2—4 mm. in diameter; on which are crowded in clusters, 6—10 shallow cup-shaped peridia with orange-yellow disk and narrow lacerated border.

II. Stylospores. Uncertain.

III. Teleutospores. Spots obliterated; sori amphigenous, scattered, oblong, about 1 mm. in diameter, sometimes subconfluent in elongated patches, dark umber-brown; spores obovate; epispore scarcely thickened above; pedicel equal in length to the spore. μ 20—28 × 13—20.

On living leaves of Brodiæa laxa. Antioch, Cal. April. 3105.

Nearly allied to *U. Zygadeni*, Pk., but the spores are smaller and more delicate. The peridia of the æcidium are more distinctly clustered, and not mixed with teleutospores; both seem to be distinct from *U. Liliacearum*, Schw.

Uromyces chorizanthis.

I. Hymenium. Unknown.

II. Stylospores. Globose, granular, pale brown.

III. Teleutospores. Sori elliptic, convex, dark brown, ½—1 mm., spores obovate; epispore strongly thickened above; pedicels hyaline, stout, three times as long as the spore. Spore μ 20—30 × 19—22.

On stems and leaves of Chorizanthe pungens. San Francisco, July. 2641.

Differs from *U. Polygoni*, Fckl. in its larger, darker and more prominent sori.

Uromyces eriogoni.

I. Hymenium. Æcidium preceding or mixed with the teleutospores, crowded in clusters of 5—20; peridia cylindrical with minutely fringed border; spores yellow, smooth, irregular in shape with several large vacuoles.

II. Stylospores. Pale brown, globose rough.

III. Teleutospores. Sori oblong, arranged in concentric ellipses; spores obovate, or oblong; epispore yellowish brown, thickened above; pedicel 3—4 times as long as the spores. μ 27—38 $\times$ 26.

On stems of Eriogonum virgatum. Antioch, Cal., July.
3002.

Hymenula aciculosa.

Convex, gelatinous, livid, translucent, $\frac{3}{4}$—$1\frac{1}{4}$ mm., discoid and nearly black when dry, with a dense marginal fringe of straight erect brown fibres, enclosing the densely compacted mass of erect, acicular, filiform, nucleolate, sub-hyaline, μ 50—60 $\times$ 1, spores, with numerous minute sporules intermingled.

On leaves of Pinus ponderosa. Sierra Nevada, Aug. 3537.

NEW SPECIES OF CALIFORNIAN FUNGI.

BY H. W. HARKNESS.

Octaviania rosea.

Gregarious, peridium fibrillo-rugose, irregularly lobed, 1—3 cm., with distinct absorbing base, pale rose color, deepening within; basidia 1—2, spored; sterigmata filiform, capitate, as long as the diameter of the spore; spores globose, hyaline, pale; epispore covered with short, obtuse spines. μ 14—17.

Under shrubby oaks, at the Golden Gate Park, San Francisco, Jan. 2204.

Differs from *O. carnea*, Corda, in color, and in the acute spines upon the epispore of the latter—of which a form found growing in this vicinity, reached 4 cm. in diameter.

Gautiera monticola.

Dark brown, irregularly lobed, 10 cm. in breadth, uniformly about 3 cm. in thickness, nearly plane above and below; stipe short and slender; stroma ferruginous brown; basidia apparently always 2-spored; sterigmata filiform; spores pale brown, elliptic or obovate, apiculate, longitudinally, or somewhat obliquely striate. μ 10—12 $\times$ 7—8.

Found (a solitary specimen) in vegetable humus, at the root of the Grizzly Giant, in the Mariposa Big Tree Grove, July, 1883. 3543.

With the odor of decaying onions.

Splanchnomyces Behrii.

Cinnamon-brown, irregularly lobed, lacunose, 1—4 cm. in diameter; absorbing base inconspicuous; basidia 2-spored: sterigmata short, filiform; spores very unequal in size, yellowish-brown, oval or elliptic, apiculate by the remains of the sterigmata, pitted all over with minute irregular depressions. μ 10—15 $\times$ 10.

Growing in vegetable humus in Wildwood Glen above the reservoir, Sausalito, Dec. 2911.

Named in recognition of the valuable assistance of the frequent companion of our collecting excursions, Dr. H. H. Behr.

Exobasidium arctostaphyli.

Receptaculum broadly effused, bright rosy-red, becoming pruinose, thickening but only slightly distorting the affected parts; spores hyaline, fusiform, straight. μ 10—12 $\times$ 4—5.

On young shoots and leaves of Arctostaphylos pungens. Tamalpais, May, June. 3317.

Exobasidium decolorans.

Receptaculum effused, producing conspicuous yellowish-white, orbicular spots, 1—2 cm. in diameter, not at all distorting the leaf; spores appearing upon the under surface, hyaline, straight. μ 7—8 × 4—5.

On living leaves of Rhododendron occidentale. Tamalpais, Autumn. 2887.

Septoria Hosackiæ.

Perithecia minute, amphigenous, on yellowish-brown, irregular spots; spores filiform, flexuous, hyaline, 3—7-septate. μ 64 × 4.

On living leaves of Hosackia strigosa. Antioch, April. 3094.

Septoria lupini.

Epiphyllous; sparsely scattered over indeterminate yellowish spots, or the whole leaflet, minutely papillate; spores linear, acute at each end, obscurely septate. μ 40—60 × 4—5.

On living leaves of Lupinus densiflorus. Tamalpais, May. 3190.

Septoria Wyethiæ.

Perthecia amphigenous, covering the greater part of the leaf; spores linear, obscurely septate, or simple, μ 56 × 6—8.

On living leaves of Wyethia mollis. Sierra Nevada, Aug. 3579.

Marsonia loniceræ.

Epiphyllous, sparsely scattered on irregular white spots, bordered with brown; spores hyaline, clavate, often curved; septum near the base. μ 35—40 × 7—9.

On living leaves of Lonicera conjugialis. Summit of the Sierra Nevada, Aug. 3576.

Marsonia neilliæ.

Epiphyllous, on small angular, brown spots, spores hyaline, curved, septum near the centre, constricted. μ 25—30 $\times$ 8.

On living leaves of Neillia opulifolia., Berkeley, May, 2804.

Glæosporium pteridis.

Hypophyllous; covering the whole surface, oozing out in large tendrils; spores hyaline, obovate or elliptic. μ 10—24 $\times$ 6—10.

Distorting the fronds of Pteris aquilina, Berkeley, May. 3267.

Glæosporium quernum.

Amphigenous, oozing out in small heaps; spores hyaline, elliptic or oblong, with 1—3 vacuoles. μ 12—18 $\times$ 4—6.

On leaves and young shoots of Quercus agrifolia, in Golden Gate Park, in some seasons giving the oaks the appearance of having been scorched by flame. 3260.

Cylindrosporium glycyrrhizæ.

Hypophyllous, covering nearly the whole surface of the affected leaflets, oozing out in tendrils; spores cylindrical, attenuate at each end with several vacuoles. μ 40—70 $\times$ 4—5.

On living leaves of Glycyrrhiza lepidota. Sunol, Oct. 3417.

Septogleum fraxini.

Epiphyllous in small, whitish, angular spots, 2—5 lines in diameter; spores hyaline, cylindrical, 2—5-septate. μ 16—24 $\times$ 4—5.

On living leaves of Fraxinus Oregana, Tamalpais, June. 3274.

Septogleum maculans.

Hypophyllous, oozing out in pale yellow tendrils opposite dark brown orbicular spots, 1—1½ cm. in diameter, on the upper surface; spores hyaline, fusiform, strongly curved near one end, endochrome 2—7-septate. μ 30—50 $\times$ 6—9.

On living leaves of Salix lasiolepis. Tamalpais, June. 3256.

Septogleum Nuttallii.

Amphigenous, circinately arranged on pale spots, 2—5 mm. in diameter, sparsely scattered over the leaf, oozing out in flesh-colored tendrils; spores cylindrical, truncate, 1—5, usually 1-septate. μ 36—45 $\times$ 4—5.

On living leaves of Nuttallia cerasiformis. Tamalpais, May. 3179.

Harknessia longipes.

Orifice orbicular, margin elevated, toothed, spores ellipitic or oblong, often curved, apiculate, dark olive-green with 2 nuclei and a shining hyaline apex; pedicel persistent, hyaline, slender, flexuous, 4—6 times as long as the spore. μ 27 $\times$ 12.

On dead twigs and leaves of Eucalyptus odoratus. Piedmont, April. 3079.

Very remarkable for the great length of the pedicel.

Pestalozzia? anomala.

Pustules minute, irregular, often confluent, staining the matrix; spores fusiform, curved, 3-septate, constricted, pale brown, ultimate cells hyaline; sporophore thick, as long as the spore, soon deciduous; setæ 1 at each end longer than the spore, irregularly 1—3-branched at different distances, the one at the base oblique, appearing at the side of the sporophore. μ 15—18 $\times$ 5—6.

Nearly covering the stems of Eriogonum virgatum. Mt. Diablo, July. 2690.

Does not agree very well with the characters of the genus.

Pestalozzia corynoidea.

Pustules flattened, black, oblong or oval, 1 mm. broad, at length depressed and opening by irregular apertures; spores fusiform, curved, 5-septate, greenish-black, ultimate cells hyaline, very small, often nearly obsolete; apex furnished with 1 oblique seta, $\frac{1}{3}$ as long as the spore. μ 35—37 $\times$ 12.

On dead twigs of Umbellularia Californica. Tamalpais, July. 2788.

Differs from *P. plagiochæta*, Sacc. in the greater relative breath of the spore, and much smaller size of the terminal hyaline cells.

Pestalozzia Moorei.

Pseudo-perithecia sub-cuticular, in orbicular pale spots, oozing out and staining the matrix; spores fusiform, 3-septate, 2 middle cells clear brown, with oblong nuclei; ultimate cells hyaline and acutely conical; sporophore as long or twice as long as the spore, usually breaking at the termination of the conical lower cell; setæ 4, twice as long as the spore. μ 32 $\times$ 9.

On dead stems of Hosackia glabra. Antioch, July. 2700.

Named in recognition of the work of our esteemed co-laborer, Mr. J. P. Moore.

Puccinia anachoreta.

I. II. Hymenium and Stylospores. Unknown.

III. Teleutospores. Sori solitary, elliptic, 1—2 mm. in length, seated on irregular pale spots; spores short-oblong, constricted, minutely papillate; pedicel hyaline, as long as the spore, soon deciduous. μ 28—42$\times$20—24.

On living leaves of Calochortus nudus. Sentinel Dome, Yosemite, 8,000 feet. July. 3532.

Puccinia giliæ.

I. Hymenium. Unknown.

II. Stylospores. Globose, pale brown, smooth.

III. Teleutospores. Sori solitary, oval, or oblong, $\frac{1}{2}$—1 mm.; spores oblong, slightly constricted, red-brown, upper cell darker, apiculate by the thickened epispore; pedicels hyaline 2—3 times as long as the spore. μ 54$\times$21.

On leaves and subtending bracts of Gilia ciliata. Mt. Diablo. May. 2996.

Puccinia evadens.

Spermogones. Minute, oval, pale, preceding the hymenium.

I. Hymenium. *Coleosporium baccharidis*, Cke. & Hk.

II. Stylospores. Smooth, globose, yellow, mixed with

III. Teleutospores. Hypophyllous; sori few, solitary, $\frac{1}{4}$—1 mm. pale brown; spores large, oblong, or obovate, golden yellow, constricted at the septum, epispore smooth, thickened at the apex, having the appearance of being drawn in and so forming small folds; contents granular or oily, with large vacuoles, easily discharged by pressure, leaving the colorless epispore; pedicel hyaline, very stout, as long or longer than the spore. μ 55—60$\times$15—20.

On living leaves of Baccharis pilularis. San Francisco. November. 3384.

This Puccinia has been overlooked heretofore on account of its minute size and pale color. It is without doubt the final stage of *Coleosporium baccharidis*, being always found together with it on the same plant—Coleosporium upon the branches, and Puccinia upon the leaves.

Puccinia symphoricarpi.

I. Hymenium. Æcidium: preceding the teleutospores; hypophyllous, in circular clusters of 8—20, on dark brown or discolored spots; peridia as long as broad; spores orange.

II. Stylospores Unknown.

III. Teleutospores. Sori small, aggregated, covered by the epidermis 1—3 mm. in diameter, on irregular brown spots; spores oblong, constricted, brown above, paler below, epispore smooth, thickened above, lengthened somewhat obliquely into a finger-like process; pedicel of the same color, and $1\frac{1}{2}$ times as long as the spore. μ 50—60 $\times$ 15—17.

On living leaves of Symphoricarpus mollis. Tamalpais. April—June. 3330.

Puccinia variolans.

I. II. Hymenium and Stylospores. Unknown.

III. Teleutospores. Sori solitary, oval, dark brown, 1 mm. in length; spores brown, oblong or slightly clavate, constricted; epispore smooth, thickened above, pedicels hyaline, 1—2 times as long as the spore. μ 40—70 $\times$ 18—24.

On leaves and twigs of Tetradymia canescens. Mt. Davidson, Nev., 7,000 ft., Aug. 2073.

Very conspicuous from the contrast of the dark brown sori, with the gray plant over which it is thickly scattered.

Uromyces Nevadensis.

I. II. Hymenium and Stylospores. Unknown.

III. Teleutospores. Sori minute, aggregated in spots 1—4 mm. in diameter, covered for some time by the raised silvery cuticle, pulverulent; spores dark brown, oblong or obovate, smooth; pedicels hyaline, as long or longer than the spores, deciduous. μ 36—42 × 12—14.

On living leaves of Primula suffrutescens. Near Lake Tahoe, 6,000 ft., Aug. 3582.

Uromyces Spragueæ.

I. Hymenium. **Æcidium Spragueæ.** Hk. Covering the whole leaf; peridia elongated, orange-red.

II. Stylospores. Globose, pale brown, smooth. μ 24.

III. Teleutospores. Sori irregular, pulverulent, mixed with the Æcidium; spores oval, brown, marked with tortuous furrows; pedicels short, hyaline, deciduous. Æcid. μ 14 × 17. Teleut. 17—21 × 24—32.

On living leaves of Spraguea umbellata. Sierra Nevada, 7,000 ft., Aug. 3370.

Ustilago gayophiti.

Spores dark brown, oval or globose, minutely echinulate; epidermis soon ruptured; spores in a powdery mass. μ14—18.

Produced within the seeds of Gayophitum ramosissimum. Summit of the Sierra Nevada, Aug. 3391.

Peridermium gracile.

Perithecia cylindrical, 3 mm. long, very slender, border minutely fringed; spores globose, orange. μ 16—20.

Scattered over living leaves of Sarcobatus vermiculatus. Reno, Nev. August. 3568.

Peridermium Harknessii. Moore.

Spermogones. Unknown.

Protospores. Peridia aggregated, irregular, encircling the stem; spores irregular, very finely echinulate, orange, becoming white. μ 35—40.

On stems and branches of Pinus insignis, P. ponderosa and P. Sabiniana. 449.

Appearing as annular swellings, often 2 feet in circumference upon the trunks and branches. In the Sierra Nevada, below the height of 4,000 feet, and in the Coast Range. Particularly abundant at Monterey.

The different species of Peridermium of the pine seem to be doubtfully distinct. H. W. H.

Didymaria spissa.

Hypophyllous, hypha very short, compacted into a dense tuft, aggregated into oblong white spots $\frac{1}{2}$—1 cm. long; spores oblong-elliptic, often dividing at the septum. μ 27 × 7.

On living leaves of Solidago occidentalis. San Francisco, July. 2658.

Stigmina thermopsi.

Amphigenous in irregular brown spots; tufts minute, hypha very short, simple, brown; spores oblong or oval, rough, 1—2-septate, brown. μ 24 × 12.

On living leaves of Thermopsis Californica. Tamalpais, June. 3216.

CAMPOSPORIUM, nov. gen.

(*Etym. Campe:* larva, from the resemblance of the spore to the larva of Danais Archippus.)

Hypha brown, flexuous, septate. Spores 1—2, attached by slender pedicels to the angles of the apex, transversely pluriseptate with filiform setae springing from the apex.

Camposporium, antennatum.

Hypha septate, flexuous brown; spores 1—2, cylindrical, pale olive-brown, 7—13-septate, attached to the apical angles of the hypha by filiform spiral pedicels; ultimate cells hyaline, the upper one bearing 2, sometimes 1 or 3, filiform setae $\frac{1}{3}$—$\frac{1}{2}$ as long as the spore. μ 70—94 × 10.

On decaying bark of Eucalyptus globulus. San Francisco, Dec. 2349.

Heterosporium abroniæ.

Epiphyllous, tufts scattered on orbicular, pale, depressions; hypha longer than the spores, septate, brown; spores oblong, yellowish-brown, sub-echinulate, 1—4-septate, attenuate at each end. μ 14—20 × 7.

On living leaves of Abronia latifolia. San Francisco, Dec. 3018.

Heterosporium Eschscholtziæ.

Hypha very short, brown, scattered over indeterminate brown spots; spores oblong, yellowish-brown, minutely echinulate, 3—7-septate, one or two of the cells occasionally longitudinally divided. μ 50—60 × 14—16.

On living leaves of Eschscholtzia Californica. San Francisco, Jan. 3116.

Cercospora Garryæ.

Hypophyllous; spots irregular, pale; hypha pale brown, slender; spores nearly linear, attenuate above, hyaline, 7—12-septate. μ 10 × 110.

On living leaves of Garrya elliptica. Saucelito. July. 3273.

Cercospora Gnaphalii.

Epiphyllous; spots broad, indeterminate, tufts aggregated, hypha short, brown; spores pale brown, attenuate above, 3—7-septate. μ 16 × 120.

On living leaves of Gnaphalium decurrens. San Francisco, May. 2601.

Cercospora heteromeles.

Hypophyllous; spots pale, irregular, large; tufts scattered, hypha very short, brown; spores cylindrical, attenuate above, brown, 5—13-septate. μ 16 $\times$ 130.

On living leaves of Heteromeles arbutifolia. Berkeley, September. 3424.

Cercospora Rafinesquiæ.

Hypophyllous; in minute tufts covering a great part of the leaf; hypha brown, very short; spores oblong, brown, 2—7-septate. μ 20—30 $\times$ 6.

On living leaves of Rafinesquia Californica. San Francisco, May. 2603.

Beltrania querna.

Hypha erect, growing in tufts, becoming confluent, brown, 2—4-septate bearing at the apex 1—2 whorls of bud-like processes, the outer border fringed with 2—5 dentations, to each of which a spore is attached: spores obscurely rhomboid, rounded at the basal, and rostrate at the free end, brown, granular, obscurely septate, at length dividing at the widest part; setulæ black, much exceeding the hypha, septa none or invisible. μ 17—28 $\times$ 8—10.

Forming a dense black stratum on decaying leaves of Quercus agrifolia. San Francisco, Jan. 2191.

TROPOSPORIUM, nov. gen.

Sporodochium flattened, farinaceous. Hypha elongated, lax, branching. Spores spiral, attached to the hypha by slender pedicel-like branchlets.

Allied to *Fusisporium*, but with very different spores.

Troposporium album.

Acervuli white, 1—2 mm, often confluent, thick, branching freely, without septa, containing numerous granules and oil globules which are set free by breaking; spore — a long tube granular, nucleolate without septa, μ 7 wide, coiled in a long spiral of 3—7 turns, flattened at the crossings, forming an oblong mass, with crenate borders. μ 40—45 $\times$ 18—22.

On dead stems of Corylus rostrata. Sausalito, Dec. Feb. 2929.

Entyloma Collinsiæ.

Forming white spots 2 mm. in diameter on the leaves; spores attached to slender radiating threads, globose hyaline; epispore thick. μ 10—12.

On leaves of Collinsia bartsiæfolia. Tamalpais, Feb. 3143.

Entyloma Eschscholtziæ

Forming white spots 1—2 mm. in diameter; spores hyaline, attached to thick, branching, threads, irregular in shape; epispore thick. μ 10—5.

On living leaves of Eschscholtzia Californica. San Francisco, Feb. 3117.

Sphærotheca lanestris.

Conidia: **Oidum ventricosum,** Hk. Segments swelling in the centre and becoming barrel-shaped μ 34—38 $\times$ 20—22, and filled with numerous round or elliptic bodies, μ 5—6 $\times$ 2—4, which are freely discharged from the ends, as the joints separate.

Ascophore: mycelium dense, persistent, arachnoid, yellowish brown, in tufts $\frac{1}{2}$ mm. in breadth, which becoming confluent, form a woolly stratum, often covering the entire lower sufrace of the leaf: perithecia double, dark brown, the inner formed of large, highly refracting, hyaline, cells: appendages undistinguishable from the mycelium; asci ovate thick-walled, thinner at the summit, and with a short stipe, 8-spored: sporidia elliptic or globose, granular. Perithecia, μ 90—108. Asci, μ 75 $\times$ 102. Sporid. μ 21 $\times$ 18.

Very conspicuous upon the growing shoots of Quercus agrifolia—the oidium as a white mealy stratum from Feb—May, followed by the ascophore on the leaves below. San Francisco. 3169.

Erysiphe (Erysiphella) trina.

Epiphyllous, mycelium covering orbicular spots, pruinose, fugacious: perithecia clustered, minute, yellowish brown, μ 56—70: appendages none: asci 3, nearly globular, μ 32—38: sporidia 2, oblong-elliptic, or somewhat boat-shaped, very large, completely filling the ascus. μ 28—32 18—20.

On living leaves of Quercus agrifolia. Berkeley, Jan. 3012.

THECLOSPORA, nov. gen.

Spores surrounded by a cleft, hyaline border, borne on slender branching hyphæ, compacted into a globular woolly mass.

Theclospora bifida.

Heaps scattered, globular, 1—2 mm. in diameter, loosely attached to the surface, white, becoming yellow: hypha arising from irregular, yellowish, elongated masses, rough, slender, bearing at intervals granular spores, surrounded by a broad and firm hyaline or yellowish border, marked with concentric striæ, and cleft on opposite sides, the hypha apparently passing through. μ 24—40.

On rotting leaves of Eucalyptus globulus. San Francisco, Dec. 3612.

The place of this fungus in classification is very uncertain, and it is only placed here because of its connection with the next.

CLEISTOSOMA, nov. gen.

Perithecia orbicular, membranaceous. Asci borne on branching threads, globose, evanescent, Sporidia hemispherical, echinulate.

Cleistosoma purpureum.

Perithecia purple black, very delicate, soon dehiscent, developed within the heaps of Cleistosoma purpureum, which it stains purple; asci globular, hyaline, 8-spored, μ 9—12: sporidia purple, hemispherical, long-echinulate round the disk margin. μ 3—4. 3606.

The relation of this fungus to the preceding is still in doubt. I suspect it may be the same as that of Eurotium to Aspergillus.

Myriococcum sparsum.

Perithecia scattered, yellowish brown. μ 170—180, surrounded by scanty white subiculum: spores numerous, unequal-elliptic, hyaline, apiculate at each end, with a large vacuole. μ7—9 $\times$ 4—6.

On dead trunks of Acer macrophyllum, between the bark and wood. Sunol, April. 2444

Lasiobotrys affinis.

Hypophyllous, black, aggregated in circular groups 2—6 mm. in diameter, depressed, attached to radiating non-septate fibres: secondary perithecia reticulate, brown, globose, μ 70—100: asci shortly stipitate, nearly cylindrical, μ 60—70 $\times$ 12—14: sporidia fusoid, yellowish-brown, uniseptate, with the septum near the larger end. μ 15—17 $\times$ 6—8.

On living leaves of Lonicera hispidula. Tamalpais, June, 2539.

Rosellinia (Coniochæta) spinosa.

Perithecia superficial, gregarious, globose, μ 300 in diameter, bearing numerous yellowish-white spines which are very thick walled, inclosing a central canal filled with oil globules, acuminate, often branching, 1—3 times, μ 200—300 $\times$ 18—22; asci 8-spored, cylindrical, 1-seriate, short-stipitate, μ 50 $\times$ 12; paraphyses filiform; sporidia ovate-elliptic, 2-celled; upper cell $\frac{2}{3}$—$\frac{3}{4}$ the length of the spore, olive-brown, with a large nucleus; lower cell conical, hyaline, μ 9 $\times$ 4.

On decaying bark of Eucalyptus. San Francisco, Sept. 2842.

Rosellinia (Coniochæta) rhyncospora.

Perithecia globose-conical, densely aggregated, superficial, covering large areas, studded all over with short black spines; asci 8-spored, cylindrical, obliquely 1-seriate, μ 96 $\times$ 10, paraphyses filiform; sporidia continuous, oval, or elliptic, dark brown, about half of them prolonged upward into a curved beak, $\frac{1}{3}$—$\frac{1}{2}$ as long as the body of the spore. μ 15—18 $\times$ 9.

On decorticated branches of Sambucus glauca. Blue Cañon, June. 3288.

Læstadia auripunctum.

Hypophyllous, perithecia scattered, 5—20 in yellowish orbicular spots 2—5 mm. broad, bordered by a dark brown line; nucleus orange; asci 8-spored, fusiform, long-stipitate; sporidia hyaline, ovate or clavate, asci μ 54 $\times$ 10, sporidia 10 $\times$ 6.

On living leaves of Quercus Wislizeni. Folsom, May. 3243.

Læstadia cælata.

Perithecia hypophyllous, entirely concealed, scattered; asci mucoid, clavate, long-stipitate, μ 45 $\times$ 15; paraphyses none; sporidia 8, hyaline, turbinate, shining; endochrome divided very near the pointed end of the spore. μ 12 $\times$ 6.

On dead leaves of Quercus densiflora. Tamalpais, Jan. 2968.

Phomatospora datiscæ.

Perithecia scattered, sub-epidermal; ostiolum conical; asci 8-spored, oblong, or ob-clavate. μ 50—60 $\times$ 15—20, paraphyses none; sporidia oblong-oval, hyaline or minutely granular, with a small vacuole at each end, μ 20—30 $\times$ 8—10.

On dead stems of Datisca glomerata. Folsom, May. 3231.

Physalospora bina.

Epiphylous; shining black, hemispherical, half free, numerous, discrete in irregular whitish spots, covering a third or more of the leaf and bordered by a dark line; paraphyses mucoid, vacuolate; ascus 2-spored, very delicate, fusiform, attenuate to a slender pedicel, μ 45 $\times$ 9; sporidia oblong-elliptic or slightly boat-shaped, rounded at one end and slightly pointed at the other, with several vacuoles. μ 15 $\times$ 6.

On living leaves of Quercus agrifolia. Tamalpais, Jan. 2966.

Diaporthe (Chorostate.) eucalypti.

Peritheca aggregated in valsæform spots, bordered by a raised black line, rostra 1 mm. or more long, lax, somewhat agglutinated; asci oblong-fusoid. μ 33 × 7; sporidia fusiform, slightly curved, hyaline, 1-septate, 4-guttate, acuminate. μ 15 × 4.

On dead leaves of Eucalyptus globulus. San Francisco, June. 3613.

Diaporthe (Tetrastaga) lupini.

Perithecia clustered, rostrum short, thick; asci very delicate, fusoid. μ 15 × 4; sporidia fusoid, 1-septate, 4-guttulate, slightly constricted; cells frequently unequal, readily separating at the septum. μ 55—60 × 9.

On branches of Lupinus arboreus. San Francisco, March. 2247.

Didymosphæria circinans.

Hypophyllous, perithecia gregarious in circular spots, 1—6 mm. in diameter, covered, staining the matrix around the ostiolum; asci 8-spored, cylindrical, sessile, μ 66 × 6; paraphyses filiform; sporidia oval, or oblong, uniseptate, slightly constricted, olive brown. μ 5—7 × 3—4.

On the early form of leaves, of Eucalyptus globulus. Berkeley, Oct. 2877.

Massaria pulchra.

Perithecia scattered, covered; contents white, 1—1½ mm.; ascus 8-spored, broadly clavate, μ 126 × 36; sporidia fusiform-navicular, of two irregular, unequal cones, united by their bases, and surrounded by a gelatinous stratum; at first unisepstate and hyaline, slowly becoming brown, and unequally 3—5-septate by division of the endochrome. μ 58—60 × 20—22.

On dead branches of Umbellularia Californica. Sausalito, July. 2710.

Massaria cleistotheca.

Perithecia minute, covered; asci 8-spored, pyriform, or obovate, thick-walled, closed all round, without stipe, or point of attachment, μ 48 × 30; paraphyses agglutinate; sporidia hyaline, of two opposed, rather long, equal cones, occasionally again divided, so as to make the spore 3-septate, surrounded by a gelatinous stratum. μ 32—40 × 8—10.

On dead stems of Dendromecon rigidum. Tamalpais, March. 3083.

Chætosphæria ornata.

Perithecia superficial, orbicular, black, not rugulose, μ 360; setæ hyphoid, ½ mm. or more in length, black, not acuminate, occasionally septate; asci 8-spored, mucoid, clavate, with a long pedicel filled with oil globules or granules, μ 8—10 × 100; paraphyses hardly visible; sporidia fusiform, tri-septate, middle cells olive-brown ultimate ones hyaline. M 16 × 6.

On decaying bark of Eucalyptus. San Francisco, Sept. 2845.

Pleospora compressa.

Perithecia scattered, covered by the blackened cuticle, concave, surrounded by radiating brown hypha; asci 8-spored clavate, 2-seriate, short-stipitate, μ 80—90 × 15—18, paraphyses filiform; sporidia brown, unequally elliptic, transversely 3-septate, the two central cells constricted by a longitudinal septum which flattens them antero-posteriorly, and causes the central cells of the spore to appear narrower than the ultimate ones when viewed from the side; at first surrounded by a mucoid envelope. μ 20—27 × 10—19.

On dead stems of Polygonum polymorphum. Blue Cañon, June. 3284.

Pleospora (Catharinia) argyrospora.

Perithecia minute, black, erumpent, sparse; asci 8-spored clavate, sessile, thick-walled, μ 60—65 × 20; bi-seriate; paraphyses filiform; sporidia hyaline, elliptic-lanceolate, transversely 3—5, longitudinally 1—2-septate, μ 18 × 8.

On dead branches of Dendromecon rigidum. Tamalpais, March. 3084.

Plæosphæria modesta.

Perithecia superficial, orbicular, black, μ 135, with stout black spines, μ 40—50; asci 8-spored, ovate, or broadly fusiform, μ 45—50 × 15—20; paraphyses none; sporidia elliptic, transversely 3—4, longitudinally 2-septate, pale olive-brown. μ 10 × 6.

On decorticated, rotting branches of Eucalyptus. San Francisco, Sept. 2846.

Ophiobolus claviger.

Perithecia globular with papillate ostiolum, gregarious, or scattered, erumpent, then free ⅓—1 mm., at first filled with minute spermatia; asci linear-clavate, 8-spored, μ 210 × 14; paraphyses filiform, vacuolate; sporidia pale brown, 20—25-septate, the upper third somewhat swollen, and constricted, μ 140 × 7.

On creeping stems of Audibertia humilis. Folsom, May. 3233.

Ophiobolus byssicola.

Perithecia globose, with prominent ostiolum, superficial, ¾—1 mm., nestling in dirty-brown subiculum; asci 8-spored cylindrical-clavate, tapering to a slender pedicel, which terminates in a bulbous base, μ 170 × 16; sporidia pale brown, tapering, obtuse at the ends, 20—30-septate, constricted; the upper and 1—3 other cells at irregular intervals, enlarged and globular. μ 120—140 × 4—6.

On decorticated branches of Sambucus glauca. Blue Cañon, June. 3289.

Ophiodothis tarda.

Hypophyllous, in irregular, angular spots, 3—4 mm. broad, often confluent, papillate, shining black: asci 8-spored, cylindrical, abruptly contracted, curved and bulbous at the base, μ 57 × 9; sporidia linear, pluriguttulate. μ 42 × 2.

On leaves of Rhus diversiloba. San Francisco, Jan. 3047.

Fruit slowly formed after lying long on the ground.

Lophiostoma (Navicella) congregatum.

Perithecia large $\frac{3}{4}$—1 mm., half immersed, dull black; ostiolum prominent $\frac{1}{4}$—$\frac{1}{2}$ the width of the perithecium; asci 8-spored, clavate, bi-seriate, μ 70 × 12; sporidia fusiform, widest above the middle, curved, 6—8-septate, constricted, yellowish brown. cells containing 2 small vacuoles; ultimate ones paler. μ 30 × 9.

On decorticated branches of Sambucus racemosa. Summit of the Sierra Nevada, Aug. 3377.

Aulographum lucens.

Perithecia flattened, appressed, $\frac{1}{2}$—1 mm. long, opening by a longitudinal fissure, sparsely scattered over slightly discolored spots; asci oval, 8-spored, μ 37 × 28; sporidia oblong, rounded at the ends, 1-septate, slightly constricted with two very large vacuoles, hyaline, slowly becoming brown. μ 21 × 10.

On living twigs of Garrya elliptica. Tamalpais, Sept. 3146.

Aulographum acicolum.

Perithecia oblong, circinately arranged. on pale spots, applanate, semi-immersed, opening by a longitudinal fissure, $\frac{1}{2}$—1 mm.; asci globose, 8-spored, M 25; sporidia oblong-ovate or fusiform, 1-septate, constricted, hyaline, becoming brown. M 15 × 6.

On living leaves of Pinus Sabiniana. Mt. Diablo, Jan. 3014.

Acrospermum fultum.

Perithecia wedge-shaped, gregarious, 1—1$\frac{1}{2}$ mm. long, transversely striate, supported by buttress-like portions which unite with the main stem about half way up, the whole attached to brown rooting mycelium: asci 8-spored, cylindrical-clavate, tapering to a long and slender pedicel, μ 500 × 9; paraphyses linear, as long as the ascus; sporidia filiform, multi-guttate or pseudo-septate. μ 300—350 × 2

On deadle aves of Eucalyptus. San Francisco, May. 2500.

Perhaps too near *A. corrugatum* Ell., but this shows no disposition to break into regular joints.

[The following short papers were presented to the Academy at the regular stated meeting of November 5, 1883, by the President.]

NOTE ON THE APPEARANCE OF SATURN.

Upon turning 6.4-inch equatorial of the Davidson Observatory upon Saturn about nine o'clock in the evening of October 29th, it was at once made evident that the object was unusually steady for this region.

I had failed to get any transit observations because the spider lines of the reticules of the instrument were so limp and slacked up by the excessive amount of moisture in the atmosphere that they were unfit for work. Even when they had been heated and straightened out, they lost their tension in two or three minutes. The dew ran down the observatory almost like rain. The evening was clear and pleasant, and nearly calm, and the smoke of the city was to the south-eastward.

With a moderate power of 120 diameters, the Cassini division of the ring of Saturn was visible all around, and the gauzy or dusky innermost ring was made out. With a higher power of 250 diameters, the details came out marvelously clear and sharp, notwithstanding frequent shiverings of the image from atmospheric disturbance. The dusky ring was wonderfully well defined on its inner edge, and the Cassini division was distinct and well cut; the Encke division of the outer ring was made out farther than given in the well known Cambridge drawing. The shadow of the planet on the ring was so well defined that the irregularity at the outer edge of the B ring was unmistakable, the equatorial belt was broad and white and well defined; the line of dark clouding along the south border of this white belt was very distinct, and in marked contrast therewith, thence to the pole, the globe was rather deeply shaded; the edge of the planet, was traced around on the edge of the ring by its difference of color; the faint yellow-green olive tint of the planet was in marked contrast with the yellowish-white of the ring; the principal or B ring was toned faintly down towards the planet as if exhibiting some of the gauzy ring, but the characters of the two were distinct. There were six satellites visible. But one of the best revealed features of this spectacle was the undoubted difference in brightness of the gauzy ring at the two ansæ. The preceding part was decidedly brighter than the following. Different eye-pieces and different powers were used, but this peculiarity remained. Mr. R. A. Marr noted it under all the circumstances in which I examined it. I have no doubt whatever of the matter. This phenomenon may have been described before, but I have no remembrance of it. I thought also that the inner edge of the gauzy ring was more than half way from the inner edge of the B ring to the body of the planet; but under examinations with different powers and eye-pieces, I had some doubts. I made no measures.

Another feature was the apparent deeper shading of the preceding side of the planet: it was only a very little difference, but I was satisfied that it really existed.

I should mention that in my limited experience in examining Saturn I have never seen the atmospheric conditions so nearly perfect as they were that night. It was an exceptional instance in very many years. In this one case I saw more than is given in the beautiful Cambridge drawing, except that I could not make out the mottlings in the short curves of the rings.

ANNULAR SOLAR ECLIPSE, OCTOBER 30, 1883.

It is probable that this is the only observation of precision of this eclipse made on the Continent of North America, or throughout the Pacific. It was annular through the Pacific Ocean, but partial at San Francisco.

The predicted time of the first contact of the moon's limb with the sun, and the point of contact, were computed for the Davidson Observatory.

This predicted time was 3 hours 46.1 minutes; and the point of contact was 248 deg. 59 min. from the north point reckoned round by the east, corresponding to 203 deg. 43 min. from the vertex of the sun, also reckoned through the east.

The observation was made with the full aperture of the 6.4-inch equatorial, using an Airy double-image micrometer, with a power of about 240 diameters. The colored-glass exhibited the sun's disk of a whitish pearl color. The position thread was placed to cut off that segment of the sun's disk upon which the moon would first appear. The clock-work kept the image in the center of the field.

The border of the sun was much disturbed by the unequal refraction of the warm and cold strata of the atmosphere, so that the first contact was obtained under certain difficulties. The moon appeared at the predicted position, and the local meantime of the contact was 3 hours 46 minutes and 14.5 seconds, or eight seconds after the computed epoch. It is probable that this time may be a half or even one second late.

After this observation, another eye-piece was introduced, and the projected image of the sun's border was exhibited upon a white paper screen, showing the ingress of the moon's dark limb, the groups of sun spots, and the disturbed border and cusps.

The time of greatest observation occurred just before sunset, when the moon had advanced .454 of the sun's diameter on the disk of the latter. Owing to the abnormal refraction so near the sea horizon, the sun presented the appearance of a very flattened eclipse, and the moon's disk was also similarly distorted, so that the distortion of the cusps was very striking and peculiar. At that time the boiling of the sun's border was excessively great.

There were two lines of sun spots across the solar disk, one north and one south of the equator; some of them were very large, and one group was visible to the unassisted eye. The faculæ upon the surface were fairly well made out.

Mr. C. B. Hill observed the eclipse with a small reconnoitering telescope placed in the inclosure about the observatory (objective $2\frac{1}{2}$ inches, magnifying power about 50 diameters,) and his time was 2.6 seconds later than that given above.

The geographical position of the Observatory is: Latitude 37 deg. 47 min. 24.1 sec., north; longitude, 122 deg. 25 min. 37.6 sec., west, or 8 h. 9 min. 42.5 sec., from Greenwich.

A BRILLIANT METEOR.

On the evening of October 29, at exactly 11 o'clock P.M., a remarkably brilliant meteor passed vertically downwards very near to and below γ Eridani (3 mag.) It illuminated the street, and its light cast a strong shadow. The train, about 5 deg. long, was persistent for three or four seconds, with an intense, vivid brightness, then faded away to a white, vaporous looking streak, which assumed a wavy motion for three or four seconds and then vanished. The color was an intense white tinged with a purplish hue; and the brightest part of the train which was left was not, at the point of disappearance, but about the middle of its length. At the above time the star had an altitude of $28^{\circ}.9$ and bore south $39^{\circ}.4$ east.

INTRA-MERCURIAL PLANETS.

At the same meeting of the Academy, in November, 1883, the President read the following paper:

The scientific journals bring us items from the reports of M. Trouvelet, who accompanied Mr. Jannsen to the Caroline

Island in the South Pacific, to observe the total solar eclipse, of May 6th, 1882.

The members of this Academy will recollect that Jannsen and his associates, upon their return *via* San Francisco, were invited to attend our meeting. Messrs. Palisa and Tachini and Rockwell were absent. All these gentlemen had been observers of the eclipse, and some of them had specially directed their attention to the question of intra-mercurial planets. No one had seen any sign of these bodies, but M. Trouvelot made known to the Academy that at the time of totality he had seen a star — a red star — of the fourth magnitude, about three degrees north and three degrees west of the sun, and that the star had no definite disk or appreciable phase. He had no opportunity to consult star charts, and therefore he could not pronounce judgment upon its being a star or an intra-mercurial planet.

The next day I placed the sun in its proper position on the star charts of Agelander, and then found δ Arietis, of the fourth magnitude, situated two and three-fourths degrees north and two and three-fourths degrees west of the sun. I had to be absent during the day, but M. Trouvelot came and examined the charts and my location of the sun. This to my mind was the solution of of M. Trouvelot's red star. But δ Arietis is not a red star, and we can only suppose that there were such conditions present as gave to the star a reddish hue, or that M. Trouvelot sees objects red where other observers do not.

I have been thus particular about details, because we now read published statements that are somewhat different. It is mentioned that he saw a decidedly red star "a little to the north and a little to the west of the sun." He, moreover, is reported to have stated (Nature, page 546) that on September 5th and 7th, he examined the part of the sky where the sun was then situate, with a telescope of the same aperture that he used in observing the eclipse, and with the eyepiece then employed, he recognized the two white stars which he had noted as 41 and ε Arietis, but the red star was not found, even though he swept to a much greater distance than any probable error of his observation would allow. On this circumstance he remarks:

"As much as the absence of a red star as brilliant as that one I observed during the eclipse seemed naturally to lead me to suppose that the star in question was not other than an intra-mercurial planet, nevertheless, as the most necessary elements- such as the position, and a disk, or a sensible phase—failed my observation, I believe it is my duty to hold my opinion in reserve, and for the present suspend my conclusions upon the possible nature of this star."

With regard to the reference to the stars 41 Arietis and ε Arietis, respectively of the 4th and $4\frac{1}{2}$ magnitudes, it need only be remarked that they were not in or near the region of the reported red star. The former star was $10\frac{1}{4}$ degrees north of the sun and $2\frac{1}{2}$ degrees to the east; the latter star was $4\frac{1}{3}$ degrees north, $\frac{1}{2}$ a degree east of the sun. They may be thrown out of the case, except as indicating that he saw them, probably with the naked eye, as he could hardly be looking in that locality for an intra-mercurial planet. Two or three stars of this constellation, but of the 5th and 6th magnitudes, lie from $1\frac{1}{2}$ to 3 degrees to the north and west of δ Arietis, but they do not appear to have been seen.

We are therefore reduced to the consideration of δ Arietis as being the star which M. Trouvelot saw. At our meeting he named the estimated distance of the observed star from the sun, and this estimated distance almost exactly tallies with the position of δ Arietis; and his observing 3 deg. west and 3 deg. north is represented by $2\frac{3}{4}$ deg. west and $2\frac{3}{4}$ deg. north; the estimated magnitude agrees with the actual msgnitude; and the absence of disk and of phase, agreed with the observer's statement that it was a star.

In my judgment, but one condition remains unsatisfied, namely, that it was a red star. And it seems to me not unlikely that there may have been atmospheric or possibly cosmic conditions in that vicinity which gave the star a reddish hue; or that he may have a tendency to see an object with a reddish tinge. The seeing 41 and ε Arietis as white stars might militate against this view. But in M. Trouvelot's great atlas of astronomical drawings, and in his drawings of sun spots, in the Cambridge Annals, we can not help nothing that his red spot on Jupiter is very brilliantly red as compared with the appearance to most observers; and in some of the sun spots we find a reddish tint added to the blackness of the dark centres, the same reddish tint not being visible to other observers. It would be interesting for M. Trouvelot to institute comparison with other observers in order to settle this color question.

At the meetings to the end of January, the President presented several verbal communications upon his observations upon the planets and the Pons comet.

THE PONS—1812, COMET.

The comet was first seen at the Davidson Observatory with the unassisted eye, on the first of December, before 8 hrs. in the evening. A series of observations was made with the 6.4 inches equatorial to determine its position by comparisons with stars which were reasonably close to it. And a series of six drawings was made at different dates, in December and January. The measures for position were made with the micrometer for differences of declination, and over the transit threads for differences of right ascension. At different times I was assisted by Messrs. T. D. Davidson and C. B. Hill.

The series of determinations embraces the dates: 1883, December, 12, 14, 16, 18, 20, 22, 26, 27, 28, 29; 1884, January, 3, 9, 10, 11, 24, 25. There were several clear nights upon which observations could not be made on account of the path of the comet passing through a very barren part of the heavens. After January 25th the long run of favorable weather was broken by a prolonged storm; and even in the intervals of good weather succeeding it, the atmospheric conditions were very unsatisfactory.

A pressure of official duty, and the want of the mean-places of many of the comparison stars, have prevented the reduction of the observations, although a preliminary examination indicates their reliability.

THE PLANETS MARS, JUPITER AND SATURN.

During November, December and January, observations of the physical appearance of these planets were made at every available opportunity. Drawings of Jupiter and Mars were made, and full notes kept in the study of Saturn.

SATURN. *The position of the Encke division*, plainly divides the outer ring A into two slightly unequal annuli by being nearer the outer than the inner circumference. This was certainly the case at the preceding part of the ring, but at the following part of the ring the division was apparently nearer the inner circumference. This anomaly was doubtless occasioned by the sun shining full on the preceding part of the ring, but at the following part the shadow of the raised rim of the outer circumference of the B ring was projected across and beyond the outer edge of the Encke division upon the inner bright border of the A ring. This reduced the apparent breadth of the inner annulus of the A ring at that point, and makes it appear narrower than the outer annulus. When the atmosphere was quiet this shadow made the breadth of the Encke division greater at the following than at the preceding part of the ring. It was of course a very small difference, yet it was unmistakable under favorable conditions. *The dusky ring*. While there were but two or three occasions on which the inner circumference of the dusky ring was sharply defined, yet without this condition, there were no times when the extreme parts of the dusky ring were equally distinct. And upon most occasions the preceding part of the ring was the brighter. It became a question why this appearance was so generally presented; whether it was in the ring itself and would thus give a clue to its period of rotation, or whether it was owing to the direction of the atmospheric waves of disturbance as we see them in geodetic observations, whether due to peculiarities of the telescope or the observers eye. Sometimes three observers made the comparison before announcing the result: the atmospheric disturbance might account for part of it. Changes of eye-pieces did not correct the impression. Decided change of parts was exhibited during one period of two or three hours.

But upon more than one occasion the following part has seemed the brighter without any doubt in the observer's mind.

It seems that one reason for the preceding part being brighter than its normal tone, must be in the additional light reflected upon it from the illuminated body of the planet being brighter near the preceding limb, after apposition.

I have not had an evening when the atmosphere continued sufficiently and uniformly quiet to observe during the whole night under equal conditions.

The dusky ring, where it crosses the body of planet, does not present a uniform tone of color, but the inner circumference seems a little denser and darker than further out. This might arise from a narrow dark belt on the body of the planet just on the line of projection of the inne · circumference on the body of the planet.

There is across the white equatorial band, on the body of the planet, a very narrow dark belt which I first noticed close to the edge of the dusky ring. This belt moved very slowly towards south during December and January.

I have recorded also upon two occasions a narrow dark line across the body of the planet in the dark part south of the bright equatorial belt. It revealed itself only upon short occasions of extreme quietness of the atmosphere.

For all these studies I have used eye-pieces of various characters, with magnifying powers from 120 to 500 diameters, but only upon one or two occasions utilizing the latter.

JUPITER. Numerous drawings of the beltings of Jupiter have been made with observations upon the satellites. The power used ranged from 120 to 300 diameters. A later report will be made upon this planet.

MARS. The observations have not been so satisfactory on this planet. It has happened that I have not had one opportunity when the atmosphere was quiet; but drawings have been made with powers reaching 300 diameters.

COLEMANITE.

BY J. T. EVANS, A. M.

A new mineral called "Colemanite" was found not long since in the southern part of this State, and named in honor of William T. Coleman, of this city. It is a hydrous borate of lime. There are several minerals of somewhat similar composition, and its affinities are shown in the following schedule:

Ulexite	$2CaO$	15.9
	Na_2O	8.8
	$5B_2O_3$	49.7
	$10Aq$	25.6
Bechilite	CaO	20.89
	$2B_2O_3$	52.24
	$4Aq$	26.87
Colemanite	$2CaO$	27.18
	$3B_2O_3$	50.98
	$5Aq$	21.84
Pandermite	$2CaO$	29.78
	$3B_2O_3$	55.85
	$3Aq$	14.36
Priceite	$3CaO$	29.9
	$4B_2O_3$	49.8
	$6Aq$	20.3

The clearest crystals obtainable contained small quantities of soda, varying from to 26-100 per cent. to 54-100 per cent., reckoned as caustic soda, but undoubtedly present as borate of soda. This is probably a mechanical admixture, and does not enter into the mineral as an essential element. It points, however, very strongly to the origin of the mineral from ulexite. By inspection of the formula, we observe that if the soda be abstracted from ulexite along with its equivalent of boric anhydride ($2B_2O_3$), there remains a compound identical with Colemanite or pandermite in its ratio of boric acid to the lime. In fact, both Colemanite and pandermite have been produced artificially by deposition from aqueous solutions of ulexite, the temperature alone determining the degree of hydration. Under varying conditions of temperature, concentration and pressure different, and yet closely allied, hydrous borates of lime would be deposited, and this might take place in quick succession, or even simultaneously in different portions of the same bed or ledge. These borates are thus very closely allied in their origin, and are liable to glide one into another by insensible gradations. Hand specimens are found having all the appearance of ulexite at one extremity and Colemanite at the other. This may account for some of the apparent discrepancies in the analysis by reputable chemists. Pisani's analysis of pandermite (quoted by the State mineralogist), is that of Priceite pure and simple.

Specimens of borate of lime having all the appearance of the massive variety of Colemanite, have given results on analysis closely agreeing with the formula of Priceite.

As far as we are informed, Colemanite is the first definitely crystallized borate of lime hitherto found.

With reference to its susceptibility of reduction to boric acid or borax, practical tests have shown it to be quite refractory.

COLEMANITE.—Crystallization monoclinic. *Inclination of the vertical to the clinodiagonal axis (C) $70\frac{1}{2}°$ I $\wedge$ I $108\frac{1}{4}°$. ii $\wedge$ I $144\frac{1}{2}°$ ì $\wedge$ I $126\frac{1}{2}°$. Luster vitreous to adamantine, often splendent. Cleavage ì or clinodiagonal, perfect, affording readily thin, smooth and polished laminæ which often show interference figures. Cleavage in other planes imperfect and fracture uneven, giving surfaces of a subvitreous luster. Hardness 3.5 in the amorphous, to 4.25 in crystalline variety. Sp. gravity 2.428. Colorless. Streak white. Transparent, subtranslucent to milky, especially in the massive. Rather brittle.

Composition, $2CaO, 3B_2O_3 + 5H_2O$.

Anhydrous boracic acid	B_2O_3	[50.98]
Lime	CaO	27 18
Water		21.84
Total		100.00

Pyr. Decrepitates violently and at length sinters. With fluor spar and bisulphate of potash, colors the flame yellowish green. Soluble in dilute hydrochloric or nitric acid with deposition of flakes of boracic acid in abundance.

Locality, Southern California, where it was discovered by R. Neuschwander, October, 1882. Named after Wm. T. Coleman of San Francisco.

*The notation is conformable to that of Dana's system of mineralogy. The measurements were made with hand a goniometer, and subject to the ordinary errors.

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BULLETIN.

California Academy of Sciences.

ON THE MORPHOLOGY OF COLEMANITE.

BY A. WENDELL JACKSON.

In the *American Journal of Science* for December, 1884, I published a short preliminary notice of a new borate of lime, that had been discovered in the southern part of Death Valley, Inyo County, California. In the present paper I communicate the results of my crystallographic study of the mineral; a later communication will discuss its optical and other physical properties.

Mr. J. T. Evans of this Academy, who first called attention to the new mineral, gives the following description in a paper read before the California Academy of Sciences, February 4th, 1884:

"Crystallization monoclinic. *Inclination of the vertical axis to the clinodiagonal axis (C) $70\frac{1}{2}°$, I $\wedge$ I $108\frac{1}{4}°$; ii $\wedge$ I $144\frac{1}{2}°$, iì $\wedge$ I $126\frac{1}{2}°$. Luster vitreous to adamantine, often splendent. Cleavage iì or clinodiagonal, perfect, affording readily thin, smooth and polished laminæ which often show interference figures. Cleavage in other planes imperfect and fracture uneven, giving surfaces of a subvitreous luster. Hardness 3.5 in the amorphous [massive], to 4.25 in the crystalline [crystallized] variety. Specific gravity 2.428. Colorless. Streak white. Transparent, subtranslucent to milky, especially in the massive. Rather brittle.

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*Measurements were made with a contact goniometer.

Composition, $2CaO, 3B_2 O_3 + 5H_2 O$.

Anhydrous boracic acid	$B_2 O_3$	[50.98]
Lime	CaO	27.18
Water		21.84
Total		100.00

Pyr. Decrepitates violently and at length sinters. With fluor spar and bisulphate of potash, colors the flame yellowish green. Soluble in dilute hydrochloric or nitric acid with deposition of flakes of boracic acid in abundance.

Locality, Southern California, where it was discovered by R. Neuschwander, October, 1882. Named after Wm. T. Coleman, of San Francisco."

In September, 1884, Mr. Evans kindly presented to me a single beautifully developed crystal-fragment (Fig. 1, Pl. I) with permission to make a thorough study of it. From measurements on this crystal, I determined the axial elements, and reckoned therefrom most of the angles in the principal zones. This work was about completed when I unexpectedly received from the owners of the deposit in which the mineral occurs, about twenty-five more crystal-fragments, and later still, from the State Mineralogist, Mr. H. G. Hanks, one more finely developed crystal. The crystals thus acquired presented many new forms, and enabled me to test the axial elements set up on the measurements of the first crystal.

Most of these crystals are quite clear and colorless, with the faces in the main in very good condition. They vary in size from 6 mm. in the orthoaxis, 5 mm. in the clinoaxis, by 8 mm. in the vertical axis, to 30 mm. in the ortho-, 20 mm. in the clino-, by 30 mm. in the vertical axis; most however being near the former dimensions. One irregular individual entirely without crystal-faces, possessed a diameter of 60 mm. Most of the crystals in my possession are from medium to short columnar fragments, broken from a foundation on which they were closely aggregated as implanted crystals. Five specimens show the crystals in place in thickly covered, drusy cavities in massive, fine granular, gray colemanite, the latter somewhat impure from finely disseminated argillaceous particles. One cavity was first lined with small, brilliant, colorless crystals of quartz, of the common form, which were subsequently partially covered by numerous crystals of colemanite. One magnificent geode is 0.1 m. in diameter, and entirely lined with large, colorless, brilliant, and highly complex crystals of colemanite. Considerable compact, grayish quartz is finely disseminated through the walls of these cavities or segregated in small irregular masses or thin layers, always underlying the colemanite crystals. The mineral is said by its discoverer to be intimately associated with snowy white, massive,extremely fine scaly pandermite. Small patches of this latter borate (?) adhere to the larger specimens, but give no clue to the exact relation, with respect to mode of occurrence, that may exist between them. A small quantity of an actively effervescing insoluble carbonate (probably calcite) also adhered to one of the geodes.

The crystal-system was established by an optical investigation, and Mr. Evans' assumption found to be correct. Extinction between crossed Nicols in parallel polarized light, took place exactly at right angles to, and parallel to, the plane of perfect cleavage $\infty \mathrm{P} \infty$ (010) when crystals were viewed through n (Fig. 1, Pl. I.); when viewed through cleavage laminæ, the direction of extinction makes an angle of something over 6° with the vertical axis (assuming as has been done in this paper, $g =$ (001) $0\ P$), lying in the acute angle of the morphological axes.

System: monoclinic.

Axes-ratio:

$$\grave{a} : \bar{b} : \acute{c} = 0.774843 : 1 : 0.540998$$
$$\beta = 69^\circ\ 50'\ 45''$$

determined from the fundamental angles

$$\infty \mathrm{P} : \infty \mathrm{P} = (110) : (1\bar{1}0) = 107^\circ\ 56'\ 9''$$
$$\infty \mathrm{P} : 0\ \mathrm{P} = (110) : (001) = 106^\circ\ 10'\ 43''$$
$$0\ \mathrm{P} : 2\ \mathrm{P} \infty = (001) : (\bar{2}01) = 111^\circ\ 35'\ 39''$$

all taken from one crystal and from faces giving excellent reflections.

Cleavage: perfect parallel to $\infty \mathrm{P} \infty$ and distinct parallel to 0 P.

The forms observed are the following:

m = ∞ Ᵽ ∞ (010)
n = ∞ Ᵽ ∞ (100)
g = 0 P (001)
H = ∞ Ᵽ 3 (130)
J = ∞ Ᵽ $\frac{7}{3}$ (370)
z = ∞ Ᵽ 2 (120)
P = ∞ Ᵽ $\frac{19}{10}$ (10.19.0)
s = ∞ P (110)
t = ∞ Ᵽ 2 (210)
c = Ᵽ ∞ (011)
a = 2 Ᵽ ∞ (021)
y = P ($\bar{1}$11)
v = 2 P ($\bar{2}$21)
b = — P (111)
σ = — 3 P (331)
△ = — $\frac{19}{6}$ P (19.19.6)
o = 2 Ᵽ 2 ($\bar{2}$11)
ε = 3 Ᵽ $\frac{3}{2}$ ($\bar{2}$31)
Q = 4 Ᵽ 2 ($\bar{2}$41)
r = $\frac{3}{2}$ Ᵽ $\frac{3}{2}$ ($\bar{2}$32)
d = 2 Ᵽ 2 ($\bar{1}$21)
x = 3 Ᵽ 3 ($\bar{1}$31)
ω = — 3 Ᵽ 3 (131)
Θ = 3 Ᵽ 3 ($\bar{3}$11)
B = 4 Ᵽ 4 ($\bar{4}$11)
k = — 3 Ᵽ 3 (311)
U = 6 Ᵽ ∞ ($\bar{6}$01)
Ψ = 4 Ᵽ ∞ ($\bar{4}$01)
h = 2 Ᵽ ∞ ($\bar{2}$01)
i = Ᵽ ∞ ($\bar{1}$01)
λ = — 2 Ᵽ ∞ (201)*

Of these forms s (∞ P), c (Ᵽ ∞), a (2 Ᵽ ∞), y (P), v (2 P), and d (2 Ᵽ 2), were observed on all the crystals examined,

* See Appendix II.

b (— P) on all but one, and *t* (∞ Ᵽ 2) on all but two. Very commonly present are *g* (*o* P), *h* (2 Ᵽ ∞), *i* (Ᵽ ∞), *n* (∞ Ᵽ ∞), *z* (∞ Ᵽ 2), *o* (2 Ᵽ 2), *ε* (3 Ᵽ $\frac{3}{2}$), *ω* (— 3 Ᵽ 3), and U (6 Ᵽ ∞). *r* ($\frac{3}{2}$ Ᵽ $\frac{3}{2}$) was met with on five, *x* (3 Ᵽ 3) and *σ* (— 3 P) on four, *Ψ* (4 Ᵽ ∞) and *Θ* (3 Ᵽ 3) on three, *k* (— 3 Ᵽ 3) and λ (— 2 Ᵽ ∞) on two, while H (∞ Ᵽ 3), J (∞ Ᵽ $\frac{7}{3}$), P (∞ Ᵽ $\frac{19}{10}$), △ (— $\frac{19}{6}$ P), Q (4 Ᵽ 2), and B (4 Ᵽ 4) were found each on but a single crystal. The largest number of forms met with on any one crystal was nineteen (Fig. 2, Pl. I), and the smallest number nine (Fig. 9, Pl. III).

The habit of colemanite is from medium to short columnar, determined by the large development of *s* (∞ P). None of the other lateral faces are ever large. Among the terminal forms *g* (0 P), *h* (2 Ᵽ ∞), *b* (— P), *y* (P), *v* (2 P), *c* (Ᵽ ∞) and *a* (2 Ᵽ ∞) frequently occur largely developed, *d* (2 Ᵽ 2) rarely, and *x* (3 Ᵽ 3) and *ω* (— 3 Ᵽ 3) in but a single instance. The remaining forms, and at times some of those just enumerated, occur with from small to extremely minute faces replacing the edges of the more developed forms.

In a general way it may be said of the crystals of colemanite, that they appear in three different habits, determined by the considerable or moderate development of *g* (0 P) and *h* (2 Ᵽ ∞), or by their total absence. The two extreme types, at least, are quite pronounced. In the one (Fig. 1, Pl. I) *g* (0 P) and *h* (2 Ᵽ ∞) are very largely developed, while all the rest of the terminal faces are small. The faces in the zone of the clinodiagonal polar edge of *y* (P), (*d. y. i.*) are very small in crystals of this type, so that, with the gentle inclination of *g* (0 P) to the front, and the sharp inclination of *h* (2 Ᵽ ∞) to the rear, the crystal assumes a strikingly monoclinic habit. When, however, *g* (0 P) and *h* (2 Ᵽ ∞) disappear entirely, the forms of the zone *d. y. i.* at once strongly develop (Fig. 3, Pl. I). It then results that, from the curious fact that *g* (0 P) and *i* (Ᵽ ∞) have nearly the same inclination to the vertical axis, the crystal may assume, with a certain development of the forms, a strikingly rhombic habit; and in any event one is liable to fall into error by interpreting *i* as the basal pinacoid, and *g* as the positive hemidome.

The following angles will make this clear:

g : vert. ax.	=	69° 54¾′
i : vert. ax.	=	69 25
$c : c$	=	126 9
$y : y$	=	126 21
$b : b$	=	140 14¼
$o : o$	=	140 22¾
$a : a$	=	89 6¼
$d : d$	=	89 21¼
$\omega : \omega$	=	85 20¼
$\varepsilon : \varepsilon$	=	85 33½
$c : a$	=	161 28½
$d : y$	=	161 30
$b : \omega$	=	152 33
$o : \varepsilon$	=	152 35½

Furthermore in the reversed position, v becomes — 2 P 2, h becomes — P ∞, V becomes — 5 P ∞, and the following further coincidences may be noted:

v : v	=	108 28¼
— 2 P 2 : — 2 P 2	=	108 15
h : U	=	151 58½
— P ∞ : — 5 P ∞	=	151 43½
v : ε	=	168 33
— 2 P 2 : ω	=	168 33

Numerous other coincidences could be traced, but I have already adduced more than enough to show the necessity for some caution in interpreting a crystal, whenever the forms of the zone $y : d$ are well developed. The danger of error in this respect is considerably diminished by the fact that the faces in the zone $y : d$ are often striated parallel to the edge $y : d$. When this striation is not present, one can of course always avoid error by determining the direction of extinction in a cleavage lamina of the doubtful crystal. This direction, as before remarked, lies in the acute angle of the morphological axes.

As at once appears from an examination of the orthographic horizontal projections given for each crystal, figured on Pls. I, II and III, and of the linear projection Pl. IV, the faces on colemanite crystals are finely grouped in zones; moreover, with but two or three exceptions ($\triangle$, σ, B) each face occurs in two or more important zones, thus materially aiding in its determination. The four most important zonal points in Fig. 11, Pl. IV, at once strike the eye; and it is worthy of note that the zonal point $a = 1$, $b = 0$ contains so many traces, while the corresponding point $a = -1$, $b = 0$, contains but one, that of λ ($-$ 2 P ∞).

On account of the perfect clinopinacoidal cleavage, many of the crystals examined have suffered from careless handling. In Figs. 1, 4, 6, 8 and 10, the large development of m (∞ P ∞) is due to this cause. Wherever m is observable as a natural surface, it is exceedingly small, and in one case only, wanting absolutely.

n (∞ P ∞) varies in this respect with h (2 P ∞), being fairly developed when h is large, and very small or absent when h is absent.

H (∞ P 3) and J (∞ P $\frac{7}{3}$) were both observed but once, and as adjacent faces upon the same crystal-fragment (Fig. 7, Pl. II). Both are quite small, and give very poor reflections, whence the discrepancies, that will be observed in the table on page 16, between the observed and calculated inclinations of these faces to the others in the vertical zone. The observed angle $H : J =$ 174° 8′ agrees well however with its calculated value 174° 6′ 50″.

z (∞ P 2) is wanting on but one crystal that is unbroken at its orthodiagonal extremities; m (∞ P ∞) is absent on the same crystal. On the other hand, z is always very small and gives poor reflections. On one crystal (Fig. 9, Pl. III.) the faces of z and m were merged into a continuous curved surface. In no other instance was any irregularity of development noticed about this portion of the crystal; but as we shall see later, it is quite marked in the region of the edge n (∞ P ∞) : h (2 P ∞).

P (∞ $\breve{P}$ $\frac{19}{10}$) was found on a small cleavage-fragment as a very narrow face on the edge *s* (∞ P): *m* (∞ $\breve{P}$ ∞), the latter face being also very small as a cleavage surface. The reflection from P took the form of a very broad band of light that entered and left the field so gradually that no precise points could be fixed upon as limits. The maximum culmination was symmetrically in the centre, but neither very bright nor sharply defined, so that an error of 15′ in the recorded reading is quite possible. The following angles will show that $\frac{19}{10}$ is probably the correct value of the coëfficient:

s (∞ P) : P	= 162°	9′		(observed)
s : P (= ∞ $\breve{P}$ $\frac{19}{10}$)	= 161	55	8″	(calculated)
s : P (= ∞ $\breve{P}$ $\frac{9}{5}$)	= 163	24	12	"
s : P (= ∞ $\breve{P}$ 2)	= 160	32	10	"

s (∞ P) is invariably the only form largely developed in the zone of the vertical axis. The faces are always bright, but the reflections often highly complex from the slight want of parallelism in the numerous sub-individuals that make up the crystal. From four crystals only could faultless reflections be obtained, and the mean value of *s* : *s* from these crystals is 107° 55′ 17″. Four other crystals furnished reflections that were single and only very slightly hazy in outline. Measurements from these faces were accurate to within one minute, and averaged with the above result, give as a mean from eight crystals, *s* : *s* = 107° 56′ 17″. This differs only 8″ from the value obtained for this angle in the crystal first measured, that is, from the value used in the determination of the axial elements.

t (∞ $\breve{P}$ 2) is very generally present with bright faces, but usually very small.

c ($\breve{P}$ ∞) is never absent and varies from a very small plane replacing the edge *g* (0 P) : *a* (2 $\breve{P}$ ∞), when *g* (0 P) is large, to one of the dominant terminal faces.

a (2 $\breve{P}$ ∞) is small in only one instance. On the crystal represented in Fig. 3, Pl. I, it occurs as an exceedingly minute triangular face in the angle of the three faces *c*, *ω*, and *d*. It was overlooked in the drawing, and in any case would have had to be considerably enlarged for a drawing on that scale. It was just visible with a hand lens, and was recognized by the two zones c (Ꝑ ∞) : c (Ꝑ ∞) and s (∞ P) : ω (— 3 Ꝑ 3). The faces of a are almost invariably among the most largely developed of the terminal planes.

y (P) is never absent and varies greatly in size under the circumstances explained on p. 7. It is sometimes strongly striated parallel to the edge y : d, resulting from an oscillatory combination with r ($\frac{3}{2}$ Ꝑ $\frac{3}{2}$). In one instance this striation is quite coarse, so that its cause is easily determined. At other times it is so extremely delicate as to be nearly invisible even with a lens, and again is absent altogether.

v (2 P), the only other positive hemi-pyramid determined*, is constantly present and large.

Of the negative hemi-pyramids of the vertical series, b (—P) is nearly always present either as a narrow face on the edge g (0 P) : s (∞ P) (Fig. 1, Pl. I.) when g (0 P) is large, or as a more triangular face when g is small or absent, (Fig. 3, Pl. I.)

σ (— 3 P) (Fig. 4, Pl. II.) was found on four crystals, in three very small on the edge s (∞ P) : b (— P) and on the fourth with one of its faces considerably developed and the other absent. It is determined by the two zones s (∞ P) : b (— P) and t (∞ Ꝑ 2): y (P). For s : σ, the angles 161° 21′ ca. and 161° 38′ ca. (calculated 161° 29½′) and for b : σ, 158° 12′ ca. 158° 31′, 158° 22′ ca. (calculated 158° 24¾′) were obtained.

△ (— $\frac{19}{6}$ P) (Fig. 9, Pl. III.) was found on but a single crystal. The adjacent face of s (∞ P) was broken into several subindividual parts, but it was easy to identify the reflection from that portion of s immediately adjacent to △; it was quite sharp, and admitted good adjustment. The reflection from △ was single, and somewhat blurred at the contact of the two discs which formed the signal. Three readings from it agreed to within 15″, so that the angle s : △ = 162° 19′ must be regarded as correct. It is practically identical with the calculated value 162° 19′ 5″ for △ = — $\frac{19}{6}$ P. One would be inclined to favor the simpler symbol — 3 P, and regard △ as identical with σ (— 3 P). But the angle s (∞ P) : σ (— 3 P) = 161° 29½′ is too far from the observed angle

* See Appendix II.

of *s* to $\triangle$, and furthermore I have carefully adjusted the zone *t* (∞ P 2) : *y* (P) on the goniometer and found that $\triangle$ is not in it as it should be were it identical with σ.

o (2 P 2) is never large and is often exceedingly small. It is easily determined by the zones *v* (2 P) : *h* (2 P ∞) and *c* (P ∞) : *y* (P). It is absent from only five crystals of the twenty-eight examined.

ε (3 P $\frac{3}{2}$) is also very common and usually extremely small on the edge *d* (2 P 2) : *s* (∞ P). It is determined by the zones *d* : *s* and *v* (2 P) : *h* (2 P ∞).

Q (4 P 2) is a minute triangular face, found on only one crystal (represented in Fig. 5, Pl. II). This crystal is one of the very few that are partially developed on both ends. Q is determined by the zones *v* (2 P) : ε (3 P $\frac{3}{2}$) and *a* (2 P ∞) : *x* (3 P 3). The observed angle Q : ε = 171° 55′ ca. agrees very well with its calculated value 171° 59′.

r ($\frac{3}{2}$ P $\frac{3}{2}$) (Fig. 2, Pl. I.) whenever present is always very minute on the edge *d* (2 P 2) : *y* (P). It is determined by the zones *d* : *y* and *v* : *c*. While present as an actual face on only five crystals, it is involved in the striation of *y* and *d* on many of the others.

d (2 P 2), determined by the zones *v* (2 P) : *a* (2 P ∞) and *y* (P) : *y* (P), is usually present as a narrow face on the edge *v* : *a*. It rarely attains the size represented in Figs. 6, Pl. II, and is often extremely small. When *v* (2 P) is very small, ε (3 P $\frac{3}{2}$) absent, and *d* comes to intersection with *s* (∞ P), it takes the form of a very acute lozenge bounded by *v*, *c*, *a* and *s*. I have already referred to the striation on this face parallel to the edge *d* : *y*.

x (3 P 3), usually very small, attains considerable size but once (Fig. 2, Pl. I). It is determined by the zones *d* (2 P 2) : *y* (P) and *a* (2 P ∞) : *s* (∞ P). From the two faces of *x* on the fragment represented in Fig. 7, Pl. II, faultless reflections were obtained, giving *x* : *x* (over plane of symmetry) = 66° 39′ 40″ (calculated 66° 47′ 10″), a variation from the calculated value considerably less than that observed between equivalent angles on different crystals in a number of instances. On the same fragment was obtained *d* : *x* = 168° 42′ (calculated 168° 42′ 57″).

ω (— 3 Ꝑ 3) is determined by the zones a (2 Ꝑ ∞) : s (∞ P) and z (∞ Ꝑ 2) : c (Ꝑ ∞). It is usually a very small face on the edge a : s, and in one crystal only (Fig. 3, Pl. I) attains considerable size. It is also in the zone b (— P) : m (∞ Ꝑ ∞), and in this zone was measured $b : \omega = 152° 33'$ (calculated $152° 33' 1''$).

Θ (3 Ꝑ 3) (Fig. 10, Pl. III,) is a very small face in the zones y (P) : o (2 Ꝑ 2) and h (2 Ꝑ ∞) : s (∞ P). It was found on one crystal as a very small face on the edge h : s, and in another as represented in Fig. 10, but with only one of its faces. It is one of the rare forms.

B (4 Ꝑ 4) is still more rare, having been recognized but once with certainty (Fig. 8, Pl. III). It is determined by the zones y (P) : o (2 Ꝑ 2) and t (∞ Ꝑ 2) : c (Ꝑ ∞). The latter zone was proved on the goniometer. On the crystal represented in Fig. 10, Pl. III, the edge Θ : n is replaced by a very narrow face (not drawn) that was so roughened that no reflection could be obtained from it. It agrees in position with, and probably is, B.

k (— 3 Ꝑ 3) was found in three crystals, and is shown in Fig. 1, Pl. I, and Fig. 6, Pl. II. It is determined by the zones c (Ꝑ ∞) : b (— P) and b (— P) : s (∞ P) (on opposite sides of the plane of symmetry). In the crystal shown in Fig. 6, Pl. II, the faces were entirely dull, in the others very bright, giving $k : b = 157° 56'$ and $158° 0'$ (calculated $157° 56' 8''$).

Of the hemidomes, h (2 Ꝑ ∞) is the only one that attains considerable size; the others are all very small.

U (6 Ꝑ ∞) occurs as a small lozenge (Fig. 3, Pl. I.), when h and n (∞ Ꝑ ∞) are absent, and when the latter are present, as a very narrow face on the edge n : h. It is usually accompanied by Ψ (4 Ꝑ ∞), developed in a similar manner but showing a very marked tendency to curvature, which sometimes does and sometimes does not involve also the face of U. In only one instance could a satisfactory reading be obtained from Ψ, giving $\Psi : \mathrm{h} = 159° 13'$ ($159° 13' 50''$ calculated).

h (2 Ꝑ ∞) I have already referred to as determining with g (0 P), by enlargement or total disappearance, two somewhat pronounced types. They are also moderately developed in forms intermediate between the extreme types, and both very often give faultless or nearly faultless reflections.

i (P ∞) is always very small on the edge h (2 P ∞) : g (0 P) (Fig. 1, Pl. I) or the edge y (P) : y (P) (Fig. 10, Pl. III), and is often absent.

λ was observed but once (Fig. 10, Pl. III) as a lozenge-shaped face in the angle of b, b, s and s. It is worthy of note that its trace is the only one passing through the zonal point (Fig. 11, Pl. IV) $a = -\frac{1}{2}$, $b = 0$.

I have carefully measured the angles in the more important zones on twenty-eight crystals with a large Fuess-Babinet goniometer, furnished with two telescopes and Websky's slit as signal. The results, together with calculated values, are collected in the following table.

In making up the mean values of the measured angles, all readings were rejected that were taken from reflections not single, or blurred in outline to such an extent that successive readings failed to agree to minutes. When, however, readings were to be had from imperfect reflections only, such have been given, and the fact indicated.

It will be observed that the mean value of each of the fundamental angles, $s : s$, $h : g$, and $g : s$, agrees remarkably closely with that obtained from the crystal first measured, and which had been used in determining the axial elements some time before the remaining crystals came to hand. Furthermore, while considerable variation exists between the different values of each angle obtained from the various crystals, the larger number of values of each are near the mean, as will be seen from the following:

$s : s = (\infty$ P : ∞ P$) =$	107°	50′	15″
	107	51	
	107	55	
	107	55	56
	107	56	9
	107	58	50
	107	59	
	108	4	
Mean	107°	56′	16″

$s : g = (\infty P : 0 P) =$	106°	7′	0″
	106	10	43
	106	10	50
	106	11	
	106	11	30
	106	12	20
	106	15	50
Mean	106°	11′	29″

$h : g = (2 P \infty : 0 P) =$	111°	31′	57″
	111	32	
	111	32	33
	111	35	39
	111	36	
	111	36	
	111	36	28
	111	36	40
	111	37	5
	111	37	7
	111	37	17
	111	37	30
	111	38	24
	111	39	
Mean	111°	35′	58″

It seemed, therefore, unnecessary to re-calculate the axial elements with these mean values. It will be noticed that there is a very fair agreement between the measured and calculated angles, and also that the variations of the same angle in different crystals take place both ways from the calculated value in the greater number of instances.

	Calculated.	Measured (mean).	No. of Crystals.	Extreme values.	Diff.
m : H	155° 22′ 49″	155° 33′ circa			
m : J	149 29 39	149 41 "			
m : z	145 29 46	145 31½	2	145° 31′ — 145° 32′	1′
m : P	144 6 48	143 58 circa			
m : s	126 1 56	126 3 2	5	125 59 — 126 5	6
m : t	109 59 11				
H : J	174 6 50	174 8 circa			
H : z	170 6 57	169 56 "			
H : P	168 43 59				
H : s	150 39 7	150 24 "			
H : t	134 36 22				
H : n	114 37 11				
J : z	176 0 7	175 48 "			
J : P	174 37 9				
J : s	156 32 17	156 16 "			
J : t	140 29 32				
J : n	120 30 21				
z : P	178 37 2				
z : s	160 32 10	160 30½	2	160 28 — 160 33	5
z : t	144 29 24				
z : n	124 30 14				
P : s	161 55 8	162 9 circa			
P : t	145 52 23				

	Calculated.	Measured (Mean).	No. of Crystals	Extreme Values.	Diff.
P : *n*	125 53′ 12″				
s : *t*	163 57 15	163 57′ 10″	3	163 56′ — 163 59′	3′
s : *n*	143 58 4	143 57 36	5	143 55 — 143 59	4
t : *n*	160 0 49	160 0 0	7	159 58 — 160 2	4
H : H	49 14 22				
J : J	61 0 42				
z : *z*	69 0 28				
P : P	71 46 24				
s : *s*	107 56 9	107 56 16	8	107 50 15 — 108 4	13 45″
t : *t*	140 1 38	140 0 0	4	139 58 — 140 2	4
m : *a*	135 26 50	135 27 44	4	135 26 — 135 32 50″	6 50
m : *c*	116 55 29	116 55 34	3	116 53 — 116 57 42	4 42
m : *g*	90 0 0				
a : *c*	161 28 39	161 29 24	8	161 25 — 161 33 9	8 9
a : *g*	134 33 10	134 32 10	7	134 22 — 134 36	14
c : *g*	153 4 3	153 2 32	7	152 59 — 153 5 30	6 30
c : *c*	126 9 2	126 4 42	3	126 0 — 126 8 6	8 6
a : *a*	89 6 20	89 7 20	3	89 3 — 89 13	10
s :	162 19 5	162 19			
s : *σ*	161 29 27	161 29½ circa	2	161 21 circa 161 38 circa	17
s : *b*	139 54 14	140 1 45	4	139 57 — 140 4	7

	CALCULATED.			MEASURED (MEAN).			No. of Crystals.	EXTREME VALUES.							DIFF,	
$s : g$	106	10′	43″	106	11′	29″	7	106	7′		—	106	15′	50″	7′	17″
$s : g$ (rear)	121	16	35	121	24	10	3	121	23		—	121	25		2	
$s : r$ (")	146	26	51	146	29	6	5	146	25		—	146	32		7	
$\triangle : \sigma$	179	10	22													
$\triangle : b$	157	35	9													
$\triangle : g$	123	51	38													
$\triangle : y$	76	24	20													
$\triangle : v$	51	14	14													
$\sigma : b$	158	24	47	158	22	circa	3	158	12	circa	—	158	31	circa	19	
$\sigma : g$	124	41	16													
$\sigma : y$	77	13	58													
$\sigma : v$	52	3	42													
$b : g$	146	16	29	146	14	30	4	146	14		—	146	16		2	
$b : y$	98	49	11	98	43		1									
$b : v$	73	38	55													
$g : y$	132	32	42	132	27	28	5	132	24		—	132	29		5	
$g : v$	107	22	26	107	21	57	4	107	21	30″	—	107	23	20	1	50
$y : v$	154	49	44	154	55	0	4	154	49		—	154	59		10	
$m : \omega$	137	14	49													
$m : b$	109	52	50													
$\omega : b$	152	33	1	152	33	circa										
$b : b$	140	14	20	140	10	"										

	Calculated.	Measured (Mean).	No. of Crystals.	Extreme Values.	Diff.
$\omega : \omega$	85° 20′ 22″				
$k : k$	158 0 24				
$\triangle : \triangle$	118 51 26				
$\sigma : \sigma$	119 31 8				
$\Theta : \Theta$	151 18 36				
B : B	158 4 34				
$m : x$	146 36 25	146 38′ 47″	3	146 36′ — 146° 40′ 10″	4′ 10″
$m : d$	135 19 22	135 23 15	4	135 20 — 135 26	6
$m : r$	127 12 47	127 19 circa			
$m : y$	116 49 27	116 54 32			
$m : i$	90 0 0	90 1 circa			
$x : d$	168 42 57	168 44 54	5	168 44 — 168 46	2
$x : r$	160 36 22				
$x : y$	150 13 2	150 10			
$x : i$	123 23 35	123 27 circa			
$d : r$	171 53 25				
$d : y$	161 30 5	161 29 15	6	161 24 — 161 32	8

	CALCULATED.	MEASURED (MEAN).	No. of Crystals.	EXTREME VALUES.	DIFF.
$d : i$	134 40′ 38″	134 39′ 30″	2	134 39′ — 134 40′	1′
$r : y$	169 36 40				
$r : i$	142 47 13				
$y : i$	153 10 33				
$x : x$	66 47 10	66 39 40			
$d : d$	89 21 16	89 15 20	3	89 10 — 89 20	10
$r : r$	105 34 26	105 26 circa			
$y : y$	126 21 6	126 17	3	126 11 — 126 19	8
$m : Q$	145 14 21				
$m : \varepsilon$	137 13 15	137 14 7			
$m : v$	125 45 53	125 48 18	5	125 46 — 125 54 7″	8 7
$m : o$	109 48 38	109 51 25			
$m : h$	90 0 0	89 59 14	2	89 57 30 — 90 0 57	3 27
$Q : \varepsilon$	171 58 54	171 55 circa			
$Q : r$	160 31 32				
$Q : o$	144 34 17				
$Q : h$	124 45 39				
$\varepsilon : v$	168 32 38	168 34 15	2	168 33 — 168 35 30	2 30
$\varepsilon : o$	152 35 23	152 25 circa			
$\varepsilon : h$	132 46 45	132 46 "	2	132 39 circa — 132 53 circa	14
$v : o$	164 2 45	164 3 23	5	164 1 — 164 5	4
$v : h$	144 14 7	144 13 18	11	144 8 — 144 15	7

	CALCULATED.	MEASURED (MEAN).	No. of Crystals	EXTREME VALUES.	DIFF.
$o : h$	160° 11′ 22″	160° 10′ 40″	9	160 8′ — 160° 14′	6′
$Q : Q$	69 21 18				
$\varepsilon : \varepsilon$	85 33 30				
$v : v$	108 28 14	108 26 48	3	108 25 — 108 28	3
$o : o$	140 22 44	140 23	2	140 20 — 140 26	6
$n : \lambda$	151 39 47				
$n : g$	110 9 15	110 7 54	2	110 6 — 110 8 54	2 54″
$n : i$	69 24 58				
$n : h$	41 44 55	41 40 24	4	41 36 — 41 43 10	7 10
$n : \Psi$	20 58 45	21 11 circa			
$n : U$	13 43 17	13 38 "	4	13 32 circa — 13 41 circa	9
$\lambda : g$	138 29 28				
$\lambda : i$	97 45 11				
$\lambda : h$	70 5 8				
$\lambda : \Psi$	49 18 58				
$\lambda : U$	42 3 31				
$g : i$	139 15 42	139 13 15	2	139 13 — 139 13 30	0 30
$g : h$	111 35 39	111 35 58	14	111 31 57 — 111 39	7 3
$g : \Psi$	90 49 30	91 5 circa			
$g : U$	83 34 3	83 37 "	4	83 35 circa — 83 42 circa	7
$i : h$	152 19 57	152 25			
$i : \Psi$	131 33 47	131 (approx.)			

	CALCULATED.	MEASURED (MEAN).	No. of Crystals.	EXTREME VALUES.	DIFF.
$i : U$	124° 18′ 20″	124° 24′ circa	2	124° 24′ circa — 124° 24′ circa	0′
$h : \Psi$	159 13 50	159 13 "			
$h : U$	151 58 23	152 1 "	5	152 0 " — 152 2 "	2
$\Psi : U$	172 44 33	172 30 "			
$n : a$	103 59 18	103 59			
$n : d$	75 41 59	75 39			
$n : v$	52 44 50	52 45			
$a : d$	151 42 41	151 39 30	5	151 38 — 151 42	4
$a : v$	128 45 32	128 45 23	5	128 43 10 — 128 49	5 50″
$d : v$	157 2 51	157 5 15	4		
$n : k$	156 22 0	156 22 circa	2	156 22 circa — 156 21 circa	1
$n : b$	134 18 8	134 19 40	3	134 18 " — 134 21 "	3
$n : c$	107 53 26	107 47 40	3	107 44 — 107 53	9
$n : y$	71 43 14	71 30 circa			
$n : o$	45 25 7	45 18			
$n : \Theta$	31 22 42	31 18 circa		31 16 circa — 31 20 circa	4
$n : B$	23 33 18				
$k : b$	157 56 8	157 56	2	157 52 — 158 0	8
$k : c$	131 31 26	131 31 circa	2	131 30 circa — 131 32 circa	2
$k : y$	95 21 14	95 19 "			
$k : o$	69 3 7	69 3 "			

	CALCULATED.	MEASURED (MEAN).	No. of Crystals.	EXTREME VALUES.	DIFF.
$k : \Theta$	55° 0′ 42″				
k : B	47 11 18				
$b : c$	153 35 18	153° 34′ 14″	5	153° 32′ — 153° 35′ 40″	3′ 40″
$b : y$	117 25 6	117 20	3	117 19 — 117 21	2
$b : o$	91 6 59	91 6 40	3	91 4 — 91 8	4
$b : \Theta$	77 4 34	77 6			
b : B	69 15 10				
$c : y$	143 49 48	143 47 4	5	143 46 — 143 49 15	3 15
$c : o$	117 31 41	117 32 54	3	117 32 41 — 117 33	0 19
$c : \Theta$	103 29 16	103 31			
c : B	95 39 52				
$y : o$	153 41 53	153 46			
$y : \Theta$	139 39 28	139 49 circa	3	139 45 circa — 139 53 circa	8
y : B	131 40 4				
$o : \Theta$	165 57 35	165 58	2	165 58 — 165 58	0
o : B	158 8 11				
Θ : B	172 10 36				

In the following table are contained the angles for each form, from which the inclination of any two faces on a colemanite crystal may be calculated. I have taken as the basis for these calculations the axial elements already given, viz:

$$\grave{a} : \bar{b} : \acute{c} = 0.774843 : 1 : 0.540998$$
$$\beta = 69^\circ\ 50'\ 45''$$

In all the *positive* hemi-pyramids (those lying over the acute angle β), let—

X, represent the inclination of the face of the pyramid to the plane of the vertical and clino axes (inclination to the plane of symmetry.

Y, represent the inclination of the face of the pyramid to the plane of the vertical and ortho axes (inclination to the ortho-diagonal section).

Z, represent the inclination of the face of the pyramid to the plane of the lateral axes (inclination to the basal section).

μ, represent the inclination of the clino-diagonal polar edge to the vertical axis.

ν, represent the inclination of the same edge to the clino-axis.

ρ, represent the inclination of the ortho diagonal polar edge to the vertical axis.

σ, represent the inclination of the middle edge to the clino-axis.

The angles of the *negative* hemi-pyramids (those lying over the obtuse angles of the morphological axes) are represented by the same characters; only where the angles differ in value from the corresponding angles of the positive form, an accent is added. We thus get for the negative hemi-pyramids: X′, Y′, Z′, μ' and ν'.

For the positive hemi-pyramids:

$$y = +\text{P}$$

X = 63° 10′ 33″	μ = 69° 24′ 57″
Y = 71 43 14	ν = 40 44 17
Z = 47 27 18	σ = 52 13 48
	ρ = 61 35 12

$$v = + 2 P$$

$X = 51° \; 14' \; 7''$	$\mu = 41° \; 44' \; 54''$
$Y = 52 \; 44 \; 50$	$\nu = 68 \; 24 \; 20$
$Z = 72 \; 37 \; 34$	$\sigma = 52 \; 13 \; 48$
	$\rho = 42 \; 44 \; 40$

$$o = + 2 P 2$$

$X = 70° \; 11' \; 22''$	$\mu = 41° \; 44' \; 54''$
$Y = 45 \; 25 \; 7$	$\nu = 68 \; 24 \; 20$
$Z = 69 \; 44 \; 30$	$\sigma = 68 \; 49 \; 21$
	$\rho = 61 \; 35 \; 12$

$$\varepsilon = + 3 P \tfrac{3}{2}$$

$X = 42° \; 46' \; 45''$	$\mu = 41° \; 44' \; 54''$
$Y = 59 \; 33 \; 17$	$\nu = 68 \; 24 \; 20$
$Z = 75 \; 31 \; 30$	$\sigma = 40 \; 42 \; 29$
	$\rho = 31 \; 38 \; 20$

$$Q = + 4 P 2$$

$X = 34° \; 45' \; 39''$	$\mu = 41° \; 44' \; 54''$
$Y = 64 \; 49 \; 33$	$\nu = 68 \; 24 \; 20$
$Z = 77 \; 53 \; 15$	$\sigma = 32 \; 50 \; 2$
	$\rho = 24 \; 48 \; 7$

$$r = + \tfrac{3}{2} P \tfrac{3}{2}$$

$X = 52° \; 47' \; 13''$	$\mu = 69° \; 21' \; 26''$
$Y = 73 \; 41 \; 40$	$\nu = 40 \; 47 \; 48$
$Z = 52 \; 55 \; 21$	$\sigma = 40 \; 42 \; 29$
	$\rho = 50 \; 56 \; 27$

$$d = + 2 P 2$$

$X = 44° \; 40' \; 38''$	$\mu = 69° \; 24' \; 57''$
$Y = 75 \; 41 \; 59$	$\nu = 40 \; 44 \; 17$
$Z = 57 \; 48 \; 31$	$\sigma = 32 \; 50 \; 2$
	$\rho = 42 \; 44 \; 40$

$$\varkappa = + 3 P 3$$

$X = 33° \; 23' \; 35''$	$\mu = 69° \; 24' \; 57''$
$Y = 78 \; 51 \; 19$	$\nu = 40 \; 44 \; 17$
$Z = 65 \; 21 \; 12$	$\sigma = 23 \; 16 \; 38$
	$\rho = 31 \; 38 \; 20$

$\Theta = + 3 \text{P} 3$

X = 75° 39′ 18″		μ = 28° 12′ 35″	
Y = 31 22 42		ν = 81 56 39	
Z = 82 11 49		σ = 75 31 5	
		ρ = 61 35 12	

$\text{B} = + 4 \text{P} 4$

X = 79° 2′ 17″	μ = 20° 58′ 44″
Y = 23 33 18	ν = 89 10 30
Z = 89 11 24	σ = 79 2 13
	ρ = 61 35 12

For the negative hemi-pyramids:

$b = - \text{P}$

X′ = 70° 7′ 10″	μ' = 42° 1′ 33″
Y′ = 45 41 52	ν' = 27 49 11
Z′ = 33 43 31	σ = 52 13 48
	ρ = 31 38 20

$\sigma = - 3 \text{P}$

X′ = 59° 45′ 34″	μ' = 21° 3′ 1″
Y′ = 36 16 3	ν' = 48 47 43
Z′ = 55 18 44	σ = 52 13 48
	ρ = 31 38 20

$\triangle = - \frac{19}{6} \text{P}$

X′ = 59° 25′ 43″	μ' = 20° 10′ 15″
Y′ = 36 4 50	ν' = 49 40 29
Z′ = 56 8 22	σ = 52 13 48
	ρ = 30 16 23

$\omega = - 3 \text{P} 3$

X′ = 42° 40′ 11″	μ' = 42° 1′ 33″
Y′ = 59 47 54	ν' = 27 49 11
Z′ = 53 10 15	σ = 23 16 38
	ρ = 31 38 20

$k = -3\,\text{P}\,3$

$X' = 79°\ 0'\ 12''$	$\mu' = 21°\ 3'\ 1''$
$Y' = 23\ 38\ 0$	$\nu' = 48\ 47\ 43$
$Z' = 49\ 42\ 37$	$\sigma = 75\ 31\ 5$
	$\rho = 61\ 35\ 12$

For the positive hemidomes:

$U = +6\,\text{P}\,\infty$	$\Psi = +4\,\text{P}\,\infty$
$X = 90°\ 0'\ 0''$	$X = 90°\ 0'\ 0''$
$Y = 13\ 43\ 17$	$Y = 20\ 58\ 44$
$Z = 96\ 25\ 57$	$Z = 89\ 10\ 30$

$h = +2\,\text{P}\,\infty$	$i = +\text{P}\,\infty$
$X = 90°\ 0'\ 0''$	$X = 90°\ 0'\ 0''$
$Y = 41\ 44\ 54$	$Y = 69\ 24\ 57$
$Z = 68\ 24\ 20$	$Z = 40\ 44\ 17$

For the negative hemidome:

$\lambda = -2\,\text{P}\,\infty$

$X' = 90°\ 0'\ 0''$
$Y' = 28\ 20\ 12$
$Z' = 41\ 30\ 33$

For the clinodomes:

$c = \text{P}\,\infty$	$a = 2\,\text{P}\,\infty$
$X = 63°\ 4'\ 31''$	$X = 44°\ 33'\ 10''$
$Y = 72\ 6\ 34$	$Y = 76\ 0\ 42$
$Z = 26\ 55\ 29$	$Z = 45\ 26\ 50$

For the prisms:

$H = \infty\,\text{P}\,3$	$J = \infty\,\text{P}\,\frac{7}{3}$
$X = 24°\ 37'\ 11''$	$X = 30°\ 30'\ 21''$
$Y = 65\ 22\ 49$	$Y = 59\ 29\ 39$
$Z = 81\ 45\ 46$	$Z = 79\ 55\ 37$

$z = \infty\, \bar{P}\, 2$

$X = 34^\circ\ 30'\ 14''$
$Y = 55^\circ\ 29'\ 46''$
$Z = 78\ \ 44\ \ 43$

$P = \infty\, \bar{P}\, \frac{19}{10}$

$X = 35^\circ\ 53'\ 12''$
$Y = 54\ \ 6\ \ 48$
$Z = 78\ \ 20\ \ 52$

$s = \infty\, P$

$X = 53^\circ\ 58'\ 4''$
$Y = 36\ \ 1\ \ 56$
$Z = 73\ \ 49\ \ 17$

$t = \infty\, \bar{P}\, 2$

$X = 70^\circ\ 0'\ 49''$
$Y = 19\ \ 59\ \ 11$
$Z = 71\ \ 6\ \ 26$

APPENDIX I.

In May, 1884, Prof. Gerhard von Rath, of the University of of Bonn, Germany, was in San Francisco, and obtained a specimen of colemanite which he showed me at the time, stating that it was given to him as a new mineral, but that its general appearance was so similar to datholite that he was inclined to think it was that mineral. The matter had passed from my mind when Mr. Evans brought me his crystal of colemanite, and it was not until I had finished my examination, and was ready to publish my preliminary notice, that the identity of the mineral I had been examining with that shown me by von Rath occurred to me. I at once sent my results to von Rath, who had in the mean time arrived at his home from his long American tour. A slight examination had shown him that his specimen was not datholite, and he at once proceeded with a crystallographic determination. When my letter reached him, he had obtained the following results which he very kindly sent me with permission to publish. Prof. von Rath's crystal contained the forms: s (∞ P), t (∞ P 2), n (∞ P ∞), m (∞ P ∞), g (0 P), h (2 P ∞), b (— P), y (P), v (2 P), c (P ∞), a (2 P ∞), d (2 P 2), and σ (— 3 P). From the fundamental angles

$$s : s\ (\infty\ \mathrm{P} : \infty\ \mathrm{P}) = 107^\circ\ 50'$$
$$g : s\ (0\ \mathrm{P} : \infty\ \mathrm{P}) = 106\ \ 16$$
$$g : c\ (0\ \mathrm{P} : \mathrm{P}\ \infty) = 153\ \ \ 4$$

the following axial elements were determined:

$$\grave{a} : \bar{b} : \acute{c} = 0.7769 : 1 : 0.54162$$
$$\beta = 69^\circ\ 43'\ 20''$$

The following angles were calculated from these elements (a few measured being added in parenthesis):

$b : n = 134^\circ\ 22\frac{1}{2}'$	$v : h = 144^\circ\ \ 9'$
$b : m = 109\ \ 54\frac{1}{4}$	$v : y = 154\ \ 50\frac{1}{2}$
$b : g = 146\ \ 18$	(meas'd 154 50)
(meas'd 146 17)	$a : n = 104\ \ \ 4$
$c : n = 107\ \ 59\frac{3}{4}$	$a : m = 135\ \ 27\frac{1}{2}$

$c : b = 153° 37\frac{1}{4}′$	$a : y = 134° 32\frac{1}{2}′$
$y : n = 108° 11\frac{1}{2}′$	(meas'd 134° 30′)
$y : m = 116° 54′$	$a : c = 161° 28\frac{1}{2}′$
$y : g = 132° 29′$	(meas'd 161° 28$\frac{1}{2}$′)
(meas'd 132° 28′)	$y : d = 161° 29′$
$c : y = 143° 48\frac{3}{4}′$	(meas'd 161° 28′)
$y : s = 121° 15′$	$h : n = 138° 9\frac{3}{4}′$
$v : n = 127° 8\frac{3}{4}′$	$h : g = 111° 33\frac{1}{2}′$
$v : m = 125° 51′$	(meas'd 111° 35′)
$v : g = 107° 19\frac{1}{2}′$	$y : y = 126° 12′$
(meas'd 107° 20′)	(meas'd 126° 14′)
$b : s = 139° 58′$	$c : c = 126° 8′$
(meas'd 139° 58′)	(meas'd 126° 8′)
$d : n = 104° 13\frac{1}{2}′$	$\sigma : n = 143° 48\frac{3}{4}′$
$d : m = 135° 25′$	$\sigma : m = 120° 11\frac{2}{3}′$
$d : g = 122° 7′$	$\sigma : g = 124° 57\frac{1}{4}′$
$v : s = 146° 24\frac{1}{2}′$	$\sigma : b = 158° 39\frac{1}{4}′$
(meas'd 146° 30′)	(meas'd 158° 30′)

Spec. gravity = 2.417. (von Rath.)

Comparing von Rath's calculated angles and mine with the mean values, it will be found that for two thirds of those given by von Rath, my values are nearer, and for one third his are nearer the mean value observed. It will be noticed that of his fundamental angles, two ($s : s$ and $c : m$) are extremes among all thus far observed, while his third angle ($g : c$) agrees exactly with my calculated value of $g : c = 153° 4′ 3″$.

I did not include the angles observed by Prof. von Rath in making up the mean values given in my table, as I was uncertain about their fulfilling the conditions I had set for securing great accuracy in all angles entering into the mean values.

Prof. von Rath speaks once more in his letter, concerning the general resemblance between colemanite and datholite, which he considers very striking

APPENDIX II.

Since the preceding paper was placed in the hands of the printer, a few additional specimens of colemanite have been received, which have yielded the following additional forms:

$$
\begin{aligned}
q &= 3\ P\ (\bar{3}31)\\
G &= -7\ P\ (771)\\
\rho &= 2\ P\ 4\ (\bar{4}12)\\
\gamma &= 3\ P\tfrac{3}{2}\ (\bar{3}21)\\
w &= 7\ P\tfrac{7}{2}\ (721)\\
V &= -\ P\ \infty\ (101)\\
W &= 3\ P\ \infty\ (\bar{3}01)
\end{aligned}
$$

q (3 P) was found on a small fragment, showing also faces of s, v, and y, as a very small face on the edge s (∞ P) : v (2 P). The condition of the face was such that very poor reflections were obtained. The angles obtained, however, approximate sufficiently close to the calculated values for $q = 3$ P to leave no doubt as to the nature of the form

G (— 7 P) was found on a short columnar fragment with n, t, σ, b, y, c, a, h and v. Its face was so small, on the edge $s : \sigma$, that reflections could be obtained only with the lens thrown in front of the telescope. In this way nine readings were made, varying between 286° 47′ and 288° 8′. Seven of these readings lay between the extremes 287° 12′ and 287° 45′. A mean of them all gave 287° 30′. With this reading, and very good ones obtained from the other faces in the zone s, G, σ, b, angles were obtained which approximate fairly well to the calculated values for G = — 7 P.

ρ (2 P 4) occurs on a small, brilliant, but very much deformed crystal, with a, c, y, d, b, s, k, i, h, o, v, t, n, m, and σ. k and o are much more developed than represented on any of the figures in the plates, while v is very small indeed. ρ is in the zone v, o, h, on the edge $o : h$ as a very narrow face and gives very faint and blurred, though single, reflections. $\rho : h$ = 169° 49′ circa (169° 47′ 22″ calculated).

y (3 P$\frac{3}{2}$) and *w* (7 P$\frac{7}{2}$) occur each with a single face on a small mutilated fragment showing, in addition, faces of *s*, *t*, *n*, *v*, *o*, *h*, *d* and *x*. *y* is a very small rhombic face, determined by the zones *v* : *n* and *s* : *o*, and replacing the angle formed by these four faces. It gave a very faint, but single, reflection.

w (7 P$\frac{7}{2}$) occurs on the same crystal on the edge and in the zone *y* : *n*. It is extremely minute, barely discernible with the unaided eye, but easily observed with a low power under the microscope. It gave reflections on the goniometer only when the lens was thrown in front of the telescope.

V (— P ∞) was observed once as a very minute face on the edge *b* : *b* in the zone of the hemidomes. It has nearly the same inclination to the orthodiagonal section as the positive hemidoma *h* (2 P ∞). For V, this angle is 42° 1′ 33″; for *h*, it is 41° 44′ 54″.

W (3 P ∞) occurs on a crystal of totally different habit from those figured in the plates. The form is columnar parallel to the vertical axis, the front pair of faces of the primitive prism *s* being largely developed, while its rear faces are comparatively small; the only other lateral faces are those of the clinopinacoid, which are extremely small. Of the terminal faces, W itself greatly preponderates over all the others; *h* (2 P ∞) and Θ (3 P 3) are moderately developed, while *o* (2 P 2), *v* (2 P), *d* (2 P 2), *y* (— P), *c* (P ∞), and *g* (*o* P), are all very small on the edges of Θ, W, and *h* with the front pair of faces of *s* (∞ P). All of the negative hemipyramids and hemidomes, together with *a* (2 P ∞) and *n* (∞ P ∞) are absent. The crystal thus assumes somewhat of a pointed wedge-shape, the point lying over the front edge of *s* : *s*, and one of the faces of the wedge consisting almost wholly of W (3 P ∞). The face of W is somewhat curved and delicately striated, the striæ radiating from the lower part of the face. All of the faces on the crystal are affected more or less with striæ, mainly parallel to the plane of symmetry, or irregular markings. The crystal was broken from a large geode in massive colemanite, the inner surface of which is completely lined with crystals of the same habit, all of which show similar imperfections. The disturbance in the growth of the crystal in some instances became so great as to obliterate all of the terminal edges while preserving the same peculiar habit of the entire crystal.

One of the geodes just received is of especial interest, from the fact that it contains crystals of colemanite partially converted into a dull, snowy white substance, that probably differs from colemanite only in containing less water. It may prove on examination to be identical in composition with pandermite, in which case it would seem that colemanite may be considered the mother-mineral of pandermite. As already mentioned, pandermite is said to occur in large quantities associated with colemanite in Death Valley.

Two geodes, recently obtained, altogether surpass in dimensions that mentioned on p. 5. The more beautiful is 0.15 m. in diameter, and completely lined with brilliant crystals of the larger dimensions stated on p. 4. The other geode is fully 0.3 m. in diameter; some of the individual crystals are correspondingly larger, but not so clear as those of the former geode.

One irregular fragment of massive colemanite contains a small fragment of perfect charcoal.

In the following table, I give the calculated and observed angles for the new forms q (3 P), G (— 7 P), ρ (2 $\bar{P}$ 4), γ (3 $\bar{P}\frac{3}{2}$), w (7 $\bar{P}\frac{7}{2}$), V (— $\bar{P}\infty$), and W (3 $\bar{P}\infty$).

	Calculated			Observed.		
$n : w$	163	4′	0″	163°	14′	circa
$n : \gamma$	141	40	48	141	42	"
$w : \gamma$	158	36	48	158	28	"
$w : r$	144	11	10	144	3	"
$w : d$	121	15	1	121	9	"
$w : a$	92	56	42			
$\gamma : r$	165	34	22	165	34	"
$\gamma : d$	142	37	13	142	40	"
$\gamma : a$	114	19	54			
G : s (front)	171	21	44	171	38	approx.
G : $\triangle$	170	57	21			
G : σ	170	7	43	169	56	"
G : b	148	32	30	148	23	"

	Calculated.			Observed,
G : g	114°	48′	59″	114° 38′ approx.
G : y	67	21	41	
G : v	42	11	25	
G : q	31	12	0	
G : s (rear)	8	38	16	
q : s "	157	26	16	157 approx.
q : v	169	0	35	$169\frac{1}{2}$ "
q : y	143	50	19	$144\frac{1}{2}$ "
q : g	96	23	1	
q : b	62	39	30	
q : σ	41	4	17	
q : Δ	40	14	39	
q : s (front)	22	33	44	
V : λ	166	18	39	
V : g	152	10	49	
V : i	111	26	32	
V : h	83	46	29	
V : Ψ	63	0	19	
V : U	55	44	52	
V : n (rear)	22	1	34	
W : n (front)	28	12	35	
W : λ	56	32	47	
W : V	70	14	8	
W : g	98	3	21	$98\frac{1}{2}$ approx.
W : i	138	47	38	
W : h	166	27	41	166° 30′ circa.
W : Ψ	172	46	9	
W : U	165	30	42	
W : n (rear)	151	47	24	
ρ : h	169	47	22	169 49 circa.
ρ : o	170	24	0	170 18 "
ρ : v	154	26	45	
ρ : ε	142	59	23	
ρ : m	100	12	38	

In the following tables are the calculated values for X, Y, Z, μ, ν, σ, and ρ for the additional forms mentioned in this appendix.

$q = +3\,P$

X = 52° 30′ 40″	μ = 28° 12′ 35″
Y = 45 38 24	ν = 81 56 39
Z = 83 36 59	σ = 52 13 48
	ρ = 31 38 20

$G = -7\,P$

X′ = 56° 13′ 52″	μ' = 10° 10′ 20″
Y′ = 35 5 56	ν' = 59 40 24
Z′ = 65 11 1	σ = 52 13 48
	ρ = 14 47 31

$\rho = +2\,P\,4$

X = 79° 47′ 22″	μ = 41° 44′ 54″
Y = 42 45 20	ν = 68 24 20
Z = 68 45 52	σ = 79 2 13
	ρ = 74 51 40

$\gamma = +3\,P\frac{3}{2}$

X = 62° 54′ 43″	μ = 28° 12′ 35″
Y = 38 19 12	ν = 81 56 39
Z = 82 49 58	σ = 62 40 51
	ρ = 42 44 40

$w = +7\,P\frac{7}{2}$

X = 77° 38′ 58″	μ = 11° 40′ 32″
Y = 16 56 0	ν = 98 28 42
Z = 81 43 6	σ = 77 31 1
	ρ = 42 44 50

$V = -P\infty$	$W = +3\,P\infty$
X′ = 90° 0′ 0″	X = 90° 0′ 0″
Y′ = 42 1 33	Y = 28 12 35
Z′ = 27 49 11	Z = 81 56 39

The traces for the faces of all of the above forms have been placed in the linear projection Fig. 11, Pl. IV.

Museum of Mineralogy,
University of California, Berkeley.
January 1, 1885

m = ∞ P̍ ∞ (010)

n = ∞ Ᵽ ∞ (100)

g = 0 P (001)

H = ∞ P̍ 3 (130)

J = ∞ P̍ $\frac{7}{3}$ (370)

z = ∞ P̍ 2 (120)

P = ∞ P̍ $\frac{19}{10}$ (10.19.0)

s = ∞ P (110)

t = ∞ Ᵽ 2 (210)

c = P̍ ∞ (011)

a = 2 P̍ ∞ (021)

y = P $(\bar{1}11)$

r = 2 P $(\bar{2}21)$

q = 3 P $(\bar{3}31)$

b = — P (111)

σ = — 3 P (331)

△ = — $\frac{19}{6}$ P (19.19.6)

G = — 7 P (771)

o = 2 Ᵽ 2 $(\bar{2}11)$

ρ = 2 Ᵽ 4 $(\bar{4}12)$

ε = 3 P̍ $\frac{3}{2}$ $(\bar{2}31)$

γ = 3 Ᵽ $\frac{3}{2}$ $(\bar{3}21)$

Q = 4 P̍ 2 $(\bar{2}41)$

r = $\frac{3}{2}$ P̍ $\frac{3}{2}$ $(\bar{2}32)$

d = 2 P̍ 2 $(\bar{1}21)$

x = 3 P̍ 3 $(\bar{1}31)$

ω = — 3 P̍ 3 (131)

Θ = 3 Ᵽ 3 $(\bar{3}11)$

k = — 3 Ᵽ 3 (311)

B = 4 Ᵽ 4 $(\bar{4}11)$

w = 7 Ᵽ $\frac{7}{2}$ $(\bar{7}21)$

U = 6 Ᵽ ∞ $(\bar{6}01)$

Ψ = 4 Ᵽ ∞ $(\bar{4}01)$

W = 3 Ᵽ ∞ $(\bar{3}01)$

h = 2 Ᵽ ∞ $(\bar{2}01)$

i = Ᵽ ∞ $(\bar{1}01)$

V = — Ᵽ ∞ (101)

λ = — 2 Ᵽ ∞ (201)

Fig 1.

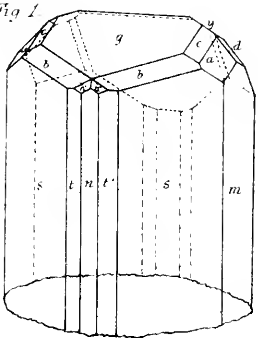

Fig 1a

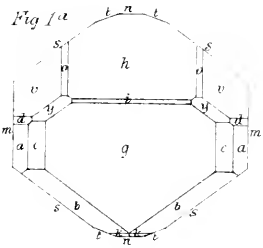

Fig 2.

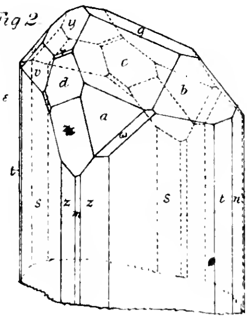

Fig 2a

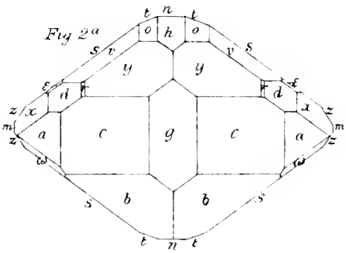

Fig 3

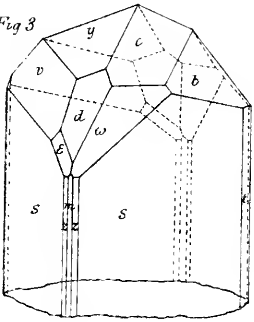

Fig 3a

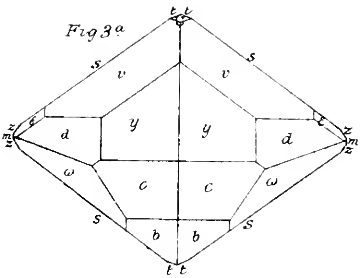

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Fig 4

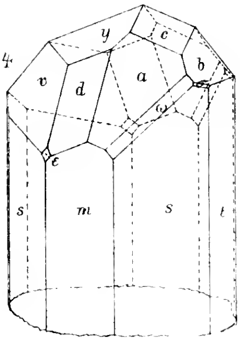

Fig 4a

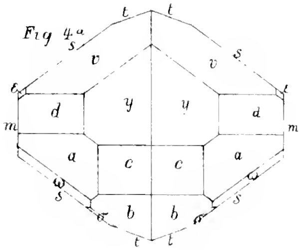

Fig 5

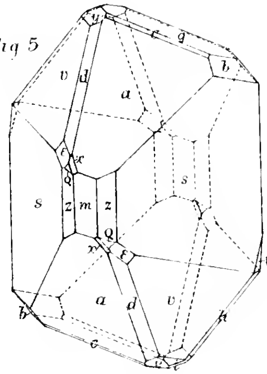

Fig 5a

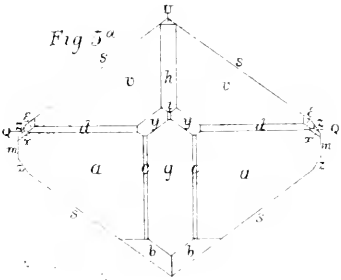

Fig 6

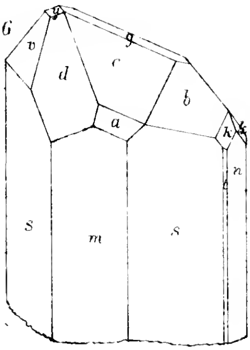

Fig 7

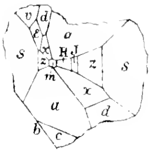

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Fig 8

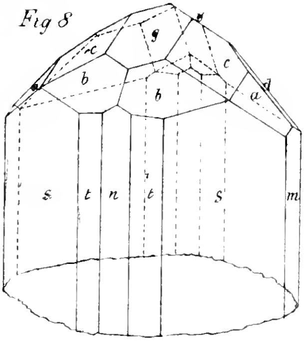


Fig 8a

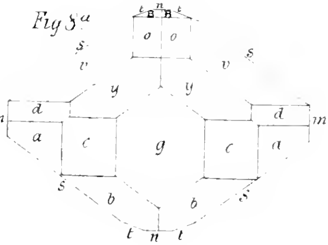


Fig 9.

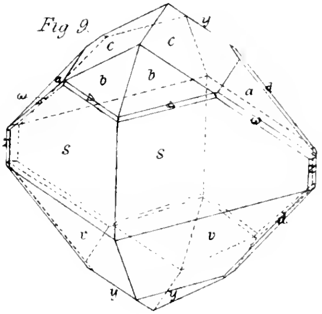


Fig 9 a

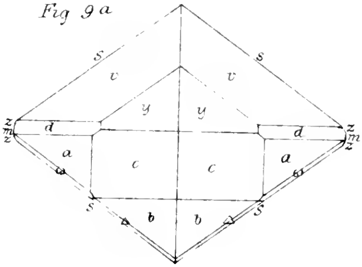


Fig 10

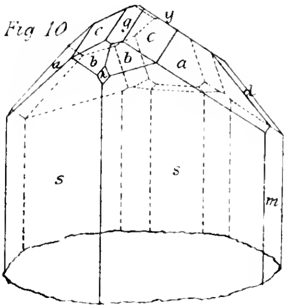
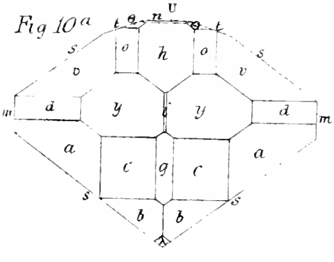


Fig 10a



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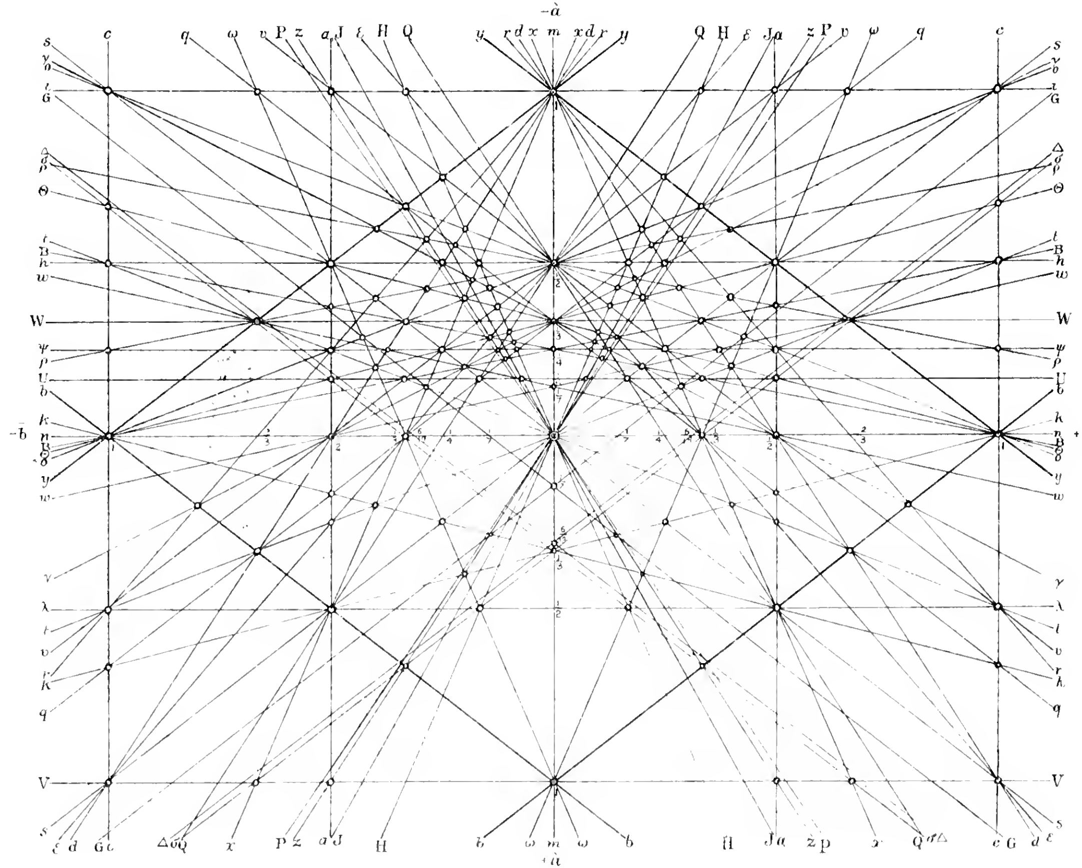

DEL. A. W. JACKSON

THE CHEMICAL PROPERTIES and RELATIONS OF COLEMANITE.

BY J. T. EVANS.

At a regular meeting of the Academy held February 4, 1884, I read a short paper giving simply the results of my analysis of this new borate—its chemical formula—the angular inclination of the vertical to the clinodiagonal and measurements of some of the other more commonly occurring angles. All the determinations embodied under the head "Colemanite," including both the physical and chemical characteristics were made and verified by myself.

I have subsequently made repeated analyses of carefully selected and beautifully clear crystals of the mineral, and the results confirm the correctness of my previously published analyses and of the formula deduced.

In the present paper I wish to specify in outline only some of the experiments made and methods used in the chemical examination, leaving the further elaboration of the physical characteristics in the able hands of Mr. Jackson, whose hearty co-operation I wish here to fully acknowledge.

Preliminary to the following experiments, some of the purest crystals obtainable were crushed to a very fine powder by means of an agate mortar and pestle.

A portion of the powder heated in a closed glass tube decrepitates and passes into a very fine dust with simultaneous condensation of a liquid in the cooler portions of the tube. The reaction of this liquid is neutral; in a word, it is water.

Heated alone before the blowpipe in a loop of platinum wire or on charcoal, it fuses to a clear transparent glass which is milk white on cooling.

Heated on platinum wire with muriatic or sulphuric acid, it gives a yellowish green flame of short duration—a yellowish red more persistent and a transient soda-yellow flame.

The powdered mineral dissolves readily and completely in dilute muriatic or dilute nitric acid with the aid of a gentle heat. It is also decomposed by sulphuric acid with the deposition of a white powder which responds to the tests for sulphate of lime. All these solutions, if not too dilute, deposit flaky crystals which have the reactions of free boracic acid.

During solution there is no effervescence. The finely powdered mineral is also soluble in strong solution of chloride of ammonium.

The muriatic or nitric solution of the mineral evaporated to dryness on a water-bath dissolves on the addition of distilled water without a trace of residue—(absence of silicic acid).

The nitric solution gives no trace of precipitate with nitrate of silver (absence of chlorine, iodine or bromine) or with chloride of barium (absence of sulphuric acid), or with nitromolybdate solution applied with proper precautions (absence of phosphoric acid).

The powdered mineral warmed with sulphuric acid gives off no fumes capable of etching glass (absence of fluorine)—warmed with ammonia—free solution of potassa gives no ammoniacal reaction.

From a muriatic solution, diluted and warmed, nothing is precipitated by sulphurreted hydrogen.

Ammonia added in excess to an acid solution of the mineral affords a flocculent precipitate of borate of lime, unless the acid solvent be present in great abundance, in which case the formation of a precipitate is prevented by the solvent action of the ammoniacal salt generated in the solution. In presence of large excess of ammoniacal salts, ammonia produces no precipitate.

In these ammoniacal solutions sulphide of ammonium produces no precipitate, but oxalate of ammonia gives a white finely granular precipitate of oxalate of lime.

This precipitate contains no baryta or strontia perceptible even with the spectroscope.

Having separated all the lime as oxalate and all excess of ammoniacal salts, phosphate of soda gives not a trace of precipitate after brisk agitation of the liquid and allowing it to remain at rest for twenty-four hours (absence of magnesia).

The blowpipe test gives slight evidence of the presence of soda. To determine whether this is present in any appreciable quantity I made use of the following process.

One gram of the finely powered mineral was treated with 5 c. c. pure hydrofluoric acid and 5 c. c. pure strong sulphuric acid in a large platinum capsule, evaporated cautiously to dryness and ignited at a dull red heat—the residue boiled with distilled water repeatedly and the lixivium decanted upon a filter—the filtrate made slightly ammoniacal and the lime precipitated therefrom by oxalate of ammonia in slight excess. After standing for 12 hours, the liquid was decanted upon a Swedish filter and passed into a platinum capsule of known weight—the residue upon the filter thoroughly washed with boiling distilled water—the filtrate evaporated to dryness on a water bath—the residue ignited at a dull red to eliminate the ammoniacal salts and the capsule weighed. It showed no appreciable increase in weight and therefore soda is present in mere traces only. This result was confirmed by a check experiment.

Thus far I have proved the mineral to contain water, lime and boracic acid. That none of the boracic acid is present in the free or uncombined state I took the precaution to prove by the spectroscope.

It now remained to make a careful quantitative estimation of these three essential constituents.

One gram of the finely powdered mineral weighed in a dry platinum crucible and heated in a hot-water oven at 100° C. for one hour suffers no loss. The hygroscopic water is therefore *nil.*

Estimation of the combined water. One gram of the finely powdered mineral was heated cautiously over a Bunsen burner in a tube of hard Bohemian glass about 150 mm. long and 19 mm. dia. Through the tube a current of air dried by passing through concentrated sulphuric acid, and then through a chloride of calcium bulb tube, was aspirated. The vaporized water was collected in a system of previously weighed chloride of calcium tubes, and their increase of weight noted on a second weighing.

During this process a very characteristic phenomenon takes place. At a heat below dull red, decrepitation sets in and the particles of the mineral, however finely pulverized, break up into a still finer dust, whose particles are so minute as to be suspended in the air of the tube for some time, and with the slightest current flowing through the apparatus, pass over into the chloride of calcium tubes and ruin the estimation, unless special precautions have been taken to prevent this occurrence. I have found it effectual to insert two plugs of recently ignited asbestos fibre to a distance of about one-fourth the length of the ignition tube; one at each end, thus confining the mineral in the middle portion of the tube, where it may be heated to a bright red without any risk of charring the corks. The plugs serve as perfect strainers of all the suspended dust, and do not impede the current.

Two independent experiments gave me the following results from one gram:

	a	*b*
Weight of the $Ca\,Cl_2$ tubes after absorption of the water	92.461_2	155.992_5
Weight before absorption	92,243	155.774
Water	$.218^2$	$.218^5$

The total combined water is therefore somewhat above $21\frac{8}{10}\%$.

ESTIMATION OF THE LIME.

One gram of the powdered mineral was dissolved in dilute muriatic acid, c. p.—solution of oxalate of ammonia (free from residue) added, and ammonia to alkaline reaction. The liquid was heated to near boiling and the oxalate added until no further precipitate appeared even on standing for twenty-four hours. The clear liquid was decanted through a Swedish filter of known ash; the precipitate boiled up with successive portions of distilled water, allowed to stand and the clear liquid decanted through the filter, repeatedly. Finally the precipitate was washed into the filter with boiling distilled water and washed thereon until free from soluble matter. The filter and precipitate was removed from the funnel and dried in a water bath; the precipitate detached from the filter as thoroughly as possible—the latter ignited by itself and the ash added to the precipitate placed in a dry platinum crucible of known weight and ignited in a muffle at a bright red until it ceased to lose weight. The results were as follows:

	a	*b*
Pt. cru. + CaO + filter ash	24.789^5	24.789^4
" ———— "	24.517^5	24.516^5
CaO	.272	$.272^9$

Two more independent determinations, in which the oxalate was ignited to carbonate, gave results as follows:

	c	*d*
$CaCO_3$ + Pt. cru. + filter ash	25.099^6	25.096^4
" "	24.615^5	24.611^5
$CaCO_3$	$.484^1$	$.484^9$

Equivalent respectively to CaO .271 and $.271^6$.

Two independent determinations as sulphate made by treating one gram of the powdered mineral with 5 c. c. pure hydrofluoric acid and 5 c. c. pure sulphuric acid, evaporating cautiously to dryness and igniting at a dull red heat in a weighed platinum crucible, gave the following results:

	a	*b*
$CaSO_4$ + Pt. cru.	61.870^6	31.779^8
Pt. cru.	61.212	31.120
$CaSO_4$	$.658^6$	$.659^8$

Equivalent respectively to CaO $.271^2$ .2717.

The mineral therefore contains somewhat over 27% lime.

Taking the average of the experimental results and calling the remainder anhydrous boracic acid, we have the following for the percentage composition of the mineral:

Lime (CaO)	27.175
Anhydrous boracic acid (B_2O_3)	[50.990]
Water (H_2O)	21.835
	100.000

CALCULATION OF FORMULA.

$27.175 \div 56 = .485 \quad 50.99 \div 70 = .7284 \quad 21.835 \div 18 = 1.213$

The ratios of the lime, anhydrous boracic acid and water are then respectively—

$.485 : .7284 : 1.213$, or as $1 : 1.5 : 2.5$ as $2 : 3 : 5$

The formula is therefore $2\ CaO\ 3\ B_2O_3 + 5\ H_2O$, or $Ca_2\ B_6\ O_{11} + 5\ H_2O$.

Its nearest relations are pandermite $2\ CaO\ 3\ B_2O_3 + 3\ H_2O$ and priceite $3\ CaO\ 4\ B_2O_3 + 6\ H_2O$. In the ratio of the lime to the anhydrous boracic acid $(2 : 3)$ it is identical with the former and differs from it in the solitary item that it contains two molecules more water than pandermite.

A knowledge of this close relationship leads very naturally to the query, Is pandermite an altered or derivative form of colemanite?

SAN FRANCISCO, January 1, 1885.

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BULLETIN.

No. 3.

California Academy of Sciences.

[February, 1885.]

NEW LEPIDOPTERA.

BY H. H. BEHR, M. D.

NOCTUIDÆ.

Fam. COSMIDÆ.

Gen. EUPERIA, Gn.

E. Sambuci.

Alæ anticæ pallidæ, sæpius virentes; linea mediana interiore ter arcuata; exteriore rectiuscula sed apicem versus refracta; umbra ex apice ad medium marginem posticum spectante, sed eum non attingente. Alæ posticæ pallidæ.

Species variat speciminibus erubescentibus, res satis frequens in insectis virentibus.

Larva adulta grisescens; lineis atris reticulatis marmorata; linea dorsali nec non stigmaticis laete flavis. Larva junior non differt signaturis sed solo colore virente. Vivit mensibus Junio et Julio prope San Francisco et in aliis locis circa sinum Sti Francisci inter folia Sambuci glaucæ occulta, quæ filis connectit. Larva vorax ne sodalibus quidem parcens.

Gen. ATETHMIA, Hb.

A. canescens.

Species maxime variabilis, quapropter describam e varietatibas duas, quæ maxime distant, et inter se omnes intermedias recipiunt.

Var. I.

Fere unicolor. Alæ anticæ pallescentes. Lineæ medianæ paululum dilutiores, sed bene distinctæ, ad marginem posticum convergentes, spatium trapezoideum includentes, interior omnino recta, exterior apicem versus paulum arcuata. Macula orbicularis puncto uno obscuriori, reniformis punctis duobus obscurioribus distincta, nec non apex extra lineam medianam puncto obscuriori signatus. Alæ posticæ candidæ.

Var. II.

Alæ anticæ pallescentes. Lineæ medianæ umbra consociatæ, interior extus, exterior intus, ita ut spatium trapezoideum distincte definiatur.

Puncta duo maculæ reniformis confluentia.

Punctum apicale in umbram solutum;

Larvas monnullas Julio mense prope Belmont oppidum in Quercu Kelloggiana inveni, quas accuratius observasse quantopere mœreo, quia Generis Atethmiæ larvæ hucusque ignotæ.

Sed Cosmiæ speciem aliquam expectavi orturam e larvis Cosmiæ Trapezinæ Europææ tam similibus. Moris tantum vivendi inter folia filis conjuncta, coloris viridis nec non pupæ pruina obtectæ memor sum.

Gen. ANARTA, Ochsen.

A. Mimuli.

Alæ anticæ nigrescentes, lineis ordinariis confusis et parum distinctis marginem versus clarioribus, linea subterminali ad angulum posticum in maculam expansa.

Alæ posticæ luteæ, margine nigro bene distincto præditæ, lunula discoidali carentes.

Alæ cunctæ subtus ut supra, signaturis tantum anticarum magis confusis.

Larvam invenit illustrissima Domina Curran, ob investigtiones botanicas celebris, prope Reno oppidum Nevadæ in Eunano Tolmiæi, Antirrhino Kingii aliisque plantis alpinis Mimulo Scrophulariæque cognatis.

Larva ei Anartæ Myrtilli Europææ simillima, colore tamen et signaturis magis varibilis.

BIOLOGICAL SYNOPSIS OF CALIFORNIA LEPIDOPTERA.

BY DR. H. H. BEHR.

The subjoined statement is an attempt to give, in a condensed form, those facts in regard to the habits of our Lepidoptera which are equally of interest to the student, the collector, the agriculturist, and horticulturist.

With a very few exceptions the various transformations noted have been observed by the writer. In the remaining cases he has relied upon the statements of entomological friends, and he takes this opportunity to return thanks to R. H. Stretch, Oscar T. Baron, Hy. Edwards, J. J. Rivers, James Behrens, and L. E. Ricksecker, for their kind assistance.

In the first column is given the name of the insect; in the second the food plant; in the third its frequency, and where it is in sufficient numbers to be destructive whether it is an epidemic or endemic pest; in the fourth the period of the imago. If more than one, it is expressed by the figures 2 or ∞; if only one, it is Vernal if it appears before the flowering of Æsculus Californica, Æstival if during the period of its flowering, and Autumnal if appearing that period.

The writer has sufficient reason for this method of classification, in the fact that in the part of California where these facts were collected the appearance of species is by no means rapid, and extends over a longer period than in countries with well defined seasons. Where there are two generations they are of course perceptibly Vernal and Autumnal.

The last column shows in what form the species hybernates.

Taking into consideration the fact of the comparative newness of the country, and that all the observations have been made by but seven entomologists, the proportion of those whose biology is more or less known, is not so very unfavorable.

Name.	Food Plant.	Occurrence.	Generation.	Hybernation.
Danais Plexippus, L.	Asclepiadeæ	Frequent.	∞	Egg.
Hipparchia Boopis, Behr	Avena fatua	Local.	Æstival.	?
Cœnonympha Californica, Doubl.	Poa annua.	Frequent.	2	Egg.
Argynnis Calippe, Bois.	Viola pedunculata	Local.	Æstival.	Larva.
Phyciodes Mylitta, W. H. Edw.	Cnicus occidentalis	Frequent.	2	Egg.
Phyciodes pratensis, Behr	Artemisia vulgaris	"	2	?
Melitæa Palla, Boisd.	Scrophulariaceæ	"	Æstival.	Larva.
" Chalcedon, Doub	Scrophulariaceæ, Caprifoliaceæ	"	"	"
" Quino, Behr	Castilleia affinis	Local.	"	?
" Editha, Boisd.	Orthocarpus pusillus	"	Vernal.	Larva.
" Leanira, Feld.	Castilleia affinis	"	Æstival.	?
Grapta Satyrus, W. H. Ed	Urtica holosericea	Frequent.	∞	?
" Zephyrus, "	Rhododendron occidentale	Local.	∞	?
Vanessa Calif'nica, Bois	Ceanothus thyrsiflorus.	Usually rare, but sometimes epidemic and migratory.	Autumnal.	?
" Milberti, Godt.	Urtica holosericea	Local.	∞	?
" Antiopa, L.	Salix, Populus	Common.	∞	Imago, Egg.
" Cardui, L.	Urticaceæ, Malvaceæ, Compositæ	Common, sometimes epidemic and migratory.	∞	Pupa, Egg.
" Carye, Hub.	Urticaceæ, Malvaceæ, Compositæ	Common.	∞	Egg.
" Huntera, Fabr	Compositæ	Rare.	∞	?
Junonia Cœnia, Hub.	Hemizonia	Common.	∞	?
Limenitis Lorquini, Bois	Salix	"	Æstival.	Egg.
Adelpha Bredowii, Hub	Quercus Kelloggii	"	"	?
Thecla Halesus, Cram.	Phoradendron flavescens	Rare.	?	Egg.
" Melinus, Hub.	Rosa Californica	"	Æstival.	?
" dumetorum, Bois	Hosackia glabra	Common.	2	Egg.
Polyommatus Xanthoides, Boisd.	Hemizonia	Local.	Æstival.	?
Polyommatus Heteronea, Boisd.	Eriogonum	Rare.	"	?
Lycæna Piasus, Boisd.	Æsculus Californica	Common.	Vernal.	Egg.
" Pheres, "	Lupinus Chamissonis	Local.	"	?
" Acmon, Doubl.	Hosackia glabra	Common.	2	?
Pieris Protodice, Boisd.	Cruciferæ	"	2	?
" Rapae, L.	"	"	2	Egg.
" Napi, L.	"	"	Vernal.	?
Meganostoma Eurydice, Boisd	Amorpha Californica	Local.	2	?
Colias Chrysotheme, Esp	Trifolium tridentatum.	Common.	∞	Imago, Egg, Pupa.
Antocharis Ausonia, Hub.	Cardamine paucisecta	Local.	Vernal.	Pupa.
Antocharis Sara, Boisd.	Cheiranthus asper	Common.	2	"
Parnassius Clodius Men	Vitis Californica	Local.	Vernal.	?
Papilio Philenor, L.	Aristolochia Californica	Common.	2	Pupa.
" Zolicaon, Boisd.	Œnanthe Calif'nica, Angelica tomentosa, Carum Kelloggii	"	2	"
" Eurymedon, "	Rhamnus Californica	"	2	"
" Rutulus, "	Amygdalaceæ.	"	2	"
" Daunus, "	Prunus demissa, Ptelea angustifolia?	Local.	?	?
Pamphila campestris, Boisd	Brizopyrum spicatum	"	?	?
Hesperia Syrichthus, Fabr.	Sidalcea humilis	Common.	2	?
Hypopta Riversii, Stretch	Lupinus (roots)	Rare.	?	?
Ctenucha brunnea, Stretch	Carex, sp.	Local.	Autumnal.	?

Name.	Food Plant..	Occurrence.	Generation.	Hybernation.
Scepsis fulvicollis, Walp	Eleocharis.............	Local.	Æstival.	?
PhryganidiaCalifornica, Pack	Quercus agri olia... " lobata..... " Kelloggii..	Common, Endemic.	∞	Imago, Pupa.
Codiosoma nigrum, Stretch.	Low herbs	Æstival.	?	?
Codiosoma fulvum Stretch	"	"	?	?
Halesidota sobrina, Stretch.	Pseudotsuga Douglasii .	Rare.	?	?
Halesidota Agassizii, Pack	Salix, Alnus	Common.	2	Pupa.
Halesidota Edwardsii, Pack	Quercus agrifolia.......	"	Æstival.	?
Seirarctia Clio, Pack ...	Asclepias Mexicana, Cav	Rare.	"	?
Cisthene nexa, Boisd. ..	Lichens.................	Common	2	Larva
" Faustinula " ...	"	"	2	"
Epicallia virginalis, " ..	Lupinus arboreus	Local.	Æstival.	?
Leucarctia Isabella, Sen	Low herbs..............	"	"	Larva.
" Acræa, Drury	"	Common.	2	Egg, Pupa.
Arachnis picta, Packard	Lupinus Chamissonis...	"	Æstival.	?
Spilosoma Vestalis, "	Megarrhiza Californica.	Rare.	"	Larva.
Antarctia vagans, Boisd	Lupinus arboreus	Common.	Vernal.	Pupa.
Arctia Achaia, Grote...	Low herbs	Local.	"	Larva.
Leptarctia Lena, Boisd.	Hosackia glabra.... Croton Californicus	"	"	?
Orgyia vetusta, Boisd. .	Quercus agrifolia... Lupinus arboreus..	Common.	Æstival.	Egg.
Sphinx quinque-maculata, Haw..........	Solanaceæ.............	"	Autumnal, Epidemic.	Pupa.
Sphinx Carolina, L.....	"	"	"	"
Deilephila lineata, Fabr	Onagraceæ .... Portulaca .... Polygonum .... Vitis vinifera.......	"	2 Epidemic.	"
Philampelos Achaemon, Drury	Vitis vinifera...........	"	Autumnal, Epidemic,	"
Smerinthus opthalmicus, Boisd.	Salix, Populus..........	"	?	"
Smerinthus Imperator, Strecker...........	" "	Rare.	?	"
Arctonotus lucidus, Bois	Arbutus Menziesii.. Arctostaphylos pungens	"	Vernal.	"
Telea Ceanothi, Behr..	Ceanothus thyrsiflorus .... Rhamnus Calif'nica Heteromeles arbutifolia............	Local.	"	"
Pseudohazis eglanterina, Boisd..........	Rosaceæ...... Rhamnus..... Salix .... (Caustic secretion.)	Common.	Autumnal.	Egg.
Hemileuca Nevadensis, Stretch.	Salix..............	Local.	"	"
Clisiocampa sp..........	Forest trees	Common.	Vernal, Endemic.	"
" sp....	Quercus lobata...	Local.	Vernal.	"
Dicranura paradoxa, Behr. (Ined)	Salix..................	"	"	Pupa.
Notodonta Californica, Stretch	"	Rare.	Æstival,	Egg.

STUDIES IN THE BOTANY OF CALFORNIA AND PARTS ADJACENT.

BY EDWARD LEE GREENE.

I.

VANCOUVERIA.

V. chrysantha.

A foot high, more villous than *V. hexandra*, with finer hairs, leaves of more coriaceous texture, obscurely 3-angled or lobed, the angles emarginate: scape exceeding the leaves: raceme few-(10—15)flowered: pedicels stout: flowers large, golden yellow, nodding: bractlets linear-oblong: ovary densely glandular, pubescent: fruit not seen.

Coast mountains of Oregon, on about the forty-second parallel, Thomas Howell, June 8th, 1884.

A welcome addition to a genus hitherto supposed to be monotypical. The deep yellow flowers are more than thrice the size of those of the original and more common species. The pubescence is also different. That of *V. hexandra* is much less in quantity, shorter, and the hairs, under a lens, are seen to be flat and twisted, as well as strongly glandular. There is, moreover, no trace of hairs or glands on the ovaries of that species.

ESCHSCHOLTZIA.

A careful study of these plants as they grow wild on our plains and hillsides, has brought to light some good characters in the shape, degree of expansion and persistency of the petals. For example, in all save one of the species they persist for two or more days, opening each morning and closing at nightfall, while in the exceptional species they are very fugacious, hardly to be found adhering to their receptacle after nine or ten o'clock in the morning. In about half the species the corolla does not expand beyond the funnelform or broadly campanulate; in the rest it unfolds to nearly or quite the rotate. In one the petals are comparatively narrow, their margins not meeting when the flower is fully open; in all the rest they are broad, and overlap each other when expanded.

The torus does not appear to have been at all carefully examined by any of the authors who have written upon the genus. It has commonly been described as being either simply turbinate, or as dilating to a broad rim. The true state of the case is this: the upper portion has always two distinct rims, the inner always short, thin, scarious, nerved or nerveless, and usually erect. Outside of and below this is a separate one, generally more herbaceous, and this in two or three species is very broad and conspicuous; but in others it appears as a mere fleshy ring, or is more rarely thin and hyaline, like the inner one.

Due attention has been given to the characters of the seed; but these have not been found to be of greater value than those of the corolla and the torus. As a rule the seeds are perfectly globular, with a black or very dark brown testa, which, under a good lens, appears scrobiculate in all the species. The coarser and usually angular reticulation of lighter color, which marks the seeds of most species, is wholly wanting in those of a new one from the Mohave Desert, while in an old one not of late recognized as a species, but now restored, this appendage takes not the form of reticulation, but rather of scattered, pyramidal, or often flattened, strap-shaped processes, which in some specimens are so dense as to entirely hide the testa and give the seed the appearance of a burr. The seeds of a new species from the peninsula of Lower California are exceptional in being perceptibly elongated and having an apiculation at each end. Those of the new one from the Mohave are peculiar not only in their lack of reticulations or other apppendage, but in being deeply pitted and of an ash-gray color.

The Eschscholtzias are far from being always smooth. Half the species are more or less hairy or scabrous; but all are glaucous. The root is perennial in two species, one of which is the type of the genus. The remainder are annual; and even those truly perennial often flower, like annuals, when only a few months old.

The following arrangement of the species is respectfully submitted, in hope that it may be found helpful to all who may be interested in the further study of these brilliant and most characteristic plants of the Pacific Coast.

* *Petals broad, overlapping each other in the open flower, persistent for two or more days.*

÷ *Corolla funnelform to widely campanulate, never rotate-expanded.*

÷÷ *Outer margin of the torus forming a broad, herbaceous, spreading rim.*

E. Californica, Cham.

Perennial, very smooth and slightly glaucous: stems usually weak and decumbent, freely branching: petals an inch or two long, yellow with an orange spot at base, or more commonly brilliant orange throughout: inner margin of the torus short, thin and nerveless: seed with prominent favose reticulations.—Watson, Bot. Cal. I. 22.

Common from the sandhills along the seaboard to the foothills of the Sierra. The stouter, more erect, less branching form, with the largest and most deeply colored corollas, belongs to the interior, extending northward to Oregon and Washington, where it is known as the *var. Douglasii*, Gray; but it does not seem to merit even a varietal name.

E. peninsularis

Annual, smooth and glaucous, slender, erect, much more branched than the preceding, with corollas of one third the size and more broadly campanulate: rim of torus broader in proportion, the inner margin a very short, nerveless, hyaline ring: seed slightly elongated and distinctly apiculate at each end, reticulations less regularly favose.

Mountains of the peninsula of Lower California, collected by Mr. C. R. Orcutt, July, 1884.

A very freely branching species with the habit of *E. minutiflora*, but more nearly allied to *E. Californica*.

++ ++ *Torus without conspicuous rim.*

E. Mexicana.

Annual, smooth and glaucous: foliage less finely dissected: stems short: peduncles numerous, stout and scape-like: petals an inch long, yellow or cream color: torus short, obconical, the outer margin a sub-cartilaginous ring, the inner erect, scarious, with stout nerves: seed globular apiculate, with coarse but rather faint reticulations.—*E Californica*, var. *parvula*. Gray. Pl. Wright, 2. 10. *E. Douglasii*, Torr. Mex. Bound, 31; Hemsl. Biol. Cent. Am.

This plant ranges from the region of the upper Gila, in New Mexico, far southward into Texas and adjacent Mexico, and is apparently a very good species.

E. Austinæ.

Perennial: stems slender, erect and branching, hirsute below, only sparingly scabrous, or sometimes quite smooth above: segments of the leaves slender and remote: petals yellow, an inch long: torus almost cylindrical, only a little widened above, the outer margin a faint, herbaceous ring, the inner deeper and hyaline: seeds with conspicuous but irregular reticulations.

Collected in Butte County, 1883, by Mrs. R. M. Austin; also in the same year, further down the Sacramento Valley, near Elmira, by Mrs. Curran. Doubtless a common species of the region, and one which, in the collections, would naturally be put in with *E. Californica* by those who disregard the importance of the character of the torus.

I gladly dedicate the species to one of the most intelligent and helpful of our field students of California botany.

The hirsute, or sometimes chiefly short, scabrous pubescence, often extending even to the calyx, is wholly wanting in the smaller of Mrs. Austin's specimens, which are nevertheless distinguishable from *E. Californica* by the torus, and by the seeds, which are less regularly reticulate than in that species.

+− +− *Corolla rotate-spreading; annual species, with the two margins of the torus similar and closely approximate.*

E. tenuifolia, Benth.

Sparingly hirsute-scabrous: stems very short: leaves subradical, their lobes few, long and linear-filiform, or more numerous, shorter and a little wedge-shaped: peduncles scape-like, very slender and exactly quadrangular: petals a half inch long, usually pale yellow, never orange: seeds not reticulated, but more or less clothed with prominent tuberculations, or even ligulate projections—*E. cæspitosa*, and *E. hypecoides*, Benth.

Common on the western slope of the Sierra Nevada. It is not improbable that *E. cæspitosa* will also have to be restored on the strength of the characters of the seed alone. Our material is not yet sufficient however to fully warrant such action.

E. glyptosperma.

Wholly glabrous and very glaucous: stems very short: leaves much dissected, but short and compact: scape-like peduncles numerous, six inches high, terete, and rather stout: corolla as in the preceding species, but of a deeper yellow: seeds not reticulate, but deeply pitted and of an ash-gray color.

A most peculiar species, collected in 1884, by Mrs. Curran, on the Mohave Desert. The seeds are remarkably unlike those of any other known *Eschscholtzia*.

E. minutiflora, Watson.

Smooth and very glaucous, a foot or more high and much branched: corolla 3 lines broad, greenish yellow: double character of margin of torus hardly perceptible: seeds reticulate.—Proc. Am. Acad. XI. 122, and Bot. Cal. I. 23.

The description of this species is drawn from specimens brought from the Mohave Desert. I have seen none from any of the more easterly localities.

* * *Petals narrower, their margins not meeting when open, fugacious.*

E. rhombipetala.

Tuberculate-scabrous throughout and glaucous: stems with stout, depressed branches: peduncles quadrangular, stout, little exceeding the sub-radical leaves: petals rhombic-ovate, a half inch long, fugacious: capsules 3—4 inches long, nearly equaling the peduncles: torus cylindrical, becoming scarious above, the two margins alike, and easily distinguishable: seeds large, the reticulations very distinctly and regularly honeycombed.

A most distinct and peculiar species found chiefly in the lower San Joaquin Valley, but also observed by Mrs. Curran in Colusa County. Most of our specimens in the herbarium want the petals, it being impossible to obtain them unless the collecting is done in the early part of the day.

The peculiar roughness of the plant extends even to the capsules, and is conspicuous on the angles of the peduncles. The pods and seeds are as large as in the rankest forms of *E. Californica*, although the entire plant is very much smaller than even the middle sized specimens of that species.

HETERODRABA. Nov. Gen. Cruciferarum.

Sepals equal. Petals minute or wanting. Style none. Silicle short-elliptical, twisted, indehiscent, by a very filmy partition 2-celled: valves flat, nerveless. Seeds 3—5 in each cell, in two rows: cotyledons accumbent. A Californian annual, leafy at base, with long, horizontal and nearly prostrate, racemose branches, evidently near to *Draba*, from which it differs in its indehiscent pods, on short reflexed pedicels, and its dissimilar habit.

H. unilateralis.

Hirsute-pubescent with branching hairs: leaves obovate, with cuneate base $\frac{1}{2}$—1 inch long, sparingly toothed toward the apex: branches from a few inches to more than two feet long, spreading horizontally, flowering and fruiting throughout their entire length: pods 2 lines long, $1\frac{1}{2}$ lines wide, with some stout, straight bristles besides the stellate pubescence, in maturity twisted: pedicels hardly a line long, stout and deflexed. *Draba unilateralis*, M. E. Jones, Bull. Torr. Club, IX. 124.

Abundant in certain localities from Colusa County, California, southward to the peninsula, where it was first collected by Mr. Jones in 1882. It is especially common in the wheat lands of the lower San Joaquin Valley, as well as still farther northward.

The long, wiry, nearly prostrate branches, with their pods all turned downwards, the valves of the latter breaking anywhere else more readily than along what should be the natural line of dehiscence, forbid our thinking of the plant as congeneric with even the annual species of *Draba*.

ATHYSANUS. Nov. Gen. Cruciferarum.

Sepals equal. Petals small or none. Style very short. Silicle orbicular, not margined, indehiscent, flat, nerveless, 1-celled, 1-seeded. Cotyledons accumbent. Annual, leafy at base, strongly resembling the preceding genus: branches slender, erect-spreading or trailing, racemose; their numerous pods hanging earthwards on short filiform pedicels.

A. pusillus.

Herb of about half the size of *Heterodraba*, but with the same habit, foliage and pubescence, save that the leaves are more conspicuously toothed, and the bristles of the pod uncinate.—*Thysanocarpus pusillus.* Hook. Icon. t. 42. Torr. & Gray. Fl. N. Am. I. 119. Hook & Arn. Bot. Beech. 324. Watson, King's Rep. V. 31, and Bot. Cal. I. 49. *T. oblongifolius.* Nutt. Torr. & Gray l. c.

Without any hesitancy do I separate this very common plant from the beautiful genus, *Thysanocarpus,* of which it has neither the habit, nor the technical character. The stems of Thysanocarpi are firmly erect, and simple up to where they part into several racemose branches which are also erect. Their leaves are in a radical, rosulate tuft mostly, and their pubescence is simply hirsute, none of the hairs being forked even, much less stellate. Their pods consist of strongly plano-convex, completely indehiscent, cartilaginous nutlets, the widely radiating fibres of which are connected by a hyaline membrane, thus forming a broad, encircling wing. *Athysanus* has its pods not only marginless, but the firm, slightly woody interior part, so far from combining inseparably into a solid shell, consists of two slightly, although equally convex valves which separate from one another completely, when moisture and warmth have caused the swelling of the seed. The fruit is therefore less worthy of being described as indehiscent than is that of *Heterodraba*, in which the valves, even when soaked, separate less regularly and less readily.

Should further and more careful examination of fresh and immature specimens reveal in any instances more than one ovule, so that the pods would need to be described as *by abortion* 1-seeded, an event which I half anticipate, inasmuch as it occurs in some foreign genera of cruciferæ, then would *Athysanus* be fairly reducible to *Heterodraba*, which it looks so exceedingly like, but from which it is, for obvious structural reasons, at present deemed needful that it shall be held distinct. The place for these two genera would seem to be near each other, between *Alyssum* and *Draba,* as relatives of them, although anomalous by their nearly or quite indehiscent pods.

CARDAMINE.

C. cuneata.

Glabrous throughout; perennial from small tubers; rather slender, erect, about a foot high, simple: radical leaves 3—4 inches long, two thirds as wide, 5—7-foliolate; leaflets ovate, irregularly few-toothed or -lobed, a half inch or more long, cuneate, tapering to slender petiolules of greater length, some of these with a pair of secondary leaflets at base; cauline leaflets 5—9, linear-cuneiform, entire: petals white, drying purplish: pods unknown.

Collected only by the writer, March, 1884, in the interior of Monterey County on mountain sides near Jolon.

The species is nearest the common *C. paucisecta*, differing from it mainly in the very peculiar, large, flaccid, pinnately- or commonly somewhat bipinnately-parted radical leaves. The habitat is dry ground, under oak trees, such as *C. paucisecta* usually affects. *C. Breweri*, the other species, to which it stands related, grows in water.

SIDALCEA.

A SYNOPSIS OF THE SPECIES.

* *Perennial.*

+ *Root not tuberous.*

S. candida, Gray.

Stems 12—18 inches high, erect and simple, from a creeping rhizome: glabrous except some sparse hirsute hairs below and a minute ciliolation of the leaf-margins: lower leaves orbicular, 7-lobed, sinus closed, lobes rounded, coarsely 3—5-crenate or -incised; the upper about 5—7-parted, segments lanceolate, entire: raceme short and dense, glandular-tomentose: lobes of the calyx ovate, abruptly pointed: corolla white: carpels smooth and glabrous.—Pl. Fendl. 24. Watson, Bot. King. V. 46.

Rocky Mountains of Colorado and New Mexico, at considerable elevations, by streams and in springy places, but rather rare. The only white flowered species, the rest being rose or purple.

S. malvæflora, Gray.

Stems 2—4 feet high, erect or a little decumbent, mostly solitary, from a fusiform root: hirsute below, and on the calyx and pedicels: short, stellate pubescence wanting: leaf-margins ciliate: radical leaves orbicular with open sinus and 5—9 shallow, crenate-incised lobes: the uppermost cauline 5—7-parted into linear, entire segments: raceme mostly solitary, virgate: pedicels erect, twice the length of the calyx, the lobes of which are broadly ovate, acuminate: carpels smooth, depressed. Pl. Wright. I. 16. *S. Neo-Mexicana*, Gray. Pl. Fendl. 23.

We have no *Sidalcea* specimens from any part of California or the regions northward which are not pretty readily distinguishable specifically from this plant of Colorado, New Mexico and Arizona. It is to be hoped that the *Sida malvæflora*, Moç & Sesse, of Mexico is really the same thing; but otherwise the name *S. Neo-Mexicana* is to be restored to this. In the Plantæ Wrightianæ it is said to attain the height of eight feet, which I am less disposed to regard as an exaggeration, since Dr. Rusby's specimen from the northern part of Arizona measures more than four feet, and has cauline leaves eight inches in diameter.

÷ ÷ *Root tuberous-enlarged: stems mostly clustered and decumbent at base.*

++ *Pubescence (as in the two preceding species) hirsute only.*

S. humilis, Gray.

Hispid-hirsute especially on the pedicels and calyx: stems stout, ascending, simple, about a foot high: radical leaves round, with open sinus; cauline 5—7-parted, their segments obtuse, 3-lobed at apex: raceme long and loose: petals obcordate, fully an inch long, rose-purple: pedicels stout:

calyx large, enclosing about 7 large, much depressed, distinctly reticulated carpels.—Pl. Fendl. 20. Brewer & Watson, Bot. Cal. I. 84.

Abundant in all parts of California lying near the sea, doubtless also in like situations to the northward; albeit the few specimens which have come to us from Oregon, bearing this name, are of a quite distinct species. The best marks of this one are the stout, decumbent stems and broad calyx, with correspondingly large, depressed carpels.

++ ++ *Pubescence of two kinds; hirsute and stellate.*

S. spicata.

Equably hispid-hirsute throughout, the hairs simple and not deflexed, stellate pubescence sparse, mostly confined to the under surface of the leaves, and to the calyx, where it is minute: stems 2 feet high, strict and simple, or with a few short branches above: lowest leaves orbicular, sinus narrow or closed, lobes and teeth shallow and well rounded; cauline parted into 7, variously incised, or often linear, entire segments: raceme short, spicate-crowded: petals deeply notched, about $\frac{1}{2}$ inch long, pinkish: pedicels very short: calyx thin, very hairy, its lobes ovate, acute or acuminate: carpels small, depressed, pubescent but not reticulate.—Cisco, Sierra Nevada, Cal. 1870. Dr. Kellogg. Also from near Donner Lake, 1883, Mrs. Curran.

The herbage of this species is of a peculiar, light green, and is of a thinner texture than in the other members of the perennial group. It may or may not be the *Callirhöe spicata* of Regel, neither the figure of which, nor any description, has been accessible to me, but no other *Sidalcea* has its racemes condensed into the appearance of a short spike, if we except the annual species at the end of this synopsis.

S. campestris.

Bristly hairs of the stem abundant, forked from the very base and deflexed: leaves soft beneath with a stellate pubescence, which becomes dense on the pedicels and calyx: stems slightly decumbent at the very base. otherwise strict, 2—3 feet high, simple: lower leaves orbicular, about 9-lobed, the lobes cuneate-obovate, 3-cleft at the apex; the middle and upper 7—9-parted, their segments with 3—5 linear, somewhat spreading lobes: racemes short: petals emarginate, an inch long, deep lilac-purple: calyx-lobes ovate, long acuminate: carpels not seen.

The specimens are from Mr. T. J. Howell of Oregon, and the plant is reported to inhabit dry prairies. Mr. Howell's printed labels bear the name, "*Sidalcea humilis*, Gray": but this is a most distinct species, not so much like *S. humilis* as *S. spicata*, from which latter species it is easily distinguished by its forked and retrorse, bristly hairs, abundant stellate pubescence, and large flowers in racemes which are not at all spicate-crowded. It is probably the *Sida malvæflora*, in part at least, of Hooker, Fl. Bor. Am. and of Torrey & Gray, Fl. N. Am.

S. Oregana, Gray.

Sparingly hirsute below, inflorescence stellate-tomentose, other parts of the plant glabrous: stems 1—5 feet high, paniculately branched above: foliage as in the preceding, but the segments narrower: calyx globose in fruit, its segments ovate to lanceolate, acute: corolla a half inch or more long: carpels very small for the genus, smooth and glabrous, not in the least depressed.—*Sida Oregana*, Nutt. Torr. & Gray Fl. N. Am. I. 234. *Sidalcea Oregana*, Gray. Pl. Fendl. 20. *S. malvæflora*, in part, of Bot. Cal. I. 83.

Very common in Oregon and the northern parts of California. The largest species, distinguished by its paniculately branching habit, and small calyx and carpels, the latter very straight, not depressed as in the other species.

++ ++ ++ *No hirsute pubescence.*

S. glaucescens.

Minutely stellate-pubescent, and somewhat glaucous throughout: stems numerous, decumbent, 2 feet high, rather slender: leaves, even the lowest, palmately 5—7-parted, the cuneate divisions 3—5-lobed or -toothed, or those of the uppermost entire: raceme simple, loosely flowered: divisions of calyx attenuate-acuminate: corolla deep purple, the lobes obtuse, or at most only truncate: reticulations distinct and elongated lengthwise of the carpels.

Sierra Nevada, at about 6,000 feet altitude, and ranging from Mt. Shasta to Kern County. Very common about Summit station, in the neighborhood of Donner Lake, where it was collected by Mrs. Curran and the writer, in August, 1883. One of the best species, readily known by its pale, glaucous hue, and the peculiar, geranium-like foliage. To the unassisted eye the plant looks perfectly smooth; but a good lens reveals on all parts of the stem and foliage, the pubescence above described.

S. asprella.

Deep green; roughish throughout with a short, stellate pubescence: stems several, simple, decumbent, leafy up to the slender raceme: leaves 2—3 inches wide, truncate at base or with a broad sinus, lightly 5-lobed, the broad lobes each with about 5 rounded teeth: divisions of calyx triangular-lanceolate, acute: corolla purple, an inch long, its lobes truncate, erose: carpels large, transversely rugose, depressed.

On bushy hillsides of the lower Sierras, just below the habitat of *Chamæbatia:* apparently not collected before last season; found by Mrs. Curran in El Dorado County, and by the writer on Mr. John Ramm's ranch, near Camptonville, in Yuba County. Peculiar, at least among the perennial species, in having its leaves all of precisely the same shape, the lowest and the uppermost differing only in point of size. The rough pubescence is likewise very characteristic.

* * *Annuals.*

S. Hartwegi, Gray.

Glabrous, except the pedicels and calyx, which are hispidly pubescent: stem 1—3 feet high, mostly simple, leaves orbicular, the lowest deeply cleft, the upper digitately 5—9-parted: segments linear, entire, acute: spike usually short and dense: calyx-lobes acuminate: carpels strongly reticulate, hispid above.—Pl. Fendl. 20. Bot. Cal. I. 84.

Common in the Sacramento Valley.

S. tenella, Greene.

Rough-puberulent, or nearly glabrous, glaucescent; slender and branching, about a foot high: leaves small, the lowest orbicular, 5—7-lobed, the upper digitately parted; segments linear, entire; purple flowers in numerous short racemes: calyx-lobes lanceolate, acuminate: carpels not hairy, rugose- or alveolate-roughened.—Bull. Cal. Acad. I. 7.

Common in the foothills skirting the Sacramento Valley; first collected by Mr. Elisha Brooks, and later by Mrs. Austin, Mrs. Curran and the writer. Near the preceding species, but smaller, more slender, and freely branching; inflorescence and fruit lacking the hispid pubescence, but frequently the whole plant roughened and glaucous.

S. sulcata, Curran in herb.

Glabrous below, sparsely hirsute above, especially on calyx and pedicels; about 2 feet high, sparingly branching: foliage as in the preceding species: calyx-lobes ovate-lanceolate, abruptly acuminate: corolla small, light purple: carpels evenly reticulate on the sides, the back striately so, or else (by disappearance of the reticulation), longitudinally about 7-sulcate.

Collected near Folsom in May, and on Sweetwater Creek, El Dorado County, in June, 1884, by Mrs. Curran.

S. diploscypha, Gray.

Pubescent with long, spreading hairs; a foot or two high: leaves deeply 5—9-cleft, with sharply lobed segments: flowers in umbellate clusters, their pedicels subtended by 5—7-

parted, linear, hispid bracts: calyx-lobes long-acuminate: petals an inch long, emarginate: filaments of outer stamens united into broad, membranaceous lobes, which commonly enclose the inner anthers: carpels glabrous, transversely rugose, the back with a central, longitudinal channel.—Pl. Fendl. 19. Bot. Cal. I. 84. Var. *minor*, Gray, differs remarkably from the type in having racemose inflorescence, and the petals marked by a dark purple spot at the base.

It was collected in Lake County by Mrs. Curran, in 1884. The original of the species is common in the central parts of the State, on hillsides everywhere.

S. malachroides, Gray.

Stout, hirsute, 3—6 feet high: leaves cordate, 2—5 inches broad, 3—7-angled with the lobes sharply toothed: bractlets subulate, caducous: flowers small, white, nearly sessile in close racemose or spicate clusters: calyx-lobes triangular, acute: petals narrowly obcordate: carpels glabrous, not reticulate, the back showing a more or less distinct central ridge.—Proc. Am. Acad. VII. 332. Bot. Cal. I. 84.

Rather rare, along the Coast from Mendocino County to Santa Cruz.

CEANOTHUS.

C. macrocarpus, Nutt.

Shrub 8—12 feet high, with naked, dark-barked trunk, and well rounded, tree-like head: branchlets rusty-pubescent, and bearing conspicuous, dark, warty, stipular glands: leaves alternate, coriaceous, obovate-oblong, retuse, entire, minutely tomentose-canescent beneath: flowers in umbellate clusters: fruit very large.—Torr. & Gray, Fl. N. Am. I. 267.

The flowering branchlets alone furnish characters enough by which to distinguish this specifically, from *C. cuneatus*. I refer to the strictly alternate leaf-arrangement, and the large, warty stipules. The shrub inhabits the highest parts of the Santa Inez Mountains, back of the city of Santa Barbara. It presents, with its naked stem, and rough, almost black bark, the aspect of a plum tree. But *C. cuneatus*, which abounds at lower elevations on the same mountains, is always in bushy clumps, its stems when old being covered with a smooth, ash-gray bark. Moreover, the *C. cuneatus*, even in its milder climate of the lower altitude is several weeks later in its flowering, than the kindred species of the higher summits. The very able and discriminating botanist who discovered *C. macrocarpus*, named it well: the fruits being about twice the size of those of the allied species.

Of the following I have seen nothing hitherto, except flowering branches, which always come to us named *C. cuneatus*, which it certainly is not. From the description it must be distinct from *C. macrocarpus*, and should doubtless bear that name, in our herbaria, which the discoverer of the species gave to it. I shall copy, for the assistance of our southern correspondents, to whom the valuable and rare book may not be accessible, the account given by Mr. Nuttall himself, and printed by Torr. & Gray in the Fl. N. Am.

C. verrucosus, Nutt.

Branchlets verrucose and somewhat canescent with a rusty-colored pubescence: leaves alternate, approximate or crowded, very thick and coriaceous, roundish-obovate or cuneate-oval, often emarginate, the younger sometimes obscurely serrulate, glabrous above, minutely tomentose-canescent beneath: umbels axillary, few-flowered, naked: fruit with minute protuberances at the angles.

Low hills near the coast, San Diego—leaves about half an inch long and 4—5 lines wide: fruit the size of a large pea.

HOSACKIA.

H. macrantha.

About a foot high and stoutish, silky-puberulent: leaflets 7—9, obovate or oblong, obtuse, $\frac{1}{2}$—1 inch long; stipules subulate, minute, dark colored and deciduous, leaving a glandular base: peduncles 2—4 inches long, 3—7-flowered; bract 1-foliolate, closely subtending the umbel: corolla an inch long, bright yellow throughout; the standard erect, a half inch broad: pod stout, $1\frac{1}{2}$ inches long.

El Dorado County, on Sweetwater Creek, 1883, Mrs. K. Curran.

To come in between *H. Torreyi* and *H. grandiflora;* the very showy flowers nearly twice as large as in any other known species. The young specimens would be referred to the group with foliaceous stipules; the older ones, showing only the glandular, basal portion, would as surely be taken as belonging to the gland-bearing group.

H. flexuosa.

Stems depressed, rigid and flexuous, a foot long; minutely silky-pubescent: stipular glands large: leaflets 3—5, thickish, broadly obvate, retuse or somewhat obcordate, 3—5 lines long: peduncles an inch long, 1—3-flowered, the bract wanting, replaced by a pair of conspicuous glands a little below the umbel: calyx-teeth lanceolate, as long as the turbinate tube: pod an inch long.

Cedros Island, Dr. Veatch. Very unlike any of those numerous forms from the Mexican region which go under the name of *H. rigida*.

H. procumbens.

Near *H. glabra* but appressed-silky throughout: stems prostrate, 2 feet long: leaflets 3, approximate, oblanceolate, mostly acute, $\frac{1}{2}$—1 inch long: umbels numerous, sessile, bractless, about 2-flowered: calyx-teeth very short, triangular-subulate: pod almost an inch long, slender and nearly straight, 2-seeded.

Tehachapi, Kern County, 1884. Mrs. K. Curran. Of the *Syrmatium* group, among which it is remarkable for its long, straight pods.

H. Veatchii.

Suffrutescent, decumbent or prostrate, very stout: appressed-silky throughout even to the pods: leaflets 3—4, oblong-obovate, somewhat cuneate, 6—9 lines long: umbels numerous, nearly sessile, bractless, 10—12-flowered: calyx 3—4 lines long; its teeth short-triangular, acute: corolla twice as long as the calyx: pods almost straight, an inch or somewhat less in length.

From the peninsula of Lower California, at Elide, opposite Cedros Island, by Dr. Veatch. The specimens have remained thus many years unnoticed, in the herbarium of the late Mr. H. G. Bloomer. Plant very robust, and large-flowered for a member of the *Syrmatium* group.

RIBES.

R. quercetorum.

Prickles none; thorns stout, solitary: glabrous or very minutely puberulent, glandless: leaves small, numerous, 5-cleft, the lobes narrow, cuneiform, 3-cleft or -toothed, a half inch long on petioles of an inch or less: peduncles slender, deflexed, with two or more small, bright yellow flowers: calyx tubular, minutely puberulent, the lobes linear-oblong, lightly ciliate, a little longer than the petals, reflexed: stamens shorter than the petals; anthers short-oblong: style glabrous, undivided; stigmas two; ovary glabrous: berry small, smooth.

Bushes 3 or 4 feet high, in dense, well rounded clumps, growing in oak groves at the base of the mountains in Monterey and San Luis Obispo counties; especially abundant at El Paso de Robles, where it was collected by the writer in March, 1884. The species is near *R. leptanthum;* the very small yellow flowers are very fragrant. Ripe fruit has not been seen.

R. velutinum.

Without prickles, the stout thorns solitary: glandless but minutely soft-pubescent: leaves small, on petioles shorter than the lamina, deeply 5-cleft; the lobes 3-cleft: peduncles short, deflexed, having about 2 white, or pinkish flowers: calyx cylindraceous, 2—3 lines long, the tube shorter than the erect lobes: ovary white-villous: berry dark purple, velvety-pubescent but not glandular.—*R. leptanthum*, var. *brachyanthum*, Gray, Bot. Cal. I. 205.

Open grounds in the northern part of California and regions adjacent. A stout shrub, 4—6 feet high with coarse, rigid, but gracefully recurved branches. It differs from *R. leptanthum* not only in its shorter flowers, but in the velvety pubescence which clothes not only both sides of the leaf, but more markedly the fruit, even in its maturity.

PENTACHÆTA.

This exclusively Californian genus of small annual Compositæ, if it be accounted anomalous and refractory among the Asteroideæ, including, as it most certainly does golden yellow- and clear white-rayed species, has not the misfortune to be made up of species feebly marked. Three or four successive seasons of diligent observing and collecting of them in all parts of the State where they grow, have failed to show that any two species incline to run together. Of the five now recognizable, none is better marked than that one which, when first discovered, was naturally taken as the type of a distinct genus, namely, *Aphantochæta*. The corollas of this are urceolate, the filiform tube widening quite abruptly about midway, and contracting very perceptibly under the small teeth of the orifice. The name Aphantochæta was suggested by the fact of the five bristles of the pappus being reduced to mere rudiments. The very full supply of specimens now in the herbarium of the California Academy, having been brought in from numerous and widely sundered localities by Mrs. M. K. Curran, my zealous, clear-seeing and most efficient co-laborer in the field of California botany, show that even in this plant the five bristles are as commonly present in their fullest development, as in any species of the white- and purple-flowered section. It is equally in all these, a rare and exceptional case that they are reduced or wanting. That these three species have their rays, when present, clear white or purplish, with never a tint of yellow, whereas the original Pentachæta and its fine newly discovered cognate has them golden yellow, seems almost to require the reinstatement of Aphantochæta as a genus of three species; yet the plants are all so perfectly alike in habit, as well as the character of akene and pappus, that it seems best to separate them only sub-generically. The unfortunate misapplication of the specific name *exilis* should no longer be left uncorrected, and in the subjoined re-arrangement of the species, it is dissevered from its connection with the one to which it has misleadingly been applied, and is bestowed upon that excellent one which claims it.

§ 1. **Eupentachæta.**

Rays golden yellow: pappus apparently always well developed; bristles 5—12; akenes not compressed. Plants of the south part of the State; a foot or less high.

P. aurea, Nutt.

Involucre glabrous: bristles of pappus 5.—Trans. Am. Phil. Soc. VII. 336. Torr. & Gray, Fl. N. Am. II. 249. Gray, Bot. Cal. I. 305. Syn. Fl. 120.

Common on plains towards and around San Diego.

P. Lyoni, Gray.

Involucre hirsute: pappus bristles 9—12.—Syn. Fl. 445.

§ 2. **Aphantochæta.**

Rays (when present) white (reddish outside), never yellow or even ochroleucous: pappus-bristles 3—5; in each species occasionally reduced or obsolete; akenes slightly compressed. Plants *of the region of San Francsico and northward to Mendocino County; only half the size of those of § 1.*

* *Stems simple, or with few erect or ascending branches: heads 12—25-flowered: pappus bristles 5, when present.*

+ *Heads with white ray- and yellow disk-flowers.*

P. bellidiflora.

Herbage green: peduncles glabrous: throat of corolla ample, not contracted above.—*P. aurea*, Gray, Pacif. R. Rep. IV. 99, Boland. Cat. 15, not of Nutt. *P. exilis*, Gray, Bot. Cal. l. c. and Syn. Fl. l. c. excl. vars. but not *Aphantochæta exilis*.

A plant of limited range, being confined, apparently, to the immediate vicinity of San Francisco Bay, and seldom collected. Still found at Corte Madera, in Marin County, the original locality. Bolander's specimens from Crystal Springs, a little south of San Francisco, are destitute of pappus, but otherwise the same.

+ + *Heads discoid: corollas red-purple.*

P. exilis.

Herbage purple; peduncles white-villous under the involucre; throat of corolla contracted at the base of the minute teeth.—*Aphantochæta exilis*, Gray, Pacif. R. Rep. IV. 99, t. 11. *P. exilis*, var. *aphantochæta*, Gray, Bot. Cal. I, 305, Syn. Fl. l. c. *P. aphantochæta*, Greene, Bull. Torr. Club, IX. 109, & Bot. Gaz. VIII. 256.

A most common species in the counties eastward and northward from San Francisco. Very distinct from the preceding.

* * *Stems diffuse, much branched: heads in the forks, short-peduncled, 3—7-flowered: rays wanting.*

P. alsinoides, Greene.

Corollas filiform; tube scarcely widening into a throat, purplish: pappus-bristles 3, seldom obsolete.—Bull. Torr. Club IX. 109, & Bot. Gaz. l. c. Gray, Syn. Fl. l. c.

About San Francisco and eastward to the foot-hills of the Sierra Nevada; common, but often depauperate, and always an inconspicuous plant.

BIGELOVIA.

B. furfuracea.

Leaves thick, narrowly oblanceolate, 1—2 inches long, entire, covered on both sides with close resinous scales, resembling scurf, which extend also to the branches and branchlets: inflorescence corymbose-panicled; head 4—5 lines high, 12—15-flowered: involucre turbinate, its scales chartaceous, with blunt greenish tips and more or less white-tomentose: style-appendages short-subulate: pappus of very unequal bristles: akenes strongly silky-pubescent.

A most singular looking species in respect to the resinous scales resembling scurf, on the branches and foliage. The specimen consists of a single branch, in flower, and well preserved. The name of the collector is unknown, and the habitat of the species is equally enigmatic; but we suspect it to have come from Lower California.

ERIGERON.

In the small group of perennial, tall, leafy-stemmed species inhabiting and almost peculiar to California, a different arrangement is called for by those who are familiar with the plants in their native haunts, from that given in the Synoptical Flora of North America. In the herbarium of the Academy, most of the forms are abundantly represented, and are disposed as follows:

E. stenophyllus, Nutt. not of Gray.

Herbage deep green: stems ascending from a decumbent base, about two feet high, stoutish, rigid, brittle and somewhat flexuous, rough-puberulent and somewhat strigose, paniculately or corymbosely branching above: leaves numerous, scattered, filiform an inch or two long, scabrous: involucres hemispherical: rays numerous, slender, 3—4 lines long, blue-purple: akenes usually quite glabrous. — *E. foliosus, var. stenophyllus*, Gray, Bot. Cal. I. 330, and Syn. Fl. N. A. 215.

Common in open grounds at lower altitudes than the following species, and readily distinguishable from them by the entirely different habit, the pubescence, etc. If this should prove identical with the *E. decumbus*, Nutt, of Oregon, the name of Dr. Gray's Texan *E. stenophyllus* will be saved; but the Oregon plant I have not seen. The *E. foliosus* var. *tenuissimus*, Gray, is of the present species.

E. foliosus, Nutt.

Light green, and smoother than the preceding; stems more slender, erect from the base: leaves linear to oblanceolate, obtuse, 2—3 lines wide, the margins scabrous: heads larger, in a simple corymb: rays numerous, broader, 5—6 lines long, light purple or almost white: akenes slightly hirsute.—Pl. Gambel. 177. Gray, l. c. excl. var.

Wooded places at middle altitudes in the Sierra Nevada. Of a different range from *E. stenophyllus* and readily recognizable by its broader, lighter colored, smoother foliage, erect stems, and simple flat-topped corymb of larger heads.

E. inornatus, Gray.

Near the preceding, from which it is distinguished mainly by the smaller, more numerous, rayless heads, and the about twice as numerous bristles of the pappus.—Syn. Fl. 215, excluding the var. *angustatus*.

This species belongs to the higher Sierras, whence it ranges northward into Oregon and Washington.

E. angustatus.

Tall, rather slender and glabrous throughout: leaves narrowly linear or filiform: heads few, or numerous in a cymose panicle, each subtended by some subulate bracts: involucres glandular, their scales numerous, unequal, green-tipped and very regularly imbricated: rays none: akenes somewhat hirsute.—*E. inornatus*, var. *angustatus*, Gray, Syn. Fl. 215.

As strictly confined to the foot-hills of the Coast Range as *E. inornatus* is to the higher Sierra. Distinguishable from that species at a glance by the glandular, numerous and much imbricated scales of the involucre.

HELIANTHELLA.

Two species—one of them belonging to the Coast Range, and the other as strictly limited to the region of the Sierra Nevada—have hitherto been confounded. In general aspect they are exceedingly alike, but are most dissimilar in characters of the akene. I distinguish them as follows:

H. Californica, Gray.

Almost glabrous: stems branching, 2 feet high: branches naked above and monocephalous: leaves lanceolate, on long petioles, all opposite except occasionally a single one a little below the head: akenes cuneate-obovate, slightly obcordate, glabrous with traces of wings above, but wholly destitute of pappus; terminal areola prominently elevated.—Pac. R. Rep. IV. 103; also Bot. Cal. I. 352, and Syn. Fl. 285, as to the Napa Valley plant with "pappus obsolete in age."

Collected in the neighborhood of Napa by Bigelow; also in Lake County by Cleveland in 1882, and by Mrs. Curran in 1884. There is never any trace of pappus in even the young fruit, and the akene is differently shaped from that of the following.

H. Nevadensis.

Minutely scabrous-puberulent: stems simple, bearing at summit about three short-peduncled heads: leaves lanceolate, tapering into petioles, the upper usually alternate: akenes obovate-oblong, not cuneate at base, glabrous except the ciliolate margins of the imperfect wings, less obcordate than in the preceding species; pappus of two short, firmly persistent awns, and numerous intermediate, equally persistent squamellæ; terminal areola depressed.—*H. Californica*, Gray, of Bot. Cal. and Syn. Fl. as to the plant of the Sierra only.

Abundant in the higher Sierra, often collected, and by no means to be disposed of as a pappose form of the true *H. Californica.* The akenes differ in size and shape, as well as in the wholly constant matter of the pappus.

MADIA.

M. Rammii.

Annual; stem slender, a foot and a half high, above the middle abruptly parting into a loose, corymbose panicle: leaves linear, entire: peduncles slender, 2—4 inches long: ray-flowers about 10, a half inch long, bright yellow; those of the disk 18—30: bracts of the involucre minutely hispid: ray-akenes slightly lunate, the rather prominent and quite lateral apiculation bearing a short ciliolate pappus; pappus of disk-flowers of 5 slender and soft, barbellate awns.—*M. Yosemitana*, Gray, Syn. Fl. 304, as to the plants of Prof. Eisen and Marcus Jones, but not of Parry.

The present species is abundant in the region of the Sierra Nevada from Auburn northward at least to the Yuba River, and has been collected in imperfect condition by Mr. Elisha Brooks, as well as by the gentlemen above named. This description has been drawn from beautiful and very perfect specimens collected at Nevada City, last July, by Mr. Charles A. Ramm, for whom it is named. As to the pappus of both ray and disk, the species is very close to *M. Yosemitana;* but the ray-akenes are more crescent-shaped and have their terminal apiculation and basal stipe both more lateral. In size and habit, as well as geographical range, it is easily and necessarily separate from Dr. Parry's weak, depressed herb of the moist rocks of the higher elevations.

M. citriodora, Greene,

(Bull. Torr. Club. IX. 63,) which for the Syn. Fl. was transferred by Dr. Gray to *Hemizonia*, has lately been sent from Modoc County in a state with akenes laterally compressed, the thickness from side to side being considerably less than the measurement from back to ventral angle. They are therefore beyond dispute in this case the akenes of a *Madia*, and imperatively remand the species to that genus of which, in all its conditions it has strictly the habit and appearance. Mrs. Austin, the collector of these interesting specimens, reports of them the same pleasant odor of lemons, which suggested the specific name.

Altogether distinct from this, and, as to form of the akenes, most divergent from all other species of the genus, is the following, which has not hitherto been described, namely:

M. anomala, Greene.

(Gray, Syn. Fl. 307, under *Hemizonia citriodora*). Less than a foot high, rather stout and paniculately branched; lightly hirsute and very viscid-glandular: ray-flowers 3—5, the ligules greenish-yellow: disk-flowers 3, all fertile: bracts of the involucre and of the receptacle similar, the latter disconnected, each almost completely enclosing its akene: akenes of ray and disk all alike, obovate with obtuse apex and truncate base, slightly gibbous, but well rounded on all sides, without even a ventral angle.

El Dorado County, 1883, and Lake County, on Cobb Mountain, 1884, Mrs. Curran. The plant has no trace of the fragrance of *M. citriodora*, nor any close relation to that species. It looks more like a stout and dwarfish *M. dissiti-*

flora, of which species it has the pubescence and viscosity. The evenly rounded sides of the very plump akene are a peculiarity rather in conflict with the accepted generic character of *Madia*. There is discoverable, however, the very obtuse suggestion merely of an angle on the ventral face.

LAYIA.

L. graveolens.

Two feet high, stout and much branched, short-hirsute and glandular: leaves all entire: heads large: rays cream-color: clavate akenes slender; pappus deciduous in a ring, bright white, the villous wool all straight and erect, two thirds as long as the 18—20 slender bristles.

Tehachapi Station, Kern County, California, June, 1884, Mrs. Curran. The species is nearest *L. heterotricha*, though a much larger plant with very heavy scented herbage, more clavate and less villous akenes, and a deciduous pappus, of which the wool is more copious and much longer.

TETRADYMIA.

T. stenolepis.

Near *T. canescens*, but the branches bearing, for the most part, long, straight, divergent spines in place of leaves: shrub two feet high, much branched, and white throughout with dense, close tomentum: leaves mostly on the flowering branchlets, spatulate-lanceolate, an inch or more long, with sharp spinose tips; no fascicled ones: head $\frac{3}{4}$ inch high, 5-flowered; involucral scales 5, linear, obtuse: akenes barely pubescent on the nerves; pappus copious.

Mountains of Kern Co., California. Mrs. Curran, 1884. An interesting bush, intermediate between *T. canescens* and *T. spinosa*, and therefore destructive of the sectional divisions of the genus, as made in the Synoptical Flora.

CROCKERIA. Nov. Gen. Compositarum.

Heads radiate, many-flowered, the flowers all fertile. Receptacle conical. Involucre a single series of bracts connate into an about 10-toothed cup. Disk-corollas 5-lobed. Akenes oval-obovate, very flat, nerveless, glabrous; margins with a distinct filiform nerve and very densely ciliate with short somewhat clavate, more or less glandular hairs; apex truncate. Pappus none.

Genus dedicated to Charles Crocker, Esq., whose very liberal patronage of California botany well merits this recognition.

C. chrysantha.

Annual, a span or more high, nearly glabrous: leaves opposite, connate at base, linear, entire: heads $\frac{1}{4}$ inch high: involucre hemispherical, shorter than the disk; the ovate bracts united to the middle: flowers golden-yellow.

In alkaline soil about Lake Tulare; collected by the writer in the middle of April, 1884. The plant so exactly resembles *Lasthenia glabrata* that nothing but a look at the akenes will reveal the difference. Only a few specimens were made, and these were taken on the supposition that they were of the common plant just named. An account of the genus has, at the date of the printing of this, already appeared in the new volume of the Synoptical Flora of North America, which contains the Compositæ, pages 72 and 445, wherein the precise relationship of it is set forth.

SENECIO.

S. Austinæ.

Perennial, lightly floccose; stem a foot or more high, naked above; leaves somewhat fleshy, in outline oblong-oblanceolate, an inch or two long, tapering to slender petioles of greater length, their margins closely laciniate-toothed-cleft or -lobed, the lobes mostly simple and all mucronately tipped; heads not calyculate, a half inch high and nearly as wide, 5—15 in an ample corymb; scales of the involucre fleshy, linear-oblong, acuminate; rays 8—10, light yellow; akenes glabrous.

Mrs. R. M. Austin, Modoc County, Cal. July, 1884. A rather handsome species, in some respects intermediate between *S. Whippleanus* and *S. eurycephalus*, less floccose than the latter, the outline of the leaf very different, and much like that of *S. Clevelandi*. The peculiar cutting of the margin is distinctive.

DIPLACUS.

Calyx tubular, 5-angled, 5-toothed, upper lip of corolla 2-lobed, lower 3-lobed, the lobes spreading, marginate or variously toothed or cleft. Fertile stamens 4. Stigma bilamellar. Capsule linear-oblong, closely invested by the calyx and wholly included within it, firm-coriaceous, with a woody tubercular enlargement at the apex, incompletely dehiscent, opening by the upper suture only, from base to near the apex, the valves spreading into a boat-shaped open pod: placentæ distinct, borne on the middle of the valves. Seeds small, very numerous.—Californian shrubs with glutinous exudation, and a dendroid-branching pubescence, with frequently some flat, stellate hairs intermixed. Flowers short-pedicelled, solitary in the axils, large, red, orange or buff.—Nutt. in Taylor, Ann. Nat. Hist. I: 137. Endl. Gen. 681. Benth. DC. Prod. X, 368. Mimulus § Diplacus. Benth & Hook. Gen. II. 946; Gray, Bot. Cal. I. 565, & Syn. Fl. 275.

A genus quite distinct from Mimulus by its separated placentæ, the imperfect dehiscence of its folliculiform capsules, its shrubby habit, and branching pubescence. The species of Nuttall are here provisionally restored, in expectation that a more thorough examination of the corollas (in the form of which it is believed good specific characters are lurking) will establish the correctness of the judgment of the author of the genus, who had the advantage of a familiar knowledge of the floral characters, which cannot, in this and allied genera, be gained in mere herbarium studies.

D. stellatus, Kell.

Branches and under surface of leaves yellowish-tomentose, the pubescence partly stellate and partly dendroid: leaves subcoriaceous, ovate-lanceolate, entire, the margins strongly revolute, upper surface glabrous and glutinous: calyx glandular-puberulent: corolla apparently small (1 inch long), with narrow throat, the color unknown.—Proc. Cal. Acad. II. 18.

Cedros Island, Dr. J. A. Veatch. The pubescence of two different kinds is very plentiful in this plant, which is doubtless of a species distinct from all our main-land forms; although the dendroid hairs are on other species, and even the stellate are not wanting elsewhere in the genus.

D. glutinosus, Nutt. l. c.

Three to six feet high: branches puberulent: leaves not coriaceous, linear lanceolate, acutish, pubescent beneath with short, somewhat branching, but no stellate hairs, denticulate, loosely revolute in age: corolla buff, an inch long, throat narrow, the lobes entire or emarginate.—*Mimulus glutinosus*, Wendland, Jacq. Hort. Schœnbr. t. 364. Gray, l. c. excluding most of the synonymy and all the varieties.

Common along streams and in shady places in the vicinity of San Francisco Bay.

D. latifolius, Nutt l. c.

Branches puberulent, some of the hairs longer and gland-tipped: leaves thin, from nearly glabrous to quite tomentose beneath (some of the hairs stellate), narrowly oblong, obtuse, strongly toothed: corolla buff, 1½ inches long, throat enlarging upwards, limb ample, lobes erose-denticulate.—*Diplacus glutinosus*, Benth. l. c. in part, and *Mimulus glutinosus*, Gray, l. c. in part.

Foot-hills of the Sierra Nevada. Collected recently by Mr. Elisha Brooks, and by Mrs. Curran. Very possibly a variety merely of the last species; but the corolla in our best specimens appears quite too unlike.

D. puniceus, Nutt. l. c.

Nearly glabrous throughout: leaves oblong-linear, mostly entire: calyx-teeth slender: corolla scarlet, an inch or more long, with narrow throat and erose lobes.—*D. glutinosus*, var. *puniceus*, Benth. l. c. *Mimulus puniceus*, Steud. Nom. Ed. 2, Vol. II. 150. *M. glutinosus*, var. *puniceus*, Gray, l. c.

Southern part of the State. Without much doubt a good species.

D. leptanthus. Nutt l. c.

Mimulus linearis, Benth. Scroph. Ind. 27. *M. glutinosus*, var. *linearis*, Gray, l. c.

This plant is not known to me, except by the brief description given in the places above referred to.

D. longiflorus, Nutt l. c.

Stems low and only suffruticose: branches and peduncles minutely puberulent; the plant otherwise wholly glabrous: leaves coriaceous, oblong-lanceolate, obtuse, entire, the margins revolute: peduncles short: calyx-teeth with white-villous margins: corolla light salmon color, 2 inches or more long, with ample funnelform throat and not widely spreading, deeply sinuate-cleft lobes.—Benth. l. c. *Mimulus glutinosus*, var. *brachypus*, Gray, l. c.

This is not only a most beautiful plant, but very clearly distinct from *D. glutinosus*. It is of rather frequent occurrence from the hills back of Santa Barbara to the Sierra Nevada, and as far northward at least as Yuba County. The fine salmon-color, large size and peculiar cut of the lobes of the corolla are very constant in all the different localities. I have never seen the plant exceeding two feet in height, and it is commonly only half as large as that. It is the most glutinous, and at the same time the most glabrous, of all the species.

EUNANUS.

Calyx tubular, 5-angled, 5-toothed. Corolla funnelform, with included or rarely long-exserted tube, or in one section, nearly salverform: limb usually 5-lobed, strongly bilabiate or nearly regular. ⊙. Stamens 4, strongly didynamous. Style filiform: stigma bilamellar with lobes unequally or equally petaloid-dilated, or more or less peltate-funnelform. Capsule indehiscent, or the valves partly (seldom completely) separating, cartilaginous, coriaceous, chartaceous, or rarely even membranaceous, gibbous at base, obtuse and shorter than the calyx, or acuminate and considerably surpassing it: placentæ borne on the middle of the valves, not uniting in the axis. Seeds numerous, dark colored, often muriculate.

Dwarf annuals of California, the stem and branches terete and firmly erect or ascending, never decumbent, the herbage dark green or purplish, glandular and resinous-viscid, but never slimy: foliage generally narrow and entire: flowers purple *or* variegated, in two species yellow.—Benth. DC. Prod. X. 374. Mimulus § Œnœ and § Eunanus, Gray, Bot. Cal. and Syn. Fl. N. Am., including also Mimulus § Mimulastrum, Gray, Bot. Gaz. IX. 141.

Abundant fruiting specimens now in the herbarium of the Academy show the capsule of *Eunanus* to be in several ways very unlike that of *Mimulus*. In the first section, although shorter a good deal than the calyx, it is almost bony in texture, and altogether indehiscent. In the second the valves separate only along the upper suture, and partly down the lower, though often not even to the apex of the upper. Again; not even in the yellow-flowered species is there the light green herbage, the breadth of foliage, or any trace of the transparent, albuminous, slippery exudation peculiar to *Mimulus*. The second and third sections agree in a peculiar habit. The first has not only a habit of its own, but also certain technical peculiarities, chiefly the tough, indehiscent capsules, which render its elevation to generic rank, as was long ago proposed by Dr. Gray, extremely desirable. The only obstacle is a species herein first defined, a plant always heretofore confounded with *E. Douglasii*. In it are conjoined the floral character of that species, nearly, with the habit and capsule of *Eunanus* proper.

ŒNŒ.—*Corolla with usually a long filiform tube much exserted beyond the calyx: upper lip larger than the lower: capsule cartilaginous, indehiscent, shorter than the calyx, obtuse, gibbous at base.*

Dwarf annuals, hardly viscid, nearly glabrous, flowering in early spring, occurring only in the middle and northern sections of the State, and on moist ground. *Œnoe*, Gray in Benth. Pl. Hartw. 329, name only. Mimulus § Œnoe, Gray, Bot. Cal. I. 563.

E. Douglasii, Benth.

Stem $\frac{1}{4}$—$1\frac{1}{2}$ inches high, very leafy: leaves rhombic-ovate to ovate-lanceolate, $\frac{1}{2}$—1 inch long, 3—5-nerved at base, crenate-toothed or almost entire: corolla 1—$1\frac{1}{2}$ inches long, its slender tube thrice the length of the calyx; throat urceolate, the lower portion being abruptly enlarged, the orifice contracted; upper lip of the two broad, erect lobes, the lower of a single, small, triangular tooth, the two lateral lobes wholly obsolete: capsule tough-cartilaginous, semi-transparent, indehiscent, long-ovate, $\frac{1}{4}$ inch long, obtuse, strongly compressed, very gibbous; the sharp-edged posterior part twice the width of the obtuse anterior portion: seeds large, ovate, acute, granular-muriculate. DC. Prod. X. 374, in part. The description of the corolla "labio superiore 4 lin. longo, inferiore vix 1 lin. longo, brevissime et late sinuato-lobato," proves that the author was viewing a corolla of *E. Kelloggii*, Curran, which has by nearly all authors down to the present, been confounded with the plant of Douglas.—*Mimulus nanus*, var. *subuniflorus*, Hook. & Arn. Bot. Beech. 378. *M. atropurpureus*, Kellogg, Proc. Cal. Acad. I. 59. *M. Douglasii*, Gray, Proc. Am. Acad. XI. 95. Bot. Cal. l. c. Syn. Fl. 274, in part only: for Dr. Gray's description of the fruit is plainly drawn from that of *E. Kelloggii*.

A beautiful dwarf, flowering and fruiting as early as March; found on plains and damp hill sides all the way from the coast to the base of the Sierra Nevada. The corolla with its very long tube, pitcher-shaped throat, and to all appearance one-lipped limb, is very striking, rendering the fresh specimens impossible to be confounded with those of any other species.

E. angustatus.

Stemless: leaves linear, an inch or more in length, entire: calyx with a narrowly contracted throat and ample foliaceous, spreading, subequal teeth, longer than the tube, corolla as in the next species, except that the tube is very slender and the limb less regular; upper lip considerably exceeding the lower: capsule short-ovate, acute, not compressed but roundish, the thickness almost equalling the length; a pair of lateral sutures manifest, but no angles: seeds few, large, favose-pitted or -reticulate.—*E. Coulteri*, var *angustatus*, and *Mimulus tricolor*, var. *angustatus*, Gray, l. c.

In the mountains from Mendocino County to Plumas and southward to Fresno; collected by Bolander, Clarke and Eisen. A strongly marked species in the characters of the calyx and capsule. The last named organ appears to liberate its seeds by separating from the axis at the base. This may be the case in all these species.

E. tricolor.

Stem 1—2 inches high, and branching: leaves oblong-lanceolate, entire or with some scattered serratures, an inch or more long: corolla more than an inch long, very showy, light and dark purple and yellow; the tube slender, gradually widening into the funelform throat; limb $\frac{3}{4}$ inch broad, the lips nearly equal, but the upper slightly larger: capsule oblong-ovate, obtuse, slightly gibbous, compressed, both edges acute: seeds obovate.—*Mimulus tricolor*, Lindl. Journ. Hort. Soc. IV. 222, June, 1849. Gray, l. c. excl. var. *angustatus*. *Eunanus Coulteri*, Gray, in Benth. Pl. Hartw. Aug., 1849.

Plains of the Sacramento and San Joaquin, flowering in May.

E latifolius.

Mimulus latifolius, Gray, Proc. Am. Acad. XI. 95; Bot. Cal. l. c. and Syn. Fl. l. c.

This plant of Guadalupe Island I have not seen. Should its capsules appear dehiscent, its place would be in the following section, which it must resemble in its branching habit and short corolla-tube.

§ 2. EUNANUS, proper. *Corolla from tubular-funnelform to nearly campanulate, in all but the first species having its tube short, and the lower lip the larger: capsule from coriaceous to membranaceous, partially dehiscent, or in a few species completely so, from oblong to linear, obtuse, acute or acuminate, almost always surpassing the calyx; at base often slightly gibbous.*

Viscid, ill-scented, branching annuals, mostly confined to the mountain districts of California and Western Nevada, and flowering in summer. Flowers purple, without yellow spots, but in two of the species clear yellow.

* *Corolla with long tube.*

E. Kelloggii, Curran in herb.

Stem 3—10 inches high: leaves ovate to lanceolate, 3—5-nerved, entire, or the lower denticulate: slender tube of corolla an inch or more long; throat strictly funnelform; upper lip of 2 ample, ascending lobes; the lower, half as large with three sinuate, shallow ones: capsules linear, obtuse, a half inch long, slightly curved outwardly, nearly terete, bisulcate, dehiscent by the upper suture: seeds oval, minutely granular.

A most beautiful plant, common in May and June throughout the middle portions of the State, and heretofore strangely confounded by all authors with *E. Douglasii.* It is later flowering by several weeks than that species, and very widely different from it in the characters of both flower and fruit, as well as in its much larger size and branching habit. Botanists are wholly indebted to Mrs. M. K. Curran for the long needed separation now effected. The species is dedicated by her to our venerated friend Dr. Albert Kellogg, who also appears to have confounded this plant with *E. Douglasii* in his *Mimulus atropurpureus,* although his beautiful colored drawing represents plainly the former species. We have the unquestionable authority of Dr. Asa Gray for believing that not the present species, but the one first named in this synopsis is the real plant of Douglas.

E. leptaleus.

Viscid puberulent, 1—3 inches high, simple or branching: leaves from spatulate-oblong to linear-lanceolate, 2—6 lines long, entire: flowers crowded at the ends of the branches, and nearly sessile: calyx-teeth triangular-subulate: corolla crimson, the tube filiform and much exserted, limb bilabiate 1½—3 lines broad: capsule oblong-ovate, obtuse, exceeding the calyx: seed ovate-oblong, smooth.—*Mimulus leptaleus*, Gray, Proc. Am. Acad. XI. 96; Bot. Cal. I. 564; Syn. Fl. 274.

Not rare in the higher Sierra, but seldom collected, being an exceedingly small and inconspicuous species. Our best specimens are from Cisco, collected by Dr. Kellogg in 1870.

* * *Corolla with shorter tube, and ampler, less irregular limb.*

÷ *Calyx hardly oblique: the teeth nearly equal.*

E. Breweri.

Two inches to a span high, simple or much branched: viscid-pubescent with spreading gland-tipped hairs: leaves linear, entire, an inch long, sessile: pedicels slender, equaling the calyx: calyx-teeth short-triangular, equal: capsule acute, not exserted, chartaceous, dehiscent by the upper suture, the lower parting at the apex only; placentæ united below: corolla light purple, 4—5 lines long, the tube not exceeding the calyx; lobes subequal, emarginate: seeds ovate-oblong, smooth. *Mimulus rubellus*, Gray, Bot. Cal. l. c. in so far as the description is drawn from a plant "viscid-pubescent" with "corolla red, or crimson-purple, and little longer than the calyx."

Common about Donner Lake, growing with *E. leptaleus*, to which it is most related, although a larger plant with a more loosely branching habit and inflorescence, and quite differently shaped corolla. Its range is a long one, namely: from the southern part of California to the borders of British Columbia, but it is not found to the eastward of the Sierra Nevada, nor, in California at least, in the coast ranges of mountains. The principal collectors of the specimens are the following: Brewer, 1863, No. 2114; Bolander, 1866, No. 6311; Torrey, 1865, No. 373; Rothrock, 1875, No. 410; Parry & Lemmon, 1876, No. 312; Mrs. Curran, 1883; Parish Brothers, 1884, No. 1378; Oregon, Howell; Washington Territory, Suksdorf. In all these collections the plant has been named *Mimulus rubellus*, from which if the two were of the same genus, the viscid-glandular pubescence, the short, red, subregul ır corollas, the only half dehiscent capsules, and the oval, smooth seeds, would abundantly distinguish it. But we have in the habit, pubescence with resinous viscosity, and only partially dehiscent capsule, a true *Eunanus;* and as *Mimulus rubellus* diverges from the other Mimuli by separated placentæ, so *Eunanus Breweri* is aberrant from its congeners in having them firmly united below the middle.

E. Bigelovii. Gray

Viscid and more or less glandular-villous: leaves ovate to oblong, acute, often with a few coarse teeth: calyx-teeth acutely subulate from a broad base, a third as long as the tube which is broadly campanulate: throat of corolla cylindraceous: the limb rotate, crimson: capsule oblong-lanceolate, acute, well exceeding the calyx; the valves membranaceous: seeds oblong-linear, minutely and irregularly reticulated. —Pac. R. Rep. IV. 121. *Mimulus Bigelovii*, Gray, l. c.

Southern part of California and the regions adjacent, to S. Utah.

E. mephiticus.

Stout, or rather slender, 2—5 inches high, simple or much branched from the base, viscid and diffusing a strong, mephitic odor: leaves obovate to lanceolate, $\frac{1}{2}$—1 inch long: calyx teeth triangular-lanceolate, one fourth as long as the tube, the obtuse capsule a little exceeding them: corolla deep yellow, the tube slender and long exserted; the limb bilabiate, 4—6 lines broad.—*Mimulus mephiticus*, Greene, Bull. Cal. Acad. I. 9.

Sierra Nevada, in the Yosemite region and northward. Our oldest specimens are those of Mrs. Austin, collected in American Valley, 1877. It is manifestly common, and appears to have been referred to the next species, from which it is very distinct.

E. Tolmiæi, Benth. l c.

Stout and branching from the base, 1—6 inches high: leaves ovate to lanceolate: calyx-teeth broadly lanceolate, or triangular, acute, one-fourth as long as the tube: corolla rose-purple with yellow and dark purple in the throat; the limb a half inch or more in breadth, obviously bilabiate: capsule taper-pointed, far surpassing the calyx, the valves chartaceous.—*Mimulus nanus*, Hook. & Arn. (the *var. pluriflorus*) Bot. Beech. 378. Gray, l. c. excluding the yellow flowered plant which is the last.

From Washington Ter. to Oregon; California and the western parts of Nevada.

E. bicolor, Gray. (?)

Smaller and more slender than the last species: dark purple, throat of corolla abruptly and widely dilated; the white limb very regular, and rotate-spreading.—*M. nanus*, var (?) *bicolor*, Gray, Bot. Cal. I. 564.

Our specimens have no ticket, but they can hardly be of Prof. Brewer's collecting, and are not to be named with any certainty as identical with the plant of Dr. Gray: although they answer to the description of it, in all respects save the color of the corolla-limb. Our observations of living plants convince us that such wide dissimilarity in shape of corolla, as exists between this and *E. Tolmiæi*, are not to be treated as merely varietal.

E. Fremonti. Benth.

Pubescence and viscosity of *E. Bigelovii:* leaves narrowly oblong, obtuse: calyx-teeth short-ovate, obtuse: capsule abruptly pointed, included within the calyx: seed oblong, striate-reticulate.—DC. Prod. l. c. not of Gray, Pac. R. Rep. VI. 83, nor of Wats. Bot. King. 226. *Mimulus Fremonti*, Gray, l. c.

Southwestern parts of the State, and in Lower California.

+ + *Calyx oblique, the teeth unequal.*

E. Parryi.

Mimulus Parryi, Gray, l. c. being No. 147 of Dr. Parry's S. Utah collection of 1874. Unknown to me, except from the description cited.

E. Layneæ.

Viscid-pubescent, a span high, simple or with few spreading or nearly divaricate branches: leaves narrowly oblong to linear, entire: calyx-teeth triangular-subulate, acute. one-fourth as long as the tube: corolla red-purple, $\frac{3}{4}$ inch long; throat narrowly funnelform; the limb not widely-spreading; capsule often much longer than the calyx, the exserted portion attenuate, incurved.

Collected by Mr. Rattan "between the forks of the Trinity, June, 1884," and later, by Mrs. Curran, on Bartlett Mountain, Lake Co. The plant has the aspect of *E. Torreyi*, but its calyx and capsule are very unlike those of that species; the capsule having a somewhat rostrate-attenuate apex which is curved upwards, as in some species of *Cerastium*. This latter character is most conspicuous in certain specimens thought by Mrs. Curran to have come from the Sierra Nevada.

E. Torreyi.

Viscid-pubescent, a span to a foot high, simple or branching from near the base: leaves oblong to lanceolate: calyx-teeth broad and obtuse, the posterior broader than the others but only a line long: corolla less than an inch long, with funnelform tube, and not very wide limb, pink-purple: capsule chartaceous, lanceolate, oblong, a little exceeding the calyx.—*E. Fremonti*, Gray, not Benth. *Mimulus Torreyi*, Gray, l. c.

E. Rattani.

Viscid-pubescent, a span high, slender and sparingly branching: leaves oblong-lanceolate, a half inch long, entire: calyx-teeth triangular, acute, slightly unequal: corolla ½ inch long, dark red, only the small limb exserted: capsule chartaceous, ovate, lanceolate, taper-pointed, exceeding the calyx.—*Mimulus Rattani*, Gray, Proc. Am. Acad. XX. 307.

Lake and Colusa Counties, June and July, 1884, V. Rattan and Mrs. Curran.

E. Bolanderi.

Glandular-pubescent and extremely viscid, ½—2 feet high, simple or with few branches; leaves ovate to oblong, an inch or two in length, sharply toothed: calyx-teeth very unequal, acuminate: corolla purple, ½—1 inch long: capsule fusiform-subulate, not exceeding the calyx, coriaceous.—*Mimulus Bolanderi*, Gray, Proc. Am. Acad. VII. 380; Bot. Cal. l. c. Syn. Fl. l. c.

A variable species as to the size of the whole plant and the flowers; ranging from Mendocino County, across to the Sierras, where it extends well southward. The best, and very large, specimens have come in during the past season, from Mr. Rattan, and also from Mrs. Curran, who informs me that the plant has the odor of *Nicotiana* and is commonly called "wild tobacco."

E. brevipes.

Mimulus brevipes, Benth. DC. Proc. X. 369; Gray, Bot. Mex. Bound. 116; *M. (Eunanus) brevipes*, Gray, Proc. Am. Acad. XI. 97; Bot. Cal. and Syn. Fl. l. c.

Altogether an Eunanus in habit and fruit, notwithstanding the large yellow corolla. From Santa Barbara to the Peninsula, and eastward to the San Bernardino Mountains.

§ 3. MIMULASTRUM. *Corolla with cylindrical tube included in the calyx, gibbous near the base, the orifice contracted; limb* *rotate, and nearly regular, white, with veins and bars of crimson or purple.—Annuals of the Mohave region, with habit and capsule of Eunanus proper, but a quite different corolla.*—Mimulus § Mimulastrum, Gray, Bot. Gaz. IX. 141.

E. pictus, Curran in herb.

Viscid-pubescent, from a span to a foot high, simple or branched from the base, the stems somewhat rigid, and lightly wing-angled: leaves ovate to oblong, an inch long with a few salient teeth, obtuse or the uppermost acutish: calyx gibbous at base, the teeth ovate, obtuse, one-fourth as long as the tube: throat of corolla dark crimson; the limb white, with broad veins and transverse bars of crimson: capsule a half inch long, oblong-linear, obtuse, strongly mucronate, the body not equaling the calyx; valves firm-coriaceous.

Mountains of Kern Co. about Keene Station and Tehachapi, June, 1884; Mrs. Curran. Less elegant than the next species, but nevertheless a most beautiful flower, the markings of the corolla-limb very striking.

E. Mohavensis.

Viscidulous-puberulent, two inches to a span high: leaves oblong-lanceolate, acute or acuminate, entire: calyx campanulate, oblique at the contracted orifice; teeth triangular-ovate, very acute, one-fourth the length of the tube: limb of corolla crimson in the centre, with delicate veins of the same color marking the white marginal part; the border glandular-ciliolate: capsule ovate-lanceolate, acuminate, barely equaling the longest calyx-tooth; the valves chartaceous.—*Mimulus Mohavensis*, Lemmon, Bot. Gaz. IX. 142.

Collected by Mr. and Mrs. Lemmon, along the Mohave River, on hills near Waterman's and the Calico mines, May, 1884.

MIMULUS.

Calyx tubular, 5-angled or -ribbed, 5-toothed. Corolla with funnelform throat, usually marked by a pair of palatine ridges on the lower side: limb with lobes rarely all much alike in form and size, but the two upper frequently smaller and reflexed. Stamens 4: style glabrous; stigma bilamelar: the lobes equal, ovate or orbicular. Capsule obtuse, not surpassing the calyx: valves membranaceous, tardily separating from the united, columnar central placentæ.—Herbs seldom resinous- but commonly albuminous-viscid. Herbage mostly light green. Stem and branches in many species flaccid and decumbent or spreading, often rooting at the joints. Flowers in the original species blue; in most others yellow, with or without crimson or purple dots; the upper lip white in one species which is in other respects anomalous.—Linné, Gen. No. 783; Benth. in DC. Prod. X. 368; Mimulus § Eumimulus, Benth. & Hook. Gen. II. 947: Gray, Proc. Am. Acad. XI. 97; Bot. Cal. I. 566, and Syn. Fl. II. Part I. 276.

A genus which, with *Diplacus* and *Eunanus* excluded, still seems sufficiently polymorphous, when including plants of such widely different aspect as the blue-flowered Atlantic, the red- and yellow-flowered Pacific species and *M. bicolor*, the corolla of which is one half yellow and the other pure white. The following synopsis includes all the known species of the United States and the regions northward.

§ 1. EUMIMULUS, Gray, (much restricted). *Stems quadrangular, stout, erect and mostly simple: herbage deep green, glabrous and neither glutinous nor slimy: leaves feather-veined.—Atlantic perennials with blue flowers, varying to white.*

M. ringens, Linné.

Leaves oblong or lanceolate, serrate, closely sessile by an auriculate-clasping base: pedicels longer than the large flower.—Hort. Ups. 176, t. I; Lam. Ill. t. 523; Gray, Syn. Fl. l. c.

Canada to Iowa and southward to Gulf of Mexico.

M. alatus, Solander.

Stem wing-angled: leaves ovate to ovate-lanceolate, tapering into a margined petiole: pedicels shorter than the flower: corolla rather paler blue.—Ait. Hort. Rev. II. 361; Lodd. Bot. Cab. t. 410.

Range about the same as that of the preceding.

§ 2. ERYTHRANTHE. *Stems terete, stout and erect: herbage viscid or slimy: leaves parallel veined, sessile: corollas red.*

Species of the Pacific Coast—Erythranthe, Spach, *with species added.*

* *Perennials, with simple stems and large flowers.*

M. cardinalis, Dougl.

Villous, viscid and strong-scented, 2—4 feet high: leaves ovate and ovate-lanceolate, erose-dentate: corolla scarlet, the limb very irregular: lower lip closely reflexed; upper erect with reflexed lobes: stamens exserted.—Gray, Syn. Fl. 276.

In springy places and along streams, from the sea-level to middle elevations of the mountains throughout the State, extending into Oregon and Arizona.

M. Lewisii, Pursh.

More slender and nearly scentless, viscidulous-pubescent: leaves oblong-ovate to lanceolate, denticulate: corolla rose-red, more regular, the lobes merely spreading: stamens not exserted.—Gray, l. c.

In swampy places at about 7,000 feet, in the Sierra Nevada: also in Oregon, and eastward to the Rocky Mountains.

* * *Paniculately branching annual: corolla small.*

M. Parishii.

Stout, 2 feet high, villous and very slimy: leaves ovate-lanceolate, erose-dentate, 1—2 inches long, the uppermost clasping: pedicels shorter than the leaves: calyx-teeth triangular, acute, nearly equal: corolla pale rose-red, only the small, nearly regular limb exserted from the calyx: seed small, oblong, with a loose, wrinkled coat.— On the Mohave slope of the San Bernardino Mountains, at Cox's Ranch, Aug. 1882; Parish Bros. No. 1465. Collected again in the summer of 1884, by the Rev. J. C. Nevin, and Mr. J. C. Oliver, in Los Angeles County, and by Mr. C. R. Orcutt, on the peninsula of Lower California, in September of the same year. The plant is one of the stoutest and tallest of its genus, but the root is pretty clearly annual.

Only in respect to the shape and color of the corolla is the species to be associated with *M. Lewisii*. It might almost as well go into the next section.

§ 3. SIMIOLUS. *Stems usually flaccid, the branches mostly weak and decumbent, sometimes creeping and rooting: herbage in most species pale green, truly viscid in one or two, slimy in many, frequently exhaling the odor of musk: corolla pure yellow or crimson-dotted, not rarely red-purple; the throat usually funnelform-enlarged; the limb varying from personate to nearly regular.*—§ *Eunimulus*, Gray, *in part.*

Plants inhabiting chiefly the western parts of America, ranging from the Aleutian Islands to Patagonia. The bulk of the species, being North American, are herein described.

* *Stems erect, simple or with a few ascending branches; corollas strongly bilabiate; the lower lip bearded.*

+ *Perennials; large-flowered.*

M. dentatus, Nutt.

Root fibrous: stem simple, slender, a foot or two high; pubescent with short, pilose hairs: leaves ovate, acute, coarsely serrate-toothed, an inch long on very short petioles: peduncles about equaling the leaves: calyx-teeth triangular, acuminate, subequal: corolla golden yellow, an inch or more long with ample throat twice the length of the tube, purple-dotted, strongly bearded to the base in two lines; bilabiate limb an inch broad, its lobes entire and ciliolate: seed ovate, acute, scrobiculate, of a reddish brown hue.—DC. Prod. X. 372; Gray, Bot. Cal. I. 567; Bot. Gaz. VII. 112, excl. var. *gracilis*, which is *M. moniliformis*, Greene.

The above description of this fine species is drawn from very beautiful specimens collected in Humboldt County in 1882, by Mr. Rattan.

M. Tilingi, Regel.

A span high, the inflorescence minutely puberulent and viscid, plant otherwise glabrous: stems slender, naked at base, rising from matted, fleshy, amber-colored, subtranslucent rootstocks: leaves all cauline, in about 3—4 pairs, an inch long, ovate, sessile, 3-nerved, with a few salient teeth: flowers nearly terminal, few or solitary, on long, erect peduncles: calyx campanulate, purple-dotted, the teeth broad, the upper one largest: corolla an inch long, personate; throat densely bearded and purple-dotted; limb clear yellow.—Gartenfl. 1869. t. 631. *M. luteus*, var. *alpinus*, Gray, l. c. as to the Californian plant only; that of the Rocky Mountains being of a distinct species, doubtless *M. rivularis*, Nutt, a mere form of *M. guttatus*, DC.

This beautiful plant grows in masses on wet rocks, along streams in the higher Sierras, from Lassen's Peak (Mrs. Austin) northward and southward. It is readily distinguishable by its peculiar rootstocks, from any one of the various species which at first sight appear much like it.

M. guttatus, DC.

Glabrous or pubescent; racemose flowering stems 1—4 feet high, erect and simple, commonly stout and fistulous, nearly terete; the basal portion, for a few inches, horizontal, rooting at the joints and thus perennial: leaves from orbicular to oblong-ovate, 1—3 inches long; the radical petioled and occasionally somewhat lyrate; the cauline sessile: the floral reduced and connate-clasping: all more or less toothed or denticulate: peduncles ascending, an inch or more long, slender: calyx ventricose-campanulate, teeth broadly triangular, obtuse or acute, the upper one largest: corolla an inch or more long, strongly bilabiate, not personate, light yellow; the ample throat often dotted with red.—Cat. Hort. Monsp. 127; Hook. & Arn. Bot. Beech. 153; Hook.

Fl. Bor. Am. II. 99; Walp. Rep. III. 275. *M. rivularis*, Lodd. Bot. Cab. t. 1525; Nutt. Journ. Acad. Philad. VII. 47. *M. luteus*, Pursh. Fl. II. 426, excl. syn. Curt. Bot. Mag. t. 1501; DC. Prod. X. 370, as to the plant of N. Am. Watson, Bot. King, 223; Gray, l. c. excl. syn. *M. Tilingi*, and var. *depauperatus*, not of Linné.

By far the largest and most showy species of the genus: very common along streams from the Aleutian Islands to the southern part of California, and eastward to the Rocky Mountains of Colorado. The later name, *M. rivularis*, Nutt. would have been better suited to the plant, for the calyx, though frequently dotted, is more constantly so in some other species. *M. luteus*, Linné, along with which this and some other North American species have been put by all recent authors, belongs to South America. Its inflorescence is not at all racemose, and no part of the plant is erect, except the elongated peduncles; these spring from the axils of all the leaves, the stems being prostrate, and rooting freely at the joints, as in the North American *M. Jamesii*. The flowers in our specimens, which are from Chili, are more red than yellow, quite resembling those of the cultivated variety known as *M. tigrinus*.

÷ ÷ *Annuals: large or small-flowered.*

M. microphyllus, Benth.

Pubescent, or in the smallest forms glabrous: stems terete, slender, sometimes with ascending branches but usually simple, 2—12 inches high, racemose above or, in depauperate states, with a single terminal flower: leaves few, ovate to orbicular, often cordate at base, sometimes lyrate, denticulate, or coarsely toothed, purple beneath: peduncles slender, in small states filiform: calyx dotted, oblique at the orifice; the teeth obscure or prominent, the upper one largest: corolla $\frac{1}{4}$—$\frac{3}{4}$ inch long, with proportionally narrower throat and broader limb than in the last species; with or without purple spots. DC. Prod. X. 371. *M. luteus*, var. *depauper-*

atus, Gray, l. c. Probably here, rather than under *M. guttatus*, belongs *M. lyratus*, Benth.

Common on hillsides and near springs, California to Washington Territory. A winter annual, flowering in April. Distinguishable from the preceding by the different proportions of the corolla, as well as by the always annual root. Extremely variable in point of size, and also in the calyx which is sometimes very gibbous, sometimes but slightly so. Specimens from Lake County by Mrs. Curran have the body very regularly campanulate and nearly truncate at the wide orifice, the margin being nearer repand than toothed; but this form will perhaps be a species.

M. nasutus.

Hirsute-puberulent or nearly glabrous: stem $\frac{1}{2}$—2 feet high, stout, branching from the base, quadrangular and distinctly winged, flowering from the base: leaves mostly subradical, ovate- to reniform-cordate, acute, feather-veined and coarsely toothed or lobed, purple beneath, the lowest on broad petioles an inch long; the floral reduced to short bracts: peduncles ascending, short, hardly exceeding the mature calyx: calyx broadly campanulate, in fruit often $\frac{3}{4}$ inch long and $\frac{1}{2}$ inch broad; teeth acute, very unequal: the upper one thrice the length of the others; the lower pair, in maturity, bent upwards, lying at right angles across, and closely enfolding the other three: corolla very small for the size of the plant, $\frac{1}{2}$ inch long, little surpassing the ample calyx, deep yellow, with a large purple blotch on the lower lip.

Our earliest specimens were collected in 1877, in Sonoma County, Cal. at Knight's Valley and Skaggs' Springs, by Mr. Henry Edwards.

Mrs. R. M. Austin sent it from Butte County in 1883; while Mrs. Curran obtained fine specimens last year in localities as far apart as Lake and Kern counties. It is an exceedingly well marked, apparently until now undescribed species. Nevertheless a plant so far from rare will doubtless be found in many of the herbaria, and probably under the heretofore so called *M. luteus*. Its calyx is more uniformly spotted than in the true *M. guttatus*, from which it is most obviously distinct by its quadrangular winged stem, its inflorescence, racemose almost from the very base, and its small corolla, but especially by the peculiar calyx, the upper tooth of which not only almost equals the tube in length but is rendered singularly conspicuous by the enfolding about it, of the lower ones; which latter thus disappear entirely from the profile, if we may so speak, thus suggesting the specific name.

M. Hallii.

Habit of the preceding, the branching more constant and less erect: light green and glabrous throughout: stem and branches more slender, angled, but not winged: leaves and bracts broadly ovate, obtuse, parallel-veined, sparingly dentate or entire: calyx subglobose-inflated, with broad, abruptly acute teeth, the upper one twice the size of the others: corolla very small, 3—4 lines long, the slender tube hardly exserted, light yellow.

Eastern slope of the Rocky Mountains of Colorado, at lower altitudes only, about Golden City, in shady ravines. Collected by Hall & Harbour apparently, and also later by the writer, in 1871.

This, too, has gone out under the name *M. luteus*, but it is not nearly related to even the Rocky Mountain alpine form of *M. guttatus*. Its place is in this group of mainly Californian annual species. It is remarkable for having, for the size of the plant, the smallest corolla of any of the species.

M. glaucescens.

Stem terete, slender, erect and simple, 1—3 feet high, racemose from about the middle: herbage bright green, glabrous and distinctly glaucous: radical leaves orbicular to ovate, subcordate, lobed and toothed, less than an inch in length, on petioles twice as long; the lowest cauline pair connate-clasping; all the others orbicular-perfoliate, about

$\frac{3}{4}$ inch in diameter, with margin entire or remotely denticulate: pedicels slender, ascending, an inch long: calyx campanulate-cylindraceous, scarcely gibbous; orifice white-woolly within; teeth short, acutely triangular, almost equal, the upper one slightly larger: corolla an inch long with narrow throat and ample limb, light yellow, without dots.

Mrs. R. M. Austin, Butte County, Cal., 1883. A graceful species, and, I believe, the only glaucous one.

M. nudatus, Curran in herb.

Somewhat glandular-puberulent and the herbage purple; 6—10 inches high, the stem and few branches terete and rather slender: leaves inconspicuous, 1—3 lines wide, a half inch or more long, on petioles of equal length or the uppermost sessile, denticulate: pedicels an inch long, spreading: calyx oblong, not purple-dotted, teeth not very unequal, the orifice closed by the folding of the two lower teeth over the others: corolla $\frac{1}{2}$—$\frac{3}{4}$ inch long, deep yellow; the ample limb bilabiate; the throat strongly bearded: seeds linear-oblong, striate but not reticulate.

Kelsey Mountain, Lake County, June, 1884, Mrs. Curran.

A pretty species, the narrow leaves few and inconspicuous, the long pedicels nearly divaricate, the large, bright yellow corollas in fine contrast with the purple of all other parts of the plant.

* * *Stems freely branching, often decumbent, diffuse or creeping: corollas smaller.*

+ *Annuals; corollas manifestly bilabiate, mostly yellow.*

M. laciniatus, Gray, l. c.

Glabrous or slightly pubescent: filiform stems diffuse, a span or less long: leaves an inch or less in length, variously lobed or cleft, sometimes pinnately cleft or parted, on filiform petioles: pedicels filiform, longer than the leaves: calyx ovate, 2—4 lines long, gibbous, the upper tooth largest, purple-dotted: corolla 2 lines long.—*M. Eiseni*, Kellogg, Proc.

Cal. Acad. VII. 89, is a stouter, nearly erect form with leaves only laciniate-toothed.

Sierra Nevada, in the Yosemite Valley, and southward; collected first by Dr. Gray, later by Mrs. Curran.

The larger form is from Fresno County, Dr. Gustaf Eisen.

M. alsinoides, Benth. l. c.

Glabrous: stems slender and at length diffuse, 3—12 inches long: leaves broadly ovate, an inch, more or less long, on margined petioles, thin, with salient teeth: corolla 3—6 lines long; lower lip often with a red spot: calyx narrowly oblong, oblique at the orifice; the sharp teeth very short.—Gray, l. c.

Oregon and British Columbia, in wet, shady places.

M. montioides, Gray.

Dwarf, $\frac{1}{4}$—3 inches high, glabrous: leaves linear-spatulate, attenuate at base, sessile, entire, equalling or exceeding the slender pedicels: calyx-teeth ovate-oblong, equal: corolla large, golden yellow; throat elongated and narrow, purple-dotted; lower lip densely bearded.—Proc. Am. Acad. VII. 380, excepting the plant with "corolla parva, calyce paullo longiore;" which is apparently good *M. rubellus*, Gray. *M. rubellus*, var. *latiflorus*, Watson, Bot. King, 226; Gray l. c. *M. barbatus*, Greene, Bull. Cal. Acad. I. 9.

High Sierras in the central part of California, and eastward in Nevada. A small plant with very disproportionately large corollas, in this respect resembling the first section of *Eunanus:* nevertheless, in all respects a true *Mimulus* and very distinct from *M. rubellus*, Gray.

M. Pulsiferæ, Gray.

Viscid but not pubescent, erect, a span high, loosely branching: leaves broadly ovate to lanceolate-oblong, denticulate or entire, a half inch or more long, on margined petioles, surpassed by the slender, ascending pedicels: calyx with equal, ovate-triangular teeth: corolla a half inch long, yellow, or purplish.—Proc. Am. Acad. XI. 98, & l. c.

Northern parts of California, in the Sierras, and also at low altitudes in valleys, in Trinity and Siskiyou counties.

M. inconspicuus, Gray.

From glabrous to puberulent-glandular, 2—12 inches high, simple or freely branching from the base: leaves ovate to ovate-lanceolate, entire or sparingly toothed, 3—5-nerved, $\frac{1}{2}$—1 inch long, sessile by a broad base or tapering to a short petiole: pedicels equaling the flowers, in fruit becoming much longer: corolla 3—5 lines long, the limb small, ochroleucous or "yellow or rose color:" calyx oval, 3—6 lines long: teeth nearly equal, minute or very short, or ovate-triangular and conspicuous.—Pac. R. Rep. IV. 120, and l. c.

From the banks of the Columbia to the Lower Californian peninsula. As here accepted a variable species, and one which were perhaps better restricted to the original plant with calyx appearing truncate by the minuteness of the teeth. The northern plant, ranging from Modoc County, California (Mrs. Austin), to Washington Territory (Prof. E. W. Hilgard, 1882, and Suksdorf, 1883, No. 203,) is glandular, has narrow, always petiolate leaves and very small flowers. Mr. Suksdorf's specimen in the herbarium of Dr. Gray is erroneously put along with *M. rubellus*, from which the calyx-teeth, connivent and nearly closing the orifice, readily distinguish it. This peculiarity of the calyx marks all our middle Californian, even the largest forms, and ought perhaps to be taken for the good character of a new species. However, I know the original *M. inconspicuus* only by a few calyces kindly furnished me by the author of the species, and so, do not venture to propose distinctly here, the separation which I have little doubt needs to be made. The flowers in the plant of middle California are neither red nor yellow, but only yellowish, or dingy white; paler than any other *Mimulus* known to me.

M rubellus, Gray.

Very minutely and rather sparingly glandular-puberulent, but not viscid, an inch to a span high, often much branched: leaves narrowly oblong, entire or with a few prominent teeth, narrowed at base but sessile, a half inch or more long: pedicels very slender, exceeding the leaves: calyx-teeth oblong, obtuse, ciliolate, equal: corolla 3—4 lines long, golden yellow; the unequal lobes scarcely spreading: seeds linear, 5-angled.—Bot. Mex. Bound. 116; Watson, Bot. King, 225, excl. syn. *M. montioides*, and var. *latiflorus*; Gray, Bot. Cal. l. c. and Syn. Fl. l. c. in part only.

From the Organ Mountains in New Mexico to Colorado, and westward to the Pacific Coast, but not common in California, although very frequent just east of the Sierra in Arizona and Nevada. Our California specimens are only the following: Parish Brothers No. 1378, from the San Bernardino Mountains, 1882, a very depauperate state, and certain not much larger specimens collected in Lake County, 1884, by Mrs. Curran.

The common plant of the mountain districts of the eastern part of the State, and northwards which has been referred here is *Eunanus Breweri*.

M. acutidens.

Glabrous throughout, 3—8 inches high, with a few decumbent or ascending, basal branches: stem and branches wing-angled: leaves few (3 or 4 pairs on each stem or branch), an inch or less long, ovate, acute, sessile by a broad base, sharply toothed: pedicels twice the length of the leaves: calyx slightly oblique, teeth sharply subulate, subequal: corolla bright rose-purple, $\frac{3}{4}$ inch long with nearly cylindrical throat, and spreading limb.

King's River Mountains, at 4,000 feet, April, 1877; Dr. Gustaf Eisen. Evidently a very beautiful species, the place for which is here, rather than with the red-flowered group to which *M. Palmeri* belongs.

M. floribundus, Dougl.

Villous and very slimy, at first erect, at length diffuse;

branches a few inches to a foot long: leaves ovate, the lower subcordate, on petioles either equaling or much shorter than the sharply toothed lamina: pedicels an inch or more long, mostly surpassing the leaves: calyx campanulate, the teeth short-triangular, nearly equal: corolla 3—6 lines long, from light to deep yellow, sometimes with copper-colored throat. Lindl. Bot. Reg. t. 1225; Benth. in DC. Prod. l. c. Gray, l. c. *M. peduncularis*, Dougl. in Benth. Scroph. Ind. 29. *Capraria pusilla*, Torr. in Ann. Lyc. N. Y. I. 36.

In moist places from the Rocky Mountains to the Pacific; quite variable, but always known by the albuminous exudation found in no other species of this group but frequent in those of the next.

+− ÷ *Perennials: corollas yellow, subregular, except in the first species.*

M. Jamesii Torr. & Gray.

Glabrous, diffuse and creeping: leaves roundish or reniform, denticulate or nearly entire, all but the uppermost on short, margined petioles: calyx campanulate, 3 lines long: corolla pale yellow, 3—6 lines long.—Benth. in DC. l. c. 371. (with var. *Fremontii*.); Gray, Man. Ed. 2, 287. *M. glabratus*, Gray in Bot. Mex. Bound. partly, not of HBK.

From Minnesota and Wisconsin to New Mexico and Arizona, growing in springs or springy places; stems rooting at the joints whether in mud or resting on the surface of clear spring water. The species has not been found so far west as California.

Var. **Texensis**, Gray.

Larger; leaves more ovate, seldom subcordate, sometimes laciniately toothed, the uppermost often reduced and the flowers appearing racemose.—Syn. Fl. 277. *M. glabratus*, of Bot. Mex. Bound. mainly.

Texas; collected by Wright, Lindheimer and others.

M. moschatus, Dougl.

Villous, slimy and strongly musk-scented: stems spreading a foot or less, and rooting at the joints: leaves oblong-ovate, an inch long, equaling the pedicels, distinctly petiolate: corolla a half inch long, pale yellow: seed globular, yellow.—Lindl. Bot. Reg. t. 1118; Benth. l c; Gray, l. c. excl. var. *longiflorus*.

The musk plant of the gardens and green houses: native of British Columbia and parts eastward. Not found in California.

M. inodorus.

Villous and slimy but wholly scentless; stems 1—3 feet long, weak and decumbent, but not creeping or rooting: leaves ovate to ovate-lanceolate, acute, remotely and sharply toothed or entire, 1—3 inches long, closely sessile by a broad base: peduncles hardly equaling the leaves, slender, divaricate or deflexed in fruit: calyx oblique; the lanceolate teeth unequal, the longer half the length of the tube: corolla an inch long, deep yellow; throat funnelform-enlarged; limb a little bilabiate, its spreading lobes rounded and entire: seed globular, flattened at the ends, white, strongly favose-reticulate.—*M. moschatus*, Gray, Bot. Cal. I. 569, not of Dougl. *M. moschatus*, var. *longiflorus*, Gray, Syn. Fl. 278.

Common in both the Coast Range and the Sierra Nevada, throughout California, and also in Oregon. Quite distinct from the true musk plant, being of more than twice the size, scentless, and possibly only annual; certainly never rooting at the joints.

M. moniliformis, Greene.

Villous or glabrous, scentless, and neither viscid nor slimy; stems slender, erect, 3—8 inches high, simple or branching from the base; subterranean shoots bearing moniliform strings of small tubers: leaves ovate to oblong, acute, their margins prominently toothed, an inch in length, very short-petioled: calyx-teeth triangular-lanceolate, acute, nearly equal: corolla an inch long, bright yellow; the cylindraceous throat with a pair of folds beneath on the outside;

limb almost equally lobed, the lobes entire: seed ovate, marked as in the last species.—Bull. Cal. Acad. I. 10. *M. dentatus*, var. *gracilis*, Gray, Bot. Gazette, VII. 112.

Common in dry rocky places of the Sierra, from 4,000 to 8,000 ft. In the collections of Bolander, Kellogg and others, this species occurs abundantly, and is named "*M. moschatus*," being confounded with the last species.

M. primuloides, Benth.

Dwarf, spreading by bulbiferous stolons; white-villous to nearly glabrous, slimy: leaves cuneate-obovate to linear-oblong, $\frac{1}{4}$—1 inch long, obtuse, with sharp teeth, or almost entire, either flat upon the ground, subtending the long, filiform, scapose peduncle, or arranged in pairs a half inch or more apart on a slender stem 1—4 inches high, which has a single terminal peduncle and sometimes an axillary one near the base: calyx-teeth short, acute, equal: corolla $\frac{1}{4}$—$\frac{3}{4}$ inch long, golden-yellow; the funnelform throat often copper-colored; limb ample, spreading, its lobes all emarginate and much alike: seed ovate-oblong, faintly reticulated, the meshes running in longitudinal lines.—Regel, Gartenfl. 1872. t. 739; Gray, Bot. Cal. I. 569; Syn. Fl. 279.

One of the most elegant plants of the Sierras at 6,000—10,000 feet altitude; usually growing in broad, matted patches in wet, grassy ground, its one-flowered scapes and nearly regular corolla readily suggestive of the genus *Primula*. The white-villous form is rare in collections, and when growing with the other, looks like another species, but in floral character, there is no difference between them. A single specimen in the herbarium of Mr. Rattan, without a label, is wholly glabrous, with leaves crenate-toothed, rather than serrate, and the corolla seems as if it might have been decidedly bilabiate.

÷ ÷ ÷ *Annuals.*

÷ *Calyx ribbed rather than angled: corolla strongly bilabiate; the upper lip white.*

M. bicolor, Hartweg.

Viscid-pubescent, a span to a foot high, simple or branched from the base: leaves linear-oblong or lanceolate, entire or denticulate, an inch long, sessile; the upper shorter than the peduncles: calyx purple-dotted, the epidermis covering a framework of ligneous or pithy, broad ribs; teeth triangular-subulate, in maturity spreading: corolla ¾ inch long; upper lip clear white; lower yellow with dots of purple: capsule oblong-linear: seeds roundish, smooth, whitish.—Pl. Hartw. 328; Gray, l. c.

The remarkable structure of the calyx in this rather common species of the Sierra Nevada, does not appear to have been noticed heretofore. Also the lower lip is said to be the white one, whereas it is the upper, in all that we have seen, and it is so shown by Dr. Kellogg in a very correct colored drawing in the possession of the Academy.

++ ++ *Calyx not ribbed, scarcely angled: corolla subregular, purple.*

M. Palmeri, Gray.

Viscid but scarcely pubescent, 4—10 inches high: leaves lanceolate, mostly entire, sessile, shorter than the 1½-inch-long pedicels: corolla ¾ inch long, ample funnelform, the lobes spreading, emarginate: fruiting calyx 3—4 lines long, lightly angled, the teeth short, broad and obtuse.—Proc. Am. Acad. XII. 82, and l. c.

Mohave and San Bernardino, collected by Palmer, Parry, Lemmon and the Parish brothers.

M. androsaceus, Curran in herb.

Minutely puberulent-glandular, 2—5 inches high, diffusely branching, very slender: leaves 3—6 lines long, ovate-oblong, entire, obtuse, sessile by a broad, sometimes cordate-clasping base: peduncles very slender, elongated: calyx 3 lines long, faintly angled, the broad teeth nearly truncate with a mucronate point: corolla crimson, twice the length of the calyx, the subequal lobes abruptly spreading, rounded and entire: capsule oblong, shorter than the calyx.

The earliest specimen of this plant in our herbarium was collected some thirty years ago by Mr. Lobb. This specimen did not come to light until after Mrs. Curran had, in 1884, obtained a fine lot of the same thing near Tehachapi, and had named the species as new. It is a close relation of the next still more recently discovered species.

M. exiguus, Gray.

Very slender, two or three inches high and almost glabrous, diffusely branching: leaves 2—3 lines long, somewhat spatulate, often sparsely denticulate, sessile: peduncles capillary, greatly elongated: calyx short-campanulate, subturbinate, equally 5-toothed, not angled, scarcely nerved, $1\frac{1}{2}$ lines long; the purple corolla nearly twice as long: capsule ovate, a little exceeding the calyx.—Proc. Am. Acad. XX. 307.

Mountains of Lower California, C. R. Orcutt, 1884.

§ 4. MIMULOIDES, Watson. *Calyx short, 5-cleft, neither angled nor nerved: capsule with attenuate apex and divided placentæ of Eunanus. Herpestis, § Mimuloides,* Benth.

M. pilosus, Watson.

Bot. King, 225; Gray, Bot. Cal. l. c. and Syn. Fl. l. c. *M. exilis*, Dur. & Hilg. Pac. R. Rep. VI. t. 12. *Herpestis pilosa*, Benth. Comp. Bot. Mag. 257.

A soft-hairy, pale-green, Californian annual, uniting the characters partly of *Herpestis* and partly of *Eunanus*, with a habit which is not that of either of those genera, nor yet of *Mimulus*. Very likely it were better disposed of as a generic type, as was long ago suggested, but not carried into effect, by Durand & Hilgard.

Obscure Species.

M. Scouleri, Hook.

Fl. Bor. Am. II. 100, is said to differ from *M. luteus* chiefly by its narrower leaves. It can hardly fall under any of the species above described. Whatever it be, it ought to be re-discovered by those now collecting every year in the "Oregon" regions.

M. Rœzli, Regel.

Quoted by Dr. Gray under *M. luteus*. It is not known to me. I suppose it to be a North American species, and a synonym of *M. guttatus*, but this is only a guess.

ORTHOCARPUS.

O. Beldingi.

Annual, erect and rather slender, a span high and sparingly branched, hirsute and above very minutely glandular: leaves linear and entire, or with a few long lobes: calyx about equally 4-cleft, the divisions narrowly lanceolate: corolla rose color, a half inch long; the lips not dissimilar; the upper one cleft, and the lower not saccate, but having three triangular, spreading lobes: capsule sharply pointed: seed very small, with a close but transparent favose coat.

Collected on Victoria Mountains, Lower California, June, 1883, by Mr. L. Belding.

Most divergent from our other *Orthocarpi* in respect to its corolla, but in aspect quite like some species of the *Triphysaria* section.

ANTIRRHINUM.

A. strictum, Gray.

The *A. Kelloggii*, Greene, Bull. Torr. Club. X. 126, is clearly only a synonym. The ticket, giving as the habitat "Sierra Nevada, near snow, growing in dense patches," was doubtless a mistake. Good specimens of true *A. strictum* lately obtained call for this correction.

PLANTAGO.

P. Californica.

Annual, 2—5 inches high, minutely hirsute: leaves linear-lanceolate with a few large and prominent teeth, or nearly entire: scapes numerous: spikes an inch or more long, and rather thin: stamens two: capsule ovoid, 10—12-seeded, circumscissile very near the base.

Collected by the writer near Tulare, in wet places on the plains, March, 1884, but Mrs. Curran obtained it at Antioch a year earlier, and specimens of *P. Bigelovii* are mixed with hers. It is different from that species in its whole aspect, being less fleshy, and producing from 20 to 30, decumbent scapes, while those of *P. Bigelovii* are strictly erect and seldom number more than 2 or 3. Its capsule is shorter, circumscissile much lower down, and has thrice as many seeds, which are of only a third the size, and thicker in proportion to their length.

MIRABILIS.

M. Frœbelii.

Stout, spreading, very viscid-pubescent, the foliage in age somewhat scabrous: leaves thick, broadly ovate, the lower cordate, slightly decurrent on the short petioles, 4 inches long and nearly as broad: involucre 5-cleft about half way down into rather acute lobes; 5—6-flowered: perianth funnelform, $1\frac{1}{2}$ inches long, the limb an inch across, dull purple, pubescent and viscid outside: fruit ovate-oblong, not tuberculate, light brown, marked by 10 lines of a lighter color.—*M. multiflora*, var. *pubescens*, Watson, Bot. Cal. II. 2. *Oxybaphus Frœbelii*, Behr, Proc. Cal. Acad. I. 69.

Common at the base of the mountains in Kern and adjoining counties southward. Fine specimens were obtained by Mrs. Curran, in July, 1884, from which this description is drawn. Dr. Behr readily identifies it as his *Oxybaphus Frœbelii.*

The abundant viscid pubescence, the very stout stems, shorter, broader perianth and very light-colored fruits distinguish the species well from all forms of *M. multiflora.* It is really more related to *M. Greenei* of the northern part of the State.

POLYGONUM.

Descriptions of two proposed new species will best be introduced by a careful delineation of the true characters of one long known with which they are to be compared, and have been confounded, namely:

P. tenue, Michx.

Glabrous but not at all glaucous, $\frac{1}{2}$—1 foot high, the stem and branches slender but wiry and strictly erect: sheath of stipule 3 lines long, herbaceous, red-brown in age and persistent, the hyaline portion of equal length and fimbriate-lacerate: leaves thickish, erect, linear, acute, distinctly 3-nerved: their margins strongly ciliolate-scabrous, as also is the midrib beneath, and often one angle of the stem and branches: floral leaves subulate, remote, flowers solitary in their axils, on erect pedicels: akenes usually dull black, inclosed by the calyx, in outline broadly ovate.—Michx. Flora, I. 328; Meisn. in DC. Prod. XIV. 100.

Common on the Atlantic slope of the continent, from Canada to Carolina and westward to the Mississippi.

P. Douglasii.

Glabrous and somewhat glaucous, often a little scabrous about the nodes, 1—1$\frac{1}{2}$ feet high, with numerous, slender, divergent branches: leaves thinnish, oblong to lanceolate, 1-nerved, their margins smooth and more or less revolute: stipules entirely hyaline, the sheathing portion very short, or wanting, the upper part more or less lacerate: floral leaves reduced: flowers commonly more than one in each axil, their pedicels deflexed: akenes longer than in the preceding, shining or granular-roughened. — *P. tenue*, Watson, Bot. King. 315; Bot. Cal, II. 12, but not of Michx.

var. **latifolium.**

Leaves oblong: flowers numerous and crowded into a spike: face of akene rather oblong than ovate in outline.—*P. tenue*, var. *latifolium*, Engelm.

From the Saskatchewan to British Columbia, and southward everywhere in the mountains to the borders of Mexico. Clearly distinguishable from its eastern analogue by the characters indicated, of which the 3-parallel-nerved leaves and their almost saw-toothed margins are the most obvious.

In *P. Douglasii*, which we dedicate to perhaps its very earliest collector, the secondary veins, when apparent at all, are not parallel, but pinnate. The plant is variable, and yet the var. *latifolium* may be a distinct species; the shape of the akene is peculiar.

P. Engelmanni.

Erect-spreading, diffusely branched from the base, a span or more high, reddish, very minutely scabrous-puberulent throughout: branches slender and somewhat flexuous: stipules sparingly lacerate, short, with no tubular or herbaceous portion; leaves lanceolate, acute, with revolute margins, ½ inch or more long, the upper much smaller and remote: flowers in all the axils, solitary or in twos or threes, very small: pedicels strongly deflexed: sepals obtuse, shorter than the very small, ovate, shining akene, and but loosely investing it.—*P. tenue*, var. *microspermum*, Engelm.

Rocky Mountains of Colorado at considerable elevations. Very unlike any forms of the preceding species; differing not more remarkably in the minuteness of its flowers and fruit than in its peculiar erect-spreading habit and the fact of its flowering from the very base of the stems and branches.

ERIOGONUM.

E. robustum.

Cæspitose; the very thick caudex much branched; tomentose: leaves ovate, 1—1½ inches long on stout petioles of 2 inches, densely tomentose on both sides; peduncles very stout and fistulous, 6 inches high and rigidly erect: the broad, ample umbel of about 5 thrice divided rays; umbels and umbellets subtended, the former by spatulate, the latter by linear-lanceolate leaflets an inch long: involucres half inch long: flowers cream-colored, 3 lines long; basal stipe very short: akene smooth.

On the Geiger grade between Reno and Virginia City, Nevada, July, 1884, Mrs. Curran.

The species will come in between *E. compositum*, and *E. Lobbii*, having umbels more divided than even the former, by which it is more readily distinguished from *E. Lobbii* than by any difference in foliage or perianth. The caudex of the latter is seldom at all branched, but in *E. robustum* it is excessively so, each plant forming a mat of a foot or more in width. The peduncles are in the former not "decumbent" but lie flat on the ground their whole length, the dense, simple umbel itself resting on the soil; in the latter they are not even decumbent, but firmly erect from the base.

List of the Plants described in California, principally in the Proc. of the Cal. Acad. of Sciences, by Dr. Albert Kellogg, Dr. H. H. Behr, and Mr. H. N. Bolander; with an attempt at their identification.

BY MARY K. CURRAN.

When the arrangement of the Herbarium of the Academy was undertaken two years ago, the necessity of bringing these scattered descriptions of species together in some form, soon became apparent; but the press of other necessary labor prevented the undertaking until this winter.

The preparation of this list has been a matter of more difficulty than would be supposed, on account of the scattered and fragmentary condition of the material.

The types of many of the species have disappeared from the herbarium, and many have been identified from drawings by Dr. Kellogg, which have only recently become accessible to us. In the labor of identification, the writer has received the constant advice and assistance of the Rev. E. L. Greene.

Careful search has been made through files of the early publications in this city, and it is hoped that this list is nearly if not quite complete.

Many short descriptions, even of well known plants, have been published from time to time by Dr. Kellogg in various journals, frequently accompanied by illustrations, but without any claim of originality on his part. All such notices have been omitted in the list.

The first volume of the Proceedings of the California Academy was published in the columns of the Pacific, a weekly journal still in existence in this city, and afterward reprinted from the same type for the use of the Society. The date of publication therefore for any species contained in this volume, is four days later than that of the meeting at which it was announced. Several descriptions were however published at a date earlier than the beginning of the first volume; notably those of *Microscapa*, *Pterosporopsis* and *Marah*.

Many species, especially those collected by Dr. Veatch on Cedros Island, were described and figured in the Hesperian, a monthly magazine published in San Francisco in earlier years; a few found their way into the columns of the San Francisco Rural Press, and one, *Viola Brooksii*, into the California Horticulturist.

The plates of Dr. Kellogg's species appended to this Bulletin were prepared for the Hesperian, and after it ceased publication, those unused were returned to him and presented to the Society to be used in this manner.

In some instances, even when the original specimens have been preserved, it has not been possible to fully identify certain species. This is especially the case in the genus Lupinus, which is at present very much confused.

Some of the generic names proposed by Dr. Kellogg require more than a passing mention.

Microscapa is much the oldest one for the plant now known as *Stropholirion*, and though we must all regret the retiring of an appropriate name in favor of a defective one, the present tendency seems to be to respect the law of priority, and lessen the number of exceptions.

Any rule to be of force, and generally recognized, must be universal and impartial, and as we accept many other names which are equally barbarous, we must accept this if the generic rank of the plant be maintained.

Marah is an entirely different matter. It is, as will be seen, by many years the older name, and it seems to me that the proper thing for Dr. Torrey to have done in the case was to have dropped the final *h* and accepted the name as *Mara*. It would have spared us a synonym. The objection "that it was neither a native nor a personal name, nor one derived from either Greek or Latin," (Dr. Gray in Bot. Wilkes Expd.) is certainly insufficient to justify its rejection. It is a name taken from a literature with which we are all familiar, and its application appears a sufficiently happy one to any person who has accidentally tasted the copious watery juice of the fruit. It was retained as a specific name by Mr. Watson in the Botany of California, but if not admissible as a generic name, it certainly should not be used for a species. The only sufficient reason for its rejection seems to be, although it appears nowhere to have been stated—that it it has not the Latin termination.

In the Am. Jour. of Science, xiv. 33, in a communication describing the germination of *M. Californica,* Dr. Gray states that Dr. Kellogg redescribed his former *Marah muricatus,* under the name of *Echinocystis Muricatus.* This is an error, as may be seen from Bot. Cal. I. 241, where the species are correctly discriminated by Mr. Watson.

Ranunculus Eisenii, Kellogg, Proc. Cal. Acad. vii. 115. Probably R. NELSONII var. TENELLUS, Gray, but the specimen has disappeared from the herbarium, and the identification is not certain.

Isopyrum Clarkii, Kellogg, l. c. vii. 131.
I. STIPITATUM, Gray.

Delphinium flammeum, Kellogg, l. c. ii. 22.
D. CARDINALE, Hook.

Dendromecon Harfordii, Kellogg, l. c. v. 102. A peculiar form of D. RIGIDUM, with thickly clustered very broad leaves, collected on Santa Rosa Island by W. G. W. Harford.

DICENTRA UNIFLORA, Kellogg, l. c. iv. 141.

STREPTANTHUS TORTUOSUS, Kellogg, l. c. ii. 152.

Sisymbrium reflexum, Kellogg, l. c. ii. 101.
ARABIS HOLBÖLLII, Hornem.

VIOLA AUREA, Kellogg, l. c. ii. 185.

V. purpurea, Kellogg, l. c. i. 56.

V. AUREA var. VENOSA, Watson.—*V. purpurea* is much the older, but a very inappropriate name for a yellow violet, and as it has gone into circulation, and no injustice is done to the author, it is left undisturbed.

V. AVERYI, Kellogg, Pac. Rural Press, May 31st, 1879. Specimen missing from the herbarium, but evidently *V. Patrini*, DC. var *Chinensis*, and possibly a good species, but material for comparison lacking. The original description is given below:

A NEW CHINESE VIOLET.

The late Hon B. P. Avery, United States Minister at the Court of China, collected on the great Chinese wall a violet, unknown to the West, which we dedicate to the memory of our amiable and accomplished citizen:

Viola Averii.—Plant stemless, minutely scabrous throughout; leaves oblong-obtuse, often a little narrowed above, abruptly decurrent into the petiole or rarely subcordate, about half the length of the peduncles—one to two inches long, one-half inch or so broad, crenate toothed, lamina about twice the length of the petiole, mostly three-nerved; stipules linear-lance, entire, or sparingly denticulate from a three to five-nerved membranous expanded base of the petiole; peduncles longer than the leaves, somewhat striate, bracteoles opposite, or alternate near the middle, linear-lance to sublate, entire, or denticulate; sepals three-nerved, lanceolate-ovate, acute or sub-acute; flowers with somewhat erect aspect, blue-veined or lined, and violet-tinted, spur short, s ra ght, obtuse, lateral petals obovate-obtuse, or rounded, quite naked; style short, clavate-capitate—urceoloid, foramen sub-lipped or beaked, glabrous; capsules ovoid, immature.

VIOLA CHRYSANTHA, var. *Nevadensis*, Kellogg, l. c. ii. 229. Scarcely differing from the ordinary form.

V. decora, Kellogg, Pacific Rural Press, May 31st, 1879.

V. BECKWITHII, Torr. & Gray. A form with all the petals blue.

V. BROOKSII, Kellogg, Cal. Horticulturist, Sept. 1879.

Probably a good species; certainly not *V. aurea* as suggested by Mr. Watson, in Bot. Cal. ii. 433. The description is incomplete, the flowers not having been collected. The original diagnosis is appended.

Stem $\frac{1}{2}$—1 ft. high, soft hairy throughout; root leaves 5—9 inches long; on lower stem 4—8, and successively shortening or set close to the stem at the top; blade egg-shaped, mainly $\frac{1}{2}$—$\frac{1}{3}$ as long as the leaf-stem and short wedge-form at base, slightly toothed on the margin.

Stipular appendages very unequal (alike in specimens from Shasta by H. Edwards, from Kern County by S. Brannan, Jr., and from Siskiyou County by Elisha Brooks); larger $\frac{3}{4}$ inch long smaller $\frac{1}{4}$—$\frac{1}{2}$ inch, oblong to heartform, nearly sharp pointed, toothed or entire, leafy.

Tilamentous appendages of the anthers very narrow, thread-like (not at all widened or wing-heeled as in the allied V. glabella, types of which we have from the same section); flowers none (late in the season) probably yellow; fruit on very short stems about $\frac{1}{3}$ the leaves.

Unfortunately all our specimens for the last eight or ten years have been imperfect, even this last one has not the root; perennial?

V. montana, Kellogg, l. c. i. 56.
V. LOBATA, Benth. A low form.

V. Sequoiensis, Kellogg, l. c. ii. 185.
V. LOBATA, Benth.

Polygala cornuta, Kellogg, l. c. i. 62.
P. CALIFORNICA, Nutt.

Silene Dorrii, Kellogg, l. c. iii. 44.
S. MENZIESII, Hook.

Alsine palustre, Kellogg, l. c. iii. 61.
ARENARIA PALUSTRIS, Watson.

SPRAGUEA PANICULATA, Kellogg, l. c. ii. 187. Obtained anew last year from the original locality. Very different in habit from *S. Umbellata*, the stems branching paniculately beginning near the ground: sepals larger, drawn into folds by the thick greenish midrib: seeds reniform, in the original species they are short-oblong.

Lewisia alba, Kellogg, l. c. ii. 115.
L. REDIVIVA, Pursh.

Idria, Kellogg.

Idria columnaria, Kellogg, l. c. ii. 34. Hesperian, May, 1860, with fig.

FOUQUIERA COLUMNARIS, Kellogg in herb.

Ceanothus azureus, Kellogg, l. c. i. 55.

C. SOREDIATUS, Hook. & Arn.

C. CORDULATUS, Kellogg l. c. ii. 124.

C. *Californicus*, Kellogg, l. c. i. 55. } C. INTEGERRIMUS,
" *Nevadensis*, Kellogg, l. c. ii. 152. } Hook. & Arn.

C. diversifolius, Kellogg, l. c. i. 58.

C. HIRSUTUS, Nutt.

Staphylea geniculata, Kellogg, l. c. ii. 22. This plant is represented in the herbarium only by some twigs bearing mature fruit. The capsules bear a considerable resemblance to those of *Rhynchotheca*, a South American genus.

Hypericum bracteatum, Kellogg, l. c. i. 65.

H. CONCINNUM, Benth.

LAVATÈRA ASSURGENTIFLORA, Kellogg, l. c. i. 14.

MALVASTRUM SPLENDIDUM, Kellogg, l. c. i. 65.

HIBISCUS CALIFORNICUS, Kellogg, l. c. iv. 292.

? *H. moscheutos* var. *occidentalis*, Torr. Bot. Wilkes Expd. No specimen in the herbarium.

GOSSYPIUM DAVIDSONII, Kellogg, l. c. v. 82.

Linum decurrens, Kellogg l. c. iii. 44.

L. PERENNE, L.

L. trisepalum, Kellogg, l. c. iii. 42.

HELIANTHEMUM SCOPARIUM, Nutt.

Tribulus Fisheri, Kellogg, l. c. vii. 162.

T. GRANDIFLORUS, Benth.

Rhamnus ilvicifolius, Kellogg, l. c. ii. 37. }
R. insulus, Kellogg, l. c. ii. 20. } R. CROCEA, Nutt.

The latter is said to have greenish-black fruit; probably an error, as it does not otherwise differ from the preceding.

RHUS LENTII, Kellogg, l. c. ii. 16. Hesperian, with fig. Nov. 1859. Collected by Dr. Veatch on Cedros Island, and named for William M. Lent of this city, in recognition of his services to science in promoting the expedition.

Rhus Veatchiana, Kellogg, l. c. ii. 24. Hesperian, with fig. April, 1860.

VEATCHIA CEDROSENSIS, Gray, Bull. Cal. Acad. No. 1. 1884. Collected by Dr. Veatch, on Cedros Island.

LUPINUS CALCARATUS, Kellogg, l. c. ii. 195. Hesperian, Jan. 1863. Collected by H. C. Dorr, near Virginia City, Nev.

L. CAUDATUS, Kellogg, l. c. ii. 196. Hesp. l. c. This was collected at the same place as the preceding, and both were re-collected in the original locality last year. It seems to be distinct from *L. laxiflorus*, Dougl. to which it is referred by Mr. Watson. The limits of several of these closely related species are still very uncertain.

L. CERVINUS, Kellogg, l. c. ii. 229. The specimen is in bad condition, but is certainly not *L. affinis*. The pubescence is appressed silky-villous on both surfaces: upper lip of the calyx merely notched: petals more than 6 lines long, nearly equal: the flowering spike twenty-five inches in length. Probably not an annual.

L. CITRINUS, Kellogg, l. c. vii. 93.

L. CONFERTUS, Kellogg, l. c. ii. 192.

L. lacteus, Kellogg, l. c. v. 37.
L. MICROCARPUS, Sims. Specimen missing

L. Menziesii, var. *aurea*, Kellogg l. c. v. 16.
L. DENSIFLORUS, Benth. Specimen missing.

L. LUTEOLUS, Kellogg, l. c. v. 38. Found last year growing abundantly in Lake County near Epperson's. Stems stout, branching, 2—4 feet high.

L. palustris, Kellogg, l. c. v. 16.
The specimen so labeled in the herbarium is *L. affinis*. but it is described as having persistent bracts!

L. sellulus, Kellogg, l. c. v. 36.
L. MINIMUS, Dougl.

L. SERICATUS, Kellogg, l. c. vii. 92.
Obtained again in 1884 in abundant specimens from the original locality (Cobb Mountain, near Anderson's Springs). An excellent species, and one of the handsomest of the genus.

L. STIVERI, Kellogg, l. c. ii. 192.
Found last year on the rocky cliffs of the American River at Folsom; a very unexpected locality; the seeds probably brought down by the winter floods.

Trifolium pauciflorum, var. *parvum*, Kellogg, l. c. v. 54.
T. MULTICAULE, M. E. Jones.

Hosackia argentea, Kellogg, l. c. iii. 38.
H. ARGOPHYLLA, Gray.

H. balsamifera, Kellogg, l. c. ii. 125.
H. STIPULARIS, Benth

H. macrophylla, Kellogg, l. c. ii. 123.
Specimen missing; probably a variety of the above, although the stipules are described as narrowly lanceolate.

Psoralea fruticosa, Kellogg, l. c. vii. 91.
P. BRACTEATA, Linn.—Cape of Good Hope.
Collected by F. P. McLean on Mt. Tamalpais, probably in an abandoned clearing; not since met with.

Phaca fastidia, Kellogg, Hesperian, June, 1860, with fig. Apparently ASTRAGALUS COULTERI, but the specimen is very imperfect, and the colored drawing shows pale yellow flowers. Dr. Kellogg thinks, but cannot be certain, that it came from Cedros Island.

Astragalus hypoglottis, var. *strigosa*, Kellogg, l. c. ii. 115.
A. TENER, Gray.

ASTRAGALUS GIBBSII, Kellogg, l. c. ii. 162.
Probably *A. cyrtoides*, Gray, but specimen without fruit.

Vicia nana, Kellogg, l. c. vii. 89.
LATHYRUS NEVADENSIS, Watson.

V. truncata, var. *villosa*, Kellogg, l. c. i. 57.
V. AMERICANA, var. TRUNCATA, Brewer.

Lathyrus Lanszwertii, Kellogg, l. c. ii. 149.
L. PALUSTRIS, Linn.

L. SPLENDENS, Kellogg, l. c. vii. 90

Cerasus glandulosus, Kellogg, l. c. i. 59.
PRUNUS EMARGINATA, Walp.

Rubus glaucifolius, Kellogg, l. c. i. 67.
R. LEUCODERMIS, Dougl.

Potentilla Clarkiana, Kellogg, l. c. vii. 93.
Specimens very imperfect, probably P. GRAYI, Watson.

Leptarrhena, Behr.

L. inundata, Behr. l. c. i. 45.
SAXIFRAGA PELTATA, Torr.

Heuchera Californica, Kellogg, l. c. v. 53.
Specimen missing; probably TIARELLA UNIFOLIATA, Hook.

H. RUBESCENS, var. *glandulosa*, Kellogg, l. c. v. 45. Scarcely differing from the ordinary form.

Ribes balsamifera, Kellogg, l. c. ii. 94.
R. CEREUM, Dougl.

R. Nevadensis, Kellogg, l. c. I. 63.
R. SANGUINEUM var. MALVACEUM, Gray.

Ludwigia scabriuscula, Kellogg, l. c. vii. 78.
AMMANNIA LATIFOLIA, L.

Œnothera arborea, Kellogg, l. c. ii. 32. Hesperian, March, 1860, with fig.

HAUYA ARBOREA, Kellogg, in herb.—To the description of this species must be added: upper margin of the seed oblique and terminated by a membranous wing of the same length.—Apparently quite distinct from any of the described species.

Œ. arcuata, Kellogg, l. c. i. 58.
GODETIA VIMINEA, Spach.

Œ. cruciformis, Kellogg, l. c. ii. 227.
Œ. SCAPOIDEA, Nutt.

Œ. NEVADENSIS, Kellogg, l. c. ii. 227. fig. 70. The large leaf accompanying the figure does not belong to it.

Re-collected last year on rocky hills near Reno, Nevada. Quite distinct from *Œ. gauræflora* to which it has been referred.

Œ. quadrivulnera, var. *hirsuta*, Kellogg, l. c. v. 45.
GODETIA QUADRIVULNERA, Spach.

Œ. viminea var. *intermedia*, Kellogg, l. c. i. 60.
GODETIA QUADRIVULNERA, Spach.

Clarkia Eiseniana, Kellogg, l. c. vii. 94.
C. ELEGANS, Dougl.

Mentzelia cordata, Kellogg, l. c. ii. 33. Hesperian, Oct. 1860, with fig.

EUCNIDE CORDATA, Kellogg, in herb.

M. crocea, Kellogg, l. c. vii. 110.
M. LINDLEYI, Torr. & Gray.

M. pectinata, Kellogg, l. c. iii. 40.
M. GRACILENTA, Torr & Gray.

M. Veatchiana, Kellogg, l. c. ii. 99.
M. ALBICAULIS, Dougl.

Marah, Kellogg.

M. muricata, Kellogg, l. c. i. 38. Pacific, { April 6, '54.
MEGARRHIZA MARAH, Watson. { July 7, "

Echinocystis muricatus, Kellogg, l. c. i. 57.
MEGARRHIZA MURICATA, Watson.

Marah minima, Kellogg, l. c. ii. 18.
ELATERIUM MINIMUM, Watson.

HYDROCOTYLE PROLIFERA, Kellogg, l. c. i. 15.

SANICULA MARITIMA, Kellogg, in herb. Watson Bot. Cal. ii. 451.

Aralia Japonica, Kellogg, Pac. Rural Press, June 7th, 1879. A pre-occupied name. Raised by W. G. W. Harford from seed sent from Japan; stated to be used in the young state for food. It cannot be identified at present for lack of material for comparison.

GARRYA VEATCHII, Kellogg, l c. v. 40. April, 1873.
Garrya flavescens, Watson, Am. Nat. May, 1873.

LONICERA CONJUGIALIS, Kellogg, l. c. ii. 66. Hesperian, Jan. 1861.

L. intermedia, Kellogg, l. c. ii. 154.
L. INVOLUCRATA, Banks.

L. pilosa, Kellogg, l. c. i. 62.
L. HISPIDULA var. VACILLLANS, Gray.

GALIUM STELLATUM, Kellogg, l. c. ii. 94.

G. MULTIFLORUM, Kellogg, l. c. ii. 94.

BRICKELLIA MULTIFLORA, Kellogg, l. c. vii. 49. Republished inadvertently in Bull. Cal. Acad. No. 1. 8.

Grindelia latifolia, Kellogg, l. c. v. 36.
G. GLUTINOSA, Dunal.

Aplopappus Nevadensis, Kellogg, l. c. iii. 9.
A. ACAULIS, Gray.

Linosyris dentatus, Kellogg, l. c. ii. 16.
BIGELOVIA VENETA, Gray, but the original specimens include also B. TRIDENTATA, Greene, a very distinct species.

SOLIDAGO ELONGATA var. *microcephala*, Kellogg, l. c. v. 55.
The ordinary form with heads of full size.

Aster tenue, Kellogg, l. c. vii. 114.
Not in the herbarium, perhaps A. EXILIS, Ell.

Erigeron discoidea, Kellogg, l. c. v. 55.
CONYZA COULTERI, Gray.

Conyza salicina, Kellogg, l. c. iii. 36.
BACCHARIS VIMINEA, DC.

Stylocline acaule, Kellogg, l. c. vii. 112.
EVAX CAULESCENS var. MINIMA, Gray; not *E. acaulis*, Greene.

Gnaphalium Nevadense, Kellogg, l. c. v. 45.
ANTENNARIA DIOICA, Gærtn.

Melarrhiza, Kellogg.

M. inuloides, Kellogg, l. c. i. 38.
WYETHIA HELENIOIDES, Nutt.

Bahiopsis, Kellogg.

B. lanata, Kellogg, l. c. ii. 35. Hesperian, Aug. 1860, with fig.
VIGUIERA LANATA, Gray, according to Dr. Gray who is in possession of the only specimen collected.

Helianthus giganteus, var. *insulus*, Kellogg, l. c. v. 17.
H. CALIFORNICUS. DC.

Lipochæta hastata, Kellogg, l. c. ii. 106.
Verbesina venosa, Greene, Bull. Torr. Club, ix. 110.
V. HASTATA, Kellogg, in herb.

LEPTOSYNE GIGANTEA, Kellogg, l. c. iv. 198.

MADIA RADIATA, Kellogg, l. c. iv. 190.

Madaria corymbosa, var. *fragaria*, Kellogg, l. c. i. 52.
MADIA ELEGANS, Don.

Hemizonia balsamifera, Kellogg, l. c. ii. 64.
H. CORYMBOSA, Torr. & Gray.

H. LUZULÆFOLIA, DC. var. *fragaria*. Kellogg, l. c. ii. 69.

Calycadenia plumosa, Kellogg, l. c. v. 49.
HEMIZONIA PLUMOSA, Gray.

Lagophylla minima, Kellogg, l. c. v. 53.—Missing from the herbarium; probably depauperate L. RAMOSISSIMA.

Parthenopsis, Kellogg.

P. maritimus, Kellogg, l. c. v. 101.
VENEGASIA CARPESIOIDES, DC.

Actinolepis mutica, var. Kellogg, l. c. vii. 131.
BÆRIA MUTICA, Gray.

Bahia cuneata, Kellogg, l. c. v. 49.
ERIOPHYLLUM CÆSPITOSUM var. INTEGRIFOLIUM, Dougl.

Eriophyllum Californicus, Kellogg, l. c. i. 57.
ERIOPHYLLUM CÆSPITOSUM, DC.

Hymenopappus Nevadensis, Kellogg, l. c. v. 46.
CHÆNACTIS NEVADENSIS, Gray.

Senecio spatulifolia, Kellogg, l. c. i. 56.
S. LAYNEÆ, Greene: first name pre-occupied.

Calais graciloba, Kellogg, l. c. v. 48.
MICROSERIS BOLANDERI, Gray.

Stephanomeria intermedia, Kellogg, l. c. v. 39.
MICROSERIS NUTANS, Gray.

Trixis Californica, Kellogg, l. c. ii. 182.
T. ANGUSTIFOLIA, DC.

Pterostephanus, Kellogg.

P. runcinatus, Kellogg, l. c. iii. 21.
ANISOCOMA ACAULE, Torr. & Gray.

CREPIS OCCIDENTALIS, var. NEVADENSIS, Kellogg, l. c. v. 50.
" " " *subacaulis*, l. c. a form.

Macrorhynchus angustifolius, Kellogg, l. c. v. 47.
TROXIMON RETRORSUM, Gray.

Macrorhynchus Harfordii, Kellogg, l. c. v. 47.
TROXIMON HUMILE, Gray.

Campanula filiflora, Kellogg, l. c. ii. 5.
C. PRENANTHOIDES, Durand.

Wahlenbergia Californica, Kellogg, l. c. ii. 158.
CAMPANULA LINNÆIFOLIA, Gray.

Heterocodon minimum, Kellogg, l. c. vii. 111.
SPECULARIA BIFLORA, Gray; a very reduced form.

Arctostaphylos Veatchii, Kellogg, l. c. ii. 19.
Xylococus bicolor, Nutt.
ARCTOSTAPHYLOS BICOLOR, Gray.

Ledum Californicum, Kellogg, l. c. ii. 14.
L. GLANDULOSUM, Nutt.

Pterosporopsis, Kellogg.

P. Sonoraensis, Kellogg, Pacific, June 9, 1854.—Specific name from the town of Sonora in Tuolumne County, from whence the plant was sent to Dr. Kellogg.
SARCODES SANGUINEA, Torr.

Azalea nudiflora var. *ciliata*, Kellogg, l. c. i. 60.
RHODODENDRON OCCIDENTALE, Gray.

Chionanthus fraxinifolius, Kellogg, l. c. v. 18.
FRAXINUS DIPETALA, var. BRACHYPTERA, Gray.

Asclepias acornutum, Kellogg, l. c. i. 55.
Acerates atro-purpurea, Kellogg, l. c. i. 65.
GOMPHOCARPUS CORDIFOLIUS, Benth.

Asclepias longicornis, Kellogg, l. c. i. 65.
A. SPECIOSA, Torr.

GENTIANA GLAUCA var. PAULENSE, Kellogg, l. c. vii. 115. Not in the herbarium.

Tesserantherum, Kellogg.

T. radiatum, Kellogg, l. c. ii. 144.
FRASERA SPECIOSA, Dougl

GILIA CAPILLARIS, Kellogg, l. c. v. 46.
Collomia leptalea, Gray.

Collomia micrantha, Kellogg, l. c. iii. 18.
GILIA GRACILIS, Hook.

Collomia tinctoria, Kellogg, l. c. iii. 17.
GILIA TINCTORIA, Kellogg, in herb.—Nearly related to *G. leptotes*, but differing in the long-acuminate calyx-teeth and the clustered flowers, 2—6 in the axils.

Gilia Dunnii, Kellogg, Pacific Rural Press, May 31, 1879.
LŒSELIA EFFUSA, Gray.

Nemophila modesta, Kellogg, l. c. vii. 93.—Specimen lost: probably N. MENZIESII, Hook. & Arn.

Phacelia Brannani, Kellogg, l. c. vii. 90.
P. FREMONTII, Torr.

P. glandulosa, Kellogg, l. c. vii. 92.—Name pre-occupied, and the plant has disappeared from the herbarium; probably P. PARRYI.

Hesperochiron latifolius, Kellogg, l. c. v. 44.
H. CALIFORNICUS, Watson.

Nama racemosa, Kellogg, l. c. v. 51.
PHACELIA NAMATOIDES, Gray.

Mertensia stomatechoides, Kellogg, l. c. ii. 148.
M. SIBIRICA, Don.

Eritrichium connatifolium, Kellogg, l. c. ii. 163.
KRYNITZKIA CHORISIANA Gray, Proc. Am Acad. xx. 267.

ECHINOSPERMUM NERVOSUM, Kellogg, l. c. ii. 146.
E. Californicum, Gray.—Dr. Kellogg's is a very inappropriate name, the nerves only apparent in the lower leaves, but eminent authorities are of opinion that such names are not to be changed even by the authors.

Calystegia villosa, Kellogg, l. c. v. 17.
CONVOLVULUS VILLOSUS, Gray.

Ipomœa radiatifolia, Kellogg, l. c. vii. 163.
I. LEPTOTOMA, Torr.

Aniseia aurea, Kellogg, l. c. v. 83.
IPOMÆA AUREA, Kellogg, in herb.—Represented in the herbarium only by a colored drawing. Dr. Gray in Syn. Fl. states that it is the same as No. 71; in the collection of Xantus, from the same district which was referred to *I. sinuata*, as var. *foliis-integris* in Proc. Am. Acad. v. 165. Probably a distinct species.

Aniseia azurea, Kellogg, l. c. v. 89.—Of this also only the colored drawing is to be found. It agrees very well with the description of *Jacquemontia tamnifolia*. Dr. Gray refers it to *J. abutiloides*, Benth.

CUSCUTA CEANOTHI, Behr. l. c. i. 17; Pacific, Dec. 8, 1884. From the description evidently *C. subinclusa*, Dur. & Hilg.

Antirrhinum vexillo-calyculatum, Kellogg, l. c. i. 27.

This was published in the Pacific, Feb. 2d, 1854, as *A. glandulosum*, Kellogg, and shortly after republished without explanation in the same journal as above. The specimens have disappeared and it cannot be positively identified. The colored drawing which is said to represent it, is certainly *A. vagans*, Gray, but there are irreconcilable differences between drawing and description, and the plant must remain doubtful.

Saccularia, Kellogg.

S. Veatchii, Kellogg, l. c. ii. 17; Hesperian, July, 1860, with fig.

ANTIRRHINUM (GAMBELIA) JUNCEUM, Gray.

Collinsia solitaria, Kellogg, l. c. ii. 10.

" *divaricata*, Kellogg, l. c. iii. 36.

C. SPARSIFLORA, Fisch. & Mey.

C. hirsuta, Kellogg, l. c. ii. 110.

C. BARTSIÆFOLIA, Benth; the hirsute form.

C. septemnervia, Kellogg, l. c. ii. 224.

C. TINCTORIA, Hartweg.

Pentstemon carinatus, Kellogg, l. c. i. 62.

P. BREVIFLORUS, Lindl.

P. tenellus, Kellogg, l. c. i. 56.

P. AZUREUS, Benth.

P. CERROSENSIS, Kellogg, l. c. ii. 19; Hesperian, Jan. 1860, with fig.

P. brevilabris, Gray.

P. Kingii, var. *glauca*, Kellogg, l. c. v. 39.

P. GLABER, Pursh.

P. canoso-barbatum, Kellogg, l. c. ii. 15.
P. BREVIFLORUS, Lindl.

P. rostriflorum, Kellogg, l. c. II. 15.
P. BRIDGESII, Gray.—The two Pentstemons last mentioned were collected by Mr. J. M. Hutchings in Yo Semite, and published with drawings in Hutchings' Magazine for Sept. 1860. The description there given is much more intelligible than that of Proc. Cal. Acad. but Dr. Kellogg by some chance exchanged the colors of the flowers, which in the Magazine are stated to be yellow in P. rostriflorum, and red in P. canoso-barbatum.

The fragment of the former in the herbarium, however, still retains its red color; the latter as is usual with that species has become black.

Mimulus atropurpureus, Kellogg, l. c. i. 59.—The colored drawing of the original, by Dr. Kellogg, shows this to be EUNANUS DOUGLASII, Benth.

Mimulus Eisenii, Kellogg, l. c. vii. 89.
M. LACINIATUS, Gray.

DIPLACUS STELLATUS, Kellogg, l. c. ii. 18.—Probably a good species.

Ranapalus, Kellogg.

R. Eisenii, Kellogg, l. c. vii. 113.
HERPESTIS ROTUNDIFOLIA, Pursh.

Chloropyron, Behr.

C. palustre, Behr, l. c. i. 61.
CORDYLANTHUS MARITIMUS, Nutt.

Hedeoma purpurea, Kellogg, l. c. v. 52.—No specimen of this remains in the herbarium, but Dr. Gray, who has evidently seen it, names it MICROMERIA PURPUREA, Gray.

TEUCRIUM GLANDULOSUM, Kellogg, l. c. ii. 23.—Related to *T. bicolor*, Sm. from Chili, but quite distinct.

Audibertia Dorrii, Kellogg, l. c. ii. 190.
A. INCANA, Benth.

ABRONIA CRUX-MALTÆ, Kellogg, l. c. ii. 71.

MIRABILIS CALIFORNICA, var. *villosa*, Kellogg, l. c. iii. 10. Not sufficient difference to constitute a variety.

Oxybaphus Frœbelii, Behr, l. c. i. 69.
MIRABILIS FRŒBELII, Greene; page 124 of this volume.

Antigonum leptopus, var. *splendens*, Kellogg, l. c. v. 102. Agrees very well with the description of A. CORDATUM, Mart. & Galeot.

Rumex Saxei, Kellogg, Pacific Rural Press, June 7, 1879.
R. HYMENOSEPALUS, Torr.

Simmondsia pabulosa, Kellogg, l. c. ii. 21; Hesperian, Nov. 1860, with fig.
S. CALIFORNICA, Nutt.

Quercus acroglandis, Kellogg, l. c. i. 25.
Q. AGRIFOLIA, Née.

Q. Ransomi Kellogg, l. c. i. 25.
Q. DOUGLASII, Hook. & Arn.

Q. fulvescens, Kellogg, l. c. i. 71.
Q. CHRYSOLEPIS, Liebm.

Q. VACCINIFOLIA, Kellogg, l. c. i. 96.

Q. MOREHUS, Kellogg, l. c. ii. 36. Hybrid: Q. Wislizeni × Q. Kelloggii. Occasionally met with as isolated trees in the region where the two species meet. Some examples were observed last year by the writer at Sulphur Bank, in Lake County; at Newcastle, Placer County, and at Folsom, Sacramento County.

QUERCUS DUNNII, Kellogg, Pacific Rural Press, June 7, 1879.

Q. chrysolepis, var. *Palmeri*, Engelm. Trans. St. Louis Acad. 1877.

Q. Palmeri, Engelm, Bot. Cal. ii. 97. Advance sheets issued Oct. 1st, 1879. The original description is as follows:

A new oak is described by Dr. A. Kellogg, as follows:

The Dunn oak (*Quercus Dunnii*).—From Lower California, presented by Mr. G. W. Dunn. This is a small tree, or commonly a clustered shrub, rarely exceeding 10 feet high, and three to four inches in diameter. The foliage bears some resemblance to our evergreen field oak (*Q. agrifolia*), but the male catkins are in long, dense-flowered tassels, similar to *Q. densiflora*, the Chestnut or Tan-bark oak of the coast (mainly); cups like the Italian brigand hat and almost destitute of any distinct scales; color foxy-yellowish More specimens are desirable for comparison; meanwhile it is thought best to make it known under the provisional name above. Leaves, perennial, subcordate-ovate, corneously spinous-dentate, teeth often rather remote and somewhat repand, abruptly acute, rigidly re-curved, laminal wings more or less elevated and waved—tomentum very close, dense, dull whitish, chiefly beneath—one-half to one and one-half inches long, and about one-half as broad, petioles short one-sixth to one-eighth the length; fruit solitary; sessile or short peduncled, on wood of the previous year—male aments in long fascicles, dense white or sub-creamy flowers —(like those of a *castanea*; wanting in the specimens); cup, obconically bell-shaped, the very obscure scales broad and thin, continuously united (apparently) into a succession of rings, one above the other, with lessening intervals to the sub-entire thin, involuted margin; slightly fulvous externally, scar small, one-half to two and one-half lines broad; gland oblong-ovate, acute.

JUNIPERUS CERROSIANUS, Kellogg, l. c. ii. 37; Hesperian, March, 1860, with fig.—Dr. Engelmann states in Trans. St. Louis Acad. vol. iii. 588, that a specimen of this in Herb. Torrey belongs to J. Californicus. There are however abundant specimens in the herbarium of Cal. Acad. in all of which the berries are bluish-black, large and globular, always having as many as three, and often four well developed seeds. The foliage certainly is very like that of *J. Californicus*, but the fruit is very different.

Cupressus fragrans, Kellogg, l. c. i. 103.
CHAMÆCYPARIS LAWSONIANA, Parlat.

Abies Bridgesii, Kellogg, l. c. ii. 14.
TSUGA MERTENSIANA, Carr.

Taxodium giganteum, Kellogg & Behr, l. c. i. 54.
SEQUOIA GIGANTEA, Decaisne.

CYPRIPEDIUM FASCICULATUM, Kellogg, Pacific Rural Press, May, 1879.—Republished by S. Watson in Proc. Am. Acad. xvii 380, evidently without knowledge of the previous publication.

Sisyrinchium flavidum, Kellogg, l. c. ii. 50.
S. CALIFORNICUM, Ait.

ALLIUM ANCEPS, Kellogg, l. c. ii. 109.

A. ATTENUIFOLIUM, Kellogg, l. c. 110.

A. UNIFOLIUM, Kellogg, l. c. 112.

A. PARVUM, Kellogg, l. c. iii. 54.

BLOOMERIA, Kellogg.

B. AUREA, Kellogg, l. c. ii. 11; Hesperian, Dec. 1859, with fig.

BRODIÆA TERRESTRIS, Kellogg, l. c. ii. 6.

Calliprora aurantea, Kellogg, l. c. ii. 20.—Specimen lost and species indeterminable from the defective description, but probably from the expression "limb scarcely longer than the pointed tube," a stout form of BRODIÆA GRACILIS, Watson.

Veatchia, Kellogg.

V. crystallina, Kellogg, l. c. ii. 11.
BRODIÆA LACTEA, Watson.

Macroscapa, Kellogg.

M. volubilis, Kellogg, Pacific, June 30, 1854.
Stropholirion Californicum, Torr. Pac. R. R. Rep. iv. 49.
Rupalleya volubilis, Moriere, Bull. Linn. Soc. de Nor. 1863.

Dichelostemma Californica, Wood, Proc. Philad Acad. 1868.

BRODLÆA VOLUBILIS, Baker, Jour. Linn. Soc. **11**, 378.—As will be seen Dr. Kellogg's name for this plant is much the earliest, and although very objectionable, would probably have to be accepted if it were kept generically distinct. It is however too much like *B. congesta* and *B. multiflora* to be separated from that genus without violence. Both of these species have corollas nearly as urceolate, and are often found twining with two or three turns. Color in this genus is of small value; most of the species being very variable, a peculiarity shared by *B. volubilis*, which occasionally occurs purplish-blue.

CHLOROGALUM ANGUSTIFOLIUM, Kellogg, l. c. ii. 104.

LILIUM WASHINGTONIANUM, Kellogg, l. c. ii. 12; Hesperian, Oct. 1859.

L. PARDALINUM, Kellogg, l. c. ii. 12: Hesperian, Sept. 1859, with fig. and var. ANGUSTIFOLIUM, Kellogg, l. c.

L. PARVUM, Kellogg, l. c. ii. 179; Hesperian, June, 1862.

L. Bloomerianium, Kellogg, l. c. iv. 160.

" var. *ocellatum*, Kellogg, l. c. v. 88. Not in the herbarium.

L. HUMBOLDTIANUM, Roezl. & Leicht.

L. MARITIMUM, Kellogg, l. c. vi. 140.

L. lucidum, Kellogg, l. c. vi. 144.

L. COLUMBIANUM, Hanson.

Liliorhiza, Kellogg.

Fritillaria alba, Kellogg, l. c. i. 46.

Liliorhiza lanceolata, Kellogg, l. c. ii. 46.

FRITILLARIA LILIACEA, Lindl.

FRITILLARIA VIRIDIS, Kellogg, l. c. ii. 19. (Name slightly altered.)

Liliorhiza viridea, Kellogg, l. c. ii. 48.

Fritillaria lanceolata var. *gracilis*, Wats. Proc. Am. Acad. xv. 259.

FRITILLARIA MULTIFLORA, Kellogg, l. c. i. 57; and Pacific, June 8, 1855.

F. parviflora, Torr.

Liliorhiza Piattiana, Kellogg, Hesperian, Oct. 1862, with fig.

Probably FRITILLARIA PLURIFLORA, Torr. although the figure shows the plant with only one flower, which is larger than is usual in the species, and with broader leaves than the ordinary form. Specimen missing.

Fritillaria multiscapidea, Kellogg, l. c. i. 46.

ERYTHRONIUM PURPURASCENS, Watson.

Cyclobothra cœrulea, Kellogg, l. c. ii. 4.

CALOCHORTUS CÆRULEUS, Watson.

CALOCHORTUS LILACINUS, Kellogg, l. c. ii. 5.

Trillium Californicum, Kellogg, l. c. ii. 50.

T. OVATUM, Pursh.

JUNCUS LESUERII, Bolander, l. c. ii. 179.

Commelyna angustifolia, Kellogg, Pacific Rural Press, May 31, 1879. Plant missing, but evidently C. DIANTHIFOLIA, DC.

Setaria Californica, Kellogg, l. c. i. 27. The colored drawing of this plant remains in the herbarium, but the specimen is missing. It has not been identified and is probably not indigenous.

Panicum thermale, Bolander, l. c. ii. 181.

P. DICHOTOMUM, Linn.

Stipa Bloomeri, Bolander, l. c. iv. 168.

S. SIBIRICA, Lam.

STIPA KINGII, Bolander, l. c. iv. 170.

STIPA STILMANI, Bolander, l. c. iv. 169.

DANTHONIA CALIFORNICA, Bolander, l. c. ii, 182.

MELICA STRICTA, Bolander, l. c. iii. 4, & iv. 104.

M. IMPERFECTA, Trin. var. FLEXUOSA, Bolander, l. c. iv. 101.

M. HARFORDII, Bolander, l. c. iv. 102.

M. ACUMINATA, Bolander, l. c. iv. 104.

M. FUGAX, Bolander, l. c. iv. 104.

Polypodium carnosum, Kellogg, l. c. ii. 88.
P. SCOULERI, Hook. & Grev.

P. FALCATUM, Kellogg, l. c. i. 19.

Descriptions of some Californian Plants collected by the writer in 1884.

BY MARY K. CURRAN.

DELPHINIUM ULIGINOSUM. Slightly pubescent; stems generally strict, 1—1½ feet high from a tuberous root, leafy only at the base: leaves triangular in outline, 3-cleft, the segments about 3-toothed, mucronulate: petioles nearly equaling the blade: racemes open: pedicels stout, ascending ½—2 inches long: flowers deep blue, about an inch long, including the straight slender spur which nearly equals the sepals: petals slightly pubescent, the lateral ones ciliate on the margin: ovary and capsule pubescent: seeds about a line long, the coat black, closely conformed to the nucleus, and rough with minute rounded projections which form irregular horizontal ridges.—Collected in swampy ground, almost in the water, Lake county, near Epperson's, July, 1884. Related to *D. scaposum*, Greene.

LŒFLINGIA PUSILLA. Glandular-pubescent, low and spreading: stems 2—3 inches long; leaves subulate: sepals narrowly lanceolate, abruptly acute, all entire, neither rigid nor squarrose: petals none: stamens 5: style none: capsule triangular as long as the sepals, many seeded.—Tehachapi, Alt. 4,000 feet, May. A much more delicate plant than *L. squarrosa*.

LINUM (HESPEROLINON) DRYMARIOIDES. Pubescent, 6—15 inches high, branching and spreading dichotomously from near the base: stipular glands, none; leaves ovate, acute, green above, glaucous beneath; the lower often in whorls of 4, bordered by several rows of minute stipitate glands: flowers solitary, on pedicels 1—2 lines long; sepals lanceolate, acuminate, glandular-serrate: petals rose-colored with darker veins, twice as long as the sepals, the appendages at the base uniting in front and forming a minute, 3-toothed pouch: styles, 3: capsule ovate, 6-celled, ⅓ shorter than the calyx.—Lake county, near Epperson's, Aug., 1884. In aspect much resembling some of our southern species of *Drymaria*.

ASTRALAGUS.

Two very distinct species have been included in *A. didymocarpus*. (Proc. Am. Acad. vi. and Bot. Cal. i. 146.) Abundant specimens from many localities added to the herbarium during the year, show the necessity of their separation. Indeed they are so very distinct that it is a matter for surprise that they were ever confounded. Nuttall distinguished them clearly in his species *A. Catalinensis* and *A. nigrescens*, but his descriptions were evidently drawn from immature plants, and are much too short. The diagnostic differences are given below.

A. DIDYMOCARPUS, Hook. & Arn, Bot. Beechey, 334, t. 81. *A. Catalinensis*, Nutt. Pl. Gambel. 152. Spike dense: flowers nearly sessile: fruiting calyx as long as the pod and concealing it: corolla persistent: legumes erect, obovate. strongly wrinkled, laterally compressed.—Antioch; Tehachapi; Mojave Desert.

A. NIGRESCENS, Nutt. l. c. not of Gray. Lower and more slender; spike loosely flowered: pedicels short, slender: fruiting calyx $\frac{1}{3}$ as long as the pod: legume ovate, lightly wrinkled, pubescent, pendulous, strongly obcompressed except the apex.—Lake county; Folsom, and all around the bay of San Francisco.

The name was unfortunately chosen, and is even to a certain extent false—the plant having much less of the black pubescence than the former, and in fruit losing nearly all trace of it. *Phaca nigrescens*, Pal. (*A. nigrescens*, Gray) does not interfere with Nuttall's name, being now only a synonym of *A. multiflorus*, Gray.

PURSHIA GLANDULOSA. Dark green and glabrous except a slight pubescence on the lower surface of the leaves. 4—8 feet high: young shoots covered with prominent glands: leaves 3—6 lines long, 3—4 toothed, or cleft, and bordered with translucent punctate glands: stipules scarious, small: flowers nearly sessile: calyx pubescent but not glandular: petals pale yellow 5—6 lines long: capsule pubescent, obovate, the body scarcely projecting beyond the calyx-lobes: seed flesh-colored, very broadly obovate, the layer of resinous matter between the coats very pale.—On the Mojave side of Tehachapi Pass, May (flowers) and July, (a special trip for the fruit) 1884.

In appearance strikingly distinct from *P. tridentata*, with its often almost silvery foliage. The seeds of the latter, also, are black, and of very different shape from those of *P. glandulosa*.

ERYNGIUM HARKNESSII. Erect, slender, 2—4 feet high, dichotomously branched above: radical and lower leaves consisting only of the jointed fistulous petiole, often very long:

cauline leaves lanceolate, entire, sparingly ciliate-toothed, on jointed petioles of equal length, lacerate-fringed near the base; upper, reduced to sessile laciniate bracts: heads pedicellate, oblong, $\frac{1}{2}$—$\frac{3}{4}$ inch in diameter, blue: involucre of 8—10, narrow bracts, exceeding the head, sparingly toothed and reflexed: calyx-segments subulate, canaliculate, twice as long as the petals and equaling the styles: corolla bluish: seeds but little longer than broad, covered with short and rather soft apiculate scales, becoming ferruginous brown.—Suisun Marsh, Aug. 1883; Dr. Harkness.

Very distinct from any form of *E. petiolatum*; not rigid, and only the bracts of the head prickly.

Nemacladus rigidus. Slightly pubescent, prostrate and branching only at the base: branches stout and rather rigid, zigzag, 2—4 inches long: leaves thick, entire, spatulate-lanceolate: pedicels 3—8 lines long: calyx gibbous; teeth irregular: corolla purple, shorter than the calyx-lobes; petals separate: stamineal tube very short: capsule globular included in the calyx: seeds oval, reddish, longitudinally-striate.—Geiger Grade, near Virginia City, Nevada, July. The stoutest of the genus. Whole plant purplish.

Trichostema ovatum. Villous-pubescent, 1—2 feet high, branching from the base, branches ascending, virgate, leafy: leaves short-ovate, mucronate, very shortly petiolate, about as long as the internodes, lower surface ribbed by 3-6 strong nerves which follow the outline of the leaf and terminate before reaching the margin: cymes shortly peduncled: calyx densely villous: tube of the corolla slender about three lines long, twice the length of the calyx; lobes villous externally: stamens 6—8 lines longer than the corolla: seeds tuberculate, spatulate-obovate in outline, densely villous.—Bakersfield, July, 1884. Readily distinguished from *T. lanceolatum*, by its very small flowers and nearly round leaves.

ALLIUM HYALINUM. Outer bulb-coats dark gray; reticulation distinct, horizontally serrate, resembling that of *A. attenuifolium* but less regular: leaves very narrow: scape 8—12 inches high: spathe valves 2, short and acute: umbels lax, 6–12 flowered; pedicels slender 10–16 lines long: perianth pale, becoming thin, hyaline and spreading in fruit; segments lanceolate, acute but not acuminate, 4—6 lines long: filaments narrowly deltoid above the united adnate base, about half as long as the perianth-segments: stigma entire: capsule not crested, 1-seeded.—Along streams on McKewen's Ranch, El Dorado County, May, 1884.

SOME NEW SPECIES OF THE GENUS ASTRALAGUS.

BY EDWARD LEE GREENE.

A. STREPTOPUS. Annual, diffusely branched, a foot or more high, minutely pubescent: leaflets in 5—7 pairs, linear-oblong, retuse, 3—4 lines long: peduncles slender, 6 inches long, 3—5-flowered: pedicels remote, slender, twisted: calyx small, the slender teeth surpassing the tube: corolla not seen: pod linear, an inch long, ascending, slightly incurved, compressed, completely two-celled, the dorsal side turned upward by the twisting of the pedicel.

Mohave Desert, 1884, collected by Mrs. M. K. Curran.

A near relative of *A. Nuttallianus*.

A. RECURVUS. Glabrous, a foot high, from a perennial root; stems numerous, slender, erect or at base somewhat decumbent: leaflets in 6—8 pairs, obovate- to linear-oblong, acute, $\frac{1}{4}$–$\frac{1}{2}$ inch long: peduncles strict, few-flowered, the flower unknown; fruiting pedicels deflexed: pod linear-oblong, $\frac{3}{4}$ inch long, compressed, incompletely 2-celled, arcuate-recurved.

Mountains of the northern part of Arizona, 1883, Dr. H. H. Rusby.

A quite peculiar species in respect to the curvature of the pod, the direction of which is the reverse of that of other species.

A. ALBENS. White throughout with a short, appressed, silky pubescence: branches spreading, less than a foot long, from a perennial root: leaflets in about four pairs, obovate, obtuse, 3—5 lines long: raceme few-flowered: pedicels very short: calyx-teeth subulate, equaling the tube: corolla 4 lines long, purple: pod oblong, slightly compressed, falcate-incurved, silky pubescent.

Mohave Desert, May, 1882, S. B. and W. F. Parish, No. 1274.

Perhaps nearest *A. Cobrensis*, but that is a green and glabrous, considerably smaller plant with straight pods.

A. CANDICANS. Near *A. Missouriensis* but smaller, white-silky, the pubescence closely appressed: caudex branching: leaflets obovate or oblong a half inch long, in about four approximate pairs: peduncles scape-like, erect, a span high: raceme subcapitate, 8—10-flowered: corolla a half inch long, red purple: calyx- teeth triangular-lanceolate, two-thirds as long as the campanulate tube: pod narrowly oblong, a half inch long, straight, nearly cylindrical, sulcate below, completely two-celled, white silky.

Northern Arizona, 1883, Dr. H. H. Rusby.

A. LAYNEÆ. Soft-villous throughout: sub-caulescent, less than a foot high, rather stout: leaflets in 9—11 pairs, obovate, obtuse, a half inch long: peduncles stout, 8—10 inches long: raceme loose: corolla not seen: calyx-teeth triangular-subulate, short: pod nearly 2 inches long, acuminate at each end, obcompressed, partially 2-celled, strongly incurved, soft-hairy.

Mohave Desert, Parish Brothers, 1882, No. 1273; Mrs. M. K. Layne-Curran, in the same locality, 1884.

Resembling the *Mollissimi*. In Mrs. Curran's very mature specimens the long pods are curved into a ring. In the younger ones, collected by Mr. Parish, they are only moderately incurved.

A. PACHYPUS. Near *A. arrectus:* stems rigid and flexuous, 2—4 feet high, the upper portion, together with the younger foliage, minutely white-pubescent: leaflets in 8—10 pairs, narrowly linear, truncate or retuse, an inch long: peduncles stout: racemes few-flowered: corolla ochroleucous or white, 8 lines long: calyx-teeth linear-subulate, fully equaling the campanulate, slightly gibbous tube: pod when young thick and succulent, in maturity hard-coriaceous, glabrous, much wrinkled, an inch and a half long, mucronate, somewhat compressed, slightly incurved, both sutures prominent, completely 2-celled, erect or ascending on a very stout stipe which a little exceeds the calyx.

Mountains of Kern County, California, June, 1884, Mrs. Curran.

A. HOSACKIÆ. *Phaca*, near *A. Sonoræ:* prostrate, sparingly pubescent with soft, spreading hairs: leaflets rather crowded in about 7 pairs, elliptical, acute, glabrous above: peduncles exceeding the leaves: racemes short: calyx-teeth setaceous, surpassing the campanulate tube: pod obscurely puberulent, ovate, acute, ½ inch long, the ventral suture prominent.

Northern Arizona, 1883. Dr. Rusby.

The crowded leaflets give the plant something of the aspect of a Hosackia. The resemblance to its near relative in the genus is not striking, that being a silvery-silky species, and this not in the least canescent.

A. CALIFORNICUS. Stems numerous, erect and simple, rather stout, 1½ feet high: pubescence loose, cinereous:

leaflets linear or oblong, in about 11 pairs: peduncles thrice the length of the leaves: pedicels ascending: calyx oblong, somewhat gibbous, the teeth triangular-subulate, the pubescence nigrescent: corolla ochroleucous, 7—9 lines long: pod coriaceous, purple-blotched, an inch and a half long, straight, on a slender stipe, deflexed.—*A. collinus*, var. *Californicus*, Gray, Proc. Am. Acad. xii, 54.

Collected only by the writer, in Siskiyou County, California, 1876. However like *A. collinus*, Dougl. the flowering specimens appear, the pods of the two are very dissimilar. The differences of size, form, texture and position are very marked. Those of *A. collinus* are much firmer, shorter, always erect, and manifestly incurved.

FUNGI OF THE PACIFIC COAST.

BY H. W. HARKNESS.

HYDNUM GELATINOSUM Scop.—Collected by E. J. Molera, on *Pseudotsuga Douglasii*, Lagunitas, Feb. 1885. 3910.

SPARASSIS CRISPA Fr.—Brought from Coos Bay, Oregon, Feb. 1885, by Capt. George A. Holt. One of the esculent fungi; sufficient to afford a meal for a large family, the specimen being 18 inches in diameter. 3911.

TREMELLA MORIFORMIS Berk.—On *Aplopappus ericoides*, San Francisco, Jan. 2971.

PHALLUS IMPUDICUS Linn.—On sand hills near San Francisco, June. 2575.

POLYPLOCIUM INQUINANS Berk.—What we take to be this species, was found last year at Roseville; Folsom; in Lake County, and at Tehachapi. Some of the specimens were very large: pileus 12 cm. across, and stipe 12—16 cm. long, very thick and stout. In many cases the volvæform peridium does not rupture at all, and the hymenium is exposed from the destruction of the stem by the larvæ of insects, which seem exceedingly fond of it, as it is impossible to find one half-grown not already infested. 3876.

P. CALIFORNICUM. Peridium grayish, soon rupturing, and widely separated by the slender elongating stipe, which is 10—20 cm. long, and 1—1½ cm. in diameter: pileus flat or depressed, 2—4 cm. broad: hymenium rusty-black soon dusty; spores dark reddish-brown, nearly globular, 6—8 μ.—Sand hills west of San Francisco, June. So far we have never succeeded in finding it in the young state. It is very distinct from the first species, and bears a considerable resemblance to the next genus. 2580.

Montagnites Candollei Fr.—Pyramid Lake, Aug. and Mojave Desert, May. 3874

Lycoperdon sculptum. Subglobose or obovate 8—15 cm. in diameter, pure white. Outer peridium very thick, forming pyramidal masses, 2—4 cm. in breadth and 1½—3 in height, which are longitudinally grooved by many parallel lines; in age dividing vertically into several segments which usually remain attached at the apex: spore mass bright yellow, becoming cinereous: flocci yellow, 6—10 μ: spores smooth pale, 5—8 μ. Plate I. 3580

A curious and strikingly beautiful species. It is very rare, and found only at considerable elevations, 6—8000 feet; in the Sierra Nevadas. In appearance it differs so much from any species known to us, as to be almost deemed worthy of generic rank. The structure however is exactly that of *Lycoperdon*, the peculiar development of the cortex being the chief difference between it and its congeners.

The accompanying plate was lithographed from the photograph of one of medium size in my possession, and with the exception of being much too dark is a fairly good representation.

Lycoperdon cyathiforme Bosc.—Tehachapi, June. 3891.

Phoma samarorum Desm.—On samaræ of *Fraxinus Oregana*, San Rafael, Autumn. 2922.

Asteroma rosæ DC.—On living leaves of *Rosa Californica*, May. 2298.

Diplodia phoradendri Cke.—On leaves of *Phoradendron flavescens*, Antioch, Sept. 2834.

Ascochyta pisi Lib.—On leaves of *Lathyrus paluster*, Berryvale, July. 3346.

Darluca filum Cast—On *Uromyces*, San Francisco, July. 2663.

SEPTORIA ACERIS B. & Br.—On leaves of *Negundo aceris*, San Francisco, August. 2776.

CHÆTOPHOMA QUERCIFOLIA Cke.—On living leaves of *Quercus agrifolia*, Berkeley, April. 3125.

GLÆOSPORIUM PHOMIFORME Sacc. & Ell.—On *Phormium tenax*, San Francisco, March. 2224.

G. NERVISEQUUM (Fckl.)—On living leaves and twigs of *Platanus racemosa*, throughout the country. "The Sycamore disease," the ravages of which continued for many years, have robbed the banks of our streams of much of their beauty. April—September. 3249.

MARSONIA POTENTILLÆ Sacc. & Ell.—On *Potentilla anserina*, San Francisco, June. 3147.

M. POPULI Desm.—On living leaves of *Populus Fremontii*, Sacramento, June. 2049.

SEPTOGLEUM DEFOLIANS. Oozing out in flesh-colored heaps all over the leaves and petioles: spores 3—7-septate more or less curved or flexuous 4 × 68.—On *Quercus Kelloggii*, in the foothills of the Sierra Nevada, July, 1884. 3705.

This fungus was so abundant last year as to make great numbers of trees almost leafless.

CORYNEUM UMBONATUM Tul.—On twigs of *Quercus Douglasii*, Antioch. 3468.

PESTALOZZIA PLANIMI Vize, Grev. vi. 109.—This is an error of the printer for *P. Euonymi*; but the name although meaningless may be allowed to stand. The host-plant is *Euonymus Japonicus*.

USTILAGO VINOSA Tul.—On *Oxyria digyna*, Donner Lake, Aug. 3889.

U. URCEOLORUM Tul.—On Carex, Lake Tahoe, Aug. 3380.

SOROSPORIUM CALIFORNICUM.—Spores nearly globular in outline, light yellowish-brown, composed of 10—20 cells, all minutely papillate, 30—38 μ. Completely filling the heads of *Grindelia* and destroying all trace of the akenes. The affected plant produces a greatly increased number of heads, which are all or nearly all infested and only about $\frac{1}{3}$ of their normal size. Antioch, Aug. 3800.

S. TRIENTALIS Woron.—On *Trientalis Europœa*, Alaska. Collected by Dr. Kellogg. 3483.

ÆCIDIUM SARCOBATI Pk.—*Peridermium gracile*, Hk. On leaves of *Sarcobatus vermiculatus*, Reno, Sept. 3568.

PUCCINIA PORPHYROGENITA Curt.—On *Cornus Canadensis*, Alaska, Aug. 3494.

ÆCIDIUM & PUCCINIA SOLANI Cooke.—On *Chamœsaracha nana*, covering the whole plant. Streets of Truckee, Aug. 3744.

P. VERATRI Niessl.—On leaves of *Veratrum Californicum*, Truckee, Aug. 3371.

ÆCIDIUM STATICES Desm. and UROMYCES LIMONII Lev.—On leaves of *Statice limonium* and *Armeria vulgaris*, San Francisco. 3135.

PUCCINIA CIRCÆÆ Pers.—On leaves of *Circœa Pacifica*, Yo Semite, July. 3485.

P. ASARI Lk.—On leaves of Asarum, Yo Semite, July 1884. 3527.

PHRAGMIDIUM FRAGARIÆ DC.—On leaves of *Potentilla gracilis*, Reno, Aug. 3350.

TRIPHRAGMIUM ECHINATUM Lev.—On leaves and stems of *Œnanthe Californica*, San Francisco, June, 2570.

TRICHOBASIS HYDROCOTYLES Cke.—On Hydrocotyle prolifera, San Francisco, Sept. 3383.

MELAMPSORA LINI Desm.—On leaves and stems of *Linum Breweri, L. congesta, and L. drymarioides,* April—August. 3481.

CYSTOPUS CANDIDUS Lev. On leaves of *Brassica rapa,* Berkeley, Nov. 2903.

C. CUBICUS Str.—On living leaves of Senecio lugens, San Francisco, April. 3166.

GRAPHIOLA PHŒNICIS Poit.—On *Phœnix dactylifera,* San Francisco. 2070.

VOLUTELLA BUXI Berk.—On dead leaves of *Buxus sempervirens,* San Francisco, Aug. 2748.

THECLOSPORA LATERALIS. Heaps scattered ½—1 mm. in diameter: hypha white, branching, penetrating the thick hyaline border of the spore and leaving it near the same spot: spores smaller and with narrower border than in *T. bifida,* 20—28μ.—On rotting stems of *Nerium Oleander,* Oakland, Feb. 2632.

Differing curiously in appearance from the other species in which the hypha seems to pass directly through the spore emerging at the opposite side. In this the spores seem to be attached along the side of the hypha, or where it is broken seem to be terminal.

DICRANIDION

(Etym. *Dikranos,* a fork).

Acervuli pale, scattered. Spores hyaline, septate, shaped like a tuning-fork, attached by the closed extremity to short branching hypha.

D. FRAGILE. Acervuli, rosy-white, minute, scattered: spores hyaline, 4-septate, shaped like a tuning-fork, attached by the closed extremity, easily separating, each arm dividing near the centre, and near the base, forming one rounded and four oblong segments; length of spore 12—16: width of arm, 4—5 μ.—On decaying *Nerium Oleander,* Oakland, Feb. 3631.

In appearance much like *Fusarium.*

STIGMINA PLATANI, Sacc.—On leaves of *Platanus racemosa*, Niles, Nov. 3381.

CLASTERISPORIUM STREPSICERAS (Ces).—On dead stems of *Sambucus*, Sausalito, June. 2600.

TRIPOSPORIUM ELEGANS Corda.—On decaying *Eucalyptus globulus*, San Francisco, Sept. 2857.

CHALARA SETOSA. Conceptacles flask-shaped, pale brown, abruptly contracting into a neck about twice the length of the body, united at the base into tufts, from among which spring non-septate setæ of 8 or 10 times their length: spores hyaline, oblong, uniseptate, truncate at the ends. Setæ 8×224, flask 12×24; spore 4×20.

Forming small, very pale brown spots on the upper surface of dead leaves of *Quercus densiflora*. Tamalpais, Nov. 2907.

C. FUSIDIOIDES Corda.—On decaying *Eucalyptus*, San Francisco, Sept. 2851.

C. MONTELLICA Sacc.—On *Eucalyptus globulus*, San Francisco, Sept. 2852.

C. BRACHYPTERA Sacc.—On *Umbellularia Californica*, decaying, Sausalito, Aug. 2744.

CHÆTOPSIS FUSCA Corda.—On *Eucalyptus* decaying, San Francisco, Sept. 2854.

STYSANUS STEMONITIS Corda.—On decaying leaves of *Eucalyptus*, San Francisco, January. 3609.

CERCOSPORA GLOMERATA. Hypha short, springing from an oblong upright mass ½ mm. in length; spores brown, slightly attenuated upwards, 3—5-septate, $10—12 \times 60—70\,\mu$.—On living leaves of *Garrya elliptica*, Tamalpais, March, 1884. 3651.

TETRAPLOA SCABRA. Effused in small greenish-black patches: spores brown, oval, quadriarticulate, studded all over with minute papillæ: setæ septate, widely diverging, often ten times the length of the spore. 30×50.—On *Scirpus*, San Francisco, February. 2794.

Differs from the two other species by the shape of the spore, narrowed above and below, by the rough surface of the epispore, and the very long setæ.

Septosporium velutinum Cke. & Ell.—On *Garrya elliptica*, Sausalito, September. 3382

Zygosporium oscheoides Mont.—On dead leaves of *Ficus laurifolia*, San Francisco, December, 1884. A very peculiar plant which, so far as I know, has not been found since it was first collected in Cuba. 3862.

Helminthosporium persistens Cke.—On twigs of *Quercus agrifolia*, San Francisco, Winter. 1966.

Cladosporium viticolum Ces.—On living leaves of *Vitis Californica*, Calistoga, September. 3714.

Ramularia urticæ Ces.—On living leaves of *Urtica holosericea*, Berkeley, November. 2902.

Microstroma leucosporum (Mont.)—On *Juglans Regia*, Berkeley, July. 3697.

Podosphæra Kunzei Lev.—On living leaves and fruit of *Prunus demissa*, Reno, August. 3356

Microsphæria symphoricarpi Howe.—On living leaves of *Symphoricarpus racemosus*, Sausalito, July. 2650.

Asterina plantaginis Ell.—On living leaves of *Plantago major*, San Francisco, March. 3073.

Diatrype asterostoma B. & C.—On dead stems of *Rhododendron occidentale*, Santa Cruz, May. 2537.

Anthostoma mortuosa (Ell.)—On decaying stems of *Scirpus*, San Francisco, July. 2706.

TRABUTIA QUERCINA (Fr. & Rud.)—On living leaves of *Quercus agrifolia*, San Francisco, March. 3081.

To this must be added as a synonym *Rhytisma erythrosporum* B. & C. Proc. Am. Acad. iv. 128.

BOTRYOSPHAERIA AMBIGUUM (Schw.)—On dead stems of *Rhus diversiloba*, Oakland, September. 2830.

B. QUERCUUM (Schw.)—On dead bark of *Quercus agrifolia*, Sausalito, December. 2953.

ERIOSPHÆRIA INVESTANS (Cke.)—On dead stems of *Eucalyptus globulus*, San Francisco, June. 2597.

DIDYMOSPHÆRIA CUPULA Ell.—*D. circinans* Hk. 2877.

PARODIELLA PERISPORIOIDES (B. & C.)—On living leaves of *Phaseolus Wrightii*, Arizona. Collected by J. G. Lemmon. 2910.

LEPTOSPHÆRIA OGILVIENSIS (B. & Br.)—On dead stems of *Erigeron Canadense*, San Francisco, June. 2610.

VALSARIA EUCALYPTI (K. & C.)—On dead stems of *Eucalyptus*, San Francisco, July. 2676.

HEPTAMERIA MESŒDEMA (B. & C.)—On dead stems of *Eriophyllum stœchadifolium*, San Francisco, May. 2497.

PYRENOPHORA RELICINA Fr.—On dead stems of various grasses, San Francisco, April. 2375.

PLOWRIGHTIA MORBOSA (Schw.)—On branches of *Prunus demissa*, Yo Semite; fruiting in Feb. 577.

P. TUBERCULIFORMIS (Ell.)—On twigs of *Artemisia Californica*, Mt. Diablo, Oct. 3101.

PLOWRIGHTIA PHYLLOGONA. Hypophyllous, seated on dense hypha: perithecia discrete, minute, black, rugose, depressed: paraphyses delicate; asci cylindrical, 8-spored; sporidia ovate-oblong, hyaline, septum near the base, the lower portion having the appearance of a rounded process, attached to the true sporidion. Asci 16×120; Sporid. 8×16 μ. On leaves of *Amelanchier alnifolia*, covering the whole lower surface of all the leaves of the affected branch, Emigrant Gap, Sierra Nevada, 5,000 feet alt. Autumn. 3577.

Although this differs very strikingly in appearance from *P. morbosa*, it is nevertheless very nearly related. The perithecia are much smaller, and, though seated on a subiculum, are all separate; the sporidia are rounded instead of acuminate below. In habit it is very distinct, being entirely confined to the lower surface of the leaves.

MICROTHYRIUM MICROSCOPICUM Desm.—On *Spartina juncea*, San Francisco, Feb. 3049.

GLONIUM STELLATUM.—On dead branches of *Arctostaphylos pungens*, Tamalpais, March. 3081.

TRYBLIDIELLA RUFULA (Spr.)—On dead stems of *Rhus diversiloba*, San Francisco, Dec —May. 2578.
Disk never red.

GLONIOPSIS MÜLLERI (Duby.)—On dead stems of *Symphoricarpus mollis*, Sausalito, Aug. 2746.

ACROSPERMUM GRAMINUM Lib.—On grass stems, San Francisco, Jan. 2072.

ACROSPERMUM CORRUGATUM Ell.—*A. fultum* Hk. 2500.

PHACIDIUM PINI Schm.—On fallen leaves of *Pinus ponderosa*, Blue Cañon, June. 3306.

RHYTISMA ARBUTI Ph.—Spermog. *Melasmia arbuticola* Vize.
This fungus is at the present time doing great injury to the Madroño (*Arbutus Menziesii*). It appears as a *Melasmia* in the autumn and very rapidly destroys the vitality of the whole or a great part of the affected leaf, which becomes brown and somewhat shriveled. In February the *Rhytisma* appears on the spot of the original infection, and while the leaf in many cases still partly green remains upon the tree.

At the date of the present writing nearly all the madroños on Mt. Tamalpais are affected, the large coriaceous leaves, although dead, remaining attached to the tree and giving the hillsides a russet-brown appearance.

POCILLUM CESATI De Not.—On leaves of *Quercus agrifolia*, San Francisco, February. 2140.

PEZIZA PERSOONII Moug.—On *Equisetum arvense*, San Francisco, February. 3614.

P. APALA B. & Br.—On stems of *Scirpus*, San Francisco February. 2125.

P. OCHRACEA Boud.—On ground amongst moss, Sunnyside, April. 3195.

CENANGIUM FERRUGINOSUM Fr.—On branches of *Pinus Sabiniana*, San Francisco, April. 3090.

TUBER RUFUM Pico.—Under Laurel trees, San Rafael. 3661.

GEOPORA

(Etym. *Ge* [*Gaia*] the earth, and *opora*, Autumn fruits.)

Subterranean. Integument woolly, continuous with the trama. Hymenium convolute. Asci cylindrical. Sporidia hyaline, oblong, smooth.

G. COOPERI. Irregularly globular, 2—4 cm. in diameter, covered with dense brown wool, which is continued inwards on the trama: absorbing base none: hymenium white, not closely packed: asci cylindrical, 8-spored, 220×26 μ: sporidia hyaline, oblong, smooth, with a large shining, excentric nucleus. 28×20 μ.—Haywards, January. Collected by Dr. J. G. Cooper. 3880.

A very interesting addition to the Tuberacei of California. Allied to *Hydnotrya* but sporidia oblong and smooth.

The following new species of Californian Fungi from the Harkness Collection have been published in Grevillea during the past year.

CONIOTHYRIUM ROSARUM Cke. & Hk.
On Rose stems, San Francisco, February. 2176.

CONIOTHYRIUM PUNCTUM Cke. & Hk.
On decorticated *Acacia*, San Francisco, January. 2067.

CONIOTHYRIUM DECIPIENS Cke. & Hk.
On branches of *Acacia*, San Francisco, March. 2267.

PHOMA RHAMNICOLA Cke. & Hk.
On twigs of *Rhamnus Californica*, San Francisco, February. 2188.

PHOMA PITTOSPORI Cke. & Hk.
On twigs of *Pittosporum*, San Francisco, March. 2294.

PHOMA STIGMA Cke. & Hk.
On stems of *Portulaca*, San Rafael, December. 1958.

PHOMA HETEROMELIS Cke. & Hk.
On dead leaves of *Heteromeles arbutifolia*, San Francisco, April. 2312.

PHOMA PRITCHARDIÆ Cke. & Hk.
On dead leaves of *Pritchardia*, San Francisco, February. 2167.

PHOMA DISCOSIÆFORMIS Cke. & Hk.
On leaves of *Quercus agrifolia*, San Francisco, February. 2135.

PHOMA SOLANI Cke. & Hk.
On stems of *Solanum umbelliferum*, San Francisco, March. 2300.

Macroplodia arctosphyli Cke. & Hk.
On leaves of *Arctostaphylos pungens*. 2480.
This has been re-described through an error. The name should be
MACROPLODIA ARCTOSTAPHYLI Vize. Grev. vi. 109. 241.

SPHÆROPSIS CUPRESSI Cke. & Hk.
On bark of *Cupressus macrocarpus*, San Francisco, January. 2064.

SPHÆROPSIS MACROSPERMUM Cke. & Hk.
On *Eucalyptus* bark, Palo Alto, January. 2000.

SPHÆROPSIS MACULATUM Cke. & Hk.
On *Palm*, San Francisco, May. 2546.

DIPLODIA RESURGENS Cke. & Hk.
On twigs of *Rhus diversiloba*, San Francisco, February. 2134.

DIPLODIA SAROTHAMNI Cke. & Hk.
On stems of *Spartium*, San Francisco, February. 2094.

DIPLODIA AMYGDALI Cke. & Hk.
On twigs of *Apricot*, Alameda, January. 2076.

DIPLODIA PITTOSPORI Cke. & Hk.
On twigs of *Pittosporum*, San Francisco, February. 2171.

DIPLODIA MILLEGRANA Cke. & Hk.
On *Acacia* decorticated, San Francisco, February. 2102.

DIPLODIA LATA Cke. & Hk.
On branches of *Acacia*, San Francisco, March. 2283.

CHROMOSPORIUM LATERITIUM Cke. & Hk.—On decorticated *Acer*, Mt. Diablo, May. 2488.

CEUTHOSPORA MINIMA Cke. & Hk.—On dead leaves of *Vaccinium ovatum*, Sausalito, Jan. 2555.

PESTALOZZIA INQUINANS Cke. & Hk.—On dead leaves of *Eucalyptus*, San Francisco, Jan. 2002.

PESTALOZZIA POLYCHÆTA Cke. & Hk.—On twigs of *Spartium*, San Francisco, Feb. 2095.

GLŒOSPORIUM CAPSULARUM Cke. & Hk.—On capsules of *Eucalyptus*, San Francisco, March. 2290.

LIBERTELLA LONICERÆ Cke. & Hk.—On twigs of *Lonicera involucrata*, San Francisco, May. 2474.

TORULA FUSOIDES Cke. & Hk.—On *Gynerium argenteum*, San Francisco, Feb. 2136.

DICTYOSPORIUM OPACUM Cke. & Hk.—On culms of *Typha latifolia*, Piedmont, May. 2507.

DICTYOSPORIUM CIRCINATUM Cke. & Hk.—On decorticated *Platanus racemosa*, Sunol, April. 2435.

BACTRODESMIUM OPACUM Cke. & Hk.—On *Cedar* plank, San Francisco, April. 2363.

BACTRODESMIUM CLAVULATUM Cke. & Hk.—On bark of *Eucalyptus*, San Francisco, Jan. —April. 1999, 2322.

DIDYMARIA CLEMATIDIS Cke. & Hk.—On living leaves of *Clematis ligusticifolia*, Redwood City, May. 2543.

MYSTROSPORIUM TURBINATUM Cke. & Hk.—On decorticated *Sequoia sempervirens*, Tamalpais, May. 2495.

HELMINTHOSPORIUM ATRO-OLIVACEUM Cke. & Hk.—On bark of *Acacia*, San Francisco, April. 2328.

CERCOSPORA RUBIGO Cke. & Hk.—On living leaves of *Spiræa*. Redwood City, May. 2527.

EPOCHNIUM GLAUCUM Cke. & Hk.—On *Quercus*, 2434, and *Umbellularia*, Sausalito, April. 2445.

CLADOSPORIUM BRUNNEUM Cke. & Hk.—On dead leaves of *Hedera helix*, San Francisco, Dec. 1954.

CAMPTOUM CUSPIDATUM Cke. & Hk.—On *Scirpus* and *Juncus*, San Francisco, Jan. 2071.

STACHYBOTRYS SCABRA Cke. & Hk.
On *Phormium tenax*, San Francisco, April. 2458.

STRUMELLA ACACIÆ Cke. & Hk.
On twigs and branches of *Acacia*, San Francisco, Feb. 2175.

BLENNORIA UMBELLULARIÆ Cke. & Hk.
On branches of *Umbellularia*, San Rafael, Jan. 1985.

FUSARIUM GYNERIUM Cke. & Hk.
On sheaths of *Gynerium argenteum*, San Francisco. 1978.

FUSARIUM CATALEPTUM Cke. & Hk.
On branches of *Acacia*, San Rafael, Jan. 1981.

FUSARIUM ACACIÆ Cke. & Hk.
On twigs of *Acacia*, San Francisco, April. 2353.

FUSARIUM OBTUSISPORUM Cke. & Hk.
On twigs of *Acacia*, San Francisco, March. 2273.

TRICHOSPORIUM FUSCESCENS Cke. & Hk.
On decorticated *Pinus Sabiniana*, Mt. Diablo, May. 2491.

ZYGODESMUS MARGINATUS Cke. & Hk.
On *Pinus insignis*, San Francisco, April. 2360.

PEZIZA (HYMENOSCYPHA) CHLOROMELA Ph. & Hk.
On leaves of *Sequoia sempervirens*, San Francisco, Dec. 1951.

PEZIZA (PYRENOPEZIZA) HETEROMELIS Ph. & Hk.
On leaves of *Heteromeles arbutifolia*, San Francisco, Jan. 1987.

DERMATEA PINI Ph. & Hk.
On *Pinus insignis*, San Francisco, May. 2505.

DERMATEA CORNI Ph. & Hk.
On twigs of *Cornus*.

STICTIS MONILIFERA Ph. & Hk.
On fruit of *Pittosporum*, San Francisco, April. 2426.

STICTIS ARAUCARIÆ Ph. & Hk.
On leaves of *Araucaria imbricata*, San Francisco, May. 2524.

STICTIS MEGARRHIZÆ Ph. & Hk.
On stems of *Megarrhiza Californica*, San Francisco, Jan. 2057.

PHACIDIUM ALBIDUM Ph. & Hk.—On leaves of *Vaccinium ovatum*, Sausalito, Jan. 2561.

PHACIDIUM HETEROMELIS Ph. & Hk.—On leaves of *Heteromeles arbutifolia*, San Francisco, Feb. 2124.

HYSTERIUM (HYSTEROGRAPHIUM) CEANOTHI Ph. & Hk.—On twigs of *Ceanothus*, Redwood City, May. 2540.

HYSTERIUM PROMINENS Ph. & Hk.—On branches of *Salix lasiolepis*, Sausalito, July. 2647.

HYSTERIUM EUCALYPTI Ph. & Hk.—On bark of *Eucalyptus*, San Francisco, April. 2405.

HYSTERIUM LONCIERÆ Ph. & Hk.—On decorticated *Lonicera involucrata*, San Francisco, May. 2472.

LOPHODERMIUM DRACÆNÆ Ph. & Hk.—On *Dracæna*, San Francisco, May. 2514.

HYPODERMA HETEROMELIS Ph. & Hk.—On leaves of *Heteromeles arbutifolia*, San Francisco, Feb. 2123.

HYPODERMA EUCALYPTI Cke. & Hk.—On leaves of *Eucalyptus*, San Francisco, April. 2402.

NECTRIA INFUSARIA Cke. & Hk.—On twigs of *Acacia*, San Francisco, April. 2268, 2362.

BYSSONECTRIA CHRYSOCOMA Cke. & Hk.—On *Eucalyptus*, San Francisco, April. 2321.

BYSSONECTRIA ROSELLA Cke. & Hk.—On dead grass, San Francisco, March. 2241.

DIALONECTRIA FILICINA Cke. & Hk.—On stipes of Tree-fern, San Francisco, Feb. 2133.

DIALONECTRIA EUCALYPTI Cke. & Hk.—On bark of *Eucalyptus*, San Francisco, March—April. 2216, 2359.

DIALONECTRIA DEPALLENS Cke. & Hk.—On stems of *Lupinus arboreus*, San Francisco, April. 2432.

DIATRYPE CEANOTHI Cke. & Hk.—On branches of *Ceanothus*, Redwood City, May. 2541.

VALSA AGNOSTICA Cke. & Hk.
On branches of *Ribes sanguineum*, Sausalito, January. 2554.

VALSARIA MAJUSCULA Cke. & Hk.
On branches of *Æsculus Californica*, Palo Alto. 1997.
By an oversight this was stated in Grevillea, to be found on *Salix*.

DIAPORTHE GORGONOIDEA, Cke. & Hk.
On *Acacia*, San Francisco, May. 2525.

SPHÆRIA (WALLROTHIELLA) EUNOTIÆSPORA Cke. & Hk.
On decorticated *Acacia*, San Francisco, February. 2111.

SPHÆRIA (MELANOMMA) SEMINIS Cke. & Hk.
On twigs of *Bacharis pilularis*, San Francisco, May. 2511.

SPHÆRIA (ANTHOSTOMA ?) GIGASPORA Cke. & Hk.
On twigs of *Symphoricarpus racemosus*, Fairfax, March. 2266.

SPHÆRIA (ANTHOSTOMELLA) OREODAPHNES Cke. & Hk.
On leaves of *Umbellularia Californica*, Sausalito, April. 2459.

SPHÆRIA (DIDYMELLA) MEGARRHIZÆ, Cke. & Hk.
On *Megarrhiza Californica*, San Francisco. January 2087.

SPHÆRIA (DIDYMELLA) LUPINI Cke. & Hk.
On stems of *Lupinus arboreus*, Sacramento, June. 2074.

SPHÆRIA (DIDYMOSPHÆRIA) SARMENTI Cke. & Hk.
On stems of *Tropæolum minus*, San Rafael, December. 1957.

SPHÆRIA (AMPHISPHÆRIA) WELLINGTONIÆ Cke. & Hk.
On bleached wood of *Sequoia sempervirens*, Monterey, March. 2218.

SPHÆRIA (AMPHISPHÆRIA) DECORTICATA Cke. & Hk.
On decorticated branches of *Quercus agrifolia*, San Francisco, May. 2502.

SPHÆRIA (METASPHÆRIA) PLAGARUM Cke. & Hk.
On bark of *Eucalyptus*, San Francisco, April—May. 2345, 2516.

SPHÆRIA (LEPTOSPHÆRIA) CEANOTHI Cke. & Hk.
On small twigs of *Ceanothus*, Santa Cruz, May. 2536.

SPHÆRIA (LEPT.) ODORA Cke. & Hk.
On branches of *Umbellularia Californica*, Sausalito, June. 2563.

SPHÆRIA (LEPT) BICUSPIDATA Cke. & Hk.
On twigs of *Baccharis pilularis*, San Francisco, May. 2517.

SPHÆRIA (LEPT) CALIFORNICA Cke. & Hk.

On *Araucaria imbricata*.	2330.	San Francisco, March—May.
" *Spartina*.	2299.	
" *Rhododendron occidentale*.	2538.	
" *Euonymus* twigs and leaves.	2238, 2358.	

SPHÆRIA (TEICHOSPORA) EUCALYPTI Cke. & Hk.
On bark of *Eucalyptus*, San Francisco, April. 2400.

SPHÆRIA (THYRIDIUM) PERSONATUM Cke. & Hk.
On decorticated *Acacia*, San Francisco, Feb. 2111.

SPHÆRIA (THYRIDIUM) GARRYÆ Cke. & Hk.
On decorticated twigs of *Garrya elliptica*, Sausalito, June. 2559.

VENTURIA ARCTOSTAPHYLI Cke. & Hk.
On dead leaves of *Arctostaphylos pumila*, San Francisco, May. 2552.

SPHÆRELLA CALIFORNICA Cke. Grev. March, 1883.
On grass. 1242.

SPHÆRELLA ACICOLA Cke. & Hk.—On leaves of *Pinus insignis*, San Francisco, April. 2303.

SPHÆRELLA UMBELLULARIÆ Cke. & Hk.—On leaves of *Umbellularia Californica*, Santa Cruz, June. 2569.

MELIOLOPSIS HETEROMELIS Cke. & Hk.—On leaves of *Heteromeles arbutifolia*. Sunol, April. 2425.

CAPNODIUM HETEROMELIS Cke. & Hk.—On leaves of *Heteromeles arbutifolia*, Sunol, April. 2425.

CAPNODIUM RHAMNI Cke. & Hk.—On leaves of *Rhamnus Californica*, Mt. Diablo, May. 2482.

CAPNODIUM TUBA Cke. & Hk.—On leaves of *Umbellularia Californica*, Palo Alto, April. 2395.

NOTES ON NOMENCLATURE.

BY H. W. HARKNESS.

The following generic names requiring rectification have been noted from time to time as they attracted our attention.

It is hoped that in all cases the necessary change of the generic name may be attended by the revision of the species belonging thereto, in order to prevent as much as possible the increase of synonymy.

I. Identical names, of which the latest must give way.

ANTENNARIA Gaertn. Fruct. ii. 410. (Compositæ)
ANTENNARIA Link. in Schrad. Jour. iii. 16, p 109. (Fungi)

HEDWIGIA Ehrh. in Hannov. Mag. 1781. (Musci)
HEDWIGIA Swartz, Fl. Ind. Oc. ii. 670. (Bursereæ)

LÆSTADIA Kunth, in Less. Gen. Comp. (Compositæ)
LÆSTADIA Auersw. in Hedwigia, 1869. (Fungi)

PHYLLACTINIA Lev. Ann. Sc. Nat. 1851. (Fungi)
PHYLLACTINIA Benth. Gen. Plant, ii. 1876. (Compositæ)

II. Names differing only in gender, alike in some of their cases, and being practically the same; the latter is inadmissible.

CLYPEOLA, Linn. (Cruciferæ)
CLYPEOLUM, Speg. F. Arg. Pug. iv. (Fungi)

EUROTIA Adans. (Chenopodiaceæ)
EUROTIUM Link. Sp. plant, vi. i. p. 79. (Fungi)

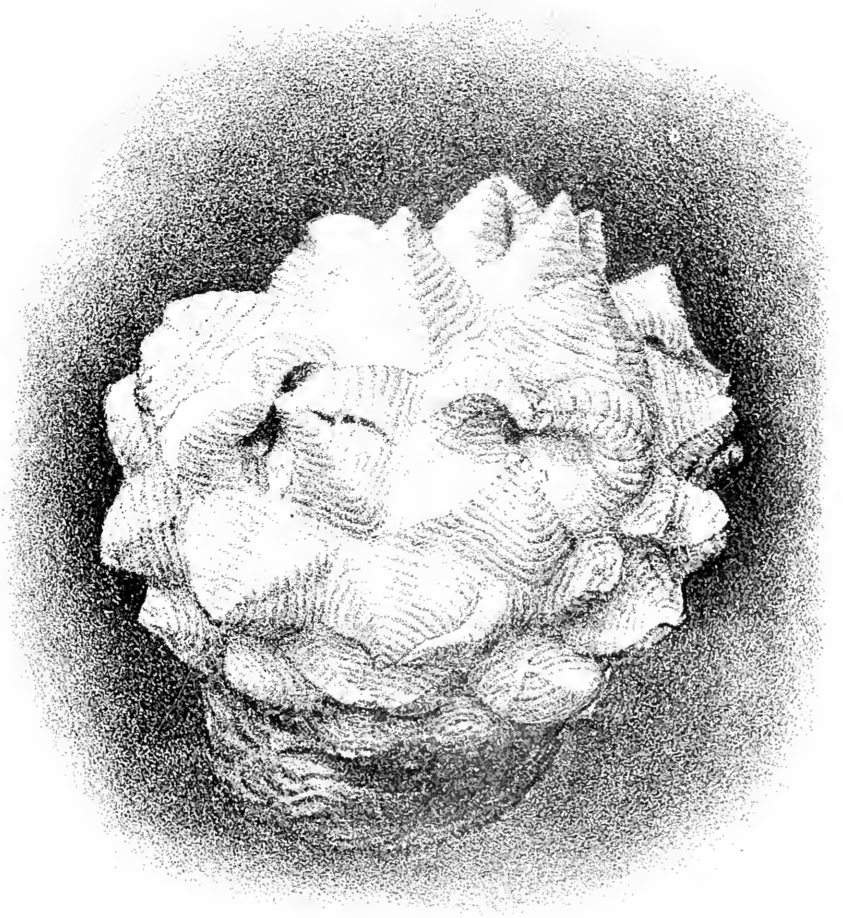
SYMPLOCOS Linn. (Styracaceæ)
SYMPLOCA Kutz, 1843. (Algæ)

The following two names, although not absolutely identical, are too nearly so to be admissible. In pronunciation they would be entirely indistinguishable.

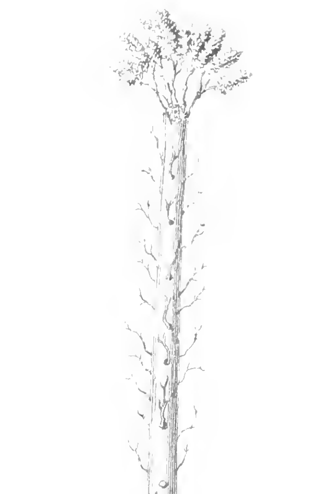
HENRIQUEZIA Spruce ex Benth in Hook. Jour. Bot. vii. 338. (Rubiaceæ)

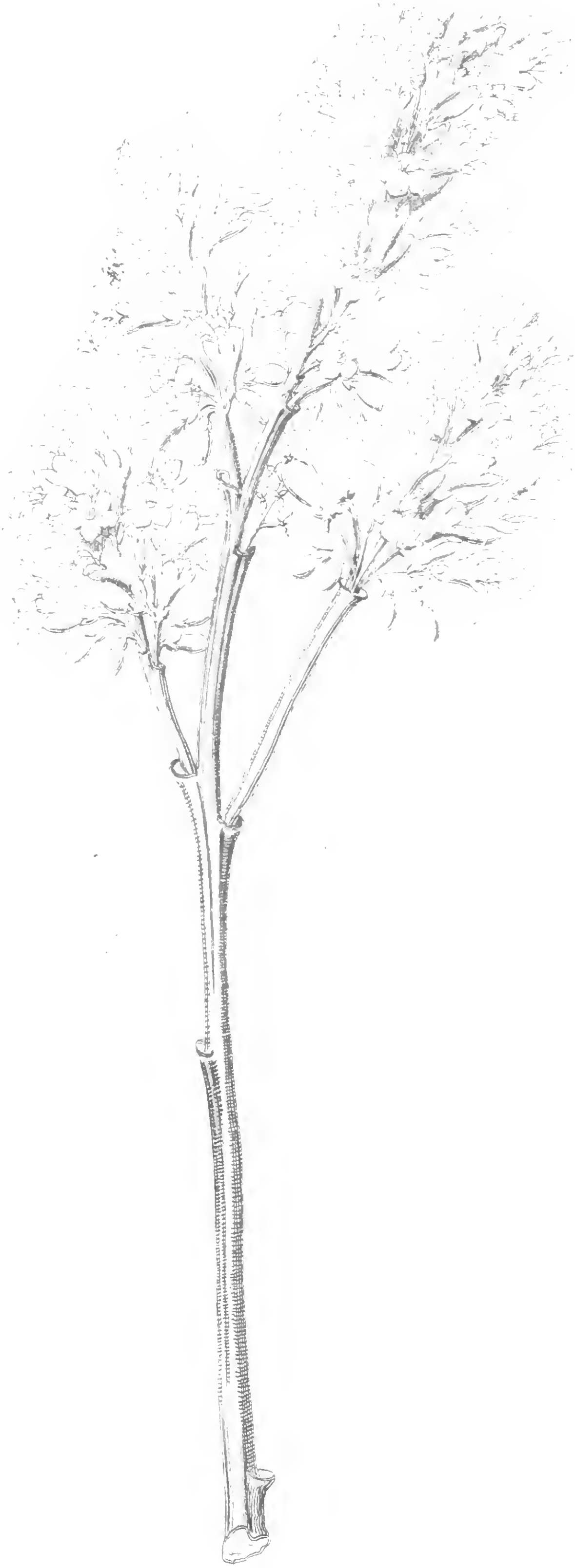
HENRIQUESIA Pass. & Thum. Cont. Myc. Lus. (Fungi)

PLATE I.



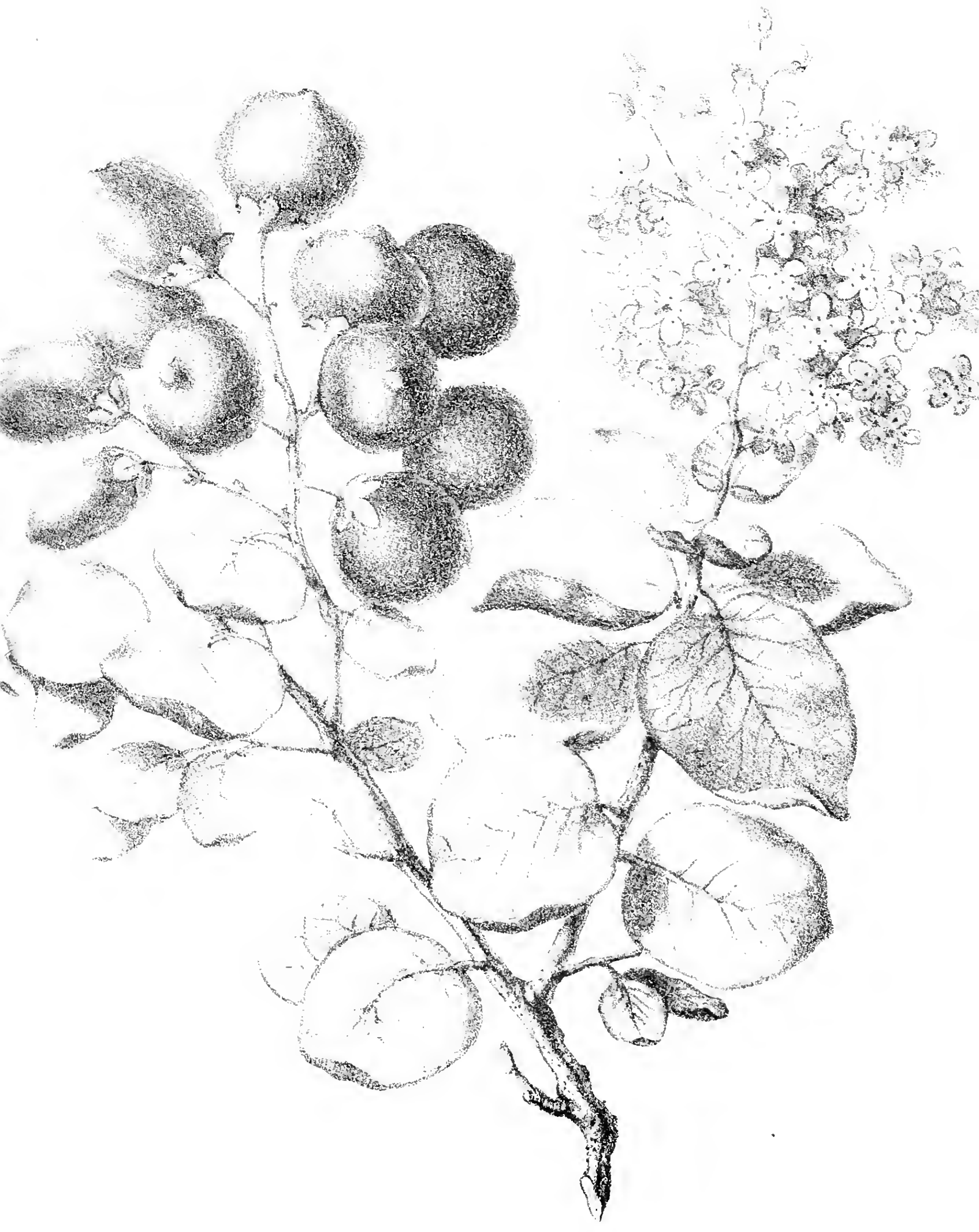
Lycoperdon sculptum.





VEATCH'S ELEPHANT TREE.

(Rhus Veatchiana — Kellogg.)



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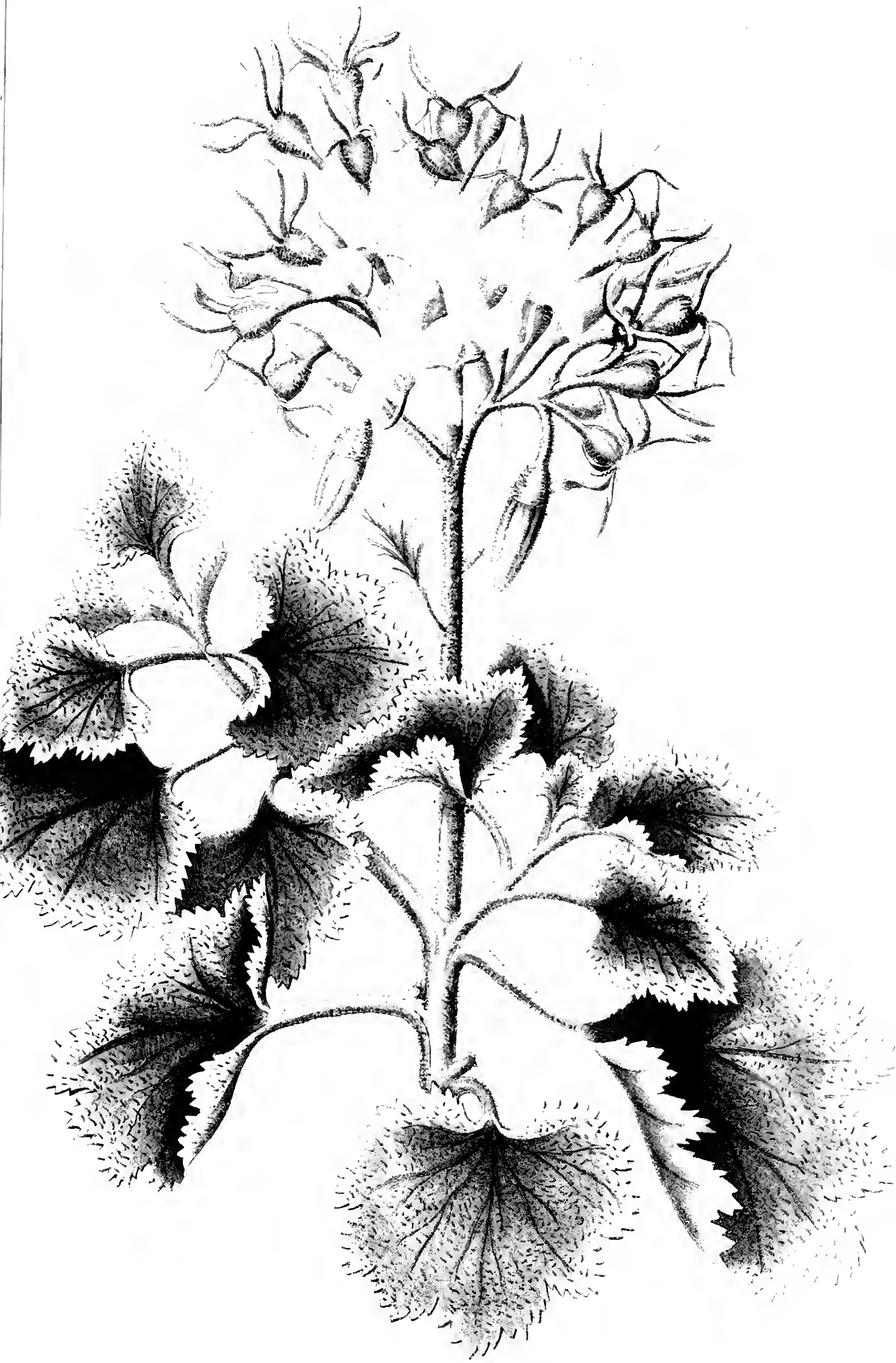
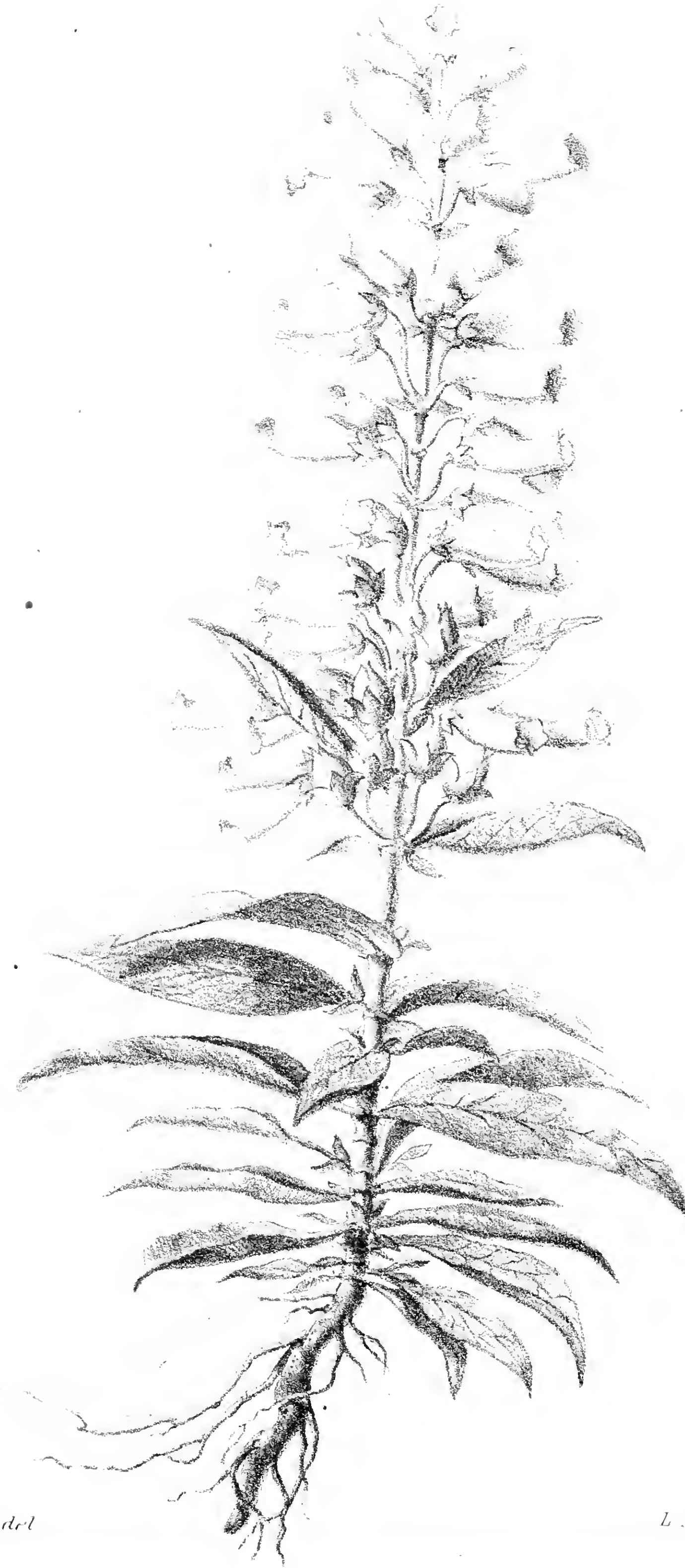
LENT'S SUMACH

Rhus Lentii — Kellogg

VEATCH'S TREE PRIMROSE





D.D Neal del *L Nagel Print.*

HUMMING BIRD'S DINNER HORN

EDIBLE GALPHIMIA, OR GOAT & DEER NUT.

(*Galphimia pabulosa* – *Kellogg*)

W. H. Neal del. | I. Nagel Print

GOLDEN BLOOMERIA.

Bloomeria Aurea — *Kellogg*

D. B. Neal

LEOPARD LILY

Lilium Pardalinum, Kellogg

Drawn from Nature Expressly for the HESPERIAN

BULLETIN

OF THE

CALIFORNIA

ACADEMY OF SCIENCES.

No. 4.

JANUARY, 1886.

CONTENTS.

ISSUED JANUARY 31st, 1886.

BULLETIN.

No. 4.

California Academy of Sciences.

STUDIES IN THE BOTANY OF CALIFORNIA AND PARTS ADJACENT.

BY EDWARD LEE GREENE.

II.

1. Three New Genera.

BEBBIA, *Helianthoidearum.*

Heads homogamous, discoid. Involucre campanulate; bracts imbricated, appressed, striate. Receptacle chaffy throughout; bracts lanceolate, partly embracing the akenes, equaling those of the involucre, persistent. Corollas tubular, 5-toothed, deep yellow. Akenes turbinate, slightly obcompressed, the angles (2 lateral and 1 dorsal) obtuse. Pappus a single series of long, slender, strongly plumose, persistent awns or stout bristles. Much branched, suffrutescent plants of the dry southwestern districts, with few and mostly opposite leaves, and scattered heads. *Carphephorus* § *Kuhniodes*, Gray, Proc. Am. Acad. viii. 632; Bot. Cal. i. 301, and Syn. Fl. ii. 113.

The long, plumose awns or bristles of the pappus, and the striate bracts of the involucre are the only characters

[Issued August 29, 1885.]

which suggest any affinity of these plants with the Eupatoriaceæ; for the corollas are neither purple nor even ochroleucous, but deep yellow; and authors appear to have overlooked altogether the shape of the akene, which is wholly that of the Helianthoideæ. The style-tips, moreover, are those of that tribe, and not of the one to which the Atlantic genus, *Carphephorus* belongs. Both the striate involucres, and the plumose pappus are found in other Helianthoid genera. Yet the place for this genus is not near either *Blepharipappus* or *Blepharizonia*, whose involucral scales are uniserial. It is nearer to the subtribe Verbesineæ by its much imbricated involucre, as well as by the roughness of its herbage, sunflower-like odor and general habit. Doubtless it ought to constitute a distinct subtribe, to come in between those here named. The genus is dedicated to Mr. Michael S. Bebb, of Rockford, Illinois, an able botanist, to whom all students of the science on the Pacific Coast are indebted for the careful elaboration of our species of the difficult genus *Salix*, in the second volume of the Botany of California.

B. juncea. *Carphephorus junceus*, Benth. Bot. Sulph. 21; Gray, Proc. Am. Acad. viii, 632, Bot. Cal. i, 301, and Syn. Fl. ii, 113.

This plant grows in perfection on Cedros Island, in arroyos near the sea, where it commonly attains the height of six or eight feet, its lithe, woody stems supporting themselves amid the branches of *Rhus Lentii*, or more frequently uniting with the similar looking *Antirrhinum junceum* to form large, impenetrably dense reedy masses as broad as high. The stems are nearly leafless and rather smooth, and the heads solitary and a good deal larger here than within the limits of the United States; but this southwestern form is the type of the species. The following may eventually prove distinct, namely:

Var. **aspera.**

Only a foot or two high, very rough, with a short, somewhat hispid pubescence; heads smaller and numerous; involucral bracts narrower and less striate; pappus fully equaling the flowers. Southeastern borders of California, and adjacent Arizona.

B. atriplicifolia. *Carphephorus atriplicifolius*, Gray, Proc. Am. Acad. v. 159; Bot. Cal. l. c. and Syn. Fl. l. c.

MIMETANTHE, *Scrophularinearum.*

Calyx campanulate, 5-cleft, the tube somewhat 5-sulcate, neither angled nor ribbed; lobes unequal, the uppermost largest. Corolla tubular-funnelform. Stamens 4, didynamous. Style glabrous; stigma bilamellar. Capsule oblong-ovate, rather acuminate, equaling the calyx, not gibbous at base, minutely glandular, chartaceous, dehiscent by the whole of the upper suture, by the lower only to the base of the apical acumination, both valves in dehiscence strongly reflexed in so far as separated; placentæ borne on the middle of the valves, many seeded. Seed minute, oblong-ovate, yellowish, under the microscope favose-reticulate and glandular. *Herpestis.* § *Mimuloides*, Benth., in DC. Prod. x, 394; Gray, Bot. Cal. i, 569; Syn. Fl. 279; Greene, Bull. Cal. Acad. iii, 122. A villous and glandular annual of the Pacific Coast, with a sickening, solanaceous odor, the small yellow corolla simulating that of *Mimulus*, but the plant in all other respects unlike that genus. The peculiar dehiscence, with the singular bending back of the valves, will hardly be observable in herbarium specimens, which are almost always too young to show it; but in autumn or midwinter, when the foliage and calyces are decayed, and the capsules alone persist upon the dead stems and branches, this character becomes conspicuous. There is but a single species, ranging from Lower California as far down as All Saints Bay at least, northward to Washington Territory (*fide* Brandegee), namely:

M. pilosa.—*Herpestis*, Benth. in Comp. Bot. Mag. ii, 57. *Mimulus exilis*, Dur. and Hilg. Pac. R. Rep. v. 12, t. 12. *M. pilosus*, Watson, Bot. King, 225; Gray, l. c.; Greene, l. c.

CLEVELANDIA. *Scrophularinearum.*

Calyx tubular-campanulate, 4-cleft. Tube of corolla slender; limb bilabiate, upper lip short, spreading, bifid, lower with three spreading lobes, neither saccate nor plicate. Stamens 4, didynamous, wholly included within the corolla-tube; anthers 2-celled, the cells unequal. Style filiform, stigma entire. Capsule oblong, loculicidally 2-valved, the valves bearing the placenta on their middle. Small annual of the southern part of Lower California.

C. Beldingi. *Orthocarpus Beldingi*, Greene, Bull. Cal. Acad. iii. 123.

The characters of the corolla and stamens forbid, as Dr. Asa Gray has suggested, the placing of this plant in *Orthocarpus*. The genus is dedicated to Mr. Daniel Cleveland, of San Diego, whose intelligent field labors in Californian Botany have well earned this acknowledgment.

2. *Miscellaneous Species, Mostly New.*

Eschscholtzia elegans.

Annual, a foot or two high, branching above the base, glabrous and very glaucous: leaves finely dissected, their ultimate divisions linear, long and parallel or shorter and divergent: torus cylindrical, the two margins closely approximate, the inner one erect and hyaline: petals 4—8 lines long, rotate-expanding, their margins hardly meeting, greenish yellow when fresh, turning toward orange in drying: seed slightly elongated, apiculate, raphe-obvious, reticulation distinct or obscure.—*E. Californica* var. *hypecoides*, Gray, of Watson's list, as to the plant of the south part of Guadalupe Island, not of Bot. Cal.

Var. **ramosa.**

Shorter, stouter, more branching and leafy: leaf-lobes shorter and divergent: corolla smaller, reddening less in drying: seeds nearly globular and distinctly reticulate.

The type is common in the middle and southern parts of the island. The variety was found under high cliffs near the landing at the northeast end. The foliage in both forms is strikingly beautiful. The erect, compact, tree-like habit of the variety is peculiar. Very likely it deserves the rank of a species. Nothing much like either form is known on the main land. The nearest relatives are *E. minutiflora*, Watson, and *E. rhombipetala*, Greene.

Eschscholtzia peninsularis, Greene,

Is the common species all about San Diego. It is strictly annual and flowers from February to the beginning of May.

Eschscholtzia Californica, Cham.,

Does not appear in the southern part of the State except at considerable altitudes in the mountains. Mr. Parish has observed it at San Gorgonio Pass, and it has been collected by the writer at Tehachapi Pass and on Guadalupe Island. In all these localities it is the same robust, large-flowered perennial so well known from San Francisco to the borders of British Columbia.

Eschscholtzia Parishii.

Annual, slender, less than a foot high, glabrous and glaucous: stems simple or sparingly branched: peduncles terete, very slender: torus turbinate, no spreading rim, the two margins similar and approximate: petals widely spreading, broad and overlapping each other, apparently light yellow: fruit not seen.

Eastern slope of Mt. San Jacinto in the Southern part of the State, collected by the Parish Brothers (No. 759) in April, 1882. In habit resembling *E. peninsularis*, but with the torus and corolla (but not the quadrangular peduncles) of *E. tenuifolia*. The different corolla, the long, slender peduncles and the leaves (mostly radical) are in the way of its being included in *E. elegans* of Guadalupe, to which it is apparently most related.

Lupinus Guadalupensis.

Annual, near *L. nanus*, but stouter and more villous: stem a foot or two high, branching from about the middle: leaflets 7—9, oblanceolate, an inch long, villous on both sides: petioles three inches long: bracts much exceeding the calyx: upper calyx-lip 2-cleft: corolla a half inch long, bluish-purple: pod two inches long, 6—8-seeded.

High plateau of Guadalupe Island, in good fruit, but nearly past flowering the 23d of April. A coarser plant than *L. nanus*, with shorter branches, none of them from the base of the stem.

Lupinus Ludovicianus.

Suffrutescent, stout, branching, a foot or two high: very villous-hirsute on the branches and petioles, and throughout, even to the bracts, calyx and legume densely white-tomentose: petioles stout, firmly erect, 2—3 inches long: leaflets 7—9, broadly oblanceolate, obtuse, 8—10 lines long: flowers purple, of medium size, subverticillate, in a short-peduncled, rather dense raceme: bracts short: calyx-lips sub-equal, broad, entire: keel strongly falcate, surpassing the other petals, somewhat woolly-ciliolate: pod an inch long, 5-seeded.

Mountains above San Luis Obispo, July, 1885; Mrs. Curran. The species is nearest *L. niveus* of Guadalupe Island, but has pubescence of a very different character, and is, moreover, a stouter, less graceful plant.

Hosackia (Euhosackia) argyræa.

Densely appressed-silky: stems numerous from a perennial root, rigid and nearly prostrate: stipular glands small, hidden by tufts of white hair: leaflets a half inch or less long, oblong-obovate, very obtuse, about five on a well developed, broad rachis: peduncles an inch long, about 2-flowered: calyx-teeth broadly lanceolate, half the length of the tube:

corolla a half inch long, salmon color, changing to orange in drying: pod terete, silky-pubescent, an inch long.

Lower California; collected in the Cantillas Mountains, October, 1884, by Mr. C. R. Orcut; also at Cape San Quentin, May, 1885, by the writer.

Hosackia (Euhosackia) mollis.

Densely soft-pubescent, with short, spreading hairs: root perennial: stems numerous, rather slender, a foot long, or nearly so: stipular glands small: leaflets 3—5, narrowly oblong to linear, acute, palmately crowded on a very short rachis: peduncles an inch or two long, erect; umbels about 2-flowered, the subtending bract when present narrowly linear: calyx-teeth linear-subulate, longer than the tube: corolla a half inch long: light yellow, drying reddish: pod an inch or more in length, terete, velvety-pubescent.

Grassy places among the lower mountain districts of the southern parts of New Mexico and Arizona, and in adjacent Mexico. Lemmon, No. 2669, Huachuca Mts. Also collected by Rusby, the writer, and others.

Hosackia (Syrmatium) ornithopus.

Densely silky: stems erect-spreading, a foot high, from a suffrutescent base, much branched above: leaflets 5—7, oblong, 3—6 lines long, acute at each end: umbels numerous, 12—20-flowered, on short, erect, simple-bracted peduncles: calyx-teeth subulate, half as long as the tube: pod thrice the length of the calyx, rostrate-attenuate, strongly curved upwards, strongly pubescent, 2—3-seeded: seed slightly curved.

Frequent in the middle of Guadalupe Island, and no doubt the *H. argophylla* of Mr. Watson's list. Dried specimens would hardly show the peculiar erect-spreading habit: but fruiting ones could hardly with their long exserted, curved pods, resembling bird's claws, be confounded with *H. argophylla*. The pubescence of the calyx is denser, and spreading, not appressed as in that species.

Hosackia (Syrmatium) disticha.

Canescent, with a short, appressed, silky pubescence: root perennial: stems stout, 2—3 feet high, erect and recurved; branches short, strictly in two ranks: stipular glands minute: leaflets 3—5, obovate, acute: umbels very short-peduncled, 2—3-flowered: calyx-teeth subulate, half the length of the tube: corolla 3—4 lines long, reddish, turning dark brown: pods (immature) nearly an inch long including the slender beak.

Cape San Quentin, Lower California, May 10, 1885. A well marked species, the tall tufted stems not at all decumbent, but erect at base, the upper portion, with its distichous branches, gracefully curving downwards.

Astragalus fastidiosus.

Inflati: tomentose-canescent, a foot high, suffrutescent at base: stipules triangular-subulate, deflexed: leaflets in many pairs, oblong, retuse, 3—6 lines long: racemes short, on peduncles exceeding the leaves: calyx-teeth sharply subulate, half as long as the campanulate tube: corolla greenish white: pod an inch long, of parchment-like texture, oblong-ovate, acuminate above, at base tapering to a short, included stipe.—*Phaca fastidia*, Kellogg, Hesperian iv. 145, with fig. *Astragalus Coulteri (?)*, Bull. Cal. Acad. iii. 136.

Fresh specimens, collected by the writer recently on Cedros Island. settle negatively the question of the identity of this plant with *A. Coulteri*, Benth. Dr. Kellogg's figure is faulty. The racemes are shorter and denser than represented, and the pods are not erect, but deflexed.

Astragalus anemophilus.

Inflati: perennial, white-tomentose throughout, leaflets numerous, somewhat crowded, obovate or oblong, acutish, 3—6 lines long: peduncles rather stout, twice the length of the leaves; raceme short and dense: calyx-teeth triangular, acute one third the length of the short-cylindrical tube:

corolla small, greenish: pod purplish, soft-pubescent, thin-bladdery, $\frac{3}{4}$ inch long by $\frac{1}{2}$ inch thick, obtuse at both ends, neither suture intruded, not stipitate.

Cape San Quentin, Lower California, May 10, 1885, growing on the tops of the bleakest sand-hills, near the sea, exposed to the incessant winds of that point of the coast; the stems, of uncertain length, alternately buried and uncovered by the loose shifting sands.

Lyonothamnus asplenifolius.

Leaves opposite, minutely stipulate, coriaceous, pinnately parted into 3—5 linear-lanceolate, remote segments, which are two inches long, and pinnatifid with many rounded lobes: calyx, corolla, stamens, etc., as in the typical species: carpels two, ovate, and, although not yet mature, almost woody, each (perhaps parting into two valves when mature) about 4-seeded: seeds pendulous, membranaceous-winged.

Santa Cruz Island, off Santa Barbara; Mr. Barclay Hazard, 1885. A most beautiful tree, with ample, fern-like, shining foliage, and a red-brown bark, easily torn off in long strips. The inflorescence and young foliage show some of the soft pubescence, which is more plentiful on *L. floribundus.* The fruit of this species, although not yet ripe, as well as the stipules, confirm the genus in *Rosaceæ*, and show it to be rather too near *Vauquelinia;* really a section of it.

Œnothera (Chylismia) Cedrosensis.

Branching from the base, a foot or two high: hirsute-puberulent and slightly viscid-glandular: leaves simple, ovate or more elongated, somewhat cordate at base, repandly toothed, short-petioled: calyx-tube narrowly funnel-form, a half inch long: petals 2—3 lines long, cream-color, changing to rose: capsule an inch long: pedicel only a line or two long: seed ovate and a little angular.

Collected on Cedros Island by Dr. Veatch, in 1859, and recently by the writer, in a single specimen, on a hillside near the watering place for vessels, on the eastern shore. The species is nearest *Œ. cardiophylla*, Torr.

Œnothera (Sphærostigma) crassifolia.

Frutescent, 3—5 feet high, parting above into numerous spreading, virgate branches: leaves fleshy, glabrous, and very glaucous, oblong-lanceolate, an inch or two long, entire, sessile: calyx-tube short-obconic: petals an inch long, light yellow, the lower portion streaked with crimson, the whole drying deep orange: capsules glabrous, more than an inch long, much contorted: seeds ovate-oblong, smooth, purple-dotted.

Cape San Quentin, Lower California, May 10, 1885. A tall and graceful shrubby species, with a very beautiful corolla.

Petalonyx linearis.

Shrubby, a foot or two high, very rough, branches numerous, erect: leaves linear to linear-oblong, an inch long, 1—3 lines wide, entire, obtuse, sessile: floral bracts ovate, cordate, obtuse, crenate-toothed at base: spikes 2—4 inches long: petals white, 2—3 lines long: filaments and style a half inch: capsule a line long, 3-nerved at base.

Cedros Island, May 1, 1885. Common in cañons of the middle of the island, on the eastern side. The foliage and inflorescence are smoother than in *P. Thurberi*, Gray, the branches rougher. Mr. Orcutt also finds the same at St. Tomas, on the peninsula.

Echinocystis (Megarrhiza) macrocarpa.

Nearly glabrous: leaves about 6 inches broad, with a closed sinus, 5-cleft to the middle or below it, the divisions slightly 3—5-lobed, mucronate: fruit ovoid-oblong, 3—5 inches long, usually densely echinate with spines which, though stout are rather soft, the longest often exceeding 2 inches, 14-seeded, 12 of the seeds arranged ascendingly or imbricately, in four cells, the other two lying horizontally across the base of the fruit, both attached to the same side: seed obovoid, 9 lines long, light brown, encircled by a dark, marginal line.—*Megarrhiza Californica*, Watson in Bot. Cal. i. 241, as to the plant of Bigelow from Cocomungo.

A species most distinct from *E. fabacea*, Naud. (*M. Californica*, Watson) which has a globose, 4-seeded fruit, with seeds of twice the size of those of the present species, and which appears to inhabit only the central portions of the State. *E. macrocarpa* takes its place from perhaps Santa Barbara, or a little farther northward, down the peninsula as far at least as Cedros Island.

Concerning the fittest generic name for these plants, it seems to the writer best to conform to that adopted by all European authorities; although if the tropical and South American species referred to *Echinocystis* should not present any clear gradations between such seeds as those of the original *E. lobata* and these turgid ones of the Pacific North American species, one might fairly regard the latter group as constituting a real genus; but *Megarrhiza* could not stand as the name for it, when there is another which has the priority by more than twenty years.

There is one species which does not appear yet to have obtained recognition under *Echinocystis*, namely:

Echinocystis (Megarrhiza) Gilensis, *Megarrhiza Gilensis*, Greene, Bulletin Torr. Club, viii. 97.

Inhabiting the region of the upper Gila River in Arizona and New Mexico; resembling in its slender habit and small leaves and fruit, the eastern type of *Echinocystis*, but with the turgid, immarginate seeds, and perennial root of the Pacific sub-genus.

Pentachæta (Eupentachæta) paleacea.

A span high, with very numerous filiform branches: involucres small, scales in two series, pubescent, setaceous-tipped: corollas of ray and disk yellow: akenes nearly linear;

pappus-bristles 5, slender, with a thin, triangular palea at base.

Santo Tomas, Lower California, July 1885. C. R. Orcutt. A peculiar species in respect to the paleaceous pappus; in other respects much like *P. aurea*, although a great deal smaller, and more diffusely branching.

Aplopappus junceus.

Near *A. spinulosus*, but more slender, sparingly leafy, the stems tufted, and two feet high, from a woody base: leaves linear, the lowest broader and pinnatifid, the upper often only three-toothed at apex, lobes and teeth all spinulose-tipped: heads few and corymbose, a half inch high: involucres turbinate, glandular-scabrous, not at all pubescent; scales setaceous-tipped: rays numerous, light yellow: akenes conspicuously nerved. *A. gracilis*, Gray Syn. Fl. ii. 130, as to the plant of the "southern border of California."

San Diego County; Cleveland, Mrs. Curran, and on the peninsula as far down as S. Tomas, Orcutt, 1884–5. Very clear of *A. gracilis*, by its suffrutescent, tall, reedy stems, turbinate involucres and distinctly nerved akenes. It is more related to the more easterly species, *A. spinulosus*, but that, also, like *A. gracilis*, has hemispherical involucres, and both are canescent, this nearly glabrous.

Lessingia adenophora.

Erect, a foot or two high, and much branched: radical leaves wanting in the specimens: lower cauline ovate-oblong, an inch long, sessile by a broad base, sharply toothed; upper broadly ovate, acute, more or less cordate-clasping; all floccose woolly on both sides, the glabrate margins, especially of the upper, closely beset with stipitate glands: heads 3—4 lines long, 5—8 flowered, terminating slender branchlets: outer involucral scales stipitate-glandular, the inner sharply acute and with barbellate margins: corollas purple: style-appendages bearing a tuft of hairs, but no cusp: akenes not compressed, strongly 5-angled: pappus short, arranged in five separate bundles, which are more or less united at base, or sometimes completely joined into a flat, barbellate awn!

Near Epperson's, in Lake County, 1884; Mrs. M. K. Curran. In aspect much like *L. ramulosa:* but with its broad, glandular marginal leaves it also appears distinct enough at sight; but the character of the pappus is very remarkable.

Lessingia nemaclada.

A foot or two high, paniculately parted into slender branches and numerous filiform branchlets: leaves lightly floccose above, beneath, as are the involucres, minutely glandular-roughened: involucres solitary, terminating the branchlets, 3—5-flowered, their scales with spreading tips: style-appendages with prominent, subulate tip: pappus of few or many awn-like bristles, which are sometimes united at base, as in the preceding.

El Dorado and Colusa Counties, 1883–4; Mrs. Curran. Evidently a common species in those parts of the State; not likely to pass into the preceding, the involucres of which have appressed scales, and whose style-tips are without cusp. Readily distinguishable from equally slender states of *L. ramulosa* and *L. leptoclada* by its pappus. These two species will form a separate group in the genus.

Lessingia Parryi.

Somewhat woolly throughout: stems 2—10 inches high, erect and, as compared with *L. nana*, very slender; heads solitary, or few and spicately arranged at the ends of the branches, 12—18-flowered: involucre 12—18-flowered, its bracts as in *L. nana:* corollas pink: pappus rufous: style appendages bristly, but without pointed tips.—*L. nana*, var. *caulescens*, Gray, Syn. Fl. ii. 163. Found in oak openings above Keene Station, Kern County, in September, 1881, by

Dr. C. C. Parry; also in the same neighborhood in 1884, by Mrs. Curran. This and *L. nana* form a group by themselves, well marked by the peculiar, cartilaginous-aristate, inner scales of the involucre. The stemless habit signifies nothing. Even *L. ramulosa* I have found in the same condition, and it is perhaps rare in *L. nana*, most of our specimens of which have branches 3—5 inches long. These are very stout, rigid and depressed or prostrate. This character, together with its denser wooliness, larger heads, and the deep sultan-red of both the corolla and pappus, the brilliant coloring of the latter being as fresh in our 20-year-old specimens as in those collected last season, are of specific value in this genus. In the slender, erect *L. Parryi*, the corollas are pink, and the pappus only reddish brown. This should come in before *L. nana*, as being intermediate between that and *L. ramulosa.*

Franseria camphorata.

Shrubby at base, a foot or two high, with spreading branches; canescent-tomentose throughout, resinous, and with a strong camphorate odor: leaves sharply triangular-ovate in outline, bipinnatifid: sterile racemes rather loose, their involucres very sharply toothed, on pedicels 3—4 lines long; fertile involucres densely glandular-pubescent, globose, with short, stout, spine-tipped tuberculations, mostly 3-seeded.—*F. bipinnatifida*, Gray, Proc. Am. Acad. xi. 115.

Collected by the writer on Guadalupe, and also in a less tomentose state on Cedros, 1885. A most distinct species: the 3-seeded involucres small and bony, their spiny tuberculations not flattened.

Lasthenia (Hologymne) Coulteri. *L. glabrata*, var. *Coulteri* Gray, Syn. Fl. i, Part ii, 324.

The discovery of the new genus *Crockeria*, a plant wholly undistinguishable from the common *Lasthenia glabrata*, except by the akenes, is an event which naturally raises the value of characters of the fruit in the entire group to which they belong. But specific rank for the plant above named might have been defended independently of *Crockeria*. Although there is not the least difference between them as regards habit, foliage or flower, the akenes in *L. glabrata* and *L. Coulteri* are considerably more unlike than is indicated in the Synoptical Flora. In *L. glabrata* they are dark green, perfectly smooth and shining, and bear a very conspicuous, yellowish, globular tubercle (enlarged style-base?) at the apex. Those of *L. Coulteri*, besides being narrower, with less acute angles, are of a grayish hue, without luster, glandular-muriculate throughout, with a depressed terminal disk which cannot well be called a tuberculation. The plant thus proposed as a new species, appears to be confined to the salt marshes of San Diego County. *L. glabrata*, Lindl., is common everywhere, on a great variety of soils, towards the sea, in the central and northern portions of the State. *Crockeria chrysantha*, Greene, was found in a subsaline marsh of the remote interior, near Tulare, in Kern County. It may be found elsewhere when our collectors have learned never to judge any plants of this little group by the outward appearance, but always to bring a good lens to bear upon the akene before passing them by uncollected. A skilled botanist would easily mistake any one of the three here named for one of the others, without such precaution.

Senecio ammophilus.

Annual; a span high, stout, glabrous: leaves thick and succulent, the lowest oblanceolate, entire, an inch or two long; cauline auriculate-clasping, pinnately parted into oblong or linear, entire, obtuse segments: heads few or solitary at the ends of the numerous decumbent branches: rays rather short, deep yellow: akenes cinerous-pubescent.

Cape San Quentin, Lower California, on bleak sand hills near the shore, growing with *Abronia maritima*. Very near *S. Californicus*, but differing in its depressed habit, very fleshy herbage, strongly saline and hard to dry, and its longer, less canescent akenes.

Senecio Cedrosensis.

Shrubby, about a foot high, much branched above; branchlets and foliage somewhat pubescent and glandular: leaves an inch or more long, oblong-lanceolate, deeply pinnatifid, the short lobes deeply toothed: heads in threes, or solitary at the ends of the branchlets, less than a half inch high: involucral scales narrow, acuminate: flowers not seen.

Rocky summits of the northern part of Cedros Island, 1885. The specimens are not in flower, but the peculiarities of habit and foliage mark strongly enough a new species. The leaves are like those of *Pedicularis Canadensis.*

Stephanomeria coronaria.

Annual or biennial, resembling *S. exigua*, but the numerous white-plumose pappus-bristles deciduous above the abruptly paleaceous base, leaving a crown of setose scales: akenes clavate, sharply 5-angled and quite smooth, with no traces of corrugation.

Santa Lucia Mountains, August, 1885, T. S. Brandegee.

Hieracium Brandegei.

Perennial, a foot or two high, paniculate from near the base: leaves spatulate-oblong to ligulate-lanceolate, entire, crinite-hirsute, and with some close, white, stellular tomentum, the latter extending to the branches and the glandular involucre: flowers yellow: akenes short-columnar: pappus nearly white.

Santa Lucia Mountains, T. S. Brandegee.

Malacothrix (Malacolepis) insularis.

Annual, glabrous, a foot or two high, corymbosely paniculate above, leafy below: leaves oblong-lanceolate in outline, laciniate-cleft to the middle, two inches long, sessile and somewhat clasping: involucre hemispherical, less than a half inch high, scales narrower and less scarious than in *M. Coulteri:* corolla yellow: akenes obtusely 5-angled and 15-ribbed: one or two of the pappus-bristles persistent; those of the receptacle sparse and short.

Coronados Island, near San Diego, May 16, 1885. Interesting as a second species of a peculiar section of the genus, and singular in being restricted to a small island only seven miles distant from the main land, a strange limitation of an annual composite; yet perhaps not so remarkable when we consider that the pappus, all but one or two bristles, is deciduous.

Malacothrix altissima.

Glabrous; stout and strict, 3—6 feet high from an annual root: stem leafy and simple up to the broad terminal, leafless, corymbose panicle: leaves of broadly lanceolate outline, 2—3 inches long, rather loosely laciniate-cleft or coarsely toothed: involucre campanulate, a half inch high; calyculate bracts numerous, subulate: summit of immature akenes with a broad white border: none of the pappus-bristles persistent.

Mountains of Kern County, near Tehachapi Station, July, 1884, Mrs. Curran. The largest species of the genus, and of the same group as the two following which are suffrutescent, and very clearly distinct from each other, as Mr. Nuttall, the discoverer of them, could not fail to see at a glance, namely:

M. saxatilis, Torr. & Gray,

Which is a strictly maritime species; leaves not only entire, but of that succulent texture which is so common in sea-side plants, and akenes one half as long only, as in the following.

M. tenuifolia, Torr. & Gray.

Foliage finely laciniate-parted, and not at all fleshy. Confined to the mountain districts back from the sea. *M.*

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saxatilis var. *tenuifolia,* Gray, Syn. Fl. 423. But for the fact that this mountain plant is there separated into two species, *M. saxatilis* and *M. tenuiflora* are best defined in that excellent old book, Torrey and Gray's Fl. N. Am. vol. ii. p. 446–7.

Nemacladus capillaris.

A span to a foot broad and high, very diffuse, the branches almost capillary, glabrous throughout: radical leaves spatulate-oblong; cauline linear-subulate, minute: pedicels capillary, divaricate or a little recurved: calyx-tube slender, long-turbinate, adnate to the lower half of the ovary, teeth ovate, obtuse, half as long as the tube, a little surpassed by the rounded summit of the 7—12-seeded capsule: corolla very minute, white: stamineal tube distinct: seed oblong-oval, 10-striate, with numerous transverse lines forming distinct, elongated reticulations.

Mohave Desert, 1884, Mrs. Curran; also a single specimen from Mr. Cleveland, probably from Lake County, 1882.

In this largest, yet most finely capillary species, the mature calyx and capsule are pyriform, and do not exceed a line in length. The stamineal tube though permanent is short, to correspond with the exceeding minuteness of all the other floral organs. It is clear, however, that the filaments in this, as in each of the following new species, and in the *N. longiflorus*, Gray, are long-monadelphous, that is, united for nearly their whole length into a filiform tube. In the original *N. ramosissimus*, Nutt., they are joined firmly, for a very short distance only, just beneath the anthers. In *N. rigidus*, Curran, they are similarly united, but so slightly that the earliest growth of the ovary forces them asunder, so that before falling away they become entirely distinct and free. The seeds in all the species appear to furnish good characters. I have described them as seen under a magnifying power of about twenty diameters.

Nemacladus rubescens.

Glabrous, like the preceding, and very similar in foliage and habit: pedicels divaricate or somewhat ascending: calyx-teeth twice as long as the very short tube which is adnate to the base only, of the globose, 20—40-seeded capsule: corolla apparently open-campanulate, without tube, from light rose-color to dark rose-red: stamineal tube elongated, equaling the calyx in length: seed oblong, with undulating striæ.

Reno, Nevada, and Mohave Desert; Mrs. Curran, 1884. Most of the Californian "*N. ramosissimus*" of earlier collectors appears to belong here; but the greatly elongated stamineal tube and the beautifully undulate-striate seeds will at once distinguish it from that species.

Nemacladus montanus.

Radical leaves spatulate-oblong, entire; whole plant glabrous, or with some villous hairs on the inner portion of the base of the pedicels and on the stem opposite: pedicels firmly ascending: calyx-teeth lanceolate, subequal and equaling the turbinate tube, which is adnate to the lower half of the 7—12-seeded capsule: corolla rather large, white, open-campanulate: stamineal tube elongated: seed large, ovate-oblong, with longitudinally compressed, zigzag reticulation.

Mountain districts of the central portions of the State: Butte County, Elisha Brooks; Lake County, D. Cleveland; Yo Semite Valley, Mrs. Curran. In respect to the paucity of the seeds, the species is like *N. capillaris*, but the reticulation of them is widely different.

Nemacladus pinnatifidus.

Glabrous throughout: radical leaves linear-lanceolate, once or twice pinnatifid, the cauline coarsely toothed: pedicels divaricate, abruptly bent upwards beneath the calyx: calyx-tube short-turbinate, the lanceolate teeth surpassed by the rather acute 15—25-seeded, oval capsule: seed short-oblong, flattened at each end, with longitudinally compressed, favose reticulation.

All Saints Bay, Lower California; collected by the writer, April 16 and May 16, 1885. Mr. Parish's 939, from S. Bernardino Mountains, 1881, is manifestly the same in a very immature condition. In this and the next the corolla is open campanulate, nearly regular, and so small as hardly to surpass the calyx.

Nemacladus tenuissimus.

Somewhat cinereous-puberulent throughout, or almost glabrous, very slender: radical leaves elongated linear, remotely dentate, the cauline entire: pedicels capillary, deflexed and appearing secund: calyx-teeth ovate, less than half the length of the turbinate tube, which is adnate to the base of the globose, obtuse 10—20-seeded capsule, which exceeds the calyx: seed short-oval, the favose reticulation very slightly compressed.

All Saints Bay, May 16; also in San Diego County, in the Jamul Valley, C. R. Orcutt.

Pholisma depressum.

Stems solitary, completely covered by the rhombic-ovate, or sometimes oblong, closely imbricated scales; flowers in a depressed, barely convex head, an inch or two broad: sepals 6, linear-filiform, minutely glandular-ciliolate: corolla tubular-funnelform, 6-lobed, lilac-purple: stamens shorter and style longer than in the typical species.

Cape San Quentin, Lower California, May 10, 1885. The fruiting specimens of the preceding year show the head to have attained, in maturing, a perfectly globose shape; but the mass of flowers appears nearly flat as it lies on the sand. This species is parasitic on roots of *Aplopappus Berberidis.*

Gilia (Leptodactylon) Veatchii, Parry in herb.

Shrubby and stout, a foot or two high, compactly branching, densely glandular-pubescent, viscid and very fragrant, leaves crowded, spreading, very rigid, acerose, those of the sterile branchlets commonly all opposite: corolla ochroleucous inside, bronze-purple without, lobes a half inch long, oblanceolate, the broad apex abruptly pointed: anthers linear-oblong, a little exserted from the throat: ovules 4—6 in each cell.

Cedros Island, common on stony hills, forming compact rounded masses a foot or two in breadth and height. First collected in fruit by Dr. Veatch in 1859; obtained in flower by the writer, April 30, 1885. The species is more like the northern *G. pungens*, than *G. Californica*, but is very distinct from both.

EUCRYPTA, *Nuttall, Pl. Gamb. in Journ. Acad. Philad.* Ser. 2, i. 158.

Calyx 5-parted, the sinuses naked. Corolla small, tubular-campanulate, without appendages. Capsule globose, 8-seeded, 2-valved, each valve in dehiscence liberating 2 oblong seeds, and long retaining concealed in a false cell formed by its wall and the placenta, as many meniscoidal ones. Seeds corrugated or smooth; testa not reticulate. Erect, paniculately branching, viscid Pacific-coast annuals, with small racemose flowers. *Ellisia* § *Eucrypta*, Gray, Proc. Am. Acad. x. 316; Bot. Cal. i. 505; Syn. Fl. ii. 157.

These plants are not at agreement with *Ellisia* in habit. But if they were, capsules of such remarkable structure, and with seeds of two sorts so strikingly dissimilar, neither sort answering to those of *Ellisia* or of any other Hydrophyllaceous genus, must, it seems to the writer, establish strongly enough a genus which was long ago well defined by an eminent authority. The name (meaning "well hidden") is very admirably appropriate; for the pair of flattened seeds (rarely by the abortion of one ovule, solitary) which lie between the wall of the valve and its placenta, are so closely sealed as to have escaped the detection of that great botanist, the late Mr. Bentham, into whose hands one or both of the species fell at an earlier date than that of Mr. Nuttall's treatment of them, and who therefore described the plant as if it had been a real *Ellisia*. Mr. Nuttall's two species seem good, and are now capable of clearer definition than he gave them.

E. chrysanthemifolia.

One to three feet high, stoutish and widely branching, very leafy; leaves ample and twice or thrice pinnatifid; racemes short and close, not much surpassing the leaves; calyx not stellate-spreading or accrescent in fruit; the lobes ovate, acutish: corolla light blue: free seeds, oblong-oval, corrugated, the concealed ones thin-meniscoid, smooth. *E. foliosa*, Nutt., l. c. *Ellisia chrysanthemifolia*, Benth. Trans. Linn. Soc.; A. DC. Prod. ix. 292; Gray, l. c. in part.

Common from San Francisco to San Diego, and on the islands to Guadalupe. Mr. Nuttall's specific name for this plant is good, but must yield before the prior one of Mr. Bentham.

E. paniculata, Nutt., l. c.

More slender than the last and less viscid: leaves fewer and mostly once pinnatifid: racemes loose and elongated, forming an ample panicle: calyx in fruit accrescent and spreading; segments oblong-oval, obtuse: corolla yellowish: free seeds more strongly corrugated than in the last; the concealed ones less meniscoid and with distinct traces of corrugation.

Probably not common in California. The specimens now in hand are all from Lower California where they were collected by Mr. Orcutt recently; the collector not unnaturally taking them for a new species of *Ellisia*.

Phacelia floribunda.

Annual; a foot or two high, widely branching; soft-hirsute throughout, and minutely glandular; leaves two or three inches long, one-third as wide, loosely bipinnately parted, the ultimate lobes crenate: spikes very numerous, crowded at the ends of all the branches: calyx-lobes small, foliaceous, pinnately 3—5-parted: corolla minute, pale blue, stamens scarcely exserted, capsule 2—4-seeded: seeds very dark, closely and deeply pitted. *P. phyllomanica*, var. *interrupta*, Gray, Proc. Am. Acad., xi. 87. Syn. Fl. ii. 161.

Lower parts of Guadalupe Island. In no wise resembling the gigantic half shrubby *P. phyllomanica*, Gray, of the upper precipices, except as regards the pinnately-parted calyx-lobes.

Eriodictyon crassifolium, Benth.

Densely tomentose-villous, the hairs straight: corolla salver-form, twice as long as the calyx, densely villous outside: seed finely about 10-striate, with innumerable minute transverse lines. Bot. Sulph. 45. DC. Prod. x. 183.

Common in the neighborhood of San Diego.

Eriodictyon tomentosum, Benth. l. c.

Very densely white or yellowish-tomentose, the hairs matted: corolla scarcely exceeding the calyx, only 2—3 lines long, somewhat urceolate, the inflated throat contracted under the minute lobes: seed-coat nearly smooth (indistinctly favose).

Newly collected by Mr. Brandegee in Monterey County, where it is common.

This and the preceding were unfortunately confounded by Dr. Torrey, in the Botany of the Mexican Boundary, and his view has been adopted by Dr. Gray, Proc. Am. Acad. x. 331. Bot. Cal. i. 518, and Syn. Fl. ii. 176, but no two species of the genus are more distinct. The former is more akin to *E. glutinosum*, as the seeds show, than to *E. tomentosum*.

Eriodictyon sessilifolium.

Six or eight feet high, the branches very leafy up to the flowers, glandular and sparsely hirsute: leaves glabrous and glutinous above, glandular and hirsute on the veins beneath, and somewhat tomentose between the veins, lanceolate-oblong, acutish, 3—5 inches long, coarsely serrate, margins of serratures revolute, all closely sessile by a broad, truncate or somewhat cordate-clasping base: calyx villous: corolla tubular-funnelform, a half inch long, villous outside, lilac-purple: seed unknown.

All Saints Bay, Lower California, April 16, 1885; but there are other specimens in the herbarium of the Academy, ticketed "Southern California, May, 1876, J. M. Hutchings," so the species occurs somewhere doubtless within the limits of the State.

Eriodictyon Lobbii.—*Nama Lobbii*, Gray, Proc. Am. Acad. viii. 37; Bot. Cal. i. 517; Syn. Fl. ii. 175.

Specimens from Donner Lake, collected last year by Mrs. Curran, present us with mature fruit, hitherto unknown. The capsule is 4-valved and 4-seeded, therefore precisely that of *Eriodictyon*, to which genus the plant conforms otherwise in its shrubby habit, resinous viscosity and wooliness, as well as in the attenuation of the sepals; for, in *Nama*, these enlarge upwards. The seed is of the same size as in other species of *Eriodictyon*, and is closely and minutely pitted.

Heliotropium (Euploca) Californicum.

Annual, with numerous stout, erect-spreading branches a foot long: strongly strigose; hispid throughout: leaves ovate, an inch long, short-petioled: corolla a half inch broad, not angulate lobed: anther-tips firmly coherent: nutlets smooth and glabrous.

Mohave Desert, June, 1884. Mrs. Curran. This is doubtless the "*H. convolvulaceum*" of Bot. Cal. i. 521, said to have been collected near Soda Lake by Dr. Cooper. It is evidently a good species, of which the abundant rigid and harsh pubescence, broad leaves, small corolla with a quite even (not in the least angular) border, and glabrous nutlets, are quite sufficient characters. It is a question whether this second species, so strictly conformed to the original *Euploca* in habit, does not call for the reinstatement of another Nuttallian genus.

KRYNITZKIA, Fischer & Meyer.

§ *Eukrynitzkia*, Gray.

K. rostellata.

Near *K. oxycarya*, but smaller and more slender, the lower leaves and branches opposite: calyx a line and a half long, rather equally hispid with spreading bristles which are straight at tip: nutlet solitary, smooth and shining, ovate-lanceolate, sharply acuminate, subterete, truncate at base, ventral groove bifurcate, and with a small, triangular, open scar.

Lake and Colusa Counties, 1884. Mrs. M. K. Curran.

K. sparsiflora.

Near the last species, but only a span high, with few slender branches inclined to be opposite; spikes few flowered, almost filiform: calyx less than a line long, clothed with short, ascending, hooked bristles: nutlet solitary, equaling the calyx, ovate, acute, smooth and shining, compressed, the ventral groove forked at the base but entirely closed.

Collected in 1884, by Mrs. Curran, the locality uncertain, but very likely the same as that of the preceding.

K. ramosissima, Gray, partly.

Annual, stoutish, rigid and densely paniculate-branching, a few inches to a foot high: leaves linear-oblong, mostly a half inch long, apparently fleshy, and the smallest subterete, beset with a few coarse, hispid hairs: spikes leafy-bracted: calyx setose-hispid and more or less white-villous; nutlet solitary, ovate-acuminate, brown, smooth and shining, ventral face flat, the groove closed and without any bifurcation, or opening at base.—Proc. Am. Acad. xx. 277, in small part only; the *Eritrichium racemosum*, Watson, (which is of § *Pseudokrynitzkia*) and the plants of Guadalupe and Cedros Islands being all excluded.

Mohave Desert, Mrs. Curran, 1884. We have also received the same from Mr. Orcutt. That this and the two following were confounded as one species is not unaccountable but that the shrubby *Pseudokrynitzkia* which Mr. Watson well named under *Eritrichium*, should have become associated with these, is rather inexplicable.

K. Cedrosensis.

Near the last but stouter and only sparingly branching, the branches decumbent or ascending; leaves larger and less setose: spikes leafy-bracted, short and somewhat glomerate at the ends of short branchlets: calyx villous-hispid but not setose: nutlet solitary, smooth and shining, mottled with darker brown, ovate-acuminate, the ventral face very flat or even a little concave by an introflexion of the sharp lateral angles, the groove open near the base, and with a distinct but short bifurcation.—*K. ramosissima*, Gray, l. c. in part.

Cedros Island, April, 1885. Dr. Gray's cited specimens from the same locality are probably identical, although none are to be found in our collection from Dr. Veatch. The nutlets are very unlike those of the last, and the habit of the species is quite characteristic.

K. maritima.

Erect, a span to a foot high, intricately and compactly branching: leaves linear, an inch long, setose with short bristles: spikes elongated, with only here and there a leafy bract: calyx a line long, short-bristly, not villous: nutlet solitary, hardly a half line long, dark brown and shining, ovate-lanceolate in outline, ventral face flat, the closed groove terminating in a triangular or roundish scar. *K. ramosissima*, Gray, l. c. as to the plant of Guadalupe Island.

First collected by Dr. Palmer, in 1875, and again by the present writer, April 26, 1885. This and the preceding all fall into line with *K. oxycarya* and *K. microstachys*, with which they agree in the character of a solitary, smooth and shining nutlet.

K. foliosa.

A span or more high, erect, simple, and very leafy below, parting above into numerous ascending branches: spikes in threes, an inch or more long, bractless, crowded: calyx rigid, and armed with short but very stiff subulate bristles: nutlets four, dull brown, muriculate, ventral groove open at base, the short bifurcation not divaricate.

Guadalupe Island; apparently collected by Dr. Palmer, as well as by the writer, and referred to *K. muriculata*, to which it bears little resemblance, except as to the nutlets; and even these differ from those of that species in the character of the basal part of the groove.

K. denticulata.

A foot or two high, stout and erect, often with some decumbent branches, very strongly hispid-hirsute throughout: foliage sparse: spikes loose and elongated, mostly in threes: calyx small, its lobes short-lanceolate, hispid, with rufous bristles: nutlets four, dark brown, sharply muriculate, triangular-ovate, with rather obvious, minutely denticulate lateral angles, and an indistinct dorsal ridge, the ventral groove closed, and forked at base.

Western Nevada, 1884, Mrs. Curran. The species may not be rare, and could have been referred, possibly, to *K. muriculata*, but it is very distinct, and the nutlets are, for a *Krynitzkia*, quite peculiar, the back of them suggestive of affinity with *Plagiobothrys Kingii*, which inhabits the same region.

§ *Piptocalyx.*

K. circumscissa, Gray.

Depressed and diffusely branched: leaves alternate: spikes short, glomerate: nutlets a half line long, light gray, minutely puncticulate, ventral suture divaricate-forked at base. Proc. Am. Acad. xx. 275.

Ranging from Washington Territory to the Southern part of California, and eastward in Nevada. The plant of Nevada and California is many times larger than the original *Lithospermum circumscissum,* H. & A. of the far north, and has a very different pubescence, but the light gray puncticulate nutlets are everywhere the same, and so it may not be well to separate these two; but the following is very distinct, namely:

K. dichotoma.

Erect and dichotomously branching, 2—6 inches high: leaves opposite: calyces in the forks of the branches, and along the internodes where they are subtended by a solitary bract: nutlets twice as long as in the last, but not thicker, acuminate, light brown with darker spots, very smooth and shining, basal forking of ventral groove short and not divaricate.

Eastern base of the Sierra Nevada, between Boca and Verdi, 1884; Mrs. Curran.

These plants, with their peculiar habit and circumscissile calyx, appear to call for that subgeneric rank, even in *Krynitzkia,* which was accorded to Dr. Torrey's *Piptocalyx* in the Botany of California.

§ *Pterygium,* Gray, l. c. in part.

* *Nutlets winged.*

K. pterocarya, Gray, l. c. in part.

One nutlet of the 4 commonly wingless: wings of the three bright white, terminating at the base of the nutlet, not crossing it; ventral face of nutlet muricate.

Common from Southern California to Washington Territory, and for some distance eastward.

K. cycloptera.

Nutlets all winged: wings brownish, not abruptly narrowing and ending on each side of the nutlet below, but continuous across the base of it: ventral face not muricate.

Arizona, at Tucson, Pringle, and probably eastward into New Mexico.

This clearly distinct species was, I judge, mixed with the original *Eritrichium pterocaryum*, Torr., for he had plants from far eastward, collected by Wright & Bigelow; but the figure in Bot. Wilkes' Exp. is made from the preceding.

* * *Nutlets not winged.*

K. oyxgona, Gray, l. c. 276 in part.

Nutlets sharply angled, and sparsely muriculate.

Mohave Desert. Pringle, 1882.

K. Mohavensis.

Nutlets not sharply angled, very smooth and shining, with no trace of muriculation.—*K. oxygona*, Gray, l. c. as to the plant of Mrs. Curran.

Muriculate and smooth nutlets are surely inadmissible in the same species, hence the necessity of separating the two last.

The above four species appear to constitute a most natural section of *Krynitzkia*, all being annuals, with a peculiar habit, light green herbage, broad calyx-lobes, and nutlets of a distinctive shape. The presence or absence of wings is shown by the first species, not to be of sub-generic value. The intrusion of *K. holoptera* and *K. setosissima* under *Pterygium* appears to me to be artificial, and destructive of this otherwise well marked section, and I would rigidly exclude them.

§ *Pseudokrynitzkia*, Gray.

K. racemosa. *Eritrichium racemosum*, Watson in Gray, Proc. Am. Acad. xvii. 226; *Krynitzkia ramosissima*, Gray l. c. xx. 277, in part, must retain its specific name, which, for the plant described originally, can hardly be considered inappropriate.

The calyces are on pedicels as long as themselves, at least, and the species is a suffrutescent *Pseudokrynitzkia*, whose nutlets are light gray and muriculate, extremely unlike those of the annual *Eukrynitzkias*, which I have distinguished on page 203, preceding.

Convolvulus luteolus, Gray.

It is this species, and not *C. occidentalis*, which has the shrubby character described in Bot. Gaz. vii. 93. The following is entirely distinct from it.

Convolvulus fulcratus.

Only a foot or two high, not shrubby, feebly, if at all twining, soft-pubescent throughout: bracts foliaceous, and, like the leaves, sagittate: corolla pale yellow: capsule and seed not seen. *C. luteolus*, var. *fulcratus*, Gray, Bot. Cal. i. 534; Syn. Fl. ii. 216.

Foothills of the Sierra, from the central parts of California down to the peninsula, where it has lately been collected by Mr. Cleveland. Remarkably unlike the tall, woody climber with perfectly glabrous foliage, and small, almost subulate bracts; and there are no intermediate forms.

Convolvulus macrostegius.

Suffrutescent, the trailing or climbing stems, with their herbaceous flowering branches 6—15 feet long: glabrous throughout: leaves triangular-hastate, 2—3 inches long, and as broad at base, on petioles of about the same length: peduncles 6—8 inches long, usually 3-flowered, a pair of large, loose membranaceo-foliaceous bracts inclosing all the buds, the lateral flowers each similarly bracted within the outer bracts: corolla pale yellow, the broad limb only surpassing the bracts: fruit unknown. *C. occidentalis*, Watson, Proc. Am. Acad. xi. 118, not of Gray.

Guadalupe Island, in the crevices of basaltic cliffs, and also spreading over rocky declivities at lower elevations. The peduncles are often 5-flowered, each bud, even then, foliaceous-bracted, save that the exterior pair of general bracts always serves as the involucre of the central flower; or, in other words, this one is otherwise bractless.

Physalis muriculata.

Less than a foot high, branching, and more or less decumbent: root perennial: herbage soft-pubescent and slightly viscid: leaves thin, ovate, repand, an inch long, on slender petioles of equal length: corolla small, greenish, with darker spots at base: fruiting calyx oval, muriculate, especially along the prominent, purplish angles.

Lower California, at Cape San Quentin, May 10, 1885.

Nicotiana petuniæflora.

Two or three feet high, stout, viscid-pubescent and somewhat hispid-scabrous: radical leaves oblong-lanceolate, 3—4 inches long on slender petioles; cauline linear-lanceolate, longer than the radical, on shorter petioles: calyx-teeth triangular-lanceolate: corolla an inch and a quarter long, salverform, white changing to bronze-purple; limb three-fourths of an inch broad, with very shallow, scarcely noticeable, rounded, or even retuse lobes.

Guadalupe Island. Placed under *N. Bigelovii*, by Mr. Watson (Proc. Am. Acad. xi. 117), and under *N. attenuata* by Dr. Gray (Syn. Fl. ii. 243), but not properly referable to either, the characters of the handsome, vespertine corolla being quite peculiar, and the hispid pubescence not appertaining to those species.

Diplacus arachnoideus.

Somewhat viscid throughout, the calyx and young foliage whitish arachnoid-tomentose: leaves lanceolate, entire or sparingly toothed, subcoriaceous: calyx more than an inch long, distinctly widened below the middle and contracted above it; teeth triangular-lanceolate: corolla more than two inches long, nearly white, drying pale buff; tube narrowly funnelform; lobes quadrate-oblong, slightly toothed: pod with no apical tuberculation.

A most beautiful species, with large corollas almost white, found only by the writer, at All Saints Bay, Lower Califor-fornia, April 16, 1885.

The pale-flowered species of the mountains back of San Diego, and of the northern part of the peninsula, collected by Messrs. Cleveland and Orcutt, are *D. longiflorus* and *D. leptanthus*, both excellent species, the former readily distinguishable from all others by the deeply sinuate-cleft corolla-lobes, the latter differing from *D. glutinosus* by its linear, entire, coriaceous leaves, and capsule without apical tubercle. Of the five southern species recognizable, only *D. puniceus* and *D. stellatus* have the tubercle. *D. arachnoideus* is readily distinguished from all the old species by its cobwebby pubescence.

Diplacus stellatus, Kellogg, Pro. Cal. Acad. ii. 18; Greene, Bull. Cal. Acad. iii. 95,

Was found again, by the writer, on Cedros Island, last May. The corolla is like that of *D. glutinosus* in form and color, but only half as large. The pubescence is chiefly a dense, short yellow tomentum. The pod has the tuberculation. The species is, in my opinion, well confirmed.

Verbena lilacina.

Suffrutescent, much branched, erect, 2—4 feet high, sparingly short-hirsute and somewhat scabrous; branches stout, 4—6-angled, sparingly leafy: leaves bipinnatifid, the divisions remote, the ultimate lobes linear-subulate, acute: inflorescence depressed-capitate, becoming spicate in fruit: bracts setaceous-attenuate, shorter than the calyx: calyx-teeth equal, subulate-setaceous: corolla small, pale lilac, very fragrant: nutlets small, light brown, nearly smooth, retrorsely hispidulous on the commissure.

Cedros Island, May 1, 1885. Common in gravelly arroyos not far from the shore.

Monardella thymifolia.

Shrubby, much branched, a foot high, soft-pubescent: leaves ovate, entire, 2—4 lines long, on petioles of less than a line: heads small, 15—25-flowered: bracts herbaceous, ovate, rather acute, parallel-veined, their margins hirsute-ciliate: calyx-teeth lanceolate, pubescent: corolla 5—7 lines long, purplish, tube much exserted, somewhat trumpet-shaped, twice as long as the limb.

Rocky ravines, near the summits of Cedros Island, May 1, 1885. More decidedly shrubby than any other known species, growing in compact, rounded masses a foot or two thick.

Salvia (Echinosphace) Bernardina, S. B. Parish, in herb.

Suffrutescent, several feet high, somewhat puberulent or glabrate: leaves rugose and green above, paler beneath, lanceolate, 2 inches long, pinnately lobed, the lobes crenate: numerous verticillastrate heads an inch in diameter: calyx naked within, its arcuate upper lip tipped with three aristiform teeth, which are commonly united almost to the end into two or one, greatly surpassing the two singly aristate lobes of the lower: corolla purple, surpassing the calyx.

Near San Bernardino, 1885; S. B. Parish.

That this singular plant, altogether resembling an *Audibertia*, should have been found at this late period in the history of San Bernardino botany, in a single specimen, goes to confirm a suspicion which the aspect of the specimens suggests, that it may be a hybrid product of *Audibertia stachyoides* fertilized by *Salvia Columbariæ.* The structure of the corolla is that of the *Salvia*, even to the polliniferous lower anther-cell.

Salvia (Calosphace) Cedrosensis.

Shrub 1—3 feet high, branches white-tomentose, the hairs branching: leaves green and not rugose above, white beneath, ovate, with cuneate, truncate or cordate base, crenate, 6—10 lines long, on short petioles: flowers in short, rather dense, naked racemes: calyx funnelform, four lines long, striate-veined, the three very short lobes entire, mucronate-pointed; pedicel less than a line long: corolla deep blue, twice the length of the calyx: filaments naked: style villous above.

Cedros Island, April 28, 1885. Common at middle and higher elevations. Related to *S. ballotæflora* and *S. platycheila*.

Polygonum (Avicularia) Austinæ.

Erect-spreading, branching from the base, a span high, glabrous except the minutely scabrous angles of the branches near the joints: leaves ovate-lanceolate, acute, sessile, a half inch long, the floral much reduced: stipules short-campanulate, not lacerate: flowers in all the axils, mostly a pair in each: pedicels very short, abruptly deflexed: sepals obtuse, completely and closely investing the rather narrowly ovate, smooth and shining akene.

Modoc County, on the northern border of the State, on sage-brush plains; Mrs. R. M. Austin, 1884–5. The species closely resembles *P. Engelmanni* (see page 126), but has broader leaves, entire stipules, and a thrice larger nutlet, which does not, in maturity even, at all surpass the perianth.

Pterostegia fruticosa.

Shrubby, diffusely branched, firmly erect, 2—4 feet high, densely leafy: branchlets short-jointed, tomentulose at the joints: leaves glabrate, fleshy, obovate-spatulate, entire, obtuse or retuse, 2—5 lines long: involucre firm-hyaline, reddish, with darker reticulate veins, 5—7 lines long, deeply cleft into two entire, reniform lobes: wings reniform, entire, unequal, one of them one-third, the other two-thirds the length of the involucre: akene ovate-lanceolate, two lines long, sharply triquetrous: perianth a half line long, persistent.

Cedros Island; first collected (in a small fragment, with one involucre) by Dr. Veatch, long ago. It is the commonest bush on all the lower and middle elevations of the island; a hard, brittle-wooded evergreen, almost the only thing to give a look of verdure to the sunburnt slopes at the dry season of the year.

Pterostegia galioides.

Shrubby, a foot or two high, diffusely branched, the branches slender, weak and reclining: foliage and branchlets minutely and sparingly pubescent: leaves linear-spatulate, a half inch long, hardly a line wide, acutish: involucre thin-hyaline, white, with reddish reticulation, scarcely lobed (the folds when spread presenting a merely obcordate outline of the whole), a half inch long: wings equal, erect, bladdery-inflated, nearly an inch long: akene broadly lanceolate, three lines long: persistent sepals half a line.

A weak under shrub, with the aspect of a *Galium* climbing up among the branches of depressed masses of *Rhus integrifolia* on the bluffs of Cape San Quentin, Lower California. This and the preceding species must be reckoned among the most remarkable additions to Pacific American botany that have been made for some years. There is nothing in the aspect of either of them to suggest at first any close relationship with the little prostrate herb, *P. drymarioides;* nevertheless, an examination of the involucres reveals no character by which either of them could be generically separated from that plant. The flowers of both are unknown, and the species are described from such fruit as could be picked up from the ground, under the bushes which produced them. It may well be that *M. macroptera* of Magdalena Bay, further down the peninsula, partially fills the hiatus between these and our common little annual, for that is described as having a root probably perennial, fleshy leaves, and a large, peculiar involucre.

Agave Sebastiana.

Acaulescent: leaves numerous, ascending, thick, glaucous, about a foot long, ovate-lanceolate, widest above the middle, tapering into a stout spine two inches long: marginal spines remote, divaricate or deflexed: scape very stout, 6—10 feet high; panicle short and crowded, its branches stout, ascending: umbels many-flowered: flowers yellow; corolla one and a half inches long, the tube broad funnelform, two-thirds as long as the segments; stamens more than twice the length of the corolla, a little exceeded by the style: capsule linear, prismatic, three inches long.

Cedros and Natividad Islands; also (according to the seal hunters) on the peninsular shores of the beautiful bay of Sebastian Viscaino. It is more like *A. Parryi* of New Mexico than any other, but very distinct from it, and a much larger plant than its nearest California relative, which is *A. deserti*.

3. *Notes on Guadalupe Island.*

The Island of Guadalupe lies about midway of the great peninsula of Lower California, and at a distance of about one hundred miles from its coast. It is twenty miles or more in length by eight or ten in breadth, and is of volcanic origin. A tract of land so large, rising out of the sea at so considerable a distance from the continent, would be expected to prove an interesting field for studies in natural history.

The first naturalist to visit Guadalupe was Dr. Edward Palmer, who was landed there in the month of February, 1875, remaining until May. A most interesting account of the vegetation of the island was published, from Dr. Palmer's notes and specimens, by Mr. Sereno Watson, in the beginning of 1876, in the eleventh volume of the Proceedings of the American Academy of Arts and Sciences.

So intelligent and so zealous a collector as Dr. Palmer, passing there so many weeks, at so favorable a season of the year, would not be likely to leave much for succeeding explorers to do. Nevertheless, I was made very glad last winter by the prospect of an opportunity of making myself the second scientific voyager to—

"This sweet lone isle amid the sea."

Sailing from San Diego toward evening on the 16th of April, on board a little sloop of ten tons' burden, with one fellow naturalist and two seamen, we made our sail of three hundred and thirty miles in about fifty hours, anchoring in the late twilight, close under the two thousand feet of perpendicular cliffs that rise abruptly from the ocean to form the northeastern shore of Guadalupe.

The early morning light disclosed at a very short distance from our moorings, a narrow line of beach under the cliffs, and on this beach a line of low cabins, their walls made of boulders, and their roofs consisting of a thatch of palm leaves. The dwellers in this rude maritime village are a band of some forty Lower California soldiers, who have been stationed there since the beginning of 1884, by the Mexican Government, to prevent the wholesale slaughter of the goats, of which there are many thousands still on the island, notwithstanding the fact that for some two or three years prior to 1884, many a cargo of goat skins and tallow had been taken to San Diego.

Our first labor, upon landing, was that of climbing to the summit of the island, a distance of five or six miles, by a steep, zigzag trail; for Guadalupe is simply a large table-land about three thousand feet high, its volcanic, rocky sides being in most places too precipitous for even a goat to climb, and almost wholly barren. The plateau is interrupted by a central ridge, some points of which rise a thousand feet higher; but the table-land section of the island is pleasant ground, with a considerable breadth of open, grassy plain, some miles of cypress woods, and several springs of excellent water; although there are no streams that flow after the winter rains have ceased. Our long and slow ascent from the beach to the camping place, near the principal spring on the island, occupied the first half day, but was far from being a tedious or uninteresting pilgrimage. Our blankets and provisions were borne on the shoulders of a half dozen of the Indian soldiers; and we were free to range about and examine the new forms of plant life which began to appear as soon as we had, by zigzag climbing, risen out of the cañon where our trail began. The gentler declivity now leading to the plateau was covered with the really very handsome *Senecio Palmeri*, a shrub three or four feet high, with snow-white foliage and fine clusters of yellow blossoms. Erect, half-shrubby plants of lower growth, namely, *Sphæralcea sulphurea* and *Hosackia ornithopus*, were also quite abundant, together with a fine, wild morning glory, which spread its long trailing branches abroad among the rocks, and was just putting forth its earliest creamy-white corollas. The latter are almost half hidden by their large, leafy involucral bracts, and the plant is in no wise referable to the *Convolvulus occidentalis* of California. It has been described on a preceding page as *C. macrostegius*. All four of the conspicuous plants that first meet the eye of the botanist here, are peculiar to the island. Another plant of these same middle altitudes is not so new; but the failure of my predecessor in this field to either collect or make a note of its presence on the island, I cannot account for. I refer to *Brodiæa capitata*, which is found exceedingly common, not only at this point, but also on the table-land, all about the spring, and differing rather strikingly from the rankest California specimens in its much greater size. Its leaves, in Guadalupe, are an inch broad, and its scape not seldom more than three feet high.

Our abode, for the week of our sojourn, was taken up in one of the palm-thatched cabins which the soldiers have constructed near the springs for their own convenience, while hunting goats on these elevated meadow-lands. The cabins stand in the midst of a fine cypress grove, and we were soon familiar with the characteristics of this peculiar species. A near relative of the Monterey cypress *(Cypressus macrocarpa)*, it is nevertheless of a very different aspect, with its smooth, scaly bark and short, conical head. It is still more distinct from *Cupressus Arizonica*, with which it has nothing in common but the glaucescent foliage. The tallest specimens of *Cupressus Guadalupensis* do not exceed fifty feet in height, and their trunks near the ground are three feet, more or less, in thickness. This tree appears formerly to have occupied almost the entire plateau of the northern half of the island; but now, upon the greater part of this tract, only the fallen trunks, far gone in decay, remain. The cause of its destruction I cannot guess. Guadalupe has never been inhabited except very temporarily by shipwrecked or seal-hunting sailors, or fugitives from Mexico. It is easy to conceive that fires might have devastated any part, but there is no evidence that the fallen trees were destroyed by flames. If they had been their decay would have been less rapid, and charring would remain visible upon the last relics of the wood. A cedar tree (*Juniperus Californica* var. *osteosperma*, Engelm.), which appears to have covered, in former times, the south part of the island, is now upon the very verge of extermination. Only ten years ago Dr. Palmer observed it, "all over the middle of the island * * * forming groves about fifteen feet high." In this year of 1885 there were remaining, of the grove in the middle of the island, only three trees that were not quite dead; and on these three, only a few tufts of green twigs gave the feeble sign of nearly exhausted vitality. Only on a southeastern cliff, hanging over the sea, did I find a tree vigorous enough to be bearing some well formed fruit. It is possible that a succession of very dry years may have wrought this havoc among these arboreal products of Guadalupe. Whether this be the cause or not there is, however, no one to tell us; but, at all events, the botanist on Guadalupe ten years hence, will hardly be likely to find this juniper surviving for enumeration on the list of living plants. The other forest trees of the island are a good sized pine, some groves of which adorn a considerable length of that very high and narrow ridge which makes the northeastern extremity of land, and an oak, of which there are not to exceed a half dozen individuals. The pine resemble a *Pinus insignis*, or "Monterey Pine," but has smoother cones, and its leaves are in pairs instead of threes. It is otherwise the same, and was named by the late Dr. Engelmann *P. insignis*, var. *binata*. The oak is a large, very handsome tree, with rounded head, large, dark evergreen leaves, and acorns larger than in perhaps any other species. It does not in any way resemble, as a tree, our *Quercus chrysolepis* of California, with which Dr. Engelmann would have compared it; but it has been published as distinct, under the name of *Q. tomentella*, Engelm.

The climate of Guadalupe appears to be colder in winter than that of the coast regions of even the central part of Cal ifornia, a circumstance owing, no doubt, to its lying more directly in the path of winds and currents that come down from arctic seas; and yet there flourishes in the cañons a tall and handsome palm, which bears an edible fruit, and is the sole product of the island which looks tropical. The herbaceous vegetation, consisting chiefly of annual species, must vary greatly in both quantity and variety in different years, according as the winter rains are scant or copious. The present year must have been one of unusual drought; for the entire plateau of the southern half of the island was a sunburnt waste, with hardly a leaf of living verdure; and yet the sere stems of the preceding year's growth were knee high everywhere, showing that the rains on Guadalupe in 1884 must have been as unusually copious as they were in the southern parts of California for that year. The northern half of the island is less dependent upon actual rainfall, so constant and so heavy are the fogs that envelop all its higher and more fertile altitudes. The vicinity of the springs, the district of highest fertility, would naturally, in the absence of all human occupants, become the favorite pasture ground for the destructive flocks of goats. The presence of the small garrison must already have had a favorable effect upon the vegetation of this very best part of the island. A detail of soldiers is sent here daily with donkeys and water-casks, after the supply of water for their encampment on the beach five or six miles below; and as often as twice a week a certain number encamp here under the cypress trees to hunt goats on the ridges and mesas above. Consequently the timid flocks never come near these freshest of all pastures, and a rank vegetation is the result. Twelve of the fifteen species which I have added to the former list of Guadalupe plants were found in this partiular district.

These general observations may be concluded with two or three remarks upon the fauna of the island. Of indigenous quadrupeds I saw nothing larger than mice; but these were very abundant, yet hardly more plentiful than a certain natural enemy of theirs which has become naturalized, namely, the domestic cat. From almost any little clump of bushes, or from behind any rock, the herbalist may startle into most swift, precipitous flight a large, sleek, handsome, well fed feline. The rocky places abound not only in mice, but in a species of wren, that is tame and confiding beyond the habit of any wild bird one meets with elsewhere; and on the mice and the wrens the cats, by whatever chance they became adventive on this lonely shore, have fared well, multiplied freely, and reverted to the original wildness of their prehistoric progenitors. Birds are numerous, especially in the dense cypress woods which crown the very highest middle region of the island, above the springs, where the morning air is resonant with varied song. Of reptiles I met with only two or three small lizards. In the moist parts of the plateau are plenty of shallow and tepid pools, fed by springs, but not even a tadpole was visible; and both soldiers and seamen assured me that none of the toad or frog race were ever seen or heard on Guadalupe. Most other islands off the coast of Mexico are commonly reported to be alive with snakes; but no one charges this remoter and more oceanic pile with harboring serpents of any sort; and during my seven days of incessant rambling and climbing, I did not see one.

In the subjoined list of plants, the species marked * were not noted by Dr. Palmer, and are additional to Mr. Watson's list, published ten years since. Those marked † were not observed by me.

4. A Catalogue of the Flowering Plants and Ferns of Guadalupe Island.

*Myosurus minimus, Linn. In the middle of the island, and also at the north end, near springs. The specimens are large, and belong to a peculiar, very slender form, which is common in California, from San Francisco to San Diego.

Ranunculus hebecarpus, Hook. & Arn. Only in the shade of a large tree of *Quercus tomentella*, Engelm. Shorter and stouter than the Californian plant; the akenes more numerous.

Crossosoma Californicum, Nutt. Wood very brittle, exhaling a pleasant, birchy fragrance when freshly broken

*ESCHSCHOLTZIA CALIFORNICA, Cham. Root perennial: stems robust, two feet high: petals orange, two inches long. The true *E. Californica*, luxuriating in one place only, near the edge of a precipice, northeast of the cabins. Possibly of recent introduction.

ESCHSCHOLTZIA ELEGANS, Greene. (See page 182.)

ESCHSCHOLTZIA ELEGANS, var. RAMOSA, Greene. (See page 182.)

*BRASSICA CAMPESTRIS, Linn. A few plants near the cabins; the species apparently not yet well established.

†BRASSICA NIGRA, Boiss.

SISYMBRIUM CANESCENS, Nutt.

SISYMBRIUM REFLEXUM, Nutt.

†LEPIDIUM MENZIESII, DC.

LEPIDIUM LASIOCARPUM, Nutt.

†THYSANOCARPUS ERECTUS, Watson.

OLIGOMERIS SUBLULATA, Boiss.

SILENE GALLICA, Linn. Very common in, and in the neighborhood of, the lower cypress groves.

†SILENE ANTIRRHINA, Linn.

STELLARIA NITENS, Nutt. Under oak trees at the north end.

CALANDRINIA MENZIESII, Hook. Much smaller than in California; always prostrate; an albino state very frequent.

CLAYTONIA PERFOLIATA, Donn. Corolla smaller and more purple than in California.

MALVA BOREALIS, Wallm. Very common on the eastward slope.

LAVATERA OCCIDENTALIS, Watson, Proc. Am. Acad. xi. 124. Shrub larger than described; the large ones ten feet high.

SPHÆRALCEA SULPHUREA, Watson, l. c. 125. Stems ascending, or the lowest prostrate.

ERODIUM CICUTARIUM, L'Her.

ERODIUM MOSCHATUM, L'Her. Very little was seen of either species of the pin clover.

†RHAMNUS CROCEA, Nutt.

CEANOTHUS CRASSIFOLIUS, Torr. Only a small seedling plant, near the cabins. Dr. Palmer's locality for the shrub was not visited by the writer.

†CEANOTHUS CUNEATUS, Nutt.

RHUS LAURINA, Nutt.

LUPINUS NIVEUS, Watson, l. c. 126. Only one flowering specimen seen, and that almost inaccessible; but numerous seedlings of this, or else of an annual species with the same pubescence, were growing on level ground south and west of the cabins, where the goats no longer range.

*LUPINUS GUADALUPENSIS, Greene. (See page 184.)

TRIFOLIUM PALMERI, Watson.

TRIFOLIUM MICROCEPHALUM, Pursh.

†TRIFOLIUM AMPLECTENS, Torr. & Gray.

HOSACKIA GRANDIFLOTA, Benth. A single plant, in a nearly inaccessible crevice. No trace of it left "among trees in the middle of the island."

HOSACKIA ORNITHOPUS, Greene. (See page 185.)

VICIA EXIGUA, Nutt. Not uncommon; the specimens thrifty.

Alchemilla occidentalis, Nutt.

†Ribes sanguineum, Pursh.

Tillæa minima, Miers.

Epilobium minutum, Lindl. Two or three plants found in the locality indicated by Dr. Palmer.

†Œnothera Guadalupensis, Watson.

†Mentzelia dispersa, Watson.

*Mentzelia micrantha, Torr. & Gray. Only on the beach, near the landing. Probably of recent introduction.

Echinocystis Guadalupensis, Naudin. The fruit of this species is conspicuously flattened laterally.

*Mamillaria Goodridgii, Scheer. A single specimen, of fair size and in flower, toward the south end of the island.

*Opuntia prolifera, Engelm. Rather common on precipitous, rocky places near the sea, on both sides of the island, but especially plentiful near the landing; smaller than in California.

*Mesembryanthemum crystallinum, Linn. On the beach at the landing.

Daucus pusillus, Michx.

Galium Aparine, Linn.

†Galium angulosum, Gray.

Corethrogyne cana. *Diplostephium canum*, Gray, Proc. Am. Acad. xi. 75. I find this shrub generically inseparable from *Corethrogyne detonsa*, Greene, Bull. Torr. Club, x. 41, and differing from it mainly in having thinner, entire leaves, smaller heads, and probably yellow corollas; for, although it was not found in flower by me, I have no reason to doubt the statement of so careful an observer as Dr. Palmer. If this be the case, there will still be no need to propose a new genus, since, in the one standing nearest to *Corethrogyne*, separated from it indeed by the character of the corolla alone, namely, *Lessingia*, the flowers are, in some species, yellow, in others purple, (never, however, "white," as in Syn. Fl. ii. 54, they are said to be "in most species"). *C. detonsa* is still as imperfectly known as when published; and of *C. cana* I saw but one plant, but that one fully six feet high. Both these species are shrubby; but so is that commonest of all species, *C. filaginifolia*, Nutt., at least at base.

†Micropus Californicus, Fisch. & May.

*Filago Californica, Nutt. A fine growth of this species about the springs, north of the middle portion of the island.

Filago Arizonica, Gray. Dry mesas toward the south end.

Graphalium Sprengelii, Hook. & Arn. Only one plant seen.

Franseria camphorata, Greene. (See page 192.)

†Leptosyne gigantea, Kellogg.

Hemizonia frutescens, Gray. Only one suffrutescent plant seen, and that on the precipice. It is common on the level ground and hillsides, and, in such places, strictly annual.

Perityle incana, Gray.

Perityle Californica, Benth.

Bæria Palmeri, Gray.

†Eriophyllum Cæspitosum, Dougl.

Amblyopappus pusillus, Hook. & Arn.

Matricaria discoidea, DC.

ARTEMISIA CALIFORNICA, Less.

SENECIO PALMERI, Gray.

MICROSERIS LINEARIFOLIA, Gray. Abundant and very rank about the springs and the cypress groves, where the goats do not now range.

MALACOTHRIX CLEVELANDI, Gray.

*TROXIMON HETEROPHYLLUM, Greene. About the springs, in grassy ground; fine large specimens, of the ordinary form only.

SONCHUS OLERACEUS, Linn. Now very common on the eastward slope of the island.

GITHOPSIS SPECULARIOIDES, Nutt.

SPECULARIA BIFLORA, Gray.

*ARCTOSTAPHYLOS ———————? A single seedling plant of not more than two or three years' growth, found under a cypress; species apparently new.

DODECATHEON MEADIA, Linn.

ANAGALLIS ARVENSIS, Linn. Only one plant, on the top of the island.

†HESPERELÆA PALMERI, Gray.

GILIA DIVARICATA, Nutt.

GILIA MULTICAULIS, Benth. A very marked form with corolla, calyx and capsule twice as long as in the plant of California; the leaves also much more dissected.

GILIA PUSILLA, Benth. Agreeing with the South American type of the species; not with the var. *Californica*, Gray.

NEMOPHILA RACEMOSA, Nutt. Common in the middle of the island; and the name *N. aurita*, Lindley, in Watson's list, must have been an error, for I saw no trace of that species. The two are indeed closely related, yet sufficiently distinct.

EUCRYPTA CHRYSANTHEMIFOLIA, Greene. (See page 200.)

PHACELIA PHYLLOMANICA, Gray. Shrubby below, and often more than six feet high; the largest species known.

PHACELIA FLORIBUNDA, Greene. (See page 200.)

EMMENANTHE PENDULIFLORA, Benth. Abundant, very large and handsome, far surpassing what one sees of this species in California.

HARPAGONELLA PALMERI, Gray.

†PECTOCARYA PENICILLATA, A. DC.

KRYNITZKIA MARITIMA, Greene. (See page 204.)

KRYNITZKIA FOLIOSA, Greene. (See page 205.)

CONVOLVULUS MACROSTEGIUS, Greene. (See page 208.)

SOLANUM DOUGLASII, Dunal. Two plants seen, in the cañon near the beach; perhaps the very same individuals seen by Dr. Palmer in the same spot; for this plant is a shrub, wrongly referred to as *S. nigrum*, which is annual.

SOLANUM XANTI, var. WALLACEI, Gray. Common on the plateau, in round, compact masses three feet and more in height and thickness. The dense villous and glandular pubescence, and large, pale corollas should apparently entitle this island plant to the rank of a species. True *S. Xanti*, as regards the plant of California, is usually quite glabrous.

†LYCIUM CALIFORNICUM, Nutt.

NICOTIANA PETUNIÆFLORA, Greene. (See page 209.)

†LINARIA CANADENSIS, Dumont.

ANTIRRHINUM NUTTALLIANUM, Benth.

ANTIRRHINUM SPECIOSUM, Gray.

EUNANUS LATIFOLIUS, Greene.

†CASTILLERIA FOLIOLOSA, Hook. & Arn.

CALAMINTHA PALMERI, Gray.

†POGOGYNE TENUIFLORA, Gray.

PLANTAGO PATAGONICA, Jacq.

MIRABILIS CALIFORNICA, Gray. Seen only near the beach, on the eastern side.

CHENOPODIUM ALBUM, Linn.

*CHENOPODIUM MURALE, Linn. A few plants near the landing; evidently a new comer.

ATRIPLEX PALMERI, Gray.

PTEROSTEGIA DRYMARIOIDES, Fisch. & Mey.

HESPEROCNIDE TENELLA, Torr.

PARIETARIA DEBILIS, Forst.

QUERCUS TOMENTELLA, Englm. (See page 218.)

†PHORADENDRON BOLLEANUM, Eichler.

CUPRESSUS GUADALUPENSIS, Watson. (See page 217.)

JUNIPERUS CALIFORNICA, Carr. (See page 217.)

PINUS INSIGNIS, Dougl., var. BINATA, Engelm. (See page 216.)

*BRODIÆA CAPITATA, Benth. (See page 216.)

JUNCUS BUFONIUS, Linn.

ERYTHEA EDULIS, Watson.

MUHLENBERGIA DEBILIS, Trin.

*POLYPOGON MONSPELIENSIS, Desf. Common about springs.

AVENA FATUA, Linn. Very little seen; apparently not established.

MELICA IMPERFECTA, Trin. Only one tuft, in a place inaccessible to goats.

†STENOCHLOE CALIFORNICA, Nutt.

BROMUS MAXIMUS, Desf. Abundant; not even goats are fond of it.

*HORDEUM MURINUM, Linn. A grass which goats will probably not prevent from overspreading all fertile parts of the island. Only a few tufts were seen, near the cabins on the plateau; but the seed is there, and it will hardly fail to become abundant.

FESTUCA MICROSTACHYS, Nutt.

POLYPODIUM CALIFORNICUM, Kaulf.

†POLYPODIUM SCOULERI, Hook. Dr. Palmer's gathering of it from "the trunk of a single oak" may have proved the extermination of the species on this island.

†GYMNOGRAMME TRIANGULARIS, Kaulf.

NOTHOLÆNA NEWBERRYI, Eaton.

†PELLÆA ORNITHOPUS, Hook.

†ASPIDIUM MUNITUM, Kaulf.

NOTES ON MOUNT PITT.

By Arthur B. Emmons, Ph. D., LL. B.

Read July 6th, 1885.

Scattered along the Cascade Range, from California through Oregon and Washington Territory, are a number of extinct volcanoes, whose isolated snow-capped peaks tower high above the rest of the range. They attain elevations from ten to fourteen thousand feet and over; and in their simple grandeur add character to the country all about them. Several of these peaks, as Mt. Hood, Mt. Shasta, and Mt. Rainier, are well known by name far beyond the limits of the territory they overlook.

One of the southernmost of these volcanoes is Mt. Pitt, which is situated in the southwestern part of Oregon, about fifty miles northeast from Jacksonville, and directly west of Upper Klamath Lake. Although one of the lowest of these extinct volcanoes, it had never been ascended before the summer of 1875, except by one or two parties of prospectors; and nothing was known of it further than that it was an extinct volcano—which knowledge, however, was the result of observation from a distance, and not the fruit of the ascents just mentioned. Last summer* its height was determined with a barometer, and its geology made the subject of several weeks special study—the results of which are given in this paper.

The elevation of Mt. Pitt was found to be 9,663 feet above Portland, Oregon, that is, 9,718 feet above the level of the sea. A cistern barometer, one of Green's of New York, was used in its determination. The height above Portland of our camp on Four Mile Lake, which is on the summit of the Cascade Range, northeast from Mt. Pitt, and just at its foot, was first determined by a series of barometrical observations, extending over four or five days, and referred to the synchronous observations made at the office of the Signal Service, at Portland, as a base. The

*With the exception of the microscopical determination of the rocks, this paper was prepared and written in the winter of 1875-6, but owing to press of other matters has only now been finished.

height of the summit of Mt. Pitt, above the camp, was then determined by taking readings at those two points with the same barometer, the readings on the summit being taken four hours after those at the camp. The atmospheric pressure in that climate is so constant that much more accurate results are obtainable, notwithstanding the longitudinal distance apart of the two stations, than would otherwise be the case. Referring the readings taken on the summit of Mt. Pitt directly to the synchronous readings taken at Portland, and calculating the elevation from them, a result was obtained varying from the one given above by only twenty-six feet, although the readings on the summit were taken a fortnight after those from which the elevation of the camp on Four Mile Lake was determined.

The outline of Mt. Pitt, as seen from almost all sides, is that of a perfect cone, and with the exception, perhaps, of Mt. Hood, as seen from one or two points, it is the most symmetrical of all the extinct volcanoes of the Cascade Range. It rises up out of the range, and the individuality of its lower portion is lost in that of the range which runs to the north and the south of it, except on the west flank, which reaches to the plain. Above this point, locally known as Rancherie Prairie, it rises to a height of about 6,835 feet. On the south it descends only to an elevation of 4,988 feet, in the neighborhood of a point known as Lost Prairie; while on the north it surmounts the main range by only 3,857 feet. Four Mile Lake, which is on the summit of the Cascades, and directly at its foot, having an elevation of 5,806 feet. The whole southern half of the mountain, from the summit downwards, extending around from the east to the west, is a steep unbroken slope of débris and detritus, varying in size from large boulders to fine sand, with here and there a protruding mass of lava, the remains of some former current not yet fully disintegrated. The slope is generally very steep, and in some parts attains an angle of 35°.

On the northeast are the remains of a large crater which forms a great basin-like depression on the side of the mountain. Rather more than half of the wall, which includes the present summit of Mt. Pitt itself, still remains. The edge of the wall sweeps down from the summit in a beautiful curve almost a semicircle, forming for some distance the outline of the mountain on that side. The front wall, that is in looking towards the mountain from the northeast, has entirely disappeared so that one looks into the bottom of the crater. The northern limit of the crater is marked by some immense perpendicular cliffs or buttresses of rock which jut out in bold relief and form a characteristic feature in the outline of Mt. Pitt as seen from the east, and are also visible from the west to the north of the summit. The sides of the crater wall are nearly perpendicular, but sloping sharply at the bottom, and are studded with jagged masses of rock which protrude through the fine débris covering the interior of the crater. It is along the edge of the wall on the southerly side of this crater that the ascent of the mountain is most easily made. The diameter of the crater must have been about a half mile. On the northern side of the mountain separated from the crater by the cliffs just referred to, from the foot of which extends a long rocky ridge, are the remains of another crater, larger than the first and not less than three-quarters of a mile in diameter, of the wall of which nearly two-thirds of the outline may still be traced. Its walls are also very steep and entirely covered with débris. The curved outline of its wall near the summit, as seen at Rancherie Prairie eight or ten miles away, suggests its nature at once. Near the summit within this crater are accumulated large masses of snow which remain throughout the year, and which towards their upper part are traversed by several large crevasses, but nowhere are there signs of a true glacier such as have been found on most of the higher volcanoes along this range thus far visited. It is only at this point, excepting unimportant patches in secluded nooks, that the snow remains during the whole year. In the summer of 1875 even on the south side, and on the walls of the crater first described, there were very considerable areas covered with snow up to August, but it was very thin and by September had all or nearly all disappeared. Between these two craters but lower down on the mountain, can be distinguished the outline of a third but very much smaller crater. Extending round from the western wall of the second crater the side of the mountain is covered by débris broken through at frequent intervals by the sides of former lava currents, that is to say the slope has been rendered uneven by these small flows, and as their surfaces disintergrated they also became covered with débris, while the sides subjected not less perhaps to the wasting effects of decomposition are the only portions where the massive rock is still visible as the products of decomposition were unable to collect on their surfaces. The slopes gradually become more even as they extend around to the western side of the mountain. Lower down on the northerly and easterly sides of the mountain, among the timber, the remains of larger flows are very frequent, sections as it were of great lava currents, the upper and lower portions of which have wholly disappeared. These are for the most part but piles of bowlders, though in several instances the scoriaceous surface of the bottom of the bed was still distinguishable.

On the west side of the mountain about two thousand feet below the summit, is a black dome-shaped cone, very regular in form and some two hundred feet in height. Its steep sides are entirely composed of huge irregular shaped blocks of rock, whose sides and edges are as fresh and sharp as though but freshly hewn from a quarry. No finer material or sand is observable between these large blocks; there is no depression on the top, nor any sign of any lava current having flowed from its immediate neighborhood—in fact, none of the characteristics of the parasitic cone, composed of scorias and tuff, and generally marking the external source of a lava stream, which is so frequently found studding the flanks and base of large volcanoes. Twenty-five degrees further south and some three hundred feet higher up on the side of the mountain, is another cone the exact counterpart of the first in height, form and structure. These cones stand to-day just as they were originally formed; there is no sign of weathering of the rock or other change due to external influences. A modern instance of the formation of a volcanic cone composed of viscous lava, its surface, at the time of its formation, consisting of loose blocks of rock, has been observed and described in Mt. Giorgios at Santorin, by Messrs. Reiss and Stübel in their "Geschichte und Beschreibung der Vulkanischen Ausbrüche bei Santorin." This fragmentary character of the rock is also noticeable on the summit of Mt.

Pitt, which is made up of huge blocks of rock, and nowhere within thirty feet of the top can any rock be found in place.

There has been but one phase in the volcanic activity of Mt. Pitt, and the rock composing it is all basalt, the only variation in it being that the rock composing the summit and upper portion of the mountain, the more recently formed rock, is more porphyritic in character and shows much vesicular inflation, while the rock forming the lower part of the mountain and the older flows is compact and fine grained. The former, though varying somewhat in color, has usually a dark bluish gray paste, thickly dotted with minute white crystals of feldspar, and disseminated through it larger crystals of pyroxene, with occasional grains of olivine. Although a solid firm rock, the vesicular inflation is very pronounced, and when, as is frequently the case, the vesicles are lined with a deep red, brown, yellowish or greenish colored substance, presumably iron in different stages of oxidation. The contrast of this deep color with the dark bluish grey of the paste and the white of the feldspar crystals, gives the rock a remarkably rich and varied appearance. When much weathered, the red color spreads itself throughout the mass of the rock, and sometimes the vesicular inflation is almost pumaceous in character. The older rocks are of a lighter gray color, frequently of a reddish tinge, compact, fine grained, and apparently solid, though close examination shows them to be of much the same general character as the others, and the vesicular inflation is not wanting, but is so fine as to be barely noticeable with the naked eye. Under the microscope these rocks show a microcrystalline ground-mass, filled with clear porphyritic crystals of plagioclase feldspar, pale green and brownish colored pyroxene, fresh and unchanged, and some roundish grains of olivine, some times quite fresh, at others edged with the thick dark border so characteristic of this mineral. In the more vesicular specimens there is more ground-mass, composed of lathe-shaped crystals of feldspar and some glass, sprinkled with minute grains of magnetite, while in the finer grained specimens the rock is more evenly crystallized, and the ground-mass is less prominent. The feldspar is all plagioclase, no orthoclase having been observed. The pyroxene mineral in these rocks consists of both hypersthene and augite, but the hypersthene rather predominates. Its determination as such rests upon its pleochroism and its orthorombic character, as shown by the extinction of light parallel to its principal axis. This occurrence of hypersthene, as a rock constituent, adds another to the already widespread range of this mineral, which has suddenly jumped into prominent existence in such a remarkable manner, through the brilliant discovery of Mr. Whitman Cross*, and the subsequent investigations of Messrs. Hague† and Iddings.

Analysis No. 1, made by Mr. R. W. Woodward, then of Yale, is of the younger and more vesicular rock, and Analysis No. II, made in the Laboratory of Harvard College, is of the more compact variety.

	I	II
SiO_2	55.89	56.33
Al_2O_3	20.01	20.19
Fe_2O_3	1.77	7.16
FeO	4.72	
MnO	.06	
CaO	8.12	8.74
MgO	4.57	2.53
Na_2O	2.66	3.81
K_2O	2.29	1.38
Ignition	.19	
	100.28	100.14

The low percentage of silica, and the constant presence of olivine, would seem to keep this rock within the line separating basalt from hypersthene-augite-andesite.

* On Hypersthene Andesite; *Am. Journal of Science*, February, 1883.

† Notes on the Volcanoes of California, Oregon, and Washington Territory; *Am. Journal of Science*, Sept. 1883; and Notes on the Volcanic Rocks of the Great Basin; *Am. Journal of Science*, June 1884.

ON FOSSIL AND SUB-FOSSIL LAND SHELLS OF THE UNITED STATES, WITH NOTES ON LIVING SPECIES.

By J. G. Cooper, M. D.

1. EXTINCT SPECIES

In a former article I attempted to trace back the origin of our Land Shells to their fossil ancestry, showing that they very probably descended from species known to be eocene, in Nebraska; and quite possibly from still older forms once existing in the northern part of this continent, or of an older Arctic continent. Notes on the same subjects are scattered in papers published by me in the Ann. N. Y. Lyc. N. H., VIII, 1861; Proc. Cal. Acad. Sc., III to VI, 1864 to 1875; Amer. Jour. of Conch., IV to VII; 1869 to 1871; Proc. Phil. Acad. N. Sc., 1872; and Proc. Amer. Phil. Soc., XVIII, 1879.

In the Third Annual Report of the U. S. Geol. Survey for 1882, pp. 453, 475, Dr. C. A. White goes so far as to refer fossil species from Nebraska and from the eocene of the Rocky Mountains to the same divisions of the land shells as now exist on the west slope, including ten divisions, besides two Pupillæ and a Succinea, as well as three Bulimoid species of more southern forms, different from those mentioned by me in the Am. Jour. of Conch., IV, 212, as occurring near Carson Valley, Nevada.

Of the ten forms mentioned, only two are like those now living near the Rocky Mountains, three or four extinct, and the rest allied to species now found only west of the Sierra or Cascade Range. This confirms my previous theory that the latter are descended from an original stock, living north and east of California. It is also interesting to find that so many marked divisions of the original stock existed as far

5—Issued October 13, 1885.

back as the "Laramie Group," on the upper borders of the Cretaceous Era, probably older than the Californian Coal-measures, including five forms, while only two species are referred to the miocene epoch, and none of later date.

I now propose to consider what we know as to *recent* extinction of species, a subject as yet little investigated, but of great interest in its relations to the geological history and origin of species. Perhaps no class of animal remains is better suited for illustrating the subject of specific descent and transformation than the Land and Fresh-water Shells. Much has already been done in Europe towards elucidating their prehistoric changes, chiefly, perhaps, because there are more extensive tertiary and later deposits containing them, and more excavation of such beds has been made than here.*

The only American observations on the subject, known to me, are those of Prof. C. B. Adams and Thomas Bland on species of the West Indies and Eastern America. (See Binney's Bibliog. of N. A. Conchology for list of these articles.)

It has been lately observed by Eastern American collectors, that many species, once numerous in the older settled districts, have become scarce, on account of the destruction of the forests in which alone most of them can find shelter and subsistence. Some authors have even predicted their complete extermination as cultivation gradually extends over the country. But there must always remain numerous rocky and precipitous tracts, left to the natural tree-growth, which will be safe refuge for land shells. The shores of rivers, also, where trees are less cut away, and annual floods bring down new specimens from their rugged mountain sources, can never be entirely deprived of their indigenous species. The vast numbers found imbedded in the banks of some of the western rivers, and also lying on the surface,

* See Hyatt in Ingersoll's Report on Mollusca, U. S. G. and G. Survey of the Territories, 1876, p. 403.

show the effect of rivers in past times in transporting and preserving them.

It is noteworthy, also, that among all these, no extinct species has yet been reported from the post-pliocene beds, and those found living do not seem to have undergone any changes to distinguish them from fossil forms. The links connecting them with the extinct forms of the Tertiary Age, are being discovered only on the west slope.

Of the changes in species effected by the new conditions caused by cultivation, there is as yet nothing recorded. As a very large proportion of the forest species of the Atlantic border are also found far out in the prairies of the Mississippi Valley, with little or no shelter by trees, it is probable that the majority of them can become accustomed to cleared fields so as to survive about their borders, even without showing any changes that might be attributed to an accommodating natural selection. Yet it is very probable that such variations will occur, and must be sharply looked for.

There is reason to believe that such changes in form, size, and color have in recent times occurred in Europe from such influences, and are even now producing many of the so-called new species, sub-species, etc., constantly being found, even in the older and best known regions. Varieties have also attracted attention in the Eastern States, but have been little studied, and are all supposed to be produced by natural, not artificial influences, nor have they been regarded as distinct species.

A highly interesting and almost endless field for investigation and experiment in this direction is open before us. A branch of the subject relates also to the effects of our climate, etc., on introduced species, some of which have been long acclimated without changing. The *negative* influence of cultivation is also shown by the statement of Woodward's Manual, that only three living European species have been found to be extinct in England, and it is not supposed that they were exterminated by cultivation. On the other hand, several are believed to have been added to the fauna by recent importation (mostly accidental), as they are not found fossil there.

2. PACIFIC SLOPE VARIATIONS.

Having thus found that little if any post-tertiary changes have occurred in the species of the Atlantic slope, it seems astonishing to discover that there have been quite striking changes in those of the Pacific slope, even in recent times, and presumably ever since the tertiary epochs. These changes are shown by the differences in fossil specimens from the living forms, but have not been marked enough to cause, so far, their separation as distinct species, chiefly because intermediate forms exist. At the same time it must be remembered that the extremes of variation are so great on this coast that many were at first described as distinct species which have since been connected by intermediate links. Here we have the examples wanted by disbelievers in the origin of species by natural selection, who claim that no transformations can be proved by fossil specimens. There is probably no class of fossils so well suited to demonstrate this law, or, if untenable, to disprove it.

The most marked instances are found on the islands of Southern California, where several species have swarmed so profusely, but indications of similar changes are seen on the main land in favorable spots, and even in the far interior mountain regions of Utah, etc., where Mr. H. Hemphill found such strange series of forms. The fossils of those regions seem also to agree with the law of development by gradual changes. In these instances we have a parallel to similar ones known to have occurred on the islands and some parts of the mainland of Western Europe and Africa, of which we perhaps see the continuation still progressing, in recent changes caused by cultivation or geological oscillations of the land known to be in progress. The effect of these oscillations is, of course, exerted through changes produced in the climate, chiefly in amounts of heat and moisture. (See Dana's Manual of Geology, Ed. 1874, p. 586–7.)

In searching for a common cause of variations affecting the west slopes of both continents similarly, we arrive at the conclusion that it is change of climate, produced by tertiary and recent geological action, and are obliged to admit that such action is still going on.

That the Atlantic slope of the United States has not undergone such changes recently, enough to influence the land shells, is also a rational conclusion, although facts point to the probable increase in number of forms by variation as still going on there, since many living species are not known from the post-pliocene strata.

Prof. J. D. Whitney, in his late elaborate work on changes of climate in the succession of tertiary epochs, has endeavored to prove that the decreasing heat of the sun has been the chief cause of a gradually colder and drier climate, both in Europe and America. It seems however that the effects of such a decrease would have affected both sides of this continent more equally. The colder and drier climate of the western slope may be sufficiently explained without such a cause, by the gradual elevation higher and higher of the interior mountains and plateaux, as well as oscillations both up and down of the coast, not only within our borders, but in the arctic and tropical zones.

The influence of the vast volcanic eruptions at the end of the pliocene epoch all through the western half of the continent, both on climate and organic life, must have been immense. An idea of their action may be obtained from the ingenious article by J. E. Clayton, M. E., in our Proceedings, Vol. VI, p. 123.

The eastern slope, on the contrary, shows evidences of changing from a colder climate to a warmer during the quaternary epoch, the glacial drift southward, which preceded the recent period, having there followed after the tropical climate of the pliocene, when the gigantic extinct Edentata, etc., existed. It is not intended, however, to discuss this subject here, except as relates to mollusca.

While the drift mentioned may have destroyed previously existing land shells in the Atlantic States, as it brought the marine arctic mollusk-fauna as far as the St. Lawrence basin at least, and may have helped to make the vast collection of land shells in the löess of the Mississippi valley, it did not exterminate any species as far as known, and there *must* have been a great extension of the range of many of them toward the north since then.

On the west slope no such general influence seems to have existed, although Prof. Whitney has shown that the glaciers of the Sierras once had a vastly greater extension downward than now, which he attributes to greater precipitation of moisture, accompanied by greater heat. It seems, however, unlikely that such was the case, but rather that the glaciers co-existed with the eastern drift, a heated epoch being followed by one of increased cold throughout the North Atlantic slopes of both continents, and in some degree increasing the glacial deposits of the western mountains. This glaciation seems to have caused the final extinction or modification of the pliocene creation in the temperate zone.

The fossil tertiary flora of California, plainly showing a sub-tropical and moist climate, is not contemporaneous with the glacial moraines, but seems to have preceded them. Whether the glacial epoch was an effect of temporary coldness of the sun's rays is not material to this question, but the fact is evident that the ice has since then decreased all over the continent, and we may conclude that warmth has increased again. The pre-glacial hot climate was probably connected with a less elevation, much of the sea borders being submerged, the interior valley of California a sea, and the Great Basin of Utah and Nevada a chain of lakes. As marine pliocene shell beds were raised several hundred feet at the end of that epoch, the Sierras probably rose also.

Unfortunately the land shells of the tertiary strata of California are rare and have not been much investigated, but from the fact that the trees show a gradual succession of changes, going back perhaps to the eocene epoch, we may expect the land shells will show something similar. The fresh water fossils, as far as known from the eocene lignitic (cretaceous No. 2 of Gabb), and later strata, probably both miocene and pliocene, consist of species mostly quite distinct from the living, though the later beds show a mixture and a few (supposed quaternary) are chiefly identical with recent forms, as would be expected. This fresh water lignitic deposit was in part again submerged and covered by marine tertiary beds of great depth. No locality has yet been found in which a series can be determined to extend through two or more epochs, though there can be little doubt that such beds exist on the borders of the vast interior basin forming now the central valley of California. It would be supposed that the extensive pliocene lignite beds near Lincoln and Ione, ought to furnish such specimens, but having examined the latter carefully, I could find no trace of shells, and supposed that this absence was on account of the salt or brackish nature of the water in which they were formed, which would be more marked at Lincoln, nearer the centre of the valley. The Ione lignite beds have been elevated at least 300 feet since their deposition. Pliocene beds containing extinct fresh water shells exist in Bear River Valley, over 3,000 feet higher on the mountains, and they doubtless occur in the beds containing the leaf prints, where also land shells should be found, although not yet reported.

As to the very fresh looking specimen found imbedded under the zygomatic arch of the celebrated "Pliocene" skull of Calaveras County, Prof. Whitney now admits the *shell* to be more recent, but thinks that the fragment of skull had been washed from its original burial place in a pliocene stratum, into the place where it was found, and there the living snail crawled into the opening, where it died and was cemented there by the tufaceous deposit going on. Even this admitted "change of base" is damaging to the determination of the pliocene age of the skull, though I am not prepared to dispute that, but believe that further developments are needed to decide it. It is evident that the tertiary and quaternary fossil bones have been all mixed up by volcanic and glacial action. There is, however, no doubt that this skull and others described from the Sierras, prove man's existence in the early quaternary, or about the end of the pliocene epoch.

Supposing the specimen of *Helix Mormonum* found with it to be of the quaternary, its close resemblance to the living form now existing in the vicinity, indicates to some extent a climate nearly like the present. The extinct tertiary vegetation of the Sierras, was doubtless accompanied by land shells as different from those now living there, as the greater part of the trees differed, and like them may have more resembled those of the present group found around the Gulf of Mexico. Their probable characters may be inferred from those of the fossil land shells of the Rocky Mountain tertiary described by Dr. White and others.

Besides this, the only fossil Helix yet seen from the Sierras, is the one before mentioned as having been named "*H. Carpenteri*" when first found, but very different from the type, and indeed more like a variety of *H. tudiculata*. It is, however, distinct enough to indicate great antiquity, and will probably rank as an extinct species when more specimens can be obtained. Having the elevated imperforate form of the species now living close to the sea shore, I have already mentioned it as probably having lived on the eastern shore of the pliocene inland sea once filling Tulare Valley, near where it was discovered in the tertiary (or later) formation by Mr. Gabb. When that sea or lake existed, the Sierras really formed the shores of the continent, and such parts of the Coast Ranges as were above water must have been peninsulas or islands many miles distant.

In the Coast Ranges there have been no fossil land shells found that can be distinguished as species from those living near them, which, however, is only negative testimony toward proving a very recent origin for these species. A deposit of lignite containing numerous extinct forms of *fresh-water* shells is found at various localities, and shows that conditions suitable for land shells existed at the same time. The southern islands, with their extinct forms of quaternary age, have been before mentioned. I have, however, obtained a few found along the middle of the coast, which differed in smaller size and fewer whorls from the living, indicating a colder climate; also a subfossil Leucochila from near San Francisco.

3. HISTORIC CHANGES.

It is necessary to give some observations on the historical changes that have occurred in the last three hundred years as affecting the land shells, and to forecast from them the probabilities of increase or decrease in numbers, adding an account of some species supposed to be very recently extinct, and new facts respecting others.

The long and extreme dry season of California has always, no doubt, been effective in limiting the extension of range of the land shells, though the existence of identical or only slightly varied species over distances of three hundred to six hundred miles north and south, indicates that they must have spread during the existence of a warmer and moister climate in the earlier quaternary. In the Sierra Nevada, the variations found to exist in species are more the effect of altitude than latitude, two species at least being almost identical from Shasta to San Diego. In the Coast ranges proper, however, local variations constituting subspecies are numerous, and many of them separated in range by wide intervals, in which few or none exist. These gaps are evidences of either periodical severe droughts, or increased dryness of climate, occurring since that stage of the quaternary when the interior valleys had become mostly dry land by filling in from the mountains, and the great bodies of heated water before existing gradually ceased to furnish a large part of the vapors to form rain and to preserve a moist air. The dryness of the climate along both sides of the Gulf of California would seem to contradict this, but there is a different cause for it of a cosmical kind. The islands of our southern coast are analogous. No human remains have been found in the coast ranges older than the Recent Period, and very near the surface, indicating that the men of the Sierra may not have reached them. It is interesting to know also that the gigantic extinct *Bison latifrons* and fossil elephant, if not other land animals, had reached the coast range in the quaternary epoch.

Even at the time of the Spanish discoveries we know that trees were much more numerous in Southern California than since, the early voyagers mentioning large and extensive forests on the mainland and the islands, which have mostly vanished. The introduction of immense herds of cattle, which browsed and trampled down the young trees, was added to destruction by fire, with the mistaken object of improving the pasture and giving a clear view in herding cattle.

It is an old proverb, that "a Spaniard hates a tree," derived from their destructiveness in Spain, where pastoral pursuits have always been fostered, and increased, perhaps, by the Moorish invasion from African deserts. We have the historical account of the island of Madeira, when discovered, being densely wooded with large and valuable trees, which the Spanish sailors burned off completely, to destroy the supposed venomous reptiles and beasts of prey, which had no existence there. The same process was, no doubt, applied to our islands and mainland by the colonizing soldiers and priests, zealous to destroy the supposed "creatures of the Evil one."

This may account in part for the changes in form and size of the land shells of the islands, and extermination of a few. It undoubtedly destroyed many of the species of Madeira and other islands; perhaps, also, of Southern Europe. There can be no doubt that the number of specimens, if not of species, on the mainland of California, were much decreased both by fires and herds of cattle, which were never numerous on the four southern islands. The largest islands, nearest land were, and still are, well stocked with cattle, and shells are scarce on them. To the cattle must also be attributed the rarity of fossil specimens near the surface of the mainland, while they abound on some of the islands. Such as are found deeper, or in sheltered spots, are like the living, but somewhat different living forms characterize the mountains and the valleys. Some colonies in the lowlands of Ventura and more northern counties, have escaped destruction apparently by concealment under fallen trees in the dry season, when the cattle sought wet pastures, and in the wet season are little exposed to their trampling. Further south they are found only where protected by rocks and bushes on the sides of cañons or mountains. Where stock-raising has given place to agriculture, and fields are fenced, they have become more numerous within thirty years.

Looking at the whole subject of changes in the fossil and recent land-shells, we find much to confirm Darwin's theories of the Origin of Species by the law of variation, natural selection, and survival of the fittest.

In an article on the "Distribution and Localities of West Coast Helicoid land-shells,"* I stated that the interior valley of California was destitute of them, on account of dryness. This is true except of some very limited localities along the central rivers and larger branches draining them, where some of the species washed down from the mountains have obtained a foothold on the edges of the great marshes which compose so much of the low lands. It is apparent from the rarity of these colonies, that they do not increase, but soon die out, from want of some essential element or food. No species have, however, yet been found to have crossed from one side of the valley to the other, or to have been washed down far enough from the Sierra Nevada to have become

*Amer. Jour. of Conch., IV, 211, 1869, and V, 207, '70.

established where the rivers cut through the coast range. I have however thought it probable that the coast range may have been colonized from the Sierra when the interior basin was a lake. Two of the largest Sierra species, *H. tudiculata* and *H. Traskii*, can be traced down to the coast southward of lat. 35°, where the coast ranges are extensive and cut by small rivers, while the latter, under the variety *Diabloensis*, extends from there north almost the entire length of the eastern slope of the coast mountains. Dr. Newcomb has suspected that Mr. Thomson had some of the large var. of *H. Mormonum*, found in the interior marshes, to confound with the African Zonites, described by him as *H. cultellata*.

But the fact of such marked variations from the Sierra forms as occur in this and still more in others of the coast range, proves at least a very ancient separation from the same stock, if not a divergence of both from a common ancestry in the somewhat similar Oregon species.

As bearing on this we also note that four large species of the Rocky Mountains are scarcely distinguishable from their representatives living in the Cascade Mountains of Oregon, and show evidences of having been washed down by branches of the Columbia River. A single colony of *Patula solitaria* has been established on Government Island in the Columbia River, west of the Cascade Mountains, and been found nowhere else on that slope. The interval between the mountain ranges above mentioned, in which no species occur is about equal to the California valley, but has no marshes in which they can find a home on the way. In the California coast ranges, however, running north and south, there are often two and sometimes three parallel series of forms, separable as species or sub-species.

I have before attempted to show that a gradual succession of species forming a chain, in which one form is observed to pass into the next southward, either suddenly or by intermediate links, can be traced from Oregon to Mexico, along both ranges of Californian mountains, but the connecting links between those of the two ranges are still wanting where the wide valley separates them, and not likely to be found. At the same time we observe that the small *Triodopsis loricata* is found on both California ranges of mountains identical in form, but in the Sierras from 2,000 to 4,000 feet altitude, on the coast only below 1,000 feet. I have also been informed lately that the Oregonian *Aplodon Columbianus* and "*Microcyclis*" *Vancouverensis* have been found at the Big Trees of Calaveras County, 4,700 feet altitude, the first time in the Sierras, if really of these species. At its southern end only, we find *H. Traskii* passing around the low mountain range there existing and dividing into two varieties — *Diabloensis* for the coast range, and *Carpenteri* in the Sierras—which, however, only extends north to latitude 38°, where it is much dwarfed. Thence north it is replaced by *H. Mormonum*, a form closely connected with *H. fidelis*, the Oregon type of the banded group,

In 1854, I noticed large numbers of *H Townsendiana* inhabiting the deserted Indian village sites near the coast, and quite common even where those rich deposits of shells and other refuse are cultivated. In California, it is not uncommon to find *H. Californiensis* in fields near thickets, among cabbages, potatoes, and other vegetables, also in young orchards with very little shade, so that as planted trees increase in size and numbers, their needed shelter will become abundant. The neighborhood of city reservoirs, parks and cemeteries are also favorable places, where I have found fine ones for over twenty years past.

In the middle and northern counties of California, the effects of the Spanish burnings and cattle grazing is less marked, though the Americans have destroyed vast tracts of sheltering forests, and thus exterminated them in some places, while they are favored in other places by new plantations, and by more care to prevent fires. The diffusion of the eggs and young of most of them is also promoted, no doubt by their adhesion to the feet of birds, which scratch among the damp leaves of dark forests, and then carry them to new localities perhaps very far distant. I thus account for the new appearance of species in spots that have been before searched for years. Thus after eight years residence at Haywards, California, I found in 1883, one lone specimen (living) of *Hyalina arborea*, never before found in the county, just as I found a few *dead* specimens of this species (var. *Breweri*) in San Francisco County, in 1869, its only occurrence there.

I have also found dead specimens of *H. minuscula* near Haywards, in a spot where the native trees had been closely cut and burned off, but nowhere else, though it has been found in other parts of California. It may again appear suddenly, like *arborea*, in a favorable place. Indeed, as is well known, these *Helicellidæ* are much less limited in range than large forms, being easier diffused by birds, and requiring less shelter and lime. In 1862 I found one *H. limutala* near San Mateo. It is, therefore, not safe to assume that a small species is extinct until much more search is made. It may reappear where least expected, like the *Helicina*, so long believed extinct in the East, and may spread very rapidly by the aid of birds, in spite of its "snail's pace."

4. SUB-FOSSIL SPECIES.

The extinction of the large land animals, probably by cold, was as complete in the coast ranges as in the Sierras, and the glacial influence may also have affected the mollusca.

There are, indeed, a few species which have so far been found only dead and bleached, all of which are peculiar from being of the discoid form that may be considered the simplest style of "Helix" (literally meaning a coil). One I found on an island off the California coast, and is possibly living in Mexico, but is undescribed. The second was "found by Mr. H. Moores in the foothills of the west slope of the Nevada Mts., about 5 miles south of Coloma, and $\frac{1}{4}$

mile south of Weber creek (Cold Springs), under an old log, between Coloma and Placerville, in 1849-50." This is Mr. Moores' own account, but the specimen being inseparable from *Ophiogyra heligmoidea* of tropical America, it is generally considered an error caused by the misplacement of labels. There is a bare possibility that such stragglers or their eggs may have been introduced by birds or travelers accidentally, and lived a short time here, but they cannot be considered as native species.*

In support of Mr. Moores' case, however, there is another specimen much like his, but bleached and without teeth, sent to Mr. H. P. Carlton as "found under a log in Calaveras Co." I may add that I have collected within ten miles both north and south of these localities, without finding any specimens resembling the above.

The fourth species (or specimens) of discoid sub-fossils have been in my hands since 1871, when Mr. C. D. Voy brought them to me as discovered by him "in an Indian mound north of S. F. Bay." They are of the size and nearly the form of *Helicodiscus lineatus* (a species said to occur in California), but without a trace of teeth or sculpture. I considered them, however, imperfect specimens of that form until 1883, when W. O. Emerson found a few of the same much larger but more fossilized, near Haywards, on a sliding bank, where they seemed to have come from under the roots of a large tree that had been undermined. These also are toothless, and some of both sent to Mr. Bland and Mr. Binney, have been decided to be of a new species if not new genus. As with the specimens of *Hyalina*, mentioned before, these were where they could not have been washed down by the mountain streams.

Without living specimens it will be inadvisable to describe these, especially as their being found first in an Indian mound is some indication that they may increase instead of

*See Amer. Jour. Conch., V, 196 to 219; 1870.

decrease with settlement of the country. The chances, however, seem in favor of their being either cave-dwellers or more northern species, introduced where found by birds, but not able to increase there.

5. LIVING SPECIES.

While on the subject of introduced species, I may remark that the *Limax* (*Amalia*) *Hewstoni* is undoubtedly increasing about gardens, where it is sometimes quite destructive. In 1879, Dr. Anderson sent me some from Santa Cruz, where I saw none in 1865. They are also strictly limited to gardens and never found along creeks where several other slugs are common, and widely spread by freshets. It is still undecided whether this is the *L. Sandwichensis* of the islands. Since I described it and *Alexia setifer* (= *myosotis* var.) in 1872, the *Mya arenaria*, first seen in 1874, has become very abundant in San Francisco Bay, from introduction with Eastern oysters, showing how some mollusca may be colonized, and it is possible that the *Alexia* came the same way. It is now abundant on salt marshes near Haywards, where it could not have existed in 1870, when Dr. Yates found all the other marsh shells there. Hemphill also found it in Humboldt Bay in 1876. The progress of our local knowledge of the land shells is shown by the additions to the table I published in 1870 of those found around San Francisco Bay. I then gave 27 species and sub-species, of which 19 were found on west side, and 11 on the east. They now number 22 on west side, and 24 on east side, including 7 without shells since added, and reducing the number of sub-species by omitting 6.

Previous to 1869, it was supposed that none of the large species of land shells existed above the limestone formation, which was then limited to about 4,000 feet elevation on the west slope of the Sierras. Although scarce and stunted at higher points, they have since been found as far up as the tertiary detritus is extensive, which seems to coincide with the lower limit of glacial action on the high Sierras. It seems probable that nearly all these lofty summits were once covered by stratified rocks, which still remain in spots as metamorphosed slates, as high as 13,400 feet. But the more soluble limestone which still covers lofty ranges in Nevada, and still exists above 5,000 feet in northern California, seems to have been entirely denuded from the highest ranges during their upheaval, and since then, by the erosive action of ice and water. This erosion has formed a belt of tertiary detritus up to an elevation of about 6,000 feet near Kern River, and northward to 4,700 feet in Bear Valley near Emigrant Gap. Here it contains fossil tertiary shells of extinct species, relics of a pliocene lake. The Big Tree Groves are along the upper edge of this alluvial detritus, which like other fresh water formations probably contains much lime, and even limestone beds, at a depth not yet ascertained. So far, only the Big Tree Groves of Mariposa County, at about 5,500 feet, and those of Tuolumne and Calaveras about 4,750 feet, have furnished specimens of the land shells common in those counties, while at Bear Valley another species occurs. This formation consists in part of volcanic materials, especially toward the north, and the more or less recent epoch in which these have been thrown out in various localities, no doubt has much to do with the occurrence of animal and vegetable life. That such rocks and soils are suited for the growth of land shells if there is enough moisture is shown by the Oregon fauna and that of some islands on the Coast.

I have also this year found *H. Mormonum* very stunted at Alta, in Placer County, 3,600 feet altitude. There is also evidence that the lower limestone stratum is exposed at about 5,000 feet, near Emigrant Gap.

Although no species have been reported from the interval of one hundred miles between Yuba River and Bass ranch, yet as most of the same species are found both north and south of this lava-covered section, and as limestone exists abundantly in the beds of the ravines beneath the volcanic covering, from four thousand feet elevation down, in Plumas County, also in Butte County in the foothills, it is most probable that the shells exist there, though scarce or overlooked. Calcareous tufa is also common in many places where the limestone is not exposed, and quite as favorable for land shells. These and other developments tend to show that the whole auriferous region is underlaid by one if not two strata of limestone, the lower one carboniferous, the upper one, perhaps, jurassic, cropping out on the east and west edges.

It is possible that the land shells, known by the Calaveras skull specimen to have existed before the end of the volcanic overflow, may have been quite exterminated where that covers most of the surface, and have not yet recolonized the region, that formation being poorly suited for their production. Several extra-limited forms have also been added to the regions northward of California, as recorded by W. G. Binney, in his "Supplements to Terr. Moll. of U. S."

Limax Occidentalis, J. G. C.

On a recent visit to Tehachipi Pass in May, 1885, I searched carefully for land shells from 4,000 feet elevation, down to about 600 on west slope, but found no traces of any below the springy tract near summit, where this species lives.

Succinea Stretchiana, Bland.

The only shell-covered *terrestrial* species seen in Tehachipi Pass, along the upper part of that creek, in which also live Limnophysa humilis *Lea*, Physa Blandii *Lea*, and Pisidium occidentale *Newc*. There being plenty of limestone and moisture there, it is strange that the large Helicoids, found both north and south at the same elevations, do not occur.

Others beyond our boundary are kindly reported to me by Mr. F. R. Latchford, of Ottawa, Canada, as follows: "The

Rev. G. W. Taylor, of Victoria, B. C., has sent me *H. fidelis*, *H. germana*, *P. striatella*, *M. Vancouverensis*, *M. Voyana*, *H. arborea*, and *C. fulvus*, found in that vicinity."

There is also a *Hyalina* near *H. viridula* (*Mke.*) or new. *H. indentata* (*Say.*), or *H. subrupicola*, *Dall*, is also to be expected from near latitude 49°, as a circumpolar or boreal American form.

Ariolimax Californicus, J. G. C.

This great slug, apparently identical with the coast species, is common up to Alta, Placer County, at 3,700 feet. From its yellow color and auriferous home, it is called "Golden Slug." The abundance of some kinds of land molluscs has attracted the attention of the miners at one locality, called "Slug Cañon," in Plumas County. There is also a "Snail Cañon" about five miles south of Alta, beyond the American River. From the description of the rocks of this place, I suspect the snails are not the shell-bearing kinds, but also "Slugs," which are much more noticeable by miners from frequenting springy ravines where cool and shady in the day-time, while the shelled kinds rarely occur in large numbers together except in limestone caves or ledges, which do not exist there.

The former $50 coins of California were called "slugs," that is, lumps of gold.

Patula Mazatlanica, Pfeiffer.

This Mexican species must be omitted from the Californian list, as the specimens so identified by Mr. Rowell and myself on being compared with types by Mr. Binney prove to be a stunted variety of *Hyalina conspecta*, Bland.

I here add some notes on a "Supplement to the Fifth Volume of Terr. Mollusks, etc." By W. G. Binney. July, 1883. In Bull. Mus. Comp. Zool., XI, 8, 135, Harvard Coll., Cambridge, Mass.

In this supplement, Mr. Binney has adopted some of the corrections that I suggested in a review of Vol. V, Terr. Moll., published in Proc. Am. Phil. Soc., XVIII, 1879, but ignores others altogether, possibly because they were not confirmed by specimens at the date of his writing.

As to distribution, there must be added to species of the Sierra Nevada *Macrocyclis* sp. (*sportello* ?), *Mesodon* (*Columbianus?*), *Arionta Traskii* var. (mentioned as *Franki* on p. 158, a thin dwarfed form found in Mariposa County, at 5,000 to 6,000 feet altitude, and described in Amer. Jour. Conch., V, 205), and *Limax campestris occidentalis.* Mr. Binney quotes "*Zonites conspectus,* Merced County, Cal.," which makes it also a Sierra species (p. 142).

"*Macrocyclis Hemphilli,*" p. 137. From the figure and description this seems to approach the Alaska form which I have mentioned as perhaps "*Helix Belcheri,*" Pfeiff., and which is quite as distinct as the several U. S. species.

"*Zonites indentatus,*" p. 139. Dall's species, *Hyalina subrupicola,* would appear quite as well entitled to separation as the above, or many others, and is at least an addition to the West Slope fauna.

"*Z. chersinellus,* Dall." This looks quite as much like *indentatus* as the last, but requires further study.

"*Limax Hewstoni,*" p. 146. From my own careful examination of localities north of San Francisco Bay, and south of Santa Cruz down to San Diego, since I described this species, I am satisfied that Hemphill's specimens were chiefly *L. campestris occidentalis,* except perhaps at Los Angeles, where it was probably introduced with plants.

"*Onchidella Carpenteri,*" p. 148. The figure of a dry specimen cannot be distinguished from a dried *Doris* and a dissection is necessary in doubtful cases, such as absence of a jaw indicates.

"*Arionta*," p. 157. Here Mr. Binney, himself, states that "*Townsendiana* has quite different genitalia from *Arionta*," which with its shell indicates its more correct reference to *Mesodon*.

He also says that the genitalia of *H. Mormonum* differ essentially "being more nearly allied to that of *Aglaia fidelis* and *infumata*." So if the latter are not *Ariontae*, neither is *Mormonum*, or *Hillebrandi*, which is as much a variety of it as the *circumcincta* Stearns (p. 158). But *Aglaia* will have to be dropped as the generic name, being twice pre-occupied.

The figures B, C and G, on Plate IV, represent some of the intermediate forms connecting *fidelis* with *infumata* and with *Mormonum*.

FUNGI OF THE PACIFIC COAST.

IV.

BY H. W. HARKNESS.

HYDNUM STEVENSONII, B. & Br.—On *Umbellularia Californica*, San Rafael, April. 1073.

HYDNUM SCROBICULATUM, Fr.—On decaying wood, Blue Cañon, October 1170.

HYDNUM LAETICOLOR, B. & C.—On *Quercus*, Palo Alto, April. 1334.

HYDNUM CILIOLATUM, B. & C.—On *Alnus rubra*, Healdsburg, April. 1566.

STEREUM INCONCINNUM, B. & C.—On *Alnus rubra*, Healdsburg, April. 1545.

STEREUM MUSCIGENUM, B. & B.—On *Robinia pseudacacia*, Sacramento, December. 1060.

STEREUM OCHRACEO-FLAVUM, Schw.—On *Quercus agrifolia*, San Francisco, April. 1342.

STEREUM RUGOSUM, Fr.—On *Quercus agrifolia*, San Francisco, April. 1344.

STEREUM VERSICOLOR, Fr.—On decorticated *Quercus*, Redding, April. 1335.

CORTICIUM EPIPHYLLUM, Pers.—On *Eucalyptus* leaves, San Francisco, April. 1285.

RADULUM ORBICULARE, Fr.—On *Alnus rubra*, Healdsburg, April. 1567.

IRPEX OBLIQUUS, Fr.—On *Quercus agrifolia*, San Francisco, April. 1343.

NAEMATELIA NUCLEATA, Fr.—On *Alnus rubra*, Healdsburg, April. 1568.

Issued November 19, 1885.

Cyphella Ravenelii, B. & C.—On *Arbutus Menziesii*, Tamalpais, March. 2255.

Mycenastrum corium, Desv. Gregarious depressed-globose, at first white, becoming brownish, 1—4 inches in diameter. Collected in Solano County, June, 1885, by Alpheus Bull, Jr. Found also at Reno, Nev. 4000.

Spores and flocci agree exactly with published description and figures of this species.

Polysaccum crassipes, DC.

This species was collected during the past year on Mt. Diablo and on Grizzly Peak, near Berkeley, by Charles D. Haines and Walter Eastman. The specimens are irregularly clavate, one of them deeply 3-cleft from the top downward and all are variously contorted and twisted, dark brown in color, with a bluish metallic bloom. The largest is seven inches in height and fourteen in its largest circumference. 4040.

Secotium nubigenum. Stipe white, becoming yellowish, very short: pileus yellowish, smooth, irregularly depressed-globose, an inch or more in diameter, often nearly sessile, collapsing more or less in drying: hymenium yellowish-brown; spores yellowish-brown, oval, smooth and shining. $6 \times 8\,\mu$. 3300.

Growing on logs of *Pinus contorta*, Sierra Nevada, 7,000 feet. The mode of dehiscence is yet unknown, although it has been several times collected, and in considerable quantity, it is always found with cortex entire.

Tulostoma obesum, C. & E. On Rattlesnake Island, Pyramid Lake, Nev., Aug. 3875.

Much larger and stouter than the specimens originally described, 3—5 inches in height: base of the stipe fringed with the remains of the volva: mouth minute, enlarging irregularly.

OCTAVIANIA COMPACTA, Tul.— Tamalpais and Blue Cañon, under leaves, May—July. 3948, 4054.

OCTAVIANIA STEPHENSII, B.—Tamalpais and Alta, May—July. 3735, 4053.

Var. nuda.—Surface rimose, entirely without peridium or cortex, otherwise exactly the same. Tamalpais, May. 3949.

HYMENOGASTER CITRINUS, Vitt.—Tamalpais, March. 3663.

HYMENOGASTER TENER, Berk.—Tamalpais, May. 3935.

RHIZOPOGON PROVINCIALIS, Tul.—Alta, July. 4045, 4047.

RHIZOPOGON RUBESCENS, Tul.—Anderson's Springs, Lake County, collected by the Misses Anderson, Tamalpais and Donner, 7,000 ft., Dec.—July. 3648, 3665, 3872, 4044.

HYSTERANGIUM THWAITESII, Berk.—Tamalpais, August. 3736.

HYSTERANGIUM STOLONIFERUM, Tul.—Tamalpais, March—May. 3662, 3893, 3931.

MELANOGASTER AMBIGUUS, Tul.—Santa Cruz, April. 3674.

MELANOGASTER VARIGATUS, Tul.—Sausalito, February. 3624.

LIBERTELLA ROSÆ, Desm.—On *Rubus ursinus*, San Francisco, April. 1261.

CEUTHOSPORA FOLIICOLA, Lib.—On *Rhamnus crocea*, *Umbellularia Californica*, and *Garrya elliptica*, Tamalpais, March—April. 1209, 1392, 1483.

CICINNOBOLUS CESATII, De Bary.—On *Euonymus Japonicus*, San Francisco, May. 2297.

CYTISPORA PINASTRI, Fr.—On *Sequoia sempervirens*, Tamalpais, April. 1351.

CONIOTHYRIUM ACUUM, C. & Ell.—On leaves of *Pinus insignis*, Woodland, May. 1591.

CONIOTHYRIUM HERBARUM, C. & E.—On stems of *Scrophularia Californica*, San Francisco, April. 1325.

CONIOTHYRIUM LINEARE, Thüm.—On leaves of *Gynerium argenteum*, San Francisco, March. 2212.

CONIOTHYRIUM SCROPHULARIÆ, Sacc.—On stems of *Scrophularia Californica*, San Francisco, April. 2463.

LEPTOSTROMA VULGARE, Fr.—On stems of *Thalictrum polycarpum*, Tamalpais, April. 1365.

LEPTOSTROMA LITIGIOSUM, Cke.—On *Pteris aquilina*, Sausalito, April. 1291.

PHOMA ASTERISCUS, Berk.—On *Sambucus glauca*, Sacramento, March. 1202.

P. COMMUNIS, D.—On *Rhamnus Californica*, San Francisco, April. 1425.

P. GLANDICOLA, Lev.—On oak galls, Tamalpais, April. 1403.

P. HEDERÆ, Curt.—On stems of *Hedera helix*, San Francisco, April. 1300.

P. HERBARUM, P.—On stems of *Eriogonum latifolium*. San Francisco, April. 1278.

P. LEBISEYI, Sacc.—On *Negundo Californica*, Healdsburg, April. 1484.

P. LIGNICOLA, Rab.—On decorticated *Acacia*, San Francisco, April. 1453.

P. NEBULOSA, Mont.—On *Thalictrum polycarpum*, Tamalpais, April. 1365.

P. SAMBUCINA, Cke.—On *Sambucus glauca*, Sacramento, April. 1234.

P. SAROTHAMNI, Cke.—On *Spartium*, San Francisco, April. 2388.

P. STROBILIGENA, Desm.—On cones of *Pseudotsuga Douglasii*, Healdsburg, April. 1504.

P. RAMEALIS, Desm.—On twigs of *Prunus amygdalus*, Sacramento, April. 1241.

P. VITIS, Bon.—On stems of *Vitis Californica*, Sacramento, April. 1236.

CRYPTOSPORIUM NEESII, Fr.—On *Alnus rubra*, Tamalpais, April. 1374.

SPHÆROPSIS LANCEOLATA, C. & E.—On stems of *Urtica holosericea*, Sacramento, April. 1229.

DIPLODIA DECORTICATA, C. & E.—On decorticated *Acacia*, San Francisco, April. 1416, 1437.

D. GALLÆ, B. & C.—On oak galls, Healdsburg, April. 1514.

D. HERBARUM, Cke.—On stems of *Artemisia pycnocephala*, San Francisco, April. 1253.

D. MAURA, Cke. & Ell.—On *Pyrus communis*, Sacramento, April. 1239.

D. MELÆNA, Lev.—On twigs of *Umbellularia Californica*, Tamalpais, April—June. 1304.

D. MUTILA, Fr.—On *Acacia*, San Francisco, April. 1438, 2077.

D. PRUNI, Fckl.—On *Prunus amygdalus*, Sacramento, April. 1593.

D. VULGARIS, Lev.—On *Acacia*, San Francisco, April. 1249.

HENDERSONIA CULMICOLA, Cke.—On stems of *Juncus Lesuerii*, San Francisco, April. 1435.

H. RUBI, West.—On dead stems of *Rubus ursinus*, Tamalpais, April. 1405.

VERMICULARIA RECTISPORA, Cke. & Ell.—On *Echinocystis Californica*, Martinez, April. 1312.

DISCOSIA MINIMA, B. & C.—On leaves of *Arbutus Menziesii*, Tamalpais, April. 1317.

DISCELLA MICROSPERMA, B. & Br. On twigs of *Salix*. Sacramento, March. 1198.

MELANCONIUM MAGNUM, Berk. On *Acer macrophyllum*, Sunol, April. 2439.

MELANCONIUM SPHÆROIDEUM, Lk. On *Alnus rubra*, Tamalpais, March. 2252.

STILBOSPORA OVATA, Pers. On *Acer macrophyllum*, Tamalpais, February. 3189.

STILBOSPORA MONOTOSPORA, Cke. On *Acer macrophyllum*, April. 1537, 1539.

SEPTONEMA TORULOIDEA, C. & E. On stems of *Scrophularia Californica*, April. 1326.

ASCOCHYTA PISI, Lib. On leaves of *Lathyrus*, Berryvale, July. 3346.

PESTALOZZIA GUEPINI, Desm. On living leaves of *Camellia Japonica*, San Francisco, April. 3059.

PESTALOZZIA FUNEREA, Desm. On *Cupressus macrocarpa* and *Araucaria imbricata*, San Francisco, April, 1271, 1440, 2427.

PESTALOZZIA HETEROSPORA, Desm. On *Cupressus macrocarpa*, San Francisco, February. 2208.

PESTALOZZIA MONOCHÆTA, Desm. On leaves of *Eucalyptus*, San Francisco, February. 2155.

TORULA GRAMINIS, Cda. On straw, San Francisco, April. 2320.

TORULA HERBARUM, Lk. On stems of *Lathyrus* and *Mesembryanthemum*, San Francisco. 1309, 2305.

TORULA QUATERNATA, C. & E.—On *Lavatera*, San Francisco, April. 2430.

SPEIRA TORULOIDES, Cda.—On *Eucalyptus*, San Francisco, April. 2401.

SPORIDESMIUM HERBARUM, Cke.—On twigs of Artemisia, May. 1598.

SPORIDESMIUM TRANSLUCENS, Cke.—On *Pseudotsuga Douglassii* and on *Quercus*, Healdsburg, April. 1553.

GYMNOSPORIUM INQUINANS, Berk.—On *Arundo*, San Francisco, March. 2219.

ÆCIDIUM ISOMERINUM, Pk.—On *Isomeris arborea*, Caliente, July. 3720.

CHRYSOMYXA PIROLATA, Körn.—On leaves of *Pyrola secunda*, Sierra Nevada, Aug. 3570.

SYNCHYTRIUM PLURIANNULATUM, Farlow.—On *Sanicula Menziesii*, San Francisco, May. 1070.

UREDO FILICUM, Desm.—On fronds of *Pteris aquilina* and *Polypodium vulgare*, San Francisco and Tamalpais, July—September. 2815, 3144.

UROMYCES TUBERCULATUS, Fckl.—On *Euphorbia dictyosperma*, with *Æcidium*, San Bernardino, April, S. B. Parrish and from Folsom, May. 3208, 3491.

PUCCINIA OXYRIÆ, Fckl.—On leaves of *Oxyria digyna*, Sierra Nevada, Aug. 3571.

P. GENTIANÆ, Lk.—On *Gentiana affinis*, collected by Mrs. Austin, Big Meadows. 4038.

P. VALANTIÆ, Alb. & Schw.—On *Galium Californicum* and *G. Nuttalli*, Sausalito, May. 2651, 2741.

PUCCINIA ALLII (D. C.)—On leaves and stems of *Allium Nevadense*, Reno, Nev., June. 3524.

PERONOSPORA SORDIDA, Berk.—Very common on leaves of *Nicotiana Bigelovii*, Reno, Nev., May—Aug. 3358.

VOLUTELLA CILIATA, Fr.—On dead stems of '*Acacia*, San Francisco, April. 2411.

FUSARIUM LATERITIUM, Nees.—On *Ficus*, San Rafael, April. 1474.

FUSISPORIUM CEREALIS, Cke.—On *Zea Mays*, Healdsburg, April. 1493.

FUSISPORIUM GRAMINUM Cke.—On *Zea Mays*, Sacramento, April. 1231.

EPICOCCUM EQUISETI, B.—On dead stems of *Equisetum*, Sacramento, April. 1228.

PERICONIA CALICIOIDES, Berk.—On *Quercus*, Healdsburg, May. 1529.

STACHYBOTRYS SIMPLEX, Cke.—On *Agave Americana*, San Francisco, March. 2229.

MYSTROSPORIUM SPRAGUEI, B. & C.—On *Eucalyptus*, San Francisco, March—April. 2286, 2394, 2403.

POLYSCYTALUM SERICEUM, Sacc.—On *Quercus agrifolia* and *Cupressus macrocarpa*, San Francisco, March—April. 2277, 2453, 2461.

CIRCINOTRICHUM MACULÆFORME, Nees.—On twigs of *Eucalyptus*, San Francisco, March. 2367.

HELICOSPORIUM VEGETUM, N.—On leaves of *Quercus agrifolia*, San Francisco, May. 2550.

ZYGODESMUS PANNOSUS, B & C.—On *Quercus agrifolia*, *Platanus racemosa*, and *Umbellularia Californica*, Sausalito, Sunol, and Healdsburg, April. 1510, 1517, 2438, 2452.

Z. HYDNOIDES, B. & C.—On *Platanus racemosa*, Sunol, April. 2424.

Z. FUSCUS, Cda.—On *Pinus insignis*, Mt. Diablo, May. 2489.

MEMNONIUM EFFUSUM, Cda.—On *Quercus*, Healdsburg, April. 1525.

TRICHÆGUM ATRUM, Fr. On stems of *Scrophularia Californica*, Tamalpais, April. 1363.

HELMINTHOSPORIUM AVENACEUM, Curt. On *Avena*, San Francisco, April. 2407.

HELMINTHOSPORIUM OBOVATUM, B. & Br. On *Eucalyptus*, San Francisco, April. 2417.

MACROSPORIUM ABRUPTUM, Cke. & Ell. On *Dracæna*, Healdsburg, April. 1532.

MACROSPORIUM COMMUNE, Rab. On dead stems of *Cnicus*, Healdsburg. 1273.

SEPTOSPORIUM PRÆLONGUM, Sacc. On *Acacia*, San Francisco, April. 2399.

HELICOMA BERKELEYI, Curt. On *Eucalyptus*, San Francisco, April. 2385.

TRICOTHECIUM ROSEUM, Fr. On decaying wood, San Francisco, Dec—May. 2222, 2315.

VIRGARIA UNISEPTATA, B. & C. On *Quercus*, Healdsburg, April. 1563.

PACHYPHLŒUS MELANOXANTHUS, Tul. From Tamalpais, Santa Cruz, and from Berkeley, by Prof. J. J. Rivers, Dec. —April. 2738, 3521. 3675.

GENEA PAPILLOSA, Vitt. Tamalpais, April. 3952.

GENEA VERRUCOSA, Vitt. Tamalpais, Santa Cruz and from Contra Costa, by Haines & Eastman. Dec.—June. 3500, 3676, 3677, 3958.

As may be observed from the species herein enumerated, *Hypogæi* and *Tuberacei* abound in California. A considerable number remain in the collection unnoticed, for want of sufficient material for comparison.

HELVELLA MONACHELLA, Fr.—Tamalpais, March. 1297.

STICTIS DECIPIENS, (Karst.)—On dead stems of *Lupinus arboreus*, San Francisco, March. 2190.

STICTIS PELVICULA, Pers.—On *Ribes Sanguinea*, Sausalito, May. 2553.

Ascomyces Tosquinetii, West.—On female catkins of *Alnus rubra*, producing great deformity, Sunol, Sept. 4042.

Ascomyces deformans, Berk.—A form of this was found last year on *Æsculus Californica* affecting the young shoots and leaves, which are quickly killed and therefore not much distorted. Sausalito, May. 3177.

Ascomyces cærulescens, Mont.—On leaves of *Quercus agrifolia*, San Francisco, May. 2556, 2661.

Ascomyces fulgens, C. & H.—This is undoubtedly an error. The specimens show only the galls of some aphidian, which are of a red color. Ascomyces is hardly to be expected on a plant belonging to the Ericaceæ.

Ascomyces pruni, B. & Br.—On fruit of *Prunus subcordata*, Yo Semite, June. 4012.

Collected by J. M. Hutchings, who reports the fact that on account of its prevalence this fruit (our wild plum) is hardly ever found fit for eating.

Ascomyces aureus, (Fr.)—On leaves of *Populus dilatata*, and *P. Fremontii*. Oakland, May. 3734.

Ascomyces Quercus, Cke.—On leaves of *Quercus Douglasii*, Folsom, and *Castanopsis chrysophylla*, Sierra Nevada, May—August. 3203, 3294.

Phacidium coronatum, Fr.—On *Berberis pinnata* and *Quercus agrifolia*, San Francisco, Healdsburg, Alta, April. 1268, 1331, 1555.

P. quadratum, Schm.—On leaves of *Arbutus Menziesii*, Tamalpais, April. 1317.

Hysterium pulicare, Pers.—On *Quercus agrofolia*, April. 1420.

H. vulvatum, Schw.—On twigs of *Arctostaphylos pungens*, Tamalpais. April. 1248.

Lophodermium caricinum, Rob.—On *Carex*, San Francisco, April.

L. XYLOMOIDES, Fr.—On leaves of *Myrica Californica*, Tamalpais, April. 1303.

LOPHIUM MYTILINUM, Fr.—On *Pinus insignis*, San Francisco, June. 2682.

HYPOCREA CONTORTA, B. & C.—On *Acer macrophyllum*, Tamalpais, April. 1215.

GIBBERELLA PULICARIS, Sacc.—On *Echinocystis Californica* and *Euonymus Japonicus*, San Francisco, April—June. 1313, 2357.

G. SAUBINETII, Sacc.—On *Artemisia pycnocephala*, *Polygala*, *Mesembryanthemum* and *Pittisporum*, San Francisco, March—May. 2275, 2295, 2302, 2351.

NECTRIA ZEALANDICA, Cke.—On *Æsculus Californica*, Martinez, April. 1265.

PORONIA PUNCTATA, Fr.—Collected in Arizona, 1882, by Mr. J. G. Lemmon. 3427.

HYPOXYLON CONCURRENS, B. & C.—On *Acer macrophyllum*, Mt. Diablo, May. 2490.

EUTYPA LATA, Fr.—On *Lonicera involucrata* and *Myrica Californica*, Sausalito, May. 2455, 2471.

DIATRYPE ASTEROSTOMA, B. & C.—On *Æsculus Californica* and *Alnus rubra*, Healdsburg, April. 1266, 1546.

VALSA AMERICANA, B. & C.—On *Umbellularia Californica*, Tamalpais, April. 1462.

SPHÆRELLA MACULÆFORMIS, Pers.—On *Acer macrophyllum*, Healdsburg, and *Arbutus Menziesii*, Tamalpais, April. 1316, 1320, 1571.

S. PERPUSILLA, Desm.—On grass, Yolo, April. 1242.

PHOMATOSPORA BERKELEYI, Sacc.—On stems of *Polygala*, San Francisco, April. 2352.

DIAPORTHE INQUILINA, Nits.—On *Heracleum lanatum* and *Smilacina racemosa*, Tamalpais, April. 1394, 1465, 1468.

D. ROSÆ, B. & C.—On stems of *Rosa Californica*, Healdsburg, April. 1547.

D. CRYPTICA, Nits.—On stems of *Lonicera involucrata*, April. 2466.

D. SAROTHAMNI, Nits.—On stems of *Spartium*, San Francisco, April. 2396.

METASPHÆRIA LATHYRI, Sacc.—On *Lupinus arboreus*, San Francisco, April. 1432.

LASIOSPHÆRIA BIFORMIS, Sacc.—On *Platanus racemosa*, Sunol, and *Myrica Californica*, Sausalito, April. 2436, 2450.

LASIOSPHÆRIA PEZIZULA, Sacc.—On *Pseudotsuga Douglasii*, Healdsburg, April. 1552.

ERIOSPHÆRIA VERMICULARIA, Sacc. On *Pinus insignis*, San Francisco and Martinez, April. 1350.

CHÆTOSPHÆRIA INNUMERA, Tul.—On *Quercus* decaying, Healdsburg, April. 1511.

LEPTOSPHÆRIA DOLIOLUM, De Not.—On *Psoralea orbicularis*, Tamalpais, April. 1346.

L. CONSESSA, Sacc.—On stems of *Scrophularia Californica*, San Francisco, April. 1325.

L. CULMICOLA, Karst.—On straw, San Francisco, April. 1360.

L. MODESTA, Karst.—On stems of *Cnicus*, San Francisco, April. 1369.

ROSELLINIA MUTANS, Sacc.—On *Sequoia sempervirens*, Tamalpais, April. 1352.

OPHIOBOLUS ACUMINATUS, Duby.—On stems of *Cnicus*, San Francisco, April. 1274.

PYRENOPHORA TRICHOSTOMA, Sacc.—On straw decaying, Healdsburg, April. 1498, 2375.

PLEOSPORA INFECTORIA, Fckl.—On culms of *Bromus ciliatus*, San Rafael, April. 1469.

P. LEGUMINUM, Rab.—On legumes of *Lupinus arboreus*, San Francisco, April. 1436.

P. MEDIA, Niessl.—On stems of *Brassica nigra*, Yolo, April. 1244.

P. PHRAGMOSPORA, Ces.—On leaves of *Dracæna*, San Rafael, January. 1980.

P. VULGARIS, Niessl.—On *Cheiranthus asper*, San Francisco, April. 1426.

DICHÆNA QUERCINA, Fr.—On *Quercus agrifolia*, Tamalpais, and Healdsburg, April. 1402, 1512, 1518.

Fungi from the Harkness Herbarium published during the past year, in Grevillea.

BY M. C. COOKE AND H. W. HARKNESS.

PHOMA ASTRAGALI.—On stems of *Astragalus Menziesii*, San Francisco. 2566.

PHOMA LUPINI.—On stems of *Lupinus arboreus*, San Francisco, January. 1986.

PHOMA POLYGALÆ.—On stems of *Polygala*, San Francisco, April. 2351.

PLEOSPOROPSIS HETEROMELIS.—On dead leaves of *Heteromeles arbutifolia*, San Francisco. 1295, 2162.

SPHÆROPSIS QUERCINUM.—On branches of *Quercus agrifolia*, San Francisco, February. 2117.

SPHÆROPSIS LUPINI.—On stems of *Lupinus arboreus*, San Francisco, January. 1989.

DIPLODIA LUPINI.—On stems of *Lupinus arboreus*, San Francisco. 2247.

This species has been previously described, see Grev. ix, 82.

DIPLODIA FUCHSIÆ.—On stems of *Fuchsia*, San Francisco, April. 2366.

DIPLODIA CRASSULÆ.—On stems of *Crassula*, San Francisco, February. 2173.

DIPLODIA PHYLLACTINIÆ.—On leaves of *Acacia*, San Francisco, January. 1992, 2053.

HARKNESSIA ARCTOSTAPHYLI.—On leaves of *Arctostaphylos pungens* and *pumila*, San Francisco, April. 2215.

RHABDOSPORA CHLOROGALI.—On stems of *Chlorogalum pomeridianum*, Piedmont, May. 2509.

RHABDOSPORA DECORTICATA.—On decorticated *Acacia*, San Francisco, April. 2052.

VERMICULARIA STRAMINIS.—On straw, San Francisco, May. 2464.

AMEROSPORIUM GERANII.—On stems of *Geranium zonale*, San Francisco, April. 2424.

HENDERSONIA SCIRPICOLA.—On culms of *Juncus Lesuerii*, San Francisco, May. 2548.

HENDERSONIA VARIANS.—On stems of *Sphacele calycina*, Mt. Diablo, May. 2512.

CAMAROSPORIUM ELLIPTICUM.—On stems of *Mesembryanthemum æquilaterale*, San Francisco, April. 2237.

LEPTOTHYRIUM JUNCINUM.—On stems of *Juncus Lesuerii*, San Francisco, May. 2568.

LEPTOSTROMA SEQUOIÆ.—On twigs of *Sequoia sempervirens*, Tamalpais, April. 2265.

TRULLULA (CESATIA) JUNCI.—On stems of *Juncus Lesuerii*, San Francisco, May. 2567.

MYXOSPORIUM MICROSPORUM.—On branches of *Pyrus Communis*, Alameda, January. 1970.

GLŒOSPORIUM CARPOGENUM. On capsules of *Populus Fremontii*, Sacramento, June. 2049.

TUBERCULARIA SPHÆROIDEA.—On stems of *Geranium zonale*, San Francisco, February. 2078.

TUBERCULARIA GERANII.—On stems of *Geranium zonale*, San Francisco, March. 2126.

TUBERCULARIA INSIGNIS.—On twigs of *Pinus insignis*, San Francisco, March. 2170.

HYMENULA GLUMARUM. On glumes of *Triticum*, San Francisco, April. 2347.

HYMENULA LUPINI.—On stems of *Lupinus arboreus*, San Francisco, January. 2063.

HYMENULA MEGARRHIZÆ.—On stems of *Echinocystis Californica*, San Francisco, February. 2082.

HYMENULA PHORMICOLA.—On leaves of *Phormium tenax*, San Francisco, April. 2224.

STRUMELLA VINCÆ.—On stems of *Vinca minor*, San Francisco, April. 2339.

UROMYCES PUNCTATO-STRIATUM.—On stems and leaves of *Rhus diversiloba*, Mt. Diablo, May. 2479.

DOTHIDEA (PLOWRIGHTIA) CALYSTEGIÆ.—On stems of *Convolvulus luteolus*, Mt. Diablo, May. 2477.

VALSA LUPINI.—On stems of *Lupinus arboreus*, San Francisco, January. 1990.

VALSA LAVATERÆ.—On stems of *Lavatera assurgentiflora*, San Francisco, April. 2361.

DIAPORTHE GERANII.—On stems of *Geranium zonale*, San Francisco, April. 2429.

DIAPORTHE ELEPHANTINA.—On stems of *Geranium zonale*, San Francisco, February—May. 2130, 2499.

Diaporthe immutabilis.—On stems of *Scrophularia Californica*, San Francisco, May. 2463.

Physalospora geranii.—On stems of *Geranium zonale*, San Francisco, Feb. 2129.

Sphærella (Læstadia) caryophyllea.—On stems of *Dianthus*, Roseville, February. 2183.

Sphærella xanthicola.—On stems of *Xanthium strumarium*, San Francisco, May. 2451.

Didymella megarrhizæ.—On stems of *Echinocystis Californica*, San Francisco, Feb. 2086.

Didymella Fuchsiæ.—On stems of *Fuchsia*, San Francisco, April. 2374.

Amphisphæria dothideaspora.—On stems of *Mimulus glutinosus*, San Francisco, Feb.—May. 2217, 2508.

Leptosphæria straminis.—On culms of straw, San Francisco, May. 2337, 2376, 2408.

Leptosphæria subcæspitosa.—On stems of *Geranium zonale*, San Francisco, Feb. 2128.

Leptosphæria phormicola.—On leaves on *Phormium tenax*, San Francisco, February. 2128.

Pleospora quadriseptata.—On pods of *Matthiola incana*, Roseville, February. 2184.

Hysterographium (Gloniopsis) insignis.—On wood of *Acacia*, San Francisco, April. 2382.

Phacidium arbuti.—On leaves of *Arbutus Menziesii*, Tamalpais, March. 2122.

Botanical Notes.

BY MARY K. CURRAN.

SIDALCEA CALYCOSA, M. E. Jones, Am. Nat., Aug., 1883. *S. sulcata*, Curran. Bull. Cal. Acad. i. 79.

Dr. Gray has called my attention to the earlier publication of this species, which I had overlooked.

VERBESINA ENCELIOIDES, Benth. & Hook. Along the roadside for several miles near San Buenaventura. July, 1885.

CENTUNCULUS MINIMUS, L. Near Antioch, May, 1884.

LYSIMACHIA THYRSIFLORA L. Big Meadows, Plumas County, Collected by Mrs. Austin, 1884.

ACANTHOMINTHA LANCEOLATA, Curran, of which only one plant had been previously collected, was found in July of this year covering rocky hillsides in Slack Cañon, Monterey County.

ZOSTERA MARINA, L. On the seashore near Santa Barbara, July, 1885.

Classification of the Eriogoneæ as affected by some connecting forms.

The genera composing the tribe of *Eriogoneæ* are becoming every year more uncertain and ill-defined by the discovery of intermediate forms. One genus after another has been merged either into *Eriogonum* or *Chorizanthe*, each one of course modifying the character, until at present *Erigonum* is separated from *Oxytheca* only by the spine-tipped involucres of the latter, and the only definable difference between *Oxytheca* and *Chorizanthe* is a comparatively slight one of form and texture of the involucre, which may disappear with the next species discovered.

If genera are to be accepted, whether definable or not, as matters of convenience, then *Oxytheca* should be maintained,

Issued December 14, 1885.

for, if united to *Erigonum*, it is to be feared that the latter will have to include the whole tribe.

Nemacaulis has, for what appears to me sufficient reason, been referred in the following pages to *Eriogonum*. The new species, *E. gossypinum*, very much resembles it, and has the involucre divided half way to the base. The similarity of the internal bracts to those of *E. angulosum* was long ago pointed out by Dr. Gray, Proc. Am. Acad. viii., 146.

In regard to those species in which the involucre consists of distinct, unequal bracts (*Lastarriæa Chilensis*, Remy., *Hollisteria lanata*, Watson, *Oxytheca luteola*, Parry, and perhaps *Eriogonum salsuginosum*, Hook., which I have not seen, but which, from the description, must be near *O. luteola*), they might perhaps be included in a genus to be characterized by the involucre; or what would perhaps be more convenient, included as a section in *Oxytheca*, two species of which, *O. trilobata*, Gray, and *O. caryophylloides*, Parry, have their involucres divided nearly to the base.

As to the theory which has been advanced, that the perigonium of *Lastarriæa* is to be considered as an involucre, with adnate, nearly obsolete perianth, I can only say, that with some slight skill in the use of the microscope, I have been unable to find any trace of such organ.

The perianth of *Lastarriæa* is quite similar to that of *Hollisteria;* both are somewhat coriaceous, with accuminate recurved segments, and the enclosing bracts have certainly as much right to the rank of an involucre as those of *O. luteola*.

The following section of *Eriogonum*, as far as the species known to me, a very natural one, is proposed:

§ Bracteolata. Flowers within the involucre each subtended by a spatulate bract. Stems usually angular, leafy.

Eriogonum angulosum, Benth. Involucre many-flowered: outer segments of the perianth rounded with inflexed margins, shorter than the acute inner ones: internal bracts broadly spatulate, scarious on the margins.

E. GRACILLIMUM, Watson. Involucres few-flowered on slender pedicels: perianth rose-colored: segments oblong, nearly equal, often crenulate, internal bracts spatulate, few.

The species was originally described from very small specimens. It is often two feet in height.

E GOSSYPINUM. One to two feet high, intricately branched, becoming decumbent: stems obscurely angular: radical leaves elliptic, somewhat woolly beneath, cauline in the axils of small united bracts: upper bracts naked beneath, woolly above: involucres on pedicels 1—6 lines long, turbinate, cleft to the middle: segments oblong, obtuse, glabrous without and densely long-villous within, about 5-flowered: perianth pale rose-color: segments nearly linear, the inner slightly longer and acute: internal bracts linear-spatulate, long-villous on the inner surface: stamens 9: akenes lenticular.

Near Bakersfield, July, 1884. In appearance much like the following species. The flowers are not to be seen without dissection, being involved in a cottony tuft.

E. DENUDATUM. *Nemacaulis denudata* and *N. foliosa*, Nutt. Pl. Gamb. *N. Nuttallii*, Gray. Stems very slender, terete; leaves spatulate, densely woolly: involucres sessile, divided to the base; segments acute: bracts linear spatulate, very slender, densely clothed with long wool on the inner surface.

I have not felt myself at liberty to disregard the earliest specific name, which, although not strictly correct, is as much so as many others of the genus.

E. Greggii, Torr. & Gray. This species I have not seen, and it is included in the section from the description only.

CHORIZANTHE.

C. PUNGENS, Benth. var. NIVEA. Very slender, decumbent, sparingly villous: margins of the involucre broadly scarious perianth yellow, with white margin.

On the mountains near San Luis Obispo, July, 1885.

The appearance of this plant is strikingly different from any form of the species to which I have referred it, but no sufficient grounds for its separation have been found.

C. THURBERI, Watson, var. CRYPTANTHA. Whole plant yellowish, forming a thick, often nearly globular mass of interwoven branches: flowers entirely included: stamens, 3.

Mojave Desert, Lancaster Station, July, 1884.

C. (MUCRONEA) INSIGNIS. Slender branching, glandular-puberulent, 2—4 inches high: radical leaves in a rosulate tuft 6—12 lines long, linear-spatulate, glabrous: involucres glandular-puberulent, of five linear somewhat corrugated segments, united in the intervals by membranous bands, and terminating in equal straight diverging awns: flowers six in each involucre: pedicels about as long as the tube: perianth pale rose-color, villous, exserted: segments oval or oblong: stamens, 9: akenes lenticular.

Indian Valley, near the Salinas River, June, 1885.

Whole plant of a reddish color like *E. Californica*, Gray. It is most nearly related to *C. leptoceras*, Watson, though with no trace of spurs at the base of the involucre, the peculiar structure of which admits of considerable expansion, so much that in the living plant it appears rather broadly turbinate.

STUDIES IN THE BOTANY OF CALIFORNIA AND PARTS ADJACENT.

BY EDWARD LEE GREENE.

III.

1. *A Revision of Myosurus.*

MYOSURUS, *Dillenius**

Sepals 5—7, imbricate, prolonged at base into a pendent spur. Petals 5—7, alternate with the sepals, unguiculate and filiform, or tubular. Stamens 5—20. Carpels very numerous, crowded or imbricated on an elongated torus. Seed suspended. Small annuals with linear, entire leaves and one-flowered scapes.

* *Spur of sepals equaling the limb and attenuate.*

M. MINIMUS, Linn. Back of carpel depressed, ovate, rhomboid, or variously elongated, with evident costa and beak not prominent.

M. MINIMUS GENUINUS. Scape 1—5 inches high, rather stout and gradually thickened above: fruiting head long-conical, 1—2 inches long: carpels closely imbricated, with margins more or less thickened; costa strong, ending in an appressed beak.

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*A sense of common justice to, and perhaps uncommon veneration for, great botanists who lived and labored before Linnæus, or contemporaneously with him, forbids my following the modern rule of crediting to that illustrious name those genera which he did not found but only adopted. I am willing to be singular in this matter, if so be that in these iconoclastic days no others will unite in the protest that no genus indicated and named by a Tournefort, for example, or by a Dillenius, ought to be wrested from its legitimate and very worthy paternity.

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Var. APUS. Scapes only a line or two long: fruiting heads shorter than the leaves, crowded and divergent; carpels as in the type.

Var. FILIFORMIS. Scape 1—6 inches high, filiform, and not at all or very slightly thickened above: fruiting heads $\frac{1}{2}$—2 inches long, not tapering, but very slender, of equal thickness from base to apex: carpels in few series, scarcely imbricated, minute, with a delicate costa, ending in a short, recurved beak.

Of the typical state of this species, the only Californian specimens in the herbarium of the Academy were collected by Dr. Kellogg, twenty years ago, on one of the islands in San Francisco Bay. They are exactly like very excellent ones from the north of France. Our largest specimens were obtained by the present writer, on the northern border of the State, in 1876. The scapes in these are uncommonly tall, and the heads shorter and more abruptly tapering than in the type. We have plants from Arizona, by Dr. Rusby, which must be referred here, notwithstanding that the carpels are too prominently beaked, so much so as to weaken the validity of *M. aristatus*. The var. *apus* is from the table-lands back of San Diego, where it was collected by Mr. Orcutt, April 10, 1884. Of the var. *filiformis*, the extreme state, with long filiform heads, found by the writer on Guadalupe Island, looks like a very good species; but in some specimens of Mr. Orcutt's gathering at San Diego, the head is thicker, somewhat tapering, and the carpels crowded, thus approaching the more typical forms of the species. A reduced state, usually not more than an inch high, was found in the Masonic Cemetery at San Francisco, in 1866, and was also brought from near Antioch, on the other side of Mt. Diablo, in 1884.

M. ARISTATUS, Geyer.* Back of carpel not depressed or flattened, rising gradually into a subulate, spreading beak.

*Although this species is commonly credited to Mr. Bentham, he himself (Fl. Aust., i. 8.) declares Geyer to be the author of it.

California to Utah: also found in South America and New Zealand. Scapes and heads shorter and stouter than in *M. minimus*.

M. SESSILIS, Watson. Flowers nearly sessile: fruiting heads stout, conical, 2—6 lines long: carpels with a straight, erect beak.—Proc. Am. Acad. xvii. 362.

Very near the last, and probably only a variety of it, corresponding to var. *apus* of the first species. Found thus far only in Oregon, by the Howell brothers.

M. CUPULATUS, Watson l. c. Scapes slender: heads long-conical: carpels cupulate by a raised, thickened, orbicular, light-colored margin, and with a broadly triangular, ascending beak in place of the costa.

New Mexico and Arizona; first collected by the writer on the upper Gila, in 1880, and distributed by him as *M. aristatus*, Mr. Watson detecting the specific characters. It is an excellent species, not likely to be found approaching any of the preceding or the following new one.

** *Spur short and blunt.*

M. ALOPECUROIDES. Scapes an inch or two high, stout and gradually thicker above: heads stout, conical, 3—6 lines long: back of carpel elongated, with a wide, spreading, brownish margin, and a laterally compressed, very prominent, spreading beak.

Antioch, 1884; Mrs. M. K. Curran.

The back of the carpel is quite as peculiar as in *M. cupulatus*, yet very unlike. The heads themselves, with their numerous, spreading, or often somewhat recurved beaks, are very suggestive of the spikes of certain grasses.

MYOSURUS SHORTII, Raf. in Sillim. Jour. i. 379, is doubtless correctly referred to *M. minimus*, but specimens collected by T. Drummond at New Orleans, in 1832, and distributed as *M. Shortii* by Sir William Hooker in 1835, are but young plants of *Plantago pusilla*, Nutt!

2. *The Genus Blepharizonia.*

Hemizonia, as at present defined in all our valuable treatises on the Compositæ, appears to the writer to be very ungenerically polymorphous. One proposal in the way of reducing its unwieldiness was some time ago decided upon, and is here presented, namely:

BLEPHARIZONIA, *Nov. Gen. Madiearum.*

Ray flowers 7—10, with 3-lobed, white ligules: disk-flowers 10—30; outer ones subtended by linear receptacular bracts: akenes sericem-hirsute, 10-nerved, those of the disk bearing a pappus of many densely plumose awns —*Hemizonia* § *Blepharizonia*, Gray, Proc. Am. Acad. ix. 192; Bot. Cal. i. 366, & Syn. Fl. i., Part ii. 312. Stout, coarse, glandular-viscid and heavy-scented, hirsute annuals, apparently confined to the lower part of the valley of the San Joaquin.

B. PLUMOSA. One to three feet high, branching from the base: heads racemosely paniculate, 15—20-flowered: ray-akenes with a minute crown of very short scales; those of the disk bearing a pappus of twenty or more erect, plumose bristles half the length of the body of the akene. *Calycadenia plumosa*, Kellogg, Proc. Cal. Acad. v. 49; *Hemizonia plumosa*, Gray, Bot. Cal. i. 366, & Syn. Fl. l. c. excl. var. *subplumosa*.

B. LAXA. Three to six feet high, paniculately branching above: heads solitary at the ends of the branches, 20—35-flowered: pappus of ray- and disk-akenes alike, short and coroniform-spreading in both, less plumose than in the preceding, never, in those of the disk even, more than a fifth the length of the body of the akene.—*Hemizonia plumosa*, var. *subplumosa*, Gray, Syn. Fl. l. c.

3. *Four New Species.*

LAGOPHYLLA SERRATA. Minutely hirsute-puberulent, with a few minute, stalked glands on the involucre, otherwise glandless: 1—3 feet high, the stem simple below, often paniculately branched above: stem-leaves 1—3 inches long, spatulate-oblong, with remote but distinct serratures: rays bright yellow, a half inch long.

Abundant at lower altitudes of the Sierra Nevada, in the central part of the State. Collected at Grass Valley in 1882, by Miss Doom, and in El Dorado County in 1884, by Mrs. Curran. A really showy species of *Lagophylla*, the heads, with expanded rays, measuring an inch across. The species will stand next to *L. glandulosa;* but that has smaller leaves, their margins entire and revolute, their surface dotted with conspicuous, sessile glands; the whole herbage is strongly pubescent, and the plant is bushy, with decumbent, basal branches.

MIMULUS (SIMIOLUS) GENICULATUS. Annual, sparingly villous or glabrate, not at all mucilaginous: branches a span to a foot long, diffusely spreading, strongly geniculate: leaves ovate, acute, ½—1 inch long, prominently nerved and toothed, on petioles 3—5 lines long: pedicels surpassing the leaves: fructiferous calyx oblong, 4 lines long, the teeth equal, triangular, acute: corolla a half inch long, with spreading, subregular, yellow limb, and reddish or copper-colored throat.

Tehachapi, Kern County, California, 1884; Mrs. Curran.

On page 118 of this volume I have confounded this plant with *M. floribundus*, Dougl. That species is always very villous and slimy, and has pale yellow corollas of less than half the size of those of this species and the next one, which I had also mixed with *M. floribundus*, but in deference to very eminent authorities.

MIMULUS PEDUNCULARIS, Dougl. Stems mostly erect and simple: herbage neither villous nor mucilaginous, but a little viscid, with a minute, glandular puberulence: leaves sparingly and indistinctly toothed, a half inch or more long, on petioles of nearly equal length: calyx truncate, the teeth short and scarcely acute: corolla deep yellow, a half inch long, the ample limb distinctly bilabiate, the throat red-dotted. Benth. Scroph. Ind. 29.

Referred to *M. floribundus* by Benth. in D. C. Prod. x. 372; Gray, Syn. Fl. 278; Greene, Bull. Cal. Acad. i. 118.

HABENARIA MICHAELI. Stem stout, 8 inches high, leafless, but bearing numerous, triangular or triangular-ovate, acuminate, membranaceous, appressed bracts, of which the lowest and largest are less than a half inch long: spike dense, 3 inches long: flowers greenish: sepals oblong, nearly equal, about 3 lines long; petals similar to the sepals in form and size, the lip slightly broader, scarcely longer, all rather fleshy: spur a third longer than the ovary.

San Luis Obispo County, June, 1884, "a single specimen found on a dry hill-side, under a small live-oak tree," by G. W. Michael. The species is strongly characterized by its robust, leafless stem. I am glad to have so interesting a plant to name, in compliment to my valued correspondent, Mr. Michael.

BLOOMERIA MONTANA. Corm an inch broad: leaf solitary: scape two feet high, stout and scabrous: bracts numerous, lanceolate: pedicels 30—50, an inch or two long: perianth rotate, an inch in diameter: appendage at base of filament a line long, its lateral cusps subulate-filiform, half as long as the filaments: anthers linear, a line and a half long, attached almost at the very base, but versatile.

Mountains of Kern County, Cal., near Tehachapi, 1884. Mrs. Curran.

This plant may have been included in the *B. aurea* of Bot. Cal. ii. 152, but it is a most distinct species. The anthers are much longer, and have an almost perfectly basal insertion, and the long, attenuate cusps of the appendages of the filaments are equally remarkable. The species is a good deal larger than the largest states of *B. aurea.*

NEW GENERA AND SPECIES OF CALIFORNIAN COLEOPTERA.

BY THOS. L. CASEY, LT. ENG'RS.

Read November 16th, 1885.

As a member of an expedition which explored several of the northern counties of California during the past summer, opportunity was given me to collect a considerable number of specimens of Coleoptera. Among these several are thought to be of sufficient importance for description in an isolated manner, and the present occasion is also taken to interpolate a few from other portions of the state. The present paper is published with the hope that they may not prove entirely uninteresting to specialists in the several families.

It will be observed that by far the greater number of species here brought to notice, belong to the great tribe Aleocharini of the Staphylinidæ; these are all assignable, however, to genera containing but a comparatively small number of species, and in which no confusion can be made by the description of special forms. The great genera Homalota, Aleochara, etc., are left for the future consideration of others who must be more experienced in the study of them than the author, and with the hope that this much needed revision will soon be undertaken; the group merits all the attention which can be bestowed upon it, and contains some of the most interesting and elegant forms of the entire family. The genus here described under the name Colusa, appears to have been entirely overlooked, although the species are very striking in appearance and are comparatively abundant; they live in wet moss at the bottom of ravines in the coast regions of the state. The genus appears to be quite local, and Dr. Sharp has recently described several closely allied genera from various regions of Mexico and Central America.

In regard to the defects of the present system of classification of the Aleocharini, the remarks which are made under the description of Colusa, are not intended as a final and definite opinion, but are merely the expression of a train of thought brought about by a somewhat extended study of the tarsi of many genera. Beginning with the assumption that the normal tarsus consists of five joints, a series of specimens can be readily formed in which one of these joints becomes gradually smaller and more anchylosed with another until finally no trace of it can be found, giving us a distinctly four-jointed tarsus. The radical difficulty, therefore, in a tarsal nomenclature, is the difficulty in determining whether the tarsus is really five or four-jointed, which difficulty is enormously increased in those genera having finely and densely pubescent tarsi. In the American species of Falagria the amalgamation of the fourth joint with the fifth has not become complete, so that the fourth joint is visible as a basal segment of the fifth; whether such a tarsus is to be considered five-jointed, as is done below, or four-jointed as in the books, is a fair sample of the questions which must continually arise under such a classification.

The older nomenclature based upon the structure of the trophi is open to the same objection in regard to difficulty of observation, and is even less satisfactory in other respects, and, although it is always easier to see defects in existing methods of classification than to propose new and better ones, I think it may be said with a considerable probability of truth that a really satisfactory classification of the Aleocharini is a thing yet to be conceived, and that it may ultimately depend in great measure upon the form and structure of large and important parts of the body.

The practice of assigning American species to European genera has perhaps been carried somewhat too far, and in many instances it will probably be found upon closer study that our species so disposed of are decidedly out of place; this is particularly true of these isolated genera of the Aleocharini, and the species placed below in Phytosus and Tachyusa may possibly necessitate the creation of two or more new genera; their present position is assigned them only provisionally, and because these genera appear to approximate more closely to the observed characters than any others which have been hitherto described.

San Francisco, Nov. 14th, 1885.

The species described in the present paper are the following:

STAPHYLINIDÆ
Falagria occidua
laticollis
Colusa gracilis n.gen.
eximia
valida
exilis
grandicollis
Pontomalota opaca Lec. n.gen.
californica
nigriceps
Tachyusa experta
linearis
laticeps
faceta
Harfordi
Platyusa sonomæ n.gen.
Calodera attenuata
Ilyobates californicus
nigrinus
Maseochara californica
Oxypoda insignis
Phytosus bicolor
maritimus
Bryonomus n.gen. (Philonthi)
Orus punctatus Casey
Homalium fucicola
rugipenne
Phlœopterus longipalpus
Vellica longipennis n.gen.
Lesteva truncata
Protinus salebrosus
TRICHOPTERYGIDÆ
Actidium robustulum
granulosum
attenuatum
DASCYLLIDÆ
Euscaphurus saltator n.gen.
PTINIDÆ
Cænocara occidens
LUCANIDÆ
Platycerus californicus
SCARABÆIDÆ
Polyphylla marginata

NOTE.—The Arabic numerals placed after the various localities indicate the number of specimens from each respectively.

FALAGRIA Mann.

F. occidua n. sp.—Rather slender; body dark brownish-piceous, legs paler, uniformly yellowish-testaceous, antennæ piceous, basal joint, the tenth partially, and the eleventh testaceous; pubescence very fine, moderately dense, recumbent, more dense on the abdomen toward tip; integuments polished. Head moderate, as wide as long, truncate at base; sides parallel for a short distance behind the eyes; basal angles broadly rounded; base and occiput strongly convex, front nearly flat; punctures very minute, feeble and rather sparse; antennæ distinctly longer than the head and prothorax together, moderately slender and feebly incrassate, first three joints sub-equal in length, the first slightly more robust, the third conical and more than twice as long as wide, joints four to ten, equal in length, the former distinctly longer than wide, the latter slightly wider than long, eleventh ovoidal, acuminate, slightly thicker than the tenth and as long as the two preceding together. Prothorax widest at one-third its length from the apex, where it is very slightly narrower than long and scarcely as wide as the head; sides strongly convergent anteriorly and strongly arcuate, much less strongly convergent posteriorly and just visibly sinuate; base broadly, evenly and rather feebly arcuate, three-fourths as wide as the disk and nearly twice as wide as the apex; basal angles narrowly rounded; disk broadly and strongly declivous and convex along the sides, narrowly declivous along the base, feebly canaliculate along the middle, the furrow being narrowly impressed and vanishing toward the apex, not attaining the base; punctuation fine, even and rather sparse. Elytra at base one-third wider than the pronotum; sides parallel and feebly arcuate, more strongly so toward tip; together truncate behind; apical angles very small and slightly produced; disk nearly quadrate, distinctly longer than the prothorax, moderately convex, extremely, finely and rather sparsely punctate; punctures not appreciably denser toward the scutellum which is more densely asperate but not channeled. Abdomen at base much wider than the pronotum and slightly narrower than the elytra; sides feebly convergent to the apex of the sixth segment and rather strongly arcuate; border strong; three basal segments transversely and deeply impressed, channels very narrow, sparsely and rather more coarsely punctate, remainder finely and rather densely punctate. Legs long and very slender; posterior tarsi long, first joint distinctly longer than the next three together, second slightly shorter than the fifth. Length 2.2–2.7 mm.

California (Gilroy Springs, Sta. Clara Co. 12; Paraiso Springs, Monterey Co. 13).

This species may be distinguished by the feebly canaliculate pronotum, its slender form, sparse punctuation and form of the prothorax.. *F. cavipennis*, Lec. having a feebly sub-sulcate pronotum, has been described from California, but its roughly granulose elytra and habitat, being found on the sea shore, point it out as being aberrant and probably belonging to another genus; I have not, however, been able to secure any specimens as yet, and therefore cannot pronounce a definite opinion.

F. laticollis n. sp.—Rather robust; body very dark piceous; pronotum and three basal joints of the abdomen paler, dark brown; legs translucent, testaceous; antennæ fuscous; teguments polished; pubescence fine and not very dense, cinereous. Head rather large, wider than long; sides behind the eyes short and parallel, arcuate; base broadly truncate; basal angles broadly rounded; occiput rather convex; front very wide, flat; punctures rather coarse, feeble and sparse; antennæ much longer than the head and prothorax together, very slender, three basal joints elongate, sub-equal in length, fourth slightly longer than the succeeding joints, twice as long as wide, tenth very slightly wider than long, eleventh slender, obliquely and gradually acuminate, slightly longer than the two preceding together. Prothorax widest at a little over one-third its length from the apex where it is as wide as the head and one-sixth wider than long; sides convergent and slightly arcuate to the apex which is squarely truncate, and very slightly less strongly convergent and feebly sinuate to the base which is broadly and evenly arcuate, four-fifths as wide as the disk and very slightly wider than the apex; basal angles obtuse and distinctly rounded; disk declivous and convex along the sides, broadly and very feebly impressed in the middle from the anterior third nearly to the basal margin where there are two approximate and feeble, eroded impressions which are sometimes sub-confluent; extremely minutely, feebly and very sparsely punctate. Elytra at base one-third wider than the prothorax; sides very feebly divergent and feebly arcuate, more strongly so toward the apical angles which are scarcely produced; together broadly truncate behind and feebly sinuate toward the suture; disk very slightly wider than long and about one-third longer than the pronotum, feebly convex, distinctly impressed on the suture toward the base, extremely minutely, evenly and rather sparsely punctate. Abdomen at base much wider than the pronotum and very slightly narrower than the elytra; sides nearly parallel and very feebly arcuate; basal impressions deep and almost entirely impunctate, strongly shining, elsewhere very minutely and moderately densely punctate; border strong, inclined. Legs very slender; posterior tarsi moderately long, first joint but slightly longer than the next two together and nearly as long as the last three. Length 2.7 mm.

California (Gilroy Springs, Sta. Clara Co. 3).

The type specimen is a male, the sixth ventral segment being truncate at apex; in the female, which is slightly more robust, this segment is broadly and rather strongly sinuate at tip. The species is very distinct by reason of the pronotal structure, this not being canaliculate and having two small punctures near the base; it is also more strongly transverse and with a broader neck than in any other species which I have seen.

F. læviuscula, Lec.—I have seen eight or ten specimens of this species collected by Mr. W. G. W. Harford, Mr. C. Fuchs and myself in various parts of the middle coast region of California. The prothorax is very strongly canaliculate.

COLUSA n. gen. (Aleocharini).

Head borne on a narrow neck; inner lobe of the maxillæ hooked at tip and fimbriate internally with short spinules; outer lobe with a narrow porous process at tip and also internally a few long robust hairs; first and second joints of the labial palpi equal in diameter, cylindrical, almost anchylosed, the second the longer, third very thin, three-fourths as long as the first two together, slightly bent; maxillary palpi slender, second joint very slender, much narrower and distinctly shorter than the third, fourth extremely small, subulate, received far within the apex of the third. Gular sutures rather widely separated, convergent posteriorly. Labrum broadly arcuate, apex finely undulated; transverse section of the epistoma broadly angulate. Antennæ long and slender; eyes very broadly oval, finely granulate. Prosternum with the antecoxal piece large, three times as wide as long, separated from the sub- and intercoxal piece by a narrow raised margin; the intercoxal piece produced posteriorly as a short but acute spine extending for a short distance over the mesosternum; portion behind the coxæ membranous; posterior inflexed side pieces large, angulate, extending inward and slightly over the mesosternum. Mesosternum large, transversely impressed behind the narrowly elevated anterior margin but without any appearanse of a neck, finely carinate in the middle anteriorly; intercoxal process very slender, separating the coxæ for three-fourths their length, very acutely rounded behind and appearing detached from the metasternum, the latter extending beneath it. Anterior coxæ contiguous; intermediate narrowly separated. Legs slender. Tarsi short, 5-5-5 jointed, first joint of the posterior longer than the second. Pronotum not canaliculate. Abdomen strongly narrowed toward base.

The various species of Colusa, with their strongly constricted head and very narrow neck, are of a distinctly Falagrioid type; the statement made above of a five-jointed anterior tarsus is therefore somewhat surprising; I have, however, carefully verified it by repeated observation of at least six specimens, and in one particular example, where the tarsus was partially detached from the tibia, the basal joint could be very clearly seen, the first four being distinctly defined against a bright background and without any indication of anchylosis; they are about equal in length and together scarcely longer than the fifth. I then examined the anterior tarsus in a series of specimens of *Falagria læviuscula*, Lec , in which the tarsi are very long and slender, differing from the comparatively short and robust ones of Colusa. To my surprise it could be plainly seen, when the tarsus was held in a suitable position, that this also is five-jointed, the fourth joint being very small and anchylosed with the fifth; the suture is very distinct on the upper surface, but is not so clear at the side, and if the tarsus were to be detached, mounted in Canada balsam, and viewed laterally by transmitted light, it would probably be entirely obliterated.

If the European species of Falagria have the anterior tarsi in reality four-jointed, that is if the fourth from the tibia has entirely disappeared by amalgamation, we should have three typical genera, Falagria, Colusa and Autalia, exhibiting so close a mutual resemblance as to indicate almost unmistakably descent from a common ancestral type, and having the tarsi 4–5–5, 5-5-5 and 4–4–5-jointed respectively; in other words these genera would be representatives of the three great groups of the tarsal nomenclature.

In reasoning upon this we cannot but be persuaded that a system of classification assigning these genera to groups in which they are placed with others of very different lines of development, is somewhat artificial and delusive. In this special group the tarsi appear to be the organs which are most susceptible to modification by descent, and therefore should not be taken as a basis of systematic division. A classification based upon the form of the head and its attachment by a narrow neck or otherwise to the prothorax, would give us two quite natural divisions of the Aleocharæ, which might then be subdivided according to modifications of the antennæ or of pronotal configuration, and, without claiming that such a system would be better than that now in vogue, it would certainly be more natural, and what is of no little importance, it would be easily observable.

The character pointed out by LeConte and Horn in the classification, and which consists of a sub-ocular ridge, although probably of more or less value for the separation of genera, would not serve for a general division into subgroups, because we have genera and species possessing this ridge in all degrees of development, from Falagria, Colusa, etc., where it is entirely absent, through such species as *Oxypoda insignis* here described, where it is only present as a very feeble ridge and toward the base of the head, being entirely obliterated anteriorly, to Ilyobates and allied genera where the ridge is remarkably strong, entire and very conspicuous.

Another line of thought is opened by the contemplation of this genus. The Stenini, it is well known, are related more closely to the Aleocharini than any other group in one important character, which is the mode of insertion of the antennæ upon the front. In the Stenini there is a remarkable character to be seen in the structure of the dorsal segments of the abdomen, this consisting of a transverse ridge which is produced posteriorly at three or four points in elevated carinate cusps, and which forms one of the best characters for the classification of the species. In Colusa, this identical structure is to be seen, and also in a highly developed state, each dorsal segment having at base a straight transverse ridge from which three long narrow elevated carinæ project posteriorly; one of these is central and two, longer than the central one, are lateral and very near the elevated border; these ridges become abruptly very much shorter on the fourth and fifth visible segments, although nearly equal on the three basal ones. This rather remarkable coincidence would appear to indicate that in one line of descent the Stenini are very closely related to several forms at present placed in the Aleocharini, and if we simply shorten the basal joints of the palpi, we should have types of these organs not unusual in that group.

If the genus Neolara, described by Dr. Sharp (Biologia Centrali-Americana I, p. 231) should in reality have five joints in the anterior tarsus instead of four, it would approach Colusa very closely according to the description, but would differ very decidedly in the structure of the mesosternum between the coxæ. These genera are allied especially in the structure of the prosternum.

The scutellum in Colusa is composite in structure, the central portion being triangular or parabolic with the surface strongly and asperately punctate, the exterior portion being in the form of a trapezoid with the sides nearly straight and convergent posteriorly, having the portion of its surface without the central triangle perfectly smooth and highly polished. This forms a convenient basis of classification, as in some species the triangle extends beyond the trapezoid posteriorly, and in others is entirely included within its limits. Dr. Le Conte has also made use of modifications of the scutellum in his classification of the species of Falagria.

The only species which I have seen are Californian, and they appear to be rather numerous, though somewhat closely allied, except *grandicollis*, which is quite aberrant in the form of the head, in sculpture and in the very feeble constriction of the abdomen toward the base. They live for the most part in wet moss.

The following table will serve to identify the species here described:

Head at least as wide as the prothorax; elytral punctuation coarse.
- Central asperate portion of the scutellum not passing beyond the enclosing trapezoid.
  - Elytra ♂ having the sides convergent posteriorly, but very slightly longer than the pronotum............ **gracilis.**
  - Elytra quadrate, at least one-third longer than the pronotum.. **eximia**
- Central portion of scutellum projecting beyond the enclosing trapezoid, the projecting portion being deflexed.
  - Size large, 4.2 mm.; elytral punctuation very dense...... **valida.**
  - Size small, 2.6 mm.; elytral punctuation much more sparse.. **exilis.**

Head slightly shorter and narrower than the prothorax; elytral punctuation extremely minute and dense......... **grandicollis.**

C. gracilis, n. sp.—Slender; surface polished; black, abdomen slightly paler toward base; legs piceous-black, tips of tibiæ and tarsi testaceous; tibiæ densely clothed with fulvous pubescence toward the apices; antennæ black throughout; pubescence very fine, rather sparse, recumbent. Head slightly longer than wide, nearly semi-circularly rounded at base from eye to eye; the latter not prominent; front and occiput rather strongly convex, even, very minutely and rather sparsely punctate; antennæ slightly longer than the head and prothorax together, very slender, densely clothed with cinereous pubescence, especially toward tip; basal joint slightly shorter and very slightly wider than the second, the latter three times as long as wide and slightly longer than the third, joints four to ten, sub-equal in length, the former twice as long as wide, the latter very slightly longer than wide, eleventh very long and slender, as long as the two preceding together, very obtusely rounded at apex. Prothorax very slightly narrower than the head, widest at two-fifths its length from the apex where it is distinctly narrower than long; sides strongly convergent to the apex just before which they are very feebly sinuate, feebly convergent to the base and nearly straight; base very broadly and feebly arcuate, five-sixths as wide as the disk and four-fifths wider than the apex; basal angles obtuse and very narrowly rounded; disk evenly and moderately convex, finely but strongly margined along the base and sides, vaguely and very feebly eroded transversely near the base, finely and rather closely punctate; punctures slightly larger than those of the head. Elytra at base nearly one-half wider than the pronotum; sides feebly but distinctly convergent toward the apices, feebly arcuate, more strongly so posteriorly; apex feebly incurvate and strongly trisinuate; disk rather convex, impressed behind the scutellum, very slightly wider than long, coarsely strongly and rather densely punctate near the scutellum, the punctures becoming much finer and more distant toward the outer apical angles. Abdomen at base much narrower than the elytra and scarcely as wide as the pronotum, widest at the base of the fourth visible segment where it is one-half wider than at base; border strong but not deep; each of the three basal segments extremely closely and coarsely punctate and transversely impressed at base, and all the segments very minutely and rather sparsely punctate upon the remainder of the disk; underside minutely and sparsely punctate. Legs slender; first joint of the posterior tarsi as long as the next two together. Length, 2.7–3.3 mm.

California, (Hoopa Val., Humboldt Co. 10; Anderson Val., Mendocino Co. 1).

In the males the terminal ventral segment is triangularly produced and acute at apex, with the sides very feebly sinuate; in the female this segment is rather broadly and evenly rounded behind, the first two joints of the antennæ nearly equal in length, longer than the third, and the pronotum is nearly three times as wide at base as at the apex, the elytra being quadrate.

The present species was found rather abundantly in the very wet moss lining the inside of a flume or trough for conveying spring water.

C. eximia, n. sp.—Form slender; black, legs piceous-black, tarsi paler, abdomen scarcely perceptibly paler toward the base, antennæ not paler at base; pubescence rather long and coarse, somewhat sparse; integuments polished. Head very slightly longer than wide, nearly as in *gracilis;* antennæ long and very slender, longer than the head and prothorax together, three basal joints equal in length, tenth distinctly longer than wide, eleventh as long as the two preceding together. Prothorax widest at two-fifths its length from the apex where it is distinctly narrower than the head and distinctly narrower than long; sides strongly convergent and nearly straight to the apex, very feebly convergent and feebly incurvate to the base; the latter very broadly and rather strongly arcuate, just visibly narrower than the disk and much more than twice as wide as the apex; disk strongly convex, very finely and sparsely punctate. Elytra at base one-half wider than the pronotum; sides parallel and feebly arcuate, strongly convergent and arcuate near the apices; together slightly longer than wide, moderately incurvate posteriorly and trisinuate; disk about one-third longer than the pronotum, rather finely and sparsely punctate, especially posteriorly, where the punctures are minute and distant. Abdomen at base about as wide as the pronotum and at the apex of the fourth segment scarcely one-half wider; sixth segment very finely and sparsely punctate, otherwise nearly as in *gracilis.* Legs very slender; first joint of the posterior tarsi distinctly longer than the next two together claws extremely long and slender. Length 2.8–3.5 mm.

California (Gilroy Springs, Sta. Clara Co., 9; Hermitage, Mendocino Co. 1).

Described from the male in which the characters are as in *gracilis;* the female is slightly more robust, the prothorax shorter and broader, the elytra quadrate, the two basal joints of antennæ equal in length and distinctly longer than the third, and the sixth ventral segment obtusely rounded behind, and very feebly and minutely sinuate at the immediate apex. The species is distinguished from its allies by its fine and rather sparse punctuation and coarser and sparser pubescence.

C. valida, n. sp.—Form rather robust; shining; piceous-black, tips of the dorsal segments, particularly the basal, paler, fuscous, tips of the tibiæ and tarsi reddish-testaceous, antennæ scarcely perceptibly paler toward base; pubescence very fine, dense, pale fulvo-cinereous, conspicuous. Head as wide as long, semicircularly rounded behind from eye to eye; occiput strongly convex, very minutely evenly and rather densely punctate; antennæ not longer than the head and prothorax together, very slender, second joint three-fourths as long as the third which is scarcely as long as the first, remainder nearly as in *gracilis*, except the eleventh which is distinctly shorter than the two preceding together. Prothorax widest just perceptibly before the middle where it is very slightly narrower than long; sides very strongly convergent anteriorly and nearly straight, very feebly convergent posteriorly and just visibly incurvate; base broadly and very feebly arcuate, very slightly narrower than the disk and more than twice as wide as the apex; posterior angles slightly obtuse and very slightly rounded; disk as wide as the head rather strongly convex, very finely, evenly and densely punctate. Elytra at base one-half wider than the pronotum; sides parallel and feebly arcuate except near the apices where they become abruptly strongly convergent to the apical angles which are acute; together strongly incurvate pesteriorly and strongly trisinuate; disk feebly convex, narrowly impressed on the suture toward the scutellum, a little wider than long, much longer than the prothorax, coarsely and extremely densely punctate, much more finely and sparsely so toward the exterior apical angles. Abdomen at base scarcely more than one-half as wide as the elytra, and, at the apex of the fourth segment, one-half wider, otherwise as in *gracilis* except that the punctuation of the posterior segments is slightly denser; underside coarsely and very densely punctate toward base, more finely and distantly so toward the apex. Legs long and very slender; claws very long and slender; first joint of the posterior tarsi slightly shorter than the next two together. Length 4.2 mm.

California (Yountville, Napa Co., 1).

This species is the largest of the genus thus far discovered; it is easily distinguished from others by its size, more robust form, dense pubescence, very dense elytral punctuation, and especially by the very dense punctuation of the underside of the abdomen toward base. The pubescence of the pronotum streams from the middle outwardly and anteriorly.

C. exilis, n. sp.—Form slender; black throughout, tips of tibiæ and tarsi dark testaceous; polished; pubescence very fine, rather short and sparse; antennæ not paler at base. Head slightly longer than wide; portion behind the eyes slightly longer than in *gracilis* and more narrowly rounded; occiput very convex, very minutely but distinctly punctate; antennæ slightly longer than the head and pronotum together, first two joints equal in length, third distinctly shorter, joints five to ten equal in length and slightly shorter than the fourth which is scarcely twice as long as wide, tenth very slightly wider than long, eleventh very slightly longer than the two preceding together, obtusely acuminate at tip. Prothorax widest at two-fifths its length from the apex where it is distinctly na rower than the head and very distinctly narrower than long; sides strongly convergent anteriorly and feebly sinuate near the apex, feebly but distinctly convergent posteriorly, and straight; base broadly and evenly arcuate and but very slightly more than twice as wide as the apex; disk moderately convex, extremely minutely and rather sparsely punctate. Elytra at base one-half wider than the pronotum; sides as in *eximia;* apex very feebly incurvate, trisinuate; disk very slightly longer than wide, much longer than the pronotum, very feebly impressed on the suture near the scutellum, moderately convex, very finely and rather sparsely punctate, more coarsely and closely so toward the suture and base. Abdomen at base nearly two-thirds as wide as the elytra and nearly three-fourths as wide as at the apex of the fourth segment, finely punctate posteriorly; underside minutely and very sparsely punctate. Legs very slender; first joint of the posterior tarsi distinctly longer than the next two together, the latter short and equal in length, much shorter than the fourth, fifth very slightly shorter than the first. Length 2.6 mm.

California (Gualala River, Mendocino Co., 1).

This species is the smallest thus far observed; it is probably described from a female, the sixth segment being very obtusely and broadly rounded at the apex with the sides widely divergent and feebly arcuate; the outline is nearly parabolic in shape. It may be distinguished from the others by its small size, very minute and comparatively sparse pronotal punctuation, and by the form of the abdomen which is less strongly narrowed toward base than in any other here described except *grandicollis.*

C. grandicollis n.sp.—Form rather robust; body black throughout, legs dark reddish-testaceous, tarsi scarcely paler; antennæ and under surface piceous-black, integuments shining; pubescence bright fulvo-cinereous, fine, very dense and conspicuous. Head about as wide as long, transversely truncate posteriorly; basal angles rounded; sides parallel and feebly arcuate; eyes small, not prominent; occiput moderately convex, very finely and densely punctate; antennæ as long as the head and prothorax together, slender, basal joints slender, equal in length and very slightly longer than the third, joints four to ten decreasing very slightly in length, the latter about as wide as long, eleventh scarcely as long as the two preceding together.

Prothorax widest at slightly more than one-third its length from the apex where it is as wide as long, and slightly wider and longer than the head; sides strongly convergent and feebly arcuate anteriorly, very feebly convergent and nearly straight posteriorly, base evenly and feebly arcuate throughout, very slightly narrower than the disk and nearly three times as wide as the apex; basal angles slightly obtuse and distinctly rounded; disk moderately convex, very minutely, evenly and densely punctate; in the middle near the base there is a very feeble transverse impression. Elytra at base scarcely one-fifth wider than the pronotum; sides parallel and very feebly arcuate, strongly convergent near the apices; together as wide as long and distinctly longer than the prothorax, slightly incurvate at apex and trisinuate; disk very feebly impressed on the suture toward the scutellum, rather depressed, extremely minutely and densely punctate; punctures scarcely larger than those of the pronotum and not apparently denser toward the base. Abdomen at base nearly three-fourths as wide as the elytra and about four-fifths as wide as at the apex of the fourth segment; three basal segments very deeply and transversely impressed at base; punctures throughout very minute and dense, without trace of coarse punctuation at the bases of the three first segments, the middle carinæ being almost obsolete; under side slightly alutaceous and very minutely punctate. Legs slender; first joint of the posterior tarsi as long as the next two together; claws very long and slender, much longer than the basal joint of the posterior tarsus. Length 3.2 mm.

California (Gilroy Springs, Sta. Clara Co., 1).

The first four joints of the anterior tarsus are seen to be equal in length and all clear and distinct, no two of them being in the least anchylosed. The species is remarkably distinct from the four preceding, both in form and in punctuation; it is also remarkable for the slight narrowing of the abdomen toward base.

PONTOMALOTA, n. gen. (Aleocharini).

Head slightly deflexed, not narrowed toward base; labrum strongly transverse, very slightly sinuate anteriorly; mandibles simple; mentum trapezoidal, large, truncate anteriorly; ligula short, having at tip two small approximate tubercles. Outer lobe of the maxillæ consisting of two lunate members, the inner corneous, the outer membranous; inner lobe having an internal membranous appendage which is finely ciliate within, the remainder of the lobe being slender and arcuately toothed at tip, the inner edge being finely spinose; maxillary palpi robust, first joint short, second very slightly shorter than the third, the latter feebly swollen, fourth thin, subulate, affixed obliquely, bulbous at base, and received far within the third; labial palpi small, three-jointed, joints cylindrical, decreasing in thickness, last longer than the second and shorter than the first, affixed obliquely; gular sutures distinct, distant, straight and parallel; eyes large, rather finely granulate, not very prominent; antennæ 11-jointed, strongly geniculate, slightly incrassate toward tip, second joint longer than the third. Prosternum acutely carinate; mesosternum narrowly separating the coxæ, not carinate. Tibiæ terminated by two small, slightly unequal, spurs, spinulose along the exterior edges and at tip. Tarsi 4-5-5-jointed; first joint of the posterior variable in length; claws small, robust, feebly arcuate. Integuments strongly alutaceous. Hind wings rudimentary, consisting of two small thick membranous appendages of a coarse cellular structure.

The species of this genus live on the ocean beach in decomposing seaweed; they are narrow, depressed, having the sides parallel, the elytra much shorter than the pronotum, and the abdomen strongly margined with a thick and rather depressed border. Pontomalota bears a somewhat close resemblance at first sight to Phytosus, but is in reality much more closely allied to Homalota, from which it differs in the structure of the maxillary lobes and most decidedly in appearance. The length of the first joint of the posterior tarsi varies greatly in the three species, and cannot be assumed as a generic character.

Our three species may be distinguished as follows:

Head testaceous.
- First joint of the posterior tarsi fully two-thirds longer than the second; fourth visible dorsal and sometimes the base of the fifth clouded with castaneous.............. **opaca**

Head blackish.
- First joint of the posterior tarsi scarcely longer than the second; abdomen entirely black........................ **californica**
- First joint of the posterior tarsi about one-third longer than the second; apex of the third, the fourth and the base of the fifth dorsal segments clouded with blackish castaneous... **nigriceps**

P. opaca, Lec. *Phytosus opacus*, Lec. Sm. Misc. Coll. vi., p. 28.—Slender; sides parallel; testaceous, fourth visible dorsal segment of the abdomen clouded with dark castaneous toward the middle of the disk; pubescence fine, short and very sparse, recumbent; integuments not shining, very strongly alutaceous, rather sparsely and very feebly punctate. Head suborbicular; surface feebly convex. Pronotum slightly wider, a little wider than long; sides strongly arcuate and convergent posteriorly; disk moderately convex. Elytra conjointly wider than long, much shorter than the pronotum. Abdominal segments not decreasing in width posteriorly. Legs slender. Length 2.8–3.8 mm.

This species is common on the ocean beach at San Diego, Cal. A figure of the anterior portion of the body is given on the plate. The elytra are, in proportion to the length of the pronotum, longer than in either of the others.

P. californica, n. sp.—Form slender; sides parallel; anterior portions of the body dark blackish-piceous, elytra slightly paler, translucent, piceo-testaceous, abdomen above and below black; antennæ and legs testaceous, translucent, the former very slightly darker toward tip; pubescence very fine, short and sparse, recumbent; integuments very coarsely and evenly granulate, abdomen shining and minutely reticulate. Head wider than long, very feebly and coarsely punctate; eyes large, finely granulate, rather prominent; antennæ slightly shorter than the head and pronotum together, very slightly thicker toward tip, basal joint slender, not as long the next two together, second slightly longer and more robust than the third, outer joints much wider than long, last as long as wide. Prothorax widest slightly before the middle where it is slightly wider than long and one-third wider than the head; sides evenly and strongly arcuate; base slightly shorter than the apex, two-thirds as wide as the disk, broadly arcuate; apex broadly emarginate; basal angles obtuse and slightly rounded; disk moderately convex, finely, feebly and rather sparsely punctate; having a very feebly impressed dorsal line. Elytra at base slightly narrower than the pronotum; sides rather strongly divergent posteriorly and rather strongly arcuate; together two-thirds wider than long and about three-fourths as long as the pronotum; apex transversely truncate, slightly sinuate in the middle; apical angles acutely produced; disk depressed, impunctate, very slightly wider at apex than the pronotum. Scutellum triangular, as wide as long, darker in color. Abdominal segments long, equal in width to the fifth, slightly narrower than the elytra; border strong, segments transversely impressed at base, depressed, shining with an æneous lustre, finely, closely and asperately punctate. Legs slender, moderate in length. Abdomen beneath tipped with a paler reddish tint. Length 2.7-3.5 mm.

California (San Francisco, 5.)

The abdominal border is deeper and less depressed than in *opaca*. The pubescence of the abdomen above and beneath is longer and very much closer than upon the remainder of the body. The species is very rare on the sea beach near the Cliff House.

P. nigriceps n. sp.—Form slender; sides parallel; pale yellowish-testaceous, head and sometimes the apex of the pronotum dark piceous, elytra paler and whiter; clouded portions of the abdomen æneous in lustre; anterior portions strongly alutaceous; abdomen shining, coarsely and evenly asperate, the asperities having a tendency to form transverse rows, especially toward the apices. Head slightly wider than long; eyes elongate, oval; front feebly convex, feebly and sparsely punctate. Prothorax slightly wider and much longer than the head, widest very slightly in advance of the middle, where it is about one-fifth wider than long; sides evenly and rather strongly arcuate; apical angles slightly obtuse, not at all rounded, basal rather broadly rounded; base about four-fifths as wide as the apex, very broadly arcuate, the latter very broadly emarginate; disk feebly convex. Elytra at base slightly wider than the base of the pronotum; sides rather strongly divergent posteriorly, moderately arcuate; disk depressed, about one-half wider than long, as wide at the apices as the pronotum, nearly three-fourths as long as the latter; exterior apical angles prolonged and acute, inner angles slightly rounded; each elytron very narrowly margined along the suture. Scutellum very small, triangular. Abdomen nearly twice as long as the head, prothorax and elytra together, as wide as the latter; sides parallel; fifth dorsal very broadly sinuate at tip, sixth truncate. Legs and antennæ pale tastaceous, slender. Anterior coxæ large, elongate. Length, 3.3–3.8 mm.

California (Santa Cruz, 11).

The three species here described agree very closely in general form, but the characters given in the table will serve to distinguish them without trouble. The inflexed sides of the pronotum terminate at about one-fourth the length from the anterior angles.

TACHYUSA Erichs.

The following species are placed in this genus, although the anterior tarsi are apparently five-jointed, the fourth joint being small but not anchylosed. They differ from Phlœopora, Colodera, etc., in facies, and especially in the tarsal and antennal structure; the first four joints of the hind tarsi decreasing almost uniformly and very rapidly in length, the first being generally shorter than the next two united; the antennæ are very slender. The middle coxæ are very narrowly separated.

T. experta n. sp.—Form rather slender, sides parallel; body black throughout, legs piceous, tarsi dark rufo-testaceous; antennæ black throughout; integuments polished; pubescence very fine, moderately dense, coarser longer, more erect and more conspicuous, though more sparse, on the abdomen. Head rather depressed, including the labrum rather longer than wide; sides behind the eyes arcuate and rather strongly convergent; neck broad; eyes rather large, not prominent, very finely granulated; front nearly flat between the eyes, excessively minutely and rather sparsely punctate; labrum prominent, wider than long; antennæ distinctly longer than the head and prothorax together; three basal joints slender, slightly decreasing in length, joints four to ten equal in length, the former scarcely twice as long as wide, the latter as wide as long, eleventh as long as the two preceding together, slender, acuminate, slightly compressed. Prothorax widest at one-third its length from the apex where it is slightly wider than the head, and slightly wider than long; sides moderately convergent and distinctly arcuate to the apex, and slightly less convergent and nearly straight to the base which is broadly, evenly and moderately arcuate, but slightly narrower than the disk, and distinctly wider than the apex; the latter nearly squarely truncate; apical angles strongly obtuse and slightly rounded, basal less strongly obtuse and very slightly rounded; disk moderately convex, nearly flat in the middle, finely, evenly, sub-asperately and rather densely punctate. Scutellum ogival, slightly wider than long, densely asperate. Elytra at base slightly wider than the pronotum; sides parallel and feebly arcuate, more strongly so toward the apex; apical angles slightly produced, acute; together as long as wide, one-fourth longer than the pronotum, broadly and feebly incurvate at apex; disk rather depressed, distinctly impressed on the suture near the base, extremely minutely, evenly and rather sparsely punctate; punctures much smaller and sparser than those of the pronotum. Abdomen at base as wide as the prothorax; sides feebly divergent and straight to the apex of the fifth segment where it is slightly narrower than the elytra; first three or four segments deeply and transversely impressed at base, the bottom of the impressions being very coarsely and closely punctate, remainder minutely and rather sparsely punctate; border rather narrow, deep and prominent; underside very minutely, evenly and rather sparseley punctate; first three segments rather strongly convex longitudinally. Legs and tarsi moderate in length, very slender; first joint of the posterior tarsi much longer than the second, slightly shorter than the next two together; first four joints decreasing nearly uniformly in length; claws extremely slender, moderate in length. Length 3.4 mm.

California (Gualala Riv., Mendocino Co., 2).

The type is a male, and has the apex of the sixth segment conspicuously bilobed at apex, the notch being triangular in outline, nearly twice as wide as deep, and rather small in proportion to the width of the segment. Each dorsal segment has at base two short lateral carinæ from the transverse ridge; the median carina is entirely obsolete.

T. linearis n. sp.—Very slender; body black throughout, legs piceous, tibiæ toward tip and tarsi pale testaceous; antennæ fuscous, slightly paler toward base; integuments polished; pubescence very fine, moderately dense, densest on the elytra, more sparse but longer, more erect and coarser on the abdomen, very pale flavo-cinereous. Head as wide as long; sides convergent and arcuate behind the eyes; occiput rather strongly convex, finely, evenly and rather densely punctate; antennæ slender, slightly longer than the head and prothorax together, second and third joints very slender, equal in length and slightly shorter than the first, fourth scarcely more than one-half as long as the third, longer than wide, tenth slightly wider than long, eleventh as long as the two preceding together, very obtusely rounded at tip; front very feebly impressed in the middle between the eyes. Prothorax widest at scarcely one-third its length from the apex where it is slightly wider than the head and just visibly wider than long; sides moderately convergent anteriorly and distinctly arcuate, less convergent posteriorly and nearly straight; base very slightly narrower than the disk and very slightly wider than the apex, broadly and rather strongly arcuate; apex very feebly arcuate; basal angles obtuse but not rounded; disk transversely convex anteriorly, narrowly and feebly impressed in the middle posteriorly, very finely and moderately densely punctate. Elytra at base distinctly wider than the pronotum; sides parallel and feebly arcuate; apical angles slightly produced, acute; together quadrate, slightly incurvate at apex; slightly emarginate at the suture; disk distinctly longer than the pronotum, impressed on the suture near the scutellum, feebly convex, very finely, feebly, evenly and rather sparsely punctate; punctures slightly asperate, forming indefinite and broken transverse rows. Abdomen distinctly narrower than the elytra, scarcely wider than the pronotum; sides to the apex of the sixth segment parallel and feebly arcuate; punctures, carinæ and border nearly as in *experta*. Legs very slender; first four joints of the posterior tarsi decreasing uniformly and rapidly in length, first much longer than the second. Length 3.3–3.5 mm.

California (Yountville, Napa Co., 1: Mt. Diablo, 1; Booneville, Mendocino Co., 1).

The type is a male; the sixth segment is broadly and moderately bilobed at apex, the notch being triangular, very small in proportion to the size of the segment, and about three times as wide as deep. The species is easily distinguished from the preceding by its more slender form and by the punctuation, which is about equally dense and strong on the elytra and pronotum.

T. laticeps n. sp.—Form slender; body rather dark piceous-brown throughout; legs slightly paler; antennæ piceous-black; integuments highly polished; pubescence extremely fine and rather sparse, closely recumbent. Head distinctly wider than long, broadly and squarely truncate at base; sides behind the eyes parallel and slightly arcuate, basal angles slightly rounded; front and occiput transversely, equally and moderately convex, excessively, minutely and very sparsely punctate; eyes rather small, not at all prominent; antennæ as long as the head and pronotum together, first three joints decreasing uniformly and rather rapidly in length, joints four to ten equal in length, the former slightly longer than wide, the latter slightly wider than long, eleventh as long as the two preceding together, abruptly compressed near the tip. Prothorax widest at about one-third its length from the apex where it is scarcely perceptibly wider than the head and slightly wider than long; sides strongly convergent and arcuate to the apex, and very feebly convergent and rather strongly arcuate to the base; the latter broadly, evenly and strongly arcuate, very slightly narrower than the disk and much wider than the apex; disk rather strongly and transversely convex, extremely feebly and transversely impressed in the middle just before the base, extremely, minutely, evenly and rather sparsely punctate. Elytra at base about one-fourth wider than the prothorax; sides nearly parallel, evenly and distinctly arcuate; together broadly truncate and trisinuate at apex; disk depressed, narrowly impressed on the suture toward the scutellum, quadrate, nearly one-third longer than the pronotum, finely, nearly evenly and sparsely punctate; punctures larger than those of the pronotum, feeble and subasperate, forming very broken series, giving a slightly imbricated appearance in certain positions. Abdomen at base slightly narrower than the elytra; sides parallel and straight; first three segments impressed at base, very slightly more coarsely punctate in the impressed areas, elsewhere finely, rather densely and asperately punctate; middle longitudinal carinæ obsolete. Legs moderate in length, very slender; posterior tarsi very slender, first joint distinctly longer than the next two together, nearly as long as the last three. Length 1.9 mm.

California (Paraiso Springs, Monterey Co., 1).

The type is a female, the sixth ventral segment being broadly and very evenly rounded behind. It is easily distinguished by its small size, pale color and very elongated basal joint of the posterior tarsi.

T. faceta n. sp.—Very slender; body piceous-black, antennæ same, two basal joints paler; legs piceous, extremities of the femora and tibiæ paler, tarsi testaceous; integuments polished; pubescence extremely fine, rather dense but not conspicuous except on the abdomen where it is much coarser. Head as long as wide; sides behind the eyes very moderately convergent and slightly arcuate; eyes large, very slightly prominent; occiput convex, front flat, both very minutely and rather sparsely punctate; antennæ very slender, much longer than the head and pronotum together, two basal joints sub-equal in length, the second slightly more slender, third distinctly shorter, joints four to ten equal in length, the former nearly twice as long as wide, the latter as wide as long, eleventh scarcely as long as the two preceding together, acuminate at tip. Prothorax widest at one-third its length from the apex where it is only slightly wider than the head and distinctly narrower than long; sides rounded and convergent to the apex, and very feebly convergent and straight to the base, which is evenly and rather strongly arcuate, distinctly narrower than the disk, and one-third wider than the apex; the latter truncate; disk strongly convex, narrowly and rather feebly impressed in the middle from the anterior third nearly to the base, finely, evenly, densely and sub-asperately punctate. Elytra at base slightly wider than the pronotum; sides just perceptibly divergent, feebly arcuate, together broadly and feebly emarginate behind; apical angles very slightly produced; disk rather feebly convex, very slightly longer than wide, about one-fourth longer than the pronotum, very feebly impressed on the suture near the base, finely, nearly evenly and sub-asperately punctate; punctures more sparse than those of the pronotum. Abdomen long and slender, at base scarcely as wide as the pronotum; sides very feebly divergent posteriorly, more strongly arcuate near the tip; border narrow but rather deep; first three segments very strongly and transversely impressed at base; impressed areas very coarsely and densely punctate, elsewhere minutely and rather densely punctate; transverse basal ridges very strong, straight, each having three short posterior carinæ. Legs very slender; tarsi slender, first joint of the posterior as long as the next two together, much longer than the fifth. Length 2.6–2.9 mm.

California (Yountville, Napa Co., 1; San José, Sta. Clara Co., 1).

The specimens are apparently females: the sixth ventral is broadly rounded at apex; the description is taken from the first named specimen which is the larger; the second differs slightly in the form of the prothorax, which is as wide as long, and in which the sides are evenly sinuate through the basal two-thirds; they resemble each other so absolutely in all other characters, however, that there can be very little doubt of their mutual identity. The species is easily distinguished from the others by its very slender form, and by the tricarinate basal ridges of the dorsal segments.

T. Harfordi n. sp.—Moderately robust; black, antennæ very slightly piceous, legs dark piceous, tarsi paler, testaceous; integuments shining; pubescence extremely fine, not very dense, longer, coarser and more prominent on the abdomen. Head orbicular, as wide as long; sides behind the eyes moderately convergent and rather strongly arcuate; occiput and base strongly convex, very feebly and rather densely punctate; front nearly flat, finely and rather sparsely punctate, nearly impunctate along the middle and between the antennæ; eyes rather large, not prominent; antennæ very slender, as long as the head, prothorax and one-half the elytra together, basal joint distinctly more robust than, and equal in length to, the second, the latter slightly longer than the third, joints four to ten equal in length, the former scarcely twice as long as wide, the latter scarcely as wide as long, eleventh about as long as the two preceding together. Prothorax widest at one-third its length from the apex where it is as wide as long and distinctly wider than the head; sides rather strongly convergent and arcuate to the apex, and very slightly less strongly convergent and feebly arcuate to the base; the latter broadly sub-truncate and very feebly arcuate, strongly arcuate near the basal angles which are broadly rounded; basal width three-fourths that of the disk, and slightly greater than the apical; disk strongly convex near the sides, broadly and distinctly impressed in the middle from the apical third to very near the basal margin, where the disk becomes abruptly declivous and convex to the basal edge; the latter is narrowly margined and continuously so with the sides; punctuation fine, strongly and acutely asperate, evenly distributed and very dense. Elytra at base very slightly wider than the pronotum; sides nearly parallel, feebly arcuate; together truncate and strongly trisinuate behind; apical angles rather strongly produced, acute; disk scarcely longer than the prothorax, quadrate, rather depressed, feebly impressed near the scutellum, rather finely, evenly and not densely punctate; punctures sub-asperate, sparse and feeble near the outer apical angles. Abdomen at base as wide as the pronotum; sides sub-parallel, more strongly arcuate near the apex; punctures fine and rather dense, except in the basal impressions, where they are very coarse: middle carinæ obsolete; border strong. Legs slender; posterior tarsi long and slender, first joint much longer than the second but not as long as the next two together, longer than the fifth. Length 2.8–3.0 mm.

California (Sebastopol, Sonoma Co., 10).

The sexual characters are very feeble, the sixth ventral segment being rather strongly but very evenly rounded behind in the male, and sub-truncate and slightly wider at apex in the female. The elytral punctuation is slightly coarser and distinctly more distant, though a little less strongly asperate on the elytra than on the pronotum.

This very distinct species is dedicated with great pleasure to Mr. W. G. W. Harford, of the California Academy of Sciences.

PLATYUSA n. gen. (Aleocharini.)

Ligula long, with two approximate and robust processes at tip; paraglossæ short, pointed, robust; labial palpi slender, joints sub-equal in length, decreasing very rapidly in thickness; maxillary palpi very long and slender, third joint much longer than the second, fourth joint spiniform or subulate, but not received within the tip of the third; mentum broadly and very feebly emarginate. Antennæ very robust, basal joint extremely robust, second and third equal, much more slender, eleventh very large, moderately compressed. Head very short and broad, strongly constricted behind. Prothorax as wide as the elytra at base. Prosternum short, strongly and transversely swollen or sub-carinate; mesosternum moderately separating the coxæ; process short, truncate at tip; coxal cavities complete; metasternal process on the same level as the mesosternal but having a thick, slightly elevated border. Tarsi 4-5-5-jointed; first joint of the posterior elongate. Under surface of the head having a fine but distinct and entire carina under and behind the eye.

This genus belongs very near Myrmedonia to which I had assigned the specimens as a rather aberrant species. It however, differs so greatly in general appearance and especially in the structure of the ligula and antennæ, that I do not think it can be placed there with any degree of propriety. Platyusa evidently approaches Platonica Sharp, described from Mexico (Biologia Centrali-Americana, I, p. 214), but differs from it in the robust basal joint of the antennæ, in the structure of the apical processes of the ligula, which are very short and robust, and by the form of the paraglossæ which are not attenuated.

P. sonomæ n. sp.—Form depressed, robust; dark reddish-testaceous, elytra near the scutellum and toward each exterior apical angle black; abdomen above piceous-black except toward the base which is reddish-fuscous; beneath piceous with the apical border of each segment paler; pubescence fine, rather long, recumbent and close, except on the abdomen where it is almost entirely absent, and replaced toward tip by a few erect bristles; basal segments each with a single transverse row of long, fine hairs; antennæ infuscate, slightly paler toward base and at tip. Head very robust, much wider than long, extremely finely and rather sparsely punctate; eyes rather large, very finely granulate, bristling with short setæ; antennæ nearly as long as the head, prothorax and elytra together, very robust, basal joint as long as the next two together, joints four to ten, increasing gradually in width, the the latter nearly twice as wide as long eleventh slightly constricted toward tip, nearly as long as the three preceding together Prothorax one-third wider than the head; sides parallel and feebly arcuate; base broadly and strongly arcuate; apex broadly and feebly emarginate; apical angles narrowly rounded, basal very broadly so; disk three-fourths wider than long, evenly and feebly convex, extremely finely and sparsely punctate. Elytra at base as wide as the prothorax; sides feebly divergent posteriorly, and nearly straight; together much wider than long and equal in length to the pronotum; surface depressed, very finely and somewhat asperately punctate. Scutellum triangular, strongly transverse. Abdominal segments decreasing in width from the fourth, seventh much narrower, border very strong, deep, rapidly becoming shallower posteriorly; surface polished, transversely and excessively finely reticulate, impunctate. Under surface of the abdomen finely and densely pubescent, finely but rather sparsely punctate; punctures slightly asperate. Legs rather long; tarsi slender, first joint of the posterior as long as the next two together. Length 4.0–5.0 mm.

California (Santa Rosa, Sonoma Co., 4).

The specimens indicated were taken while running actively in the crevices of the shaggy bark on a large oak near its junction with the soil; there were many large piceous ants in company with them, but I do not know whether this was otherwise than accidental.

CALODERA Mann.

C. attenuata n. sp.—Form very slender; body dark testaceous-brown; head piceous; legs testaceous; antennæ dark fuscous; integuments shining; pubescence coarse and rather dense, pale flavo-cinereous, conspicuous especially on the antennæ where it is very short and dense. Head orbicular, as wide as long; sides behind the eyes very feebly convergent and strongly arcuate; front and occiput evenly and moderately convex, very finely and not densely punctate; antennæ much longer than the head and prothorax together, moderately robust, three basal joints decreasing uniformly and very rapidly in length, the third scarcely more than one-half as long as the first, conical, and slightly less than twice as long as wide, joints four to ten increasing very slightly in length, the former one-third wider than long, the latter one-half wider than long, eleventh as long as the two preceding together, slightly compressed toward tip. Prothorax widest at one-fourth its length from the apex where it is scarcely wider than the head and as wide as long; sides strongly rounded thence to the apex, and extremely feebly convergent and feebly incurvate to the base, which is broadly and rather strongly arcuate and but very slightly wider than the apex; the latter broadly and very feebly arcuate; basal angles obtuse and slightly rounded; disk feebly and evenly convex, very minutely, feebly, evenly and not densely punctate, not at all impressed. Elytra at base one-fifth wider than the prothorax; sides parallel and nearly straight; together transversely truncate and very broadly trisinuate at apex; disk slightly longer than wide, one-fourth longer than the pronotum, very depressed, nearly perfectly flat, feebly impressed on the suture toward the scutellum, finely margined along the suture, finely, evenly, very feebly and rather densely punctate. Abdomen at base slightly wider than the pronotum and very slightly narrower than the elytra; sides parallel and straight; entire surface granuloso-reticulate; granulation much coarser in the basal impressed areas which are not punctate, elsewhere in addition finely, feebly, sparsely and sub-asperately punctate; middle carinæ obsolete; lateral very broad. Legs rather short, moderately stout; first four joints of the anterior tarsi equal, very short and together much longer than the last; posterior tarsi short, first joint slightly shorter than the next two together, fourth very minute. Mesosternal process acute but rather short. Length 2.1 mm.

California (Paraiso Springs; Monterey Co., 1; Calistoga, Napa Co., 1).

Easily distinguished by its conspicuous pubescence, small size, slender form, and pale color. The infraocular ridge is very feebly developed anteriorly, becoming obsolete posteriorly. The type appears to agree quite well with the various descriptions of Calodera.

ILYOBATES Kraatz.

I. californicus n. sp.—Form moderately robust, depressed; sides parallel; body shining pale ochreous-testaceous throughout, a small indefinite spot near the scutellum and a larger one near each exterior apical angle of the elytra darker, castaneous; abdominal segments slightly paler toward tip. Head moderately deflexed, slightly longer than wide, feebly constricted posteriorly; front moderately convex, rather coarsely, feebly and closely punctate; eyes rather small, moderately prominent, finely granulated; antennæ scarcely as long as the head and pronotum together, strongly geniculate, rather strongly incrassate, basal joint much shorter than the next two together, second and third equal in length, the latter more slender and nearly three times as long as wide, fourth quadrate, joints five to ten transverse, the latter two-thirds wider than long, eleventh pointed, ovoidal, slightly longer than the two preceding together. Prothorax slightly wider than the head; sides parallel, moderately and nearly evenly arcuate; posterior angles obtuse but not rounded; apex and base broadly, rather strongly and equally arcuate; disk nearly one-third wider than long, moderately and evenly convex, rather coarsely and closely punctate. Elytra at base about one-fourth wider than the prothorax; sides very feebly divergent posteriorly and very feebly arcuate; together very slightly wider than long, truncate posteriorly, feebly sinuate at the suture and more strongly so near each exterior angle; disk about one-fourth longer than the pronotum, feebly convex, very coarsely and rather densely punctate; punctures somewhat asperate. Abdomen slightly narrower than the elytra; sides parallel; border strong; basal segment very coarsely and densely punctate, each segment being successively more feebly and sparsely punctate, sixth finely and very sparsely so; underside slightly more finely punctate than the upper. Legs rather long, slender; first joint of the posterior tarsi as long as the next three together. Length 2.9–3.2 mm.

California (Hoopa Val., Humboldt Co.)

I found this very well-marked species to be gregarious and exceedingly plentiful under the fungous bark of a decayed log. The pubescence is fine, rather sparse, and not conspicuous. The mesosternal carina is strong, and is a posterior continuation of the reflexed apical margin.

The type is described from the female; in the male the third antennal joint is very much longer than the second.

In this genus the head beneath has a very strong infraocular ridge, proceeding from the outer posterior angle of each maxillary fissure, to the posterior margin of the head, feebly arcuate and gradually ascending.

I. nigrinus n. sp.—Blackish-piceous; two basal joints of the antennæ, a small humeral spot extending nearly to the scutellum, and legs paler, piceotestaceous, the apices of the abdominal segments especially beneath are also narrowly paler; pubescence very fine, recumbent, not very dense. Head scarcely longer than wide; front moderately convex, very finely, feebly and sparsely punctate; eyes moderate, having excessively fine, short and erect setæ; antennæ slightly longer than the head and pronotum together, rather slender, moderately incrassate; basal joint short, scarcely one-third longer than the second, the latter about equal in length to the third, fourth very slightly longer than wide, joints five to ten transverse, eleventh ovoidal, acuminate, slightly shorter than the three preceding together; labrum more than twice as wide as long, truncate, sides parallel. Prothorax widest slightly before the middle where it is just visibly wider than the head and scarcely one-fourth wider than long; sides rather strongly arcuate anteriorly, feebly sinuate just before the posterior angles which are therefore slightly prominent, obtuse, scarcely rounded, and in the form of wide cusps; base broadly and rather strongly arcuate, very feebly sinuate near the basal angles, about equal in width to the apex which is transversely truncate; disk rather strongly convex, especially anteriorly and laterally, even, very finely, rather sparsely and evenly punctate. Elytra at base about one-fifth wider than the pronotum; sides very feebly divergent and almost straight; disk as wide as long, depressed, even, nearly one-third longer than the pronotum, rather coarsely, moderately densely and deeply punctate; punctures somewhat asperate. Abdomen much narrower than the elytra; sides subparallel and feebly arcuate, rather finely and closely punctate; punctures becoming much more sparse toward the apex; border narrow and rather deep. Legs rather long very slender; first joint of the posterior tarsi slightly shorter than the next three together. Length 2.6-2.9 mm.

California (Hoopa Val., Humboldt Co., 8).

This species occurs with the preceding but is very much less abundant; I have also received one specimen collected by Mr. C. Fuchs near San Mateo. It is distinguished at once by its very dark color, more slender form, by the much finer punctuation, especially of the head and pronotum, the more slender antennæ, and by the form of the pronotum.

MASEOCHARA Sharp.

Tithanis Casey.

M. californica n. sp.—Moderately robust; sides parallel; body intense black throughout except the last two segments of the abdomen which are dark fuscous above and beneath, the base of the penultimate being black; antennæ black, scarcely paler toward base; legs black, tarsi very slightly paler, rufo-piceous; pubescence very sparse, erect and fine on the anterior portions, absent on the abdomen above, except along the apices of the segments which are setigerous; much denser and rather fine beneath, with numerous long, erect, black bristles, especially toward the apex; anterior portion of the body finely but strongly granulose, alutaceous; abdomen polished. Head slightly longer than wide; occiput and front feebly and evenly convex, finely, feebly and very sparsely punctate; sides behind the eyes moderately convergent and arcuate; antennæ one-half longer than the head, rather robust, strongly compressed, four basal joints glabrous although sparsely setigerous, remainder covered densely with a short fulvous pubescence with many long erect setæ at the apices; basal joint three times as long as wide, distinctly shorter than the next two together, as long as the third and fourth, second much shorter than the third, fourth smallest, as wide as long. Prothorax widest at one-third its length from the apex where it is one-fourth wider than long; sides strongly and evenly arcuate, slightly convergent toward the base which is strongly and evenly arcuate; sides strongly arcuate anteriorly; apex truncate; apical angles narrowly rounded, basal obsolete; disk feebly convex, rather finely, evenly and somewhat sparsely punctate; punctures very feebly impressed. Elytra at the humeri slightly narrower than the pronotum; sides rather strongly divergent and arcuate; together transversely truncate behind and feebly sinuate near the suture; outer apical angles broadly rounded; disk one-half wider than long distinctly shorter than the pronotum, flat; inner apical angles deflexed slightly, punctured like the pronotum but slightly more densely. Abdomen at base nearly as wide as the elytra; sides feebly convergent toward the apex and very feebly arcuate; border narrow but very deep, vertical; surface rather finely and moderately densely, asperately and rather feebly punctate, impunctate at the bases of the segments. Legs rather long and slender; middle and posterior tibiæ densely clothed with short, fulvous, spinous setæ toward the tips; first joint of the posterior tarsi nearly as long as the next two together, scarcely as long as the fifth; joints two to four equal. Length 9.0–10.0 mm.

California (San Diego, 2).

The antennæ are moderately robust and incrassate toward tip where they are strongly compressed; the penultimate joint viewed on the narrow side is very slightly wider than long: viewed, however, on the compressed side it is nearly one-half wider than long. This species differs from *M. valida* Lec. by its black elytra and more slender form, and from *opacella* Sharp, by its much more transverse prothorax, in which also the basal angles are obsolete. The description is taken from the male, in which the seventh dorsal plate is armed as usual with six porrected teeth, the middle four being robust, the lateral ones much more slender and slightly shorter; all are directed inward toward the apices, but more strongly so in the outer teeth.

OXYPODA Mann.

O. insignis n. sp.—Depressed; rather robust; sides parallel. Body dark piceous-brown; abdomen darker, nearly black; legs slightly paler, brown; antennæ black, basal joint piceo-testaceous; surface shining; pubescence fine, rather long, closely recumbent, sparse. Head deflexed, slightly longer than wide; front broadly convex, finely, very feebly and sparsely punctate; eyes not prominent; antennæ very slender, as long as the prothorax and elytra together; basal joint more than twice as long as wide, sub-cylindrical, much shorter than the next two together, second slightly shorter than the third, the latter conical and slender, joints four to ten equal in length, the former distinctly longer than wide, the latter slightly wider than long, eleventh conoidal and acuminate as long as the two preceding together; labrum nearly four times as wide as long, truncate at apex, sides parallel. Prothorax slightly wider than the head; about one-fourth wider than long; sides nearly parallel and feebly arcuate, more strongly so anteriorly; base slightly wider than the apex, broadly and evenly arcuate; the latter broadly and slightly more feebly so; posterior angles obtuse and slightly rounded; disk moderately convex, finely, very feebly and rather sparsely punctate. Scutellum large, triangular, slightly wider than long, granulose. Elytra slightly longer than the pronotum, and at base, slightly wider; sides feebly divergent and nearly straight; together slightly wider than long, truncate at apex; disk depressed, sub-alutaceous, very finely, feebly and rather closely punctate. Abdomen short and broad, very slightly narrower than the elytra; sides parallel; surface minutely, feebly and very sparsely punctate; border very deep, vertical, thin. Legs slender; first joint of the anterior and middle tarsi very short, in the latter much shorter than the second; first joint of the posterior slightly longer than the second. Length 3.0 mm.

California (San Francisco, 1).

The ligula is deeply bifid, the mentum transversely truncate, the third joint of the maxillary palpi being feebly swollen and longer than the second. The species is described because of its departure from the normal European forms, in that the second antennal joint is distinctly shorter than the third, and the first joint of the posterior tarsi but slightly longer than the second.

PHYTOSUS Curt.

P. bicolor n. sp.—Form very slender; sides parallel; anterior parts pale reddish-testaceous; legs and antennæ same; abdomen black, apex of the last segment slightly paler; pubescence very fine, rather long, moderately dense, semi-erect; surface rather feebly shining, finely and somewhat feebly alutaceous throughout. Head but very slightly deflexed sub-triangular, slightly longer than wide, broadly truncate at base; angles rather broadly rounded; sides evenly arcuate; eyes very small, not prominent, coarsely granulated; front depressed, convex only at the sides, excessively minutely and feebly punctate; in the middle, on a line with the posterior limits of the eyes, there is a small slightly elongate fovea; antennæ very strongly geniculate, slightly longer than the head and prothorax together, slender, very feebly incrassate; basal joint much shorter than the next two together, second and third equal in length, four to ten increasing very slightly in length and more distinctly in width, the former just visibly longer than wide, the latter distinctly wider than long, eleventh conoidal, nearly as long as the two preceding together. Prothorax very slightly shorter and narrower than the head, widest at one-third the length from the apex where it is distinctly narrower than long; sides arcuate anteriorly, convergent and nearly straight toward the base; the latter broadly sinuate in the middle, slightly narrower than the apex, and two-thirds as wide as the disk; basal angles narrowly rounded; disk depressed, with a very feebly impressed median line, broadly impressed in the middle near the base; punctures scarcely visible. Elytra at base as wide as the pronotum; sides moderately divergent, very feebly arcuate; together truncate behind, feebly sinuate at the suture; disk much wider than long, three-fourths as long as the pronotum, depressed, much more coarsely alutaceous than the pronotum and with traces of rugulosity. Abdomen as wide as the elytra; sides slightly divergent; border strong but not very deep; surface coarsely alutaceous. Legs slender; first joint of the posterior tarsi nearly as long as the next two together. Length 2.3 mm. (very uniform).

California (San Diego).

This species is extremely abundant under the densely packed seaweed thrown up on the shores of the inner harbor in the Spring of the year; occurring with it and also in great abundance, were *Cafius (Remus) decipiens* Lec., *Motschulskium sinuatocolle* Matth., and *Phycocœtes testaceus* Lec., and, in less number, *Cafius (Remus) opacus* Lec.

P. maritimus n. sp.—Very slender; abdomen black; head very slightly paler, piceous-black; prothorax and elytra much paler, dark piceous-brown, the latter shaded slightly darker toward the apices; legs and antennæ reddish-testaceous, the latter infuscate; surface strongly alutaceous; pubescence short, very coarse, rather dense, erect and rather conspicuous, pale fulvo-cinereous. Head sub-triangular, truncate at base; sides arcuate; front broadly convex, even throughout, finely and extremely feebly punctate; antennæ very short, scarcely two-thirds as long as the head and prothorax together, extremely geniculate, distinctly incrassate and feebly compressed toward tip; basal joint nearly as long as the second and third together, second nearly three-fourths longer than the third and as long as the third and fourth together, joints five to ten very short, the former slightly wider than long, the latter twice as wide as long, eleventh scarcely as long as wide, broadly impressed within and near the apex, impression spongy-pubescent; eyes oval, rather large, coarsely granulate. Prothorax widest at less than one-third its length from the apex where it is about as wide as long; sides feebly arcuate anteriorly, slightly convergent and nearly straight posteriorly; base broadly arcuate, distinctly narrower than the apex which is broadly and very feebly arcuate; the latter very nearly as wide as the disk; basal angles slightly rounded; disk feebly convex, without an impressed median line; scarcely punctate. Elytra at base distinctly narrower than the prothorax; sides rather strongly divergent, feebly arcuate; together truncate behind, distinctly wider than long and scarcely more than two-thirds as long as the pronotum; disk depressed and slightly more finely alutaceous than the pronotum. Abdomen about as wide as the elytra; sides straight, just visibly divergent toward tip; border thick but very shallow; surface finely, evenly, moderately densely and sub-asperately punctate, very feebly alutaceous and subreticulate, shining; underside more densely, strongly and asperately punctate. Legs slender; first joint of the posterior tarsi equal in length to the second. Length 2.2 mm.

California (Oakland, Alameda Co., 4).

There are so many striking differences between the present species and *bicolor*, that there is scarcely a doubt of its distinctness generically; these are principally the dissimilarity in antennal and tarsal structure. One of the most salient differences, however, is due to the nature and arrangement of the pubescence. In *bicolor* this is very fine, much longer, and grows without any definite arrangement; in *maritimus*, however, it is very short and stout, and on the pronotum is parted along the median line, streaming out laterally and posteriorly in a beautifully regular manner. The antennæ are so very strongly geniculate, that the angle between the axes of the first and second joints is only about sixty degrees.

BRYONOMUS n. gen. (Staphylinini.)

The two species, *Cafius canescens* Mann. and *C. seminitens* Horn., present so many aberrant characters that it seems desirable to separate them generically under the above name. In a memoir recently published by Dr. Horn in the Proceedings of the Entomological Society of Philadelphia, upon the Philonthi of the United States, it is stated by this author that these two species will probably be found to form part of Dr. Sharp's genus Phucobius, from Japan. Through the kindness of Dr. Sharp, who has sent me several specimens of his *Phucobius simulator*, I am compelled to show that this opinion is untenable, the mandibles in Phucobius being unidentate within, while in Bryonomus they are distinctly bidentate. The maxillæ and maxillary palpi of these genera are figured on the plate, and it will be seen that they also present important differences in form.

Bryonomus differs from Cafius, or more properly Remus, as the Californian species approximate much more closely to this genus than to the European Cafius, in the comparative shortness of the terminal joint of the maxillary palpi, and very greatly in appearance. The intermediate coxæ are also widely separated, while in the others they are nearly or quite contiguous, and, although generally in this group the latter cannot be depended upon as a generic character, it appears to be of much more importance in that portion immediately allied to Cafius and Remus.

In the two species *canescens* and *seminitens*, the former has the mesosternal process rounded behind and the mandibular teeth rather small and equal, the latter has the mesosternal process squarely truncate behind and the mandibular teeth very unequal in size, the smaller being minute and on the inner flank of the larger. *Canescens* is chiefly remarkable for its enormous variation in form; in a series of about forty males which I have before me, there is a regular succession proceeding without break from large males with large heads, wider behind the eyes and wider than the prothorax, the latter being much wider than long and narrowed strongly behind, down to small males having very small quadrate heads, narrower than the prothorax and not wider behind the eyes, the prothorax being quadrate with the sides parallel. The eyes in the large specimens are comparatively small and are far in advance of the hind angles, but in the series as the head decreases in size the eye remains the same, so that in the small specimens it appears relatively very large and is at only its own length from the posterior angles. These variations are not perceptible in a series of forty males of *seminitens*.

ORUS Casey.

Orus punctatus Casey, exists in the greatest profusion throughout the coast regions of California. Wherever there is a rivulet or pond this species may be gathered in multitudes amongst the rubbish along the banks. I have personally taken hundreds of specimens during a few months' residence. In these specimens the geniculation of the antennæ is seen to be as pronounced as in almost any other genus of coleoptera, the angle between the axes of the first and second joints being a right angle in the majority of cases; I have represented this upon the plate.

Of the two statements made by Dr. Horn (Ent. Amer. I, p. 112), viz.: "The antennæ are *not* geniculate," and "*O. punctatus* is from Owen's Valley, Cal.;" the first is therefore incorrect, and the second is at least open to doubt.

In the genus Orus the anterior tarsi are feebly and equally dilated in the male and female and clothed beneath rather densely with short spongy papillæ. Details of the structure of various parts of the body are shown on the plate. The genus is undoubtedly distinct from *Scopæus*, at least far as the Californian representative is concerned, the most salient differences being as follows:

In Scopæus the antennæ are straight, in Orus geniculate; in the former the mandibles are tridentate, in the latter 4-dentate; in the former the ligula has at the tip three approximate teeth, while in the latter there are plainly and distinctly but two.

In Orus the fourth joint of the maxillary palpi is excessively small, in most specimens absolutely invisible except under the most favorable conditions; when these conditions of light, position, etc., are attained, it is seen to be very oblique, thin and subulate, and to lie far within the large and deep oval excavation in the tip of the third joint, not projecting visibly beyond its margin, so that it is generally entirely invisible when viewed laterally. The labrum is strongly quadridentate.

HOMALIUM Grav.

H. algarum n. sp.—Form narrow, rather distinctly attenuated anteriorly, depressed; body castaneous; lateral margins of the pronotum, elytral humeri and apices externally, and a very small clouded spot on each elytron near the scutellum paler, testaceous; lateral margins of abdomen paler; first six joints of antennæ fuscous, remainder black; under surface pale especially the pronotal and elytral hypopleuræ; legs rufo-testaceous, femora darker; head, pronotum and elytra entirely glabrous, abdomen having a few extremely short and very sparse hairs; sub-alutaceous. Head rather small, slightly wider than long; eyes moderate, finely granulate; sides behind them short, very strongly convergent; base constricted, the constriction extending upon the dorsal surface; front very slightly produced as a broad muzzle between the antennæ, feebly impressed near the base of each antenna; having two feeble, distinct impressions on a line through the middle of the eyes and immediately in front of the small but very prominent ocelli, which are sub-triangular; surface shining, coarsely, strongly and very sparsely punctate, alutaceous near the antennæ; the latter short, three-fourths as long as the head and prothorax together; basal joint twice as long as wide, shorter than the next two together, second longer than wide, as long as the fourth and three-fourths as long as the third, the latter very slender, clavate, three times as long as wide; joints six to eleven gradually wider, forming a rather well-marked club, tenth much wider than long Prothorax widest at two-fifths its length from the apex where it is more than one-third wider than the head and about one-third wider than long; sides parallel, more strongly arcuate anteriorly, straight near the basal angles which are obtuse and distinctly rounded; base feebly and evenly arcuate, very slightly narrower than the disk and as wide as the apex; the latter broadly and feebly incurvate; apical angles rather broadly rounded; disk depressed, impressed along each side toward the base, having in the middle two elongate, parallel and well-marked impressions, finely margined on all sides, rather coarsely, deeply, irregularly and extremely sparsely punctate; all impressed and depressed areas alutaceous. Elytra at base very slightly wider than the pronotum; sides nearly parallel and almost straight; apical angles broadly rounded; together truncate behind, slightly and evenly incurvate in the middle; disk nearly twice as long as the pronotum, nearly one-fourth longer than wide, depressed, abruptly declivous along the sides, broadly and very feebly impressed along the suture, coarsely alutaceous and sub-rugulose, rather finely and sparsely punctate. Abdomen with five exposed segments, shorter and slightly narrower than the elytra; sides of the first three segments parallel and straight; surface broadly and moderately convex, finely sub-alutaceous, excessively minutely, feebly and almost indistinguishably punctate; border very deep and strongly inclined. Legs stout and robust; first four joints of the posterior tarsi short, equal, together much shorter than the fifth; middle femora short, very thin, wide and bent very strongly upward; posterior femora feebly bent. Length 3.8 mm.

California (San Francisco, 2; Santa Cruz, 2).

This remarkable species is found on the sea beach in the bunches of seaweed cast up by the waves; the description is taken from a male, the sixth ventral segment being broadly and rather strongly sinuate at apex; the four basal joints of the anterior tarsi are slightly dilated, successively less strongly so, and each has on the lower surface four transversely arranged and very long membranous papillæ. The first visible segment has upon the middle of the dorsal disk two approximate, obliquely oval patches which are covered densely with an excessively minute, coarse and brilliant, fulvous pubescence, and beneath in the middle of the base a round abrupt tubercle.

For the present this species may be placed near *longulum* in the lists of Homalium, but it appears almost certain that it must sooner or later form the type of another genus.

H. rugipenne n. sp.—Moderately attenuated anteriorly, rather slender and convex; head piceous, prothorax and elytra very dark rufo-testaceous, abdomen black, legs and antennæ rufo-testaceous, the latter slightly infuscate toward tip, posterior femora clouded with piceous; integuments shining; pubescence of the anterior portions extremely short and excessively sparse, sub-erect, that of the abdomen three times as dense, pale fulvous. Head moderate, slightly wider than long; sides behind the eyes strongly convergent, short, very arcuate and prominent; eyes rather small, not very prominent; front broad, feebly convex, scarcely preceptibly impressed at each side between the antennæ; on a line through the posterior portion of the eyes there are two minute elongate impressions which join the broadly arcuate and strongly marked nuchal constriction, which extends entirely across the base of the occiput and just behind the eyes; punctuation very coarse and sparse; antennæ slightly shorter than the head and prothorax together, slender, last five joints forming a slender club; basal joint the longest, more than twice as long as wide, second two-thirds as long, much more slender, third very slender, as long as the fourth and fifth together, the latter each longer than wide. Prothorax widest at about two-fifths its length from the apex, where it is about one-fourth wider than the head and one-third wider than long; sides evenly and strongly arcuate anteriorly, moderately convergent and straight toward the basal angles; the latter obtuse and very slightly rounded; base broadly, evenly and moderately arcuate, four-fifths as wide as the disk and just visibly narrower than the apex, the latter broadly and very slightly incurvate; apical angles evenly rounded, obsolete; disk rather strongly convex, feebly, narrowly and unevenly impressed along each side near the edge; surface unevenly and coarsely but not very strongly rugulose, very coarsely, unevenly, rather feebly and very sparsely punctate. Elytra at base scarcely wider than the pronotum; sides rather strongly divergent and straight; together broadly, evenly and feebly incurvate at apex; outer angles strongly and evenly rounded; disk transversely and distinctly convex, slightly shorter than the apical width, nearly one-half longer than the prothorax, coarsely, very strongly and unevenly rugulose; rugulosities polished, large, arranged in a generally longitudinal direction, divided by the very irregular coarse and ill-defined punctures. Abdomen having six exposed segments; together much longer and slightly wider than the elytra; exterior sides of the border arcuate, inner sides straight and parallel; border wide, feebly inclined; surface strongly convex, finely rather densely and asperately punctate; surface sub-alutaceous, feebly shining. Legs short and robust; middle and posterior tibiæ very coarsely and rather densely spinulose exteriorly; last joint of the posterior tarsi much longer than the first four together. Length, 2.9 mm.

California (Alameda Co., 1). Mr. Harford.

The humeri have no traces of callosity, and the median portions of the pronotum are evenly convex without traces of impressions or tuberculations; the species evidently belongs immediately after *hamatum* Fauv., from which it differs apparently in its greater slenderness.

PHLŒOPTERUS Mots.

P. longipalpus n. sp.—Broad, depressed, slightly wider behind; body black throughout; antennæ same; palpi intense black throughout; legs piceous-black, tarsi very dark reddish-fuscous; pubescence very fine, rather long, sub-recumbent, moderately dense, dark grayish in color; integuments polished. Head moderate or small, strongly constricted immediately behind the eyes, about as wide as long; eyes large, very prominent; front feebly convex, finely, evenly and rather densely punctate; having on a line slightly in advance of the middle of the eyes, two round impressed foveæ which are mutually slightly less than twice as distant as either from the eye; vertex transversely impressed between the antennæ; the latter long, very slender and filiform, nearly as long as the elytra and abdomen together, clothed densely with very minute pubescence; joints one, three to seven, and eleven nearly equal in length, the first slightly more robust and the last most slender, fusiform; joints eight to ten very slightly shorter and rather more slender than the seventh, second much the shortest, one-half as long as the third and more than twice as long as wide. Prothorax widest in the middle where the sides are very obtusely and feebly angulate, and where it is about two-thirds wider than long; sides thence moderately convergent posteriorly and straight, except very near the basal angles where they are feebly sinuate; basal angles slightly prominent, right, not at all rounded; base transversely truncate, nearly five-sixths as wide as the disk and just visibly wider than the apex; apical angles broadly rounded; disk broadly convex in the middle, even, broadly impressed near each basal angle, and having on each side in the middle and very near the edge a large rounded and rather deep impression; punctures fine, even and rather dense. Elytra at base slightly narrower than the prothorax; sides slightly divergent and straight; outer apical angles extremely broadly rounded; inner very narrowly so; disk widest at one-fifth the length from the apices where it is one-fourth longer than wide, two and one-third times as long as the prothorax, strongly punctate; punctures denser and distinctly larger near the suture where also the surface is finely, longitudinally and obsoletely sub-costate. Exposed surface of the abdomen much wider than long, as wide as the elytra, very short, very broadly margined at base; surface finely sub-alutaceous, very minutely and not densely punctate. Legs long; femora twice as wide as the tibiæ, sides parallel; posterior tarsi long and slender, first four joints decreasing uniformly and very rapidly in length, first as long as the next two together and much longer than the last; basal joints of the anterior tarsi feebly dilated. Length 6.0 mm.

California (Middle Sierras).

The palpi are very long and slender; the first joint of the maxillary very small; the second long, strongly arcuate and distinctly shorter than the fourth; third scarcely more than one-half as long as the second, nearly three times as long as wide; fourth very long and slender, acuminate at tip, twice as long as the third; first joint of the labial much shorter than the second; third distinctly longer than the first two together. Mesosternum feebly carinate posteriorly, having in the middle and in the anterior half, two small, abrupt and prominent, spiniform tubercles, arranged longitudinally.

The type is a male; the female is very similar being merely a little larger and relatively wider. The three specimens before me show a slight variation from immaturity in the color of the palpi and legs; in one example the former are rather pale piceo-testaceous, and the tibiæ and tarsi in another somewhat pale and uniformly clear rufo-fuscous.

This is evidently the species referred to by Dr. Le Conte, (Proc. Ac. Sci., Phil., 1866, p. 375) from El Dorado Co., as being identical with *P. fusconiger* Mots., from Unalaska Id., and not, as represented by M. Fauvel (Not. Ent. vii, p. 83), the *Tilea cavicollis* of the latter author. *Longipalpus* is evidently distinct from *fusconiger*, since the femora are described as being paler toward base in the latter, while in the former, even in the most immature specimens which I have seen, the femora are always perfectly uniform in color throughout and black; they are also somewhat alutaceous. This is the only character of positive importance which can enter into the comparison, the remaining characters given by Mäklin being applicable to a great variety of species; the color of *fusconiger* being as stated, black, would in addition lead us to suppose that the type of that species was not immature: the coloration of the femora is, therefore, for this reason, of still greater importance. The present species is distinct from *Tilea cavicollis* Fauv., in the structure of the palpi and in the color of the upper surface which is of an intense black throughout in the former. I have placed *longipalpus* in the genus Phlœopterus Mots., simply because it cannot appropriately enter Tilea Fauv., unless a wide limit of variation be granted to that genus in the relative length of the fourth joint of the maxillary palpi, and as it evidently differs widely from Lesteva, the present disposition obviates the necessity for the creation of a new genus, but is made at the same time without any positive proof of the generic identity of *longipalpus* and *fusconiger*.

One of the specimens before me is affected by a peculiar disease, of which the principal feature is a remarkable growth of long irregular corneous filaments from the dorsal surfaces; some of the filaments have at the base a very elongate acicular lobe. I have also noticed a similar fungoid disease affecting the Carabidæ, but in which the filaments, instead of being long and very slender, are shorter, robust and strongly club-shaped.

VELLICA n. gen. (Homalini.)

The following description and subsequent remarks will sufficiently characterize this genus, which belongs between Phlœopterus and Lesteva.

L. longipennis n. sp.—Moderately robust, rather strongly convex; body above throughout dark piceous-brown; prothorax slightly paler; antennæ very dark fuscous, first, second and eleventh joints much paler, testaceous; under surface paler, rufous; legs clear rufous, tarsi scarcely paler; integuments shining; pubescence coarse, sub-erect, pale fulvous, dense, much more sparse on the pronotum. Head slightly longer than wide; eyes rather small, at less than their own length from the base, prominent and coarsely granulated; front feebly and transversely convex, more strongly and evenly so between the very minute and extremely feebly impressed frontal foveæ, which are on a line nearly through the middle of the eyes and mutually slightly less than twice as distant as either from the eye; punctuation rather fine, strong and dense; antennæ slender, filiform, scarcely one-half as long as the body; basal joint more than twice as long as wide, second and fourth sub-equal, shortest, scarcely more than one-half as long as the first, and two-thirds as long as the third, the latter slightly longer than the fifth; joints five to ten equal, eleventh slightly thicker, fusiform, nearly as long as the two preceding together. Prothorax widest at one-third its length from the apex, where it is distinctly wider than the head and very slightly wider than long; sides strongly arcuate, and thence moderately convergent and very feebly incurvate throughout to the basal angles, which are very slightly obtuse and not at all rounded; base transversely truncate, three-fourths as wide as the disk and very slightly narrower than the apex; disk transversely and rather strongly convex, even, not at all depressed toward the basal angles, finely, evenly and rather densely punctate; at each side in the middle, near the edge, there is a large, rounded and very feeble impression. Elytra at base very slightly wider than the prothorax; sides very feebly divergent, feebly arcuate; outer apical angles very broadly rounded; together feebly emarginate behind; disk two and one-third times as long as the pronotum, transversely and rather strongly convex, widest near the apex, where it is two-fifths wider than the pronotum and two-fifths longer than wide, somewhat coarsely, feebly, sparsely and asperately punctate, leaving but three segments of the abdomen exposed. Abdomen very short, much wider than long, triangular, strongly and narrowly margined at base, strongly alutaceous. Legs moderately robust; posterior tarsi slender, cylindrical, glabrous; first joint nearly as long as the second and third together, very slightly longer than the fifth. Length, 3.0 mm.

California (Middle Sierras).

The palpi are long and slender, clear rufo-testaceous throughout, the third joint of the maxillary one-half longer than wide, the fourth three times as long as the third, slender, slightly fusiform, obtusely acuminate at tip; first joint of the labial scarcely two-thirds as long as the second, third much longer than the first two together; the terminal joints of all the palpi have disks at the tips, which are pale and apparently spongy.

This genus differs from Lesteva, which it should precede in the catalogue, in the structure of the labial and maxillary palpi, and in the very long elytra, which extend for a long distance behind the metasternum.

LESTEVA Latr.

L. truncata n.sp.—Rather broad, widest behind; body black throughout; antennæ not paler; legs black except the posterior tibiæ, which are slightly paler toward tip; oral organs black; integuments shining; pubescence fine, rather dense, sub-recumbent, dark fulvous. Head small, as wide as long; eyes nearly at the posterior angles, large, rather coarsely granulated, prominent; base broadly and nearly squarely truncate along a line just behind the eyes; front scarcely convex, rather coarsely, evenly and feebly punctate; having, on a line through the anterior extremities of the eyes, two small round foveæ mutually one-half more distant than either from the eye, feebly and arcuately impressed between the bases of the antennæ; the latter two-fifths as long as the body, slender, very feebly incrassate; basal joint slightly robust, more than twice as long as wide, second two-thirds as long as the first and four-fifths as long as the third; joints four to ten, equal in length, slightly shorter than the third, eleventh slightly shorter than the two preceding together; outer joints distinctly compressed. Prothorax widest at two-fifths its length from the apex, where it is two-fifths wider than the head and one-third wider than long; sides evenly and moderately arcuate, very moderately convergent and very feebly arcuate to the basal angles which are obtuse and not at all rounded; apical angles more obtuse and slightly rounded; base squarely and evenly truncate, nearly five-sixths as wide as the disk and about equal in width to the apex; the latter squarely truncate; disk transversely and rather strongly convex, even except very near each side, where, throughout the basal half, there is a narrow strongly impressed channel parallel to the edge, which terminates anteriorly at the middle in a large, round, rather broadly and deeply impressed pit; punctures fine, evenly distributed and rather dense, feebly impressed. Elytra at base as wide as the pronotum; sides distinctly divergent and nearly straight;

outer apical angles broadly rounded; together transversely, evenly and very squarely truncate behind; inner angles right and very narrowly rounded; disk at apex nearly one-half wider than the pronotum, nearly two-thirds longer, distinctly longer than wide, depressed above, abruptly declivous along the sides; margins narrowly reflexed; broadly and very feebly impressed along the suture; coarsely, rather densely, evenly and asperately punctate. Exposed segments of the abdomen five in number; together slightly longer than wide, and slightly shorter than the elytra, finely asperate, very densely so at base, becoming smooth and feebly alutaceous at apex; fourth visible segment having in the middle of the disk and very near each side a large, very shallow, rounded impression; border very wide, strongly inclined. Legs rather stout, moderately slender; first joint of the posterior tarsi as long as the next two together, as long as the last; third and fourth short; claws short, slender, simple. Length, 3.4 mm.

California (Middle Sierras).

In this species the structure of the maxillary palpus is unquestionably the same as that of Lesteva, the third joint being as long as wide, the fourth fully four times as long; the first joint of the labial palpi is distinctly longer than the second, the third longer than the first two together; as in Vellica, the palpi are all terminated by small pale spongy disks.

PROTINUS Latr.

P. salebrosus n sp.—Depressed, moderately robust; entire body, except the tip of the abdomen beneath, black; the latter testaceous; antennæ piceous, two basal joints paler, testaceous; legs piceous, knees and tarsi paler, testaceous; pubescence in the form of exceedingly minute setæ, which are very sparsely and evenly distributed over the elytra and abdomen. Head small, much wider than long; eyes rather small, very prominent, nearly hemispherical; front with a deep oblique impression on each side near the eye; surface confusedly irregular and scabrous; antennæ very slender, one-half as long as the body; two basal joints much more robust, the second slightly shorter and more slender than the first; last three joints gradually and uniformly increasing in width, nearly of equal length. Prothorax widest at two-thirds its length from the apex, where it is about two and one-third times as wide as long; sides rather evenly and strongly arcuate posteriorly, very feebly arcuate and moderately convergent anteriorly; base transversely truncate, feebly sinuate toward each basal angle, but very slightly narrower than the disk and just visibly wider than the apex; the latter broadly and feebly emarginate; apical angles narrowly rounded; basal right and not at all rounded, in the form of very minute teeth, the sides of the pronotum in front of them being deeply sinuate for a very short distance; disk strongly and coarsely scabrous, feebly convex in the middle, where there is a narrow canaliculation, growing deeper toward base, broadly impressed along each side near the margins. Elytra at base as wide as the prothorax; sides nearly parallel and moderately arcuate near the humeri; outer apical angles broadly rounded; inner narrowly rounded; together slightly longer than wide and very slightly more than twice as long as the pronotum; disk transversely and moderately convex, feebly and coarsely scabrous, indistinctly, feebly and sparsely punctate. Abdomen very short behind the elytra, triangular, wider than the elytral apices, coriaceous, dull, obsoletely and sparsely punctate; the apices of the segments paler; border evident near the elytra. Legs slender. Under surface of the abdomen shining; segments very short, each with one or two transverse discal rows of very minute setigerous punctures. Length, 1 6 mm.

California (Santa Cruz, 5).

The description is taken from the male, in which the sixth segment of the abdomen is narrowly and deeply sinuate at the apex, the sinus being strongly rounded at the bottom and slightly wider than deep; the fifth is broadly and strongly emarginate throughout its width, partially enclosing the sixth; the seventh is deeply divided; in the female the sixth segment is deflexed at tip and acutely triangular.

The species belongs near *sulcatus* Fauv., which is also from California. The antennæ from the second joint are almost precisely similar in structure to the prevailing type in the Trichopterygidæ.

ACTIDIUM Matth.

A. robustulum n. sp.—Form somewhat robust, rather convex. Body black throughout; antennæ piceous-brown; legs dark yellowish-brown; tarsi paler, flavate; pubescence very short, recumbent, rather dense, cinereous-brown in color; integuments feebly shining, very finely, feebly and somewhat densely granulose. Head nearly twice as wide as long, evenly and moderately convex; eyes small but rather prominent, very coarsely granulated; epistoma rather narrow, broadly and very feebly sinuate at apex; labrum much longer than wide, acutely rounded at apex, vertical or slightly inflexed; antennæ distinctly longer than the head and prothorax together, joints of club increasing in length and thickness. Prothorax slightly less than twice as wide as long, slightly longer and wider than the head; sides parallel and evenly arcuate; anterior angles viewed laterally narrowly rounded, basal more broadly so; base broadly and strongly rounded behind over the bases of the elytra, strongly sinuate near the basal angles; disk rather convex, perfectly even throughout. Scutellum small, equilatero-triangular. Elytra at the humeri slightly narrower than the pronotum; sides parallel and rather strongly arcuate for three-fifths the length, thence rather rapidly convergent to the apex which is narrow and sub-truncate; inner angles scarcely rounded; humeri rounded; disk one-half longer than wide and about two-thirds longer than the head and prothorax together, widest at about one-third the length from the base. Legs rather short and robust; posterior coxæ triangular, nearly twice as wide as long, sinuate outwardly, apex narrowly rounded. Under surface of the abdomen more shining than the upper. Length 0.55 mm.

California (Mt. Diablo, 1; Santa Cruz, 2).

The sub-asperate granulation of the surfaces is feebler and rather sparser than in the other species here noted.

A. granulosum n. sp.—Form rather slender, more cylindrically convex than *robustulum*: color throughout the body, legs and antennæ intense black; tarsi and anterior coxæ slightly piceous; pubescence excessively fine and short, recumbent and somewhat dense, pale fusco-cinereous; upper surface feebly shining, very finely, densely and evenly granulate; granulation strong and slightly asperate. Head two-thirds wider than long, convex; eyes rather small but very prominent, very coarsely granulate; epistoma narrow, broadly rounded at apex; labrum longer than wide, acutely rounded; antennæ much longer than the head and prothorax together, two-fifths as long as the body; joints of club increasing rapidly in length but very gradually in width. Prothorax slightly wider and distinctly longer than the head, two-thirds wider than long; sides parallel and arcuate; anterior angles viewed laterally narrowly rounded, posterior excessively broadly rounded, almost obsolete; base broadly and strongly arcuate, just visibly sinuate laterally; disk strongly convex and perfectly even. Scutellum triangular, small, very slightly wider than long. Elytra at the humeri just visibly narrower than the prothorax; sides parallel and slightly arcuate for three-fifths the length, thence slightly more convergent posteriorly; together obtusely rounded behind; humeri narrowly rounded; disk widest at two-fifths the length from the base where it is very slightly wider than the pronotum, sub-cylindrically convex, three-fourths longer than wide and fully twice as long as the head and pronotum together. Legs rather slender; under surface of the abdomen polished and minutely reticulate; posterior coxæ more than twice as wide as long, semi-circularly rounded within at the apex, sinuate outwardly. Length 0.50 mm.

California (San José, Santa Clara Co., 7; Santa Cruz, 4).

This species may be distinguished at once from *robustulum* by its more attenuated form, more dense and stronger granulation, and more particularly by the color of the legs and structure of the prothorax; it is apparently more abundant than any other species.

A. attenuatum n. sp.—Very slender; sub-cylindrical; intense black throughout; antennæ black; legs dark castaneous; suface moderately shining, covered with minute granulations which are evenly disposed and somewhat asperate; pubescence very fine and short, moderately dense, dull grayish in color. Head scarcely more than one-half wider than long, rather convex, deflexed; eyes moderate, prominent, coarsely granulate; epistoma very narrow at the apex which is acutely rounded; antennæ two-fifths as long as the body; joints of club increasing very rapidly in length and gradually in width, eighth joint small, scarcely more than one-half as long as the seventh. Prothorax but very slightly wider than the head and scarcely longer; sides parallel and feebly arcuate; base rather strongly arcuate, feebly sinuate toward the basal angles; the latter viewed laterally broadly rounded; disk strongly and transversely convex, one-half wider than long, even throughout. Scutellum triangular, very slightly longer than wide. Elytra at the humeri slightly narrower than the pronotum; sides parallel and moderately arcuate for three-fourths the length, together rather abruptly and obtusely rounded behind; disk sub-cylindrically and strongly convex, four-fifths longer than wide and two-thirds longer than the head and prothorax together, humeri slightly prominent, rounded. Pygidium semi-circularly rounded beneath, vertical, not attaining the elytral tip, feebly convex, granulose and more conspicuously pubescent. Legs moderately stout; tarsi and coxæ very slightly paler. Length 0.45 mm.

California (Santa Cruz, 1).

A very minute species; it may be distinguished at once from either of the others here described by its narrow form, more quadrate prothorax and coarser sculpture. The sides of the pronotum are longer in proportion to the median length; the sculpture is as coarse as in *granulosum* and the granulations are much more sparsely distributed than in that species; in *robustulum* these are much finer and less conspicuous.

The species here described are very homogeneous and belong apparently to the *Fowlerianum* group of Mr. Matthews, this being distinguished by the dull alutaceous surface sculpture, elongate elytra, and fine dense pubescence. All the specimens were taken in wet sand, on the surface of mud between small stones, or in mouldy earth along the edges of small streams. They are amongst the most minute of Trichopterygidæ, and are probably very numerous in species, although from the great care requisite in collecting them the number of described species will in all probability increase very slowly.

It has been stated by Dr. Horn (Ent. Amer. I, p. 108) that three of the species of Trichopterygidæ described by me (Cont. II. p. 162-166), viz: *Ptilium fungicola*, *Trichopteryx funginus* and *T. longipennis*, are synonymous with *P. Horniarum* Matth., *T. discolor* Hald., and *T. parallela* Mots., respectively. In order to show that in all probability this is not the case, I quote in parallel columns several salient differences as recorded in the descriptions of Mr. Matthews and those published by me in the work above mentioned.

P. Horniarum Matth.—Oblong, castaneous; antennæ dark yellow; legs bright yellow; under parts pale castaneous with the mouth, hinder parts of the metasternum and terminal segments of the venter flavescent. Length, .37 mm.

Texas.

P. fungicola Cas.—Form elongated. Color above piceous-black, beneath very slightly paler; oral organs, legs and parts of the prosternum pale reddish-flavate; antennæ black, basal joints dark flavo-testaceous. Length, .45 mm.

Pennsylvania.

The abdomen in *fungicola* does not project beyond the elytra as in the majority of species of Ptilium, and I noticed no flavescent parts of the metasternum and abdomen, as mentioned by Mr. Matthews.

T. discolor Hald.—Black, with the elytra testaceous, sparingly clothed with fulvous hair; thorax moderate, much broader and longer than the head, widest near the base, black with all the margins yellow; sides moderately rounded, hinder angles pale and much produced; elytra testaceous, short, rather shorter and narrower than the head and thorax; sides nearly straight; closely but ir-

T. funginus Cas.—Piceous-black, elytra becoming rufo-piceous toward the tips, which are margined with fulvous; legs and basal joints of the antennæ rather dark piceo-testaceous, remainder of the antennæ dark piceous-brown. Pubescence rather abundant, cinereous. Sides of the prothorax nearly straight anteriorly, very arcuate posteriorly; posterior angles very moderately produced.

regularly asperate. Legs and antennæ moderate, bright yellow. Length, .75–.87 mm.

United States.

Differs from other species in its depressed testaceous elytra and sculpture.

Elytra just visibly longer than wide, distinctly longer than the head and prothorax together, one-half longer than the pronotum, rather convex, more strongly and closely asperate than the prothorax; transverse rows only distinct near the suture. Length, .65–.8 mm.

Pennsylvania.

It will be readily seen that in color, especially of the legs and antennæ, in the convexity and length of the elytra, and particularly in the form of the posterior angles of the pronotum, *funginus* differs so greatly from *discolor* as to preclude any doubt of their distinctness.

T. parallela Mots.—Thorax rather large, sub-quadrate, widest at the base; sides slightly rounded; hinder angles much produced and very acute. Legs and antennæ long, bright yellow. Length, .75–.87 mm.

Dist. of Columbia.

Differs from others in its oval elongate form, rufofuscous elytra, and bright yellow antennæ.

T. longipennis Cas.—Prothorax widest slightly in advance of the base, where it is about twice as wide as long; posterior angles not at all produced. Legs and basal joints of antennæ dark piceo-rufous, remainder of the antennæ piceous-black. Color above piceous-black throughout. Length, 0.9 mm.

Pennsylvania.

The structure of the posterior angles of the prothorax and the color of the legs and antennæ alone would separate *longipennis* from *parallela* at the merest glance under suitable magnifying power.

EUSCAPHURUS n. gen. (Eucinetini).

Head strongly deflexed; mentum transverse, trapezoidal, apex broadly arcuate, continued anteriorly by a broadly lunate additional piece, leaving the tip of the ligula exposed. Labial palpi three-jointed; first strongly dilated, bulbous; second small, longer than wide, affixed obliquely to the first; third long, slender and in the form of a translucent spine; maxillæ large, lobes very small and slender, hook very minute and rudimentary; palpi four-jointed; first rather slender, sub-cylindrical; second slightly wider than long, nearly trapezoidal; third longer than the first, ovoidal, acuminate at tip; fourth in the form of a very small transparent spine. Antennæ eleven-jointed, geniculate, strongly clavate; club consisting of five or six joints which are gradually wider, strongly flattened; eyes having an acute edge at the sides beneath, where also they are feebly excavated for the passage of the antennæ, very coarsely granulated. Epistoma distinct, labrum small, strongly arcuate anteriorly. Prosternum very short, consisting of a narrow edge in front of the coxæ and a slight proce-s between them which is dilated and transversely truncate posteriorly and deeply excavated along the surface. Mesosternum small, narrowly separating the coxæ, produced in the middle in a small process which is excavated for the reception of the prosternal process, excavated at the sides for the anterior femora; epimera large, attaining the coxæ. Metasternum wide, produced posteriorly in a broad triangular process separating the posterior coxæ for two-thirds their length; epimera as long as wide, distinct. Anterior coxæ very strongly transverse, slightly separated, trochanters small but distinct; middle coxæ transverse, oblique, oval, slightly excavated, trochanters large and distinct; posterior in the form of large plates, nearly attaining the elytra and concealing the femora, in contact behind where the edge is transverse; sides nearly straight and very oblique. Middle and posterior tibiæ dilated toward tip and densely fimbriate at apex with short equal spinules, terminated by two rather small unequal spurs. Tarsi slender, all five-jointed; first four joints of the anterior short and nearly equal, last longer; those of the intermediate and posterior tarsi decreasing in length to the fourth, fifth longer; first joint of the posterior longer than the next three together; claws very small. Abdominal segments five in number, decreasing in length. Elytra covering the entire abdomen, navicular; inflexed sides not attaining the tips, suddenly and narrowly dilated toward base.

But five segments are visible, but in the males there is an indication of a rudimentary retractile sixth segment. The discovery of this somewhat anomalous genus may prove a link in the chain of evidence tending to place the Eucinetini among the Silphidæ. There are, however, many more reasons for retaining the group in the Dascyllidæ for the present; the antennæ although clavate and not at all serrate, are strongly flattened, and the structure of the labial palpi occurs frequently in the latter family. In the present genus I cannot perceive a minute basal joint in the latter, and the second is evidently very minute and affixed obliquely to the first, the third being clearly visible, not as an appendage of the second, but as a long spiniform terminal joint.

E. saltator n. sp.—Form narrowly oval, more than twice as long as wide, pointed behind, very convex; rather dark reddish-testaceous throughout; shining; pubescence fine, short and recumbent, rather sparse, fulvous in color. Head much wider than long, coarsely and rather closely punctate; punctures shallow and somewhat asperate; antennæ much shorter than the head and prothorax together; under surface deeply impressed with a transverse arcuate groove. Prothorax twice as wide as the head; apex broadly arcuate, one-half as long as the base; the latter strongly arcuate in the middle; sides strongly and evenly arcuate; posterior angles viewed laterally slightly produced, slightly acute, not rounded, anterior angles rather broadly rounded; disk strongly convex, very finely and rather sparsely punctate. Scutellum slightly wider than long, triangular. Elytra at base as wide as the prothorax, widest at slightly less than one-third their length from the base; sides at base continuous in curvature with those of the prothorax, gradually convergent posteriorly, evenly arcuate; together acutely rounded at tip; disk strongly convex, much more coarsely punctate than the pronotum, but slightly less so than the head; punctures moderately dense, rather feeble and somewhat asperate, irregu'arly but evenly distributed; sutural stria rather distinct, finely impressed, beginning at one-third the length from the base; suture about four times as long as the prothorax. Under surface much more densely pubescent than the upper; abdomen finely, closely and sub-asperately punctate. Legs rather long and s'ender; middle and posterior tarsi very slender and filiform, longer than the femora. Length 1.4–1.7 mm.

California (Anderson Val., Mendocino Co.).

This species is quite common under the bark of decaying logs and appears to be gregarious. It is difficult to discern as it feigns death at first and its color then renders it very difficult to distinguish from the surrounding powdery refuse of the Scolytides. It has a power of springing even greater in proportion to its size than that possessed by the species of Eucinetus.

CÆNOCARA Thom.

C. occidens n. sp.—Narrowly oval, two-fifths longer than wide; sides strongly declivous; color throughout rather dark brownish-red: integuments polished; pubescence coarse, rather long, moderately dense, bright fulvous, conspicuous. Head as wide as long, moderately convex, finely, nearly evenly and not densely punctate; eyes moderate, rather prominent, very finely granulate, almost divided by a narrow triangular cleft, lower lobe much wider than the upper. Prothorax viewed dorsally widest at the base; sides strongly convergent anteriorly and very feebly arcuate; apex nearly transversely truncate; base broadly and moderately angulate, sides straight, one-half wider than the apex; basal angles slightly obtuse and not rounded; disk rather strongly convex in the middle, nearly vertical at the sides, two and one-third times as wide as long, very finely and rather sparsely punctate; punctures round, perforate and with the circumference slightly elevated, slightly more dense along the base; viewed laterally the sides are straight, with the anterior angles very acute and not at all rounded, the basal angles being very obtuse and not rounded. Scutellum very small, as wide as long, ogival, slightly concave, with a few very minute punctures. Elytra at base as wide as the pronotum; sides parallel for two-thirds the length from the base and feebly arcuate; together broadly and very obtusely rounded behind; disk distinctly longer than wide; sides vertical, strongly convex behind, nearly flat in the middle toward base, finely and sparsely punctate; punctures perforate, slightly larger than those of the pronotum, slightly more dense near the scutellum, irregularly distributed; humeral tuberculations strong, narrow; lateral lobes not striate; first and second discal striæ beginning at the base, the former terminating very near, the latter twice as far from the apex; the third beginning at a slight distance from the base, immediately under the humeral tuberculations, and continuing for a distance slightly less than one-third the elytral length. Under surface finely and sparsely punctate. Length 1.4 mm.

California (Dublin, Alameda Co., 1; Paraiso Springs, Monterey Co., 2).

This species is distinguished from the others by its very small size, clear brownish-red color, and very sparse punctuation especially that of the prothorax; it belongs near *californica*.

C. californica Lec.—One specimen of this species was found at Yountville, Napa Co.; it is much larger and more broadly oval than *occidens*, black in color with the prothorax decidedly rugulose and very densely punctate; the scutellum is distinctly wider than long, the elytral surface very highly polished, the pubescence more sparse, and the difference between the density of the pronotal and elytral punctuation much more marked. The first and second striæ of the elytra are not entire as represented by Dr. LeConte; the first terminates very near the apex, and the second at a distance which is much more than twice as great.

PLATYCERUS Geoff.

P. californicus n. sp.—Very convex, slightly oval in outline, highly polished; body reddish-brown; legs paler, dark rufous; elytra with a slightly æneous lustre. Head slightly wider than long; occiput moderately convex; punctures very coarse, rounded, deeply impressed, somewhat irregularly but densely distributed; a small space in the middle of the base impunctate; lateral tuberculations moderate; labrum strongly transverse, short, very coarsely and densely punctate; mandibles small, the left rather strongly toothed, the right extremely obtusely and obsoletely so; antennæ short, slender; basal joint nearly as long as the remainder, second nearly as long as the next two together, much more robust; joints three to seven closely connate; the latter very slightly wider than long; joints of club equal in width, together distinctly shorter than the preceding six; tenth wider than long, evenly rounded; all three coarsely and rugulosely punctate toward tip and inwardly. Prothorax widest at two-thirds its length from the apex where it is two and one-half times as wide as the head and one-half wider than long; sides at this point strongly arcuate, thence moderately convergent and nearly straight to the apex, more strongly convergent to the basal angles which are slightly prominent, not at all rounded, and before which the sides are rather deeply sinuate; disk coarsely and rather densely punctate very near the sides, elsewhere more finely and very sparsely so, rather strongly convex. Elytra widest at two-thirds their length from the base where they are nearly one-fourth wider than the pronotum and one-third wider than at base; sides rather strongly arcuate posteriorly, strongly convergent toward the apex which conjointly is rather evenly and strongly rounded; disk strongly convex, distinctly striate except very near the sides where the punctures become confused; striæ finely punctate with the interspaces much longer than the punctures; intervals strongly convex, very feebly and indistinctly rugulose, each with a single or partially double row of excessively minute punctures along the middle of its crest. Under surface very coarsely punctate, densely so on the abdomen. Length 9.5 mm.

California (Eureka, Humboldt Co., 1).

The single specimen which was captured in a dusty wagon road, is a female. It is at once distinguishable from any of the others described from North America by its very convex form, partially oval outline, pale color, and very sparse punctuation of the pronotal and elytral disks.

Platycerus Agassii Lec.—One male of this species was taken while flying amongst the undergrowth of a dense redwood forest in the Anderson Valley, Mendocino Co.

The described species of Platycerus occurring within the United States may be classified as follows:

Sides of prothorax not sinuate at the basal angles.............. **quercus**
Sides of prothorax more or less sinuate at the basal angles.
  Last joint of the antennal club strongly transverse.
    Elytral striæ very fine, not at all impressed; punctures fine.................. .... **oregonensis**
    Elytral striæ coarse, distinctly impressed; punctures very coarse.. **depressus**
  Last joint of club nearly as long as wide.
    Elytral intervals unequal in width, coarsely, closely and unevenly punctate; elytra moderately convex....... **Agassii**
    Elytral intervals equal in width, very minutely, sparsely and sub-serially punctate; elytra strongly convex....**californicus**

ADDITIONAL NOTES.

I.

Among the many extraordinary errors made by Dr. Horn in his recent synonymical list (Ent. Amer. I, p. 108), there is perhaps none so remarkable as that relating to a species which was described by me under the name *Notoxus delicatus*, and which is there stated to be a synonym of *N. Pilati* Laf. *N. monodon* Fabr., of which *N. Pilati* is considered a variety, is, as well known, a single-banded species, the band crossing the elytra slightly behind the middle and being produced forward for a short distance along the suture. The principal distinguishing feature of the variety *N. Pilati* is, according to La Ferté's description, which is before me, the disintegration of this single band into three spots, one sutural and two transversely elongated lateral spots. Again, one of the chief reasons influencing La Ferté in its separation, is the fact that it is a local form, being only found on the small Island of Galveston, in the Gulf of Mexico and off the coast of Texas. On the other hand *N. delicatus* is not a single-banded species in any sense, but has two distinct and entire transverse bands, the anterior one being in advance of the position occupied by the single band of *monodon*, and the second between this and the elytral apices. In other words the style or general character of the maculation is of such an entirely different order, that we cannot imagine any mutation from one to the other; *N. delicatus* is also much smaller than *N. monodon*, or its variety *Pilati*.

Another singular error is that concerning *Eumicrus punctatus* of the Scydmænidæ, which, according to Dr. Horn, is synonymous with *Cholerus Zimmermanni* Schaum. I have before me the original description of Schaum of his *Scydmænus Zimmermanni*, and quote the following passages with their equivalents from the description of *E. punctatus* (Cont. II, p. 86):

S. Zimmermanni Schaum.—Thorax latitudine longior, ante basin utrinque obsolete bifoveolatus. Coleoptera in medio thorace dimidio latiora, tota crebre subtiliter punctata. Long. $\frac{7}{8}$ lin.

Carolina.

E. punctatus Casey. — (Prothorax); disk not foveate along the base but narrowly and feebly eroded Elytra widest in the middle, where they are nearly twice as wide as the latter (pronotum), coarsely, rather strongly and somewhat densely punctate. Length, 1.4 mm.

Michigan.

It will be readily seen that *E. punctatus* is a more robust species than the one described by Schaum, and that the elytral punctuation is probably much finer in the latter; the length, $\frac{7}{8}$ of a line, is also somewhat greater than 1.4 mill. In *E. punctatus* there are no basal foveæ as in *E. vestalis* and *Cholerus Zimmermanni*, but instead a feebly and irregularly eroded line extending across the pronotum, parallel to and very near the basal margin. These differences alone are sufficient proof that the two species are different and show most conclusively, either that the specimen with which Dr. Horn compared my type was not the true *Zimmermanni* of Schaum, or that the comparison was very hastily made.

The most positive proof of the mutual distinctness of these species, however, is found in the antennal structure. In *E. punctatus* the antennæ are strongly geniculate, precisely as in *E. vestalis*, while as *S. Zimmermanni* has been placed in Cholerus Thom., characterized by its straight antennæ, it is to be presumed that these organs are at least not strongly geniculate in that species.

There are many errors similar to these in the synonymical list referred to, which will be corrected at a future time; probably more than two-thirds of the synonyms proposed are incorrect, and will appear most obviously so to those taking sufficient interest to compare the original descriptions; a few of these are noted in the present paper under the genus Actidium.

II.

The word genus, in the present state of entomological science, scarcely admits of a satisfactory definition, but in general terms may be stated to be an aggregate of species possessing in common a character, or a certain assemblage of characters, considered by its author to be of sufficient stability and persistence to distinguish it as an isolated group. I say "considered by its author," because it is this individuality in the opinion of specialists on the one hand, and our imperfect knowledge of nature on the other, which prevent the assignment of a definite weight or value to the characters which have been adopted in the separation of genera as they at present exist; these in many cases have been founded upon comparatively trivial characters, and more or less on the score of convenience. In fact when the Coleoptera have been exhaustively collected, it will probably be found that all genera are more or less arbitrary divisions, as species must in many cases be discovered with intermediate characters, of whatever nature these may be, showing a gradual progression from one to another. In short, that there is no such thing in nature as a rigorously limited aggregate of species, is, I believe, a widely accepted opinion; therefore all genera must be more or less artificial and instituted primarily in order to secure a natural and systematic arrangement and succession of the species, and incidentally to enable these to be easily identified.

If this be granted there can, in the opinion of the writer, be no valid reason for the rejection of the genus Hemistenus Mots. (Areus Cas.). This is surely an instance where a division on the score of convenience is greatly to be desired, and is at the same time fairly warrantable from structural considerations. That there are a few forms which are intermediate and as it were connecting links between the genera Stenus and Hemistenus, is, as above indicated, no more than must be expected, and even with these intermediate forms (which, however, are not very evident in the American fauna), the two genera are apparently much more definite than a multitude of those which already exist, and which are considered well established, especially many of the Harpalinide genera.

III.

In the table given on page 285 of the present paper the species designated *Homalium fucicola* should be read *H. algarum*, under which name it has been described on page 316. The name *fucicola* has been employed by Kraatz for an Icelandic species which, although placed by Gemminger and Harold as a synonym of the Swedish *læviusculum* Gyll., may nevertheless prove to be a distinct species.

IV.

Polyphylla marginata is not described at present, further investigation being deemed necessary to establish its validity.

EXPLANATION OF THE PLATE.

Fig. 1—*Colusa eximia* Cas.
Fig. 2—*Pontomalota opaca* Lec.
2 a—Maxilla and maxillary palpus.
2 b—Ligula and labial palpus.
2 c—Mesosternal process.
Fig. 3—*Platyusa sonomæ* Cas.
3 a—Maxilla and maxillary palpus.
3 b—Ligula and labial palpus.
3 c—Mesosternal process.
Fig. 4—*Bryonomus canescens* Mann.—Maxilla and maxillary palpus.
4 a—Labial palpus.
Fig. 5—*Cafius* (*Remus*) *decipiens* Lec.—Maxilla and maxillary palpus.
5 a—Labial palpus.
Fig 6—*Phucobius simulator* Sharp—Maxilla and maxillary palpus.
6 a—Labial palpus.
Fig. 7—*Orus punctatus* Cas.—Pronotum.
7 a—Maxilla and maxillary palpus.
7 b—Ligula and labial palpus.
7 c—Antenna and right mandible.*
Fig. 8—*Actidium robustulum* Cas.
Fig. 9—*Actidium granulosum* Cas.
Fig. 10—*Actidium attenuatum* Cas.
Fig. 11—*Euscaphurus saltator* Cas.—Head and antenna.
11 a—Maxillary palpus.
11 b—Labial palpus.

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*The left mandible has not been examined.

A NEW GENUS OF RANUNCULACEÆ.

BY EDWARD LEE GREENE.

KUMLIENIA.

Sepals 5, oval or oblong, white-petaloid, deciduous. Petals 5, consisting of a minute, oval, fleshy, nectariferous-pitted lamina raised on a slender claw. Stamens indefinite; anthers white, round-oval, obtuse, a half line long, on slender filaments of a line and a half. Carpels capitate, lanceolate, 3 lines long, thin-membranaceous, pilose pubescent, brown, marginless, but with sutural lines, and lateral, parallel veinlets, the cross-section narrow-rhombic: style short, very slender, uncinate-recurved at apex. Seed ascending, a half line long, narrowly oblong, acutish at each end, not at all compressed, dark brown, with microscopic striæ, in maturity detached and slipping freely from end to end of the utricular pod.

A glabrous, acaulescent perennial, with round-reniform, crenately, 5-lobed, long-petioled leaves, and slender, reclining, 1—2-flowered scapes, inhabiting moist rocks in the Yosemite Valley and other similar localities of the Sierra Nevada of California.

K. hystricula.—*Ranunculus* (*Aphanostemma*) *hystriculus*, Gray. Proc. Am. Acad. vii. 328; Brewer & Watson, Bot. Cal., i. 6.

If there is anything in the general appearance of the plant here described which suggests affinity with the genus to which the authorities above named have referred it, it must be the outline of the carpels; and these do indeed somewhat faintly recall those of the section *Ceratocephalus*, but not *Aphanostemma*, in which latter section they are not different from those of *Ranunculus* proper. But, in all Ranunculi, of whatever group or section, the fruit is a compressed

Issued January 6, 1886.

akene; that is to say, the seed is more or less flattened, and in close contact throughout with the wall of the cartilaginous pericarp. In *Kumlienia* the carpel is perfectly utricular. The seed is terete, and nowhere touches the wall of the thin, bladdery pericarp; and the genus is not only most clearly distinct from *Ranunculus*, but its place is next to *Trautvetteria*, the fruit-character of which is almost the same.

I gladly dedicate this very characteristic plant of our Sierras to Prof. Thure Ludwig Kumlien, A. M., formerly Professor of Natural History at Albion, Wisconsin, a learned and zealous naturalist, and my first instructor in the science of botany.

BLACK TRANSITS OF JUPITER'S SATELLITES III AND IV.

BY PROF. GEO. DAVIDSON.

At the meeting of March 3d, 1884, the President called attention to the observation of the black transit of the III and IV Satellites of Jupiter, made by Messrs. Burckhalter and Hill, and himself. The paper was accompanied by his drawings to exhibit the phenomena.

The first observation was upon the transit of the III Satellite, and its shadow over the disk of the planet, on the 15th of January, at 9 hr. 01 m., local mean time, by Professor Davidson. It is illustrated in Fig. 1, wherein the small dark disk is the shadow of the satellite with the partially dark image of the satellite itself three or four diameters to the right. The figure gives the appearance of the planet, etc., as seen with the inverting eye-piece.

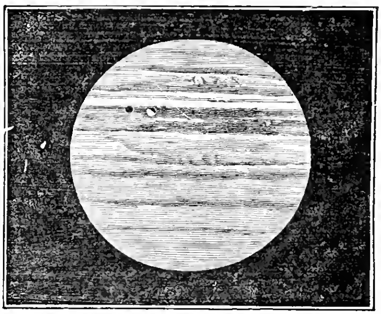


FIG. 1—Jan. 15, 1884—Jupiter at 17h. 11m. G. M. T.

When it was examined with powers of 120 to 150 diameters, the image of the satellite itself showed nearly as dark as the shadow, but not quite so large. After making the first drawing, the atmosphere was steady enough to admit using 255 diameters. This was 12 minutes later, and then the satellite was seen as a circle with a segment of two-thirds of the disk bright white, and the other segment of one-third the disk dark or black. Upon again testing with the 120 power, the same effect was revealed. The two were moving along, and upon the dark brown-red belt, which has been persistent on Jupiter for some time, and yet they were very markedly black. The shadow was like a drop of ink. The satellite preceded the shadow about 22 minutes of time. The observations were made with the 6.4 inch Equatorial of the Davidson Observatory. (Clark Objective.)

The President then read two short memoranda furnished by Messrs. Hill and Burckhalter upon their observations of the black transit of the IV Satellite on the 24th of February. The observation of Mr. Charles B. Hill was made at the Davidson Observatory, and that of Mr. Charles Burckhalter at his observatory in Oakland, and therefore they are independent observations of the same phenomenon.

Mr. Hill reports:—"On turning the equatorial on Jupiter about eleven and one-half hours I was surprised to see what was apparently the jet-black shadow of one of the satellites. On looking it up in the Ephemeris to see what satellite it could belong to, I found that the only phenomenon in progress was the transit of IV, the shadow of which should not come on until 15h. 43m., or four hours later, so that this was evidently a "black transit" occurrence. The "seeing" was only moderately good, and as the edges of the planet were not sharp, I concluded there would be no use in waiting to observe the time of egress; so after making a sketch of the planet, I closed the observatory and left at 11:50. On the way down I reflected that it might possibly be the shadow, owing to some erratum in the Ephemeris, and that it would be curious to see whether it would emerge as a satellite or a shadow. I returned, and on getting Jupiter in the field (about 12h. 10m.) could not at first see the supposed shadow at all, but it was finally made out as a *dusky* spot, only, very near the edge. As before mentioned, the atmosphere was not very good, only permitting the use of the 150 power on the 6.4-inch Equatorial; but I observed the egress as closely as possible, using my watch, *slow* of L. M. T. by comparison with mean time chronometer No. 5038=0m. 07s., viz.:

I. Internal contact appeared to take place, 12h. 13m.
II. First white excrescence visible, 12h. 16.7m.
III. Satellite probably tangent to limb, 12h. 21.8m.
IV. Satellite certainly clear of limb, 12h. 23.6m.
V. Satellite one diameter clear of limb, 12h. 30m. to 12h. 31m.

Hence, the egress apparently took place at 15h. 23.5m., Washington M. T., the almanac time being 15h. 23m."

Mr. Hill has furnished the drawing for figure 2, to illustrate his observation. It is a reproduction of the original in the note-book.

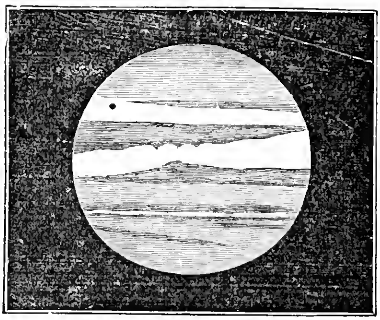


Fig. 2—Feb. 24, 1884—Jupiter at 19h. 54m. G. M. T.

Mr. Burckhalter writes:—" Last night I observed the transit of Jupiter's Satellite IV; the first contact was about two minutes later than the almanac time, and the satellite was about eight minutes getting completely on the planet's disk. The air was very steady and definition good. The satellite entered the white portion just south of the great dark red belt.

I observed the satellite for about five minutes after the internal contact, and saw nothing unusual, but on the contrary could only see the bright satellite on the white belt with difficulty. At the almanac time of II oc. dis. (8 hr. 53 m. L. M. T.) Mr. Wm. H. Lowden took the instrument to observe the phenomenon, and he at once announced that there was a shadow of a satellite on the planet. Thinking he must be mistaken, I again looked and found, as he had said, a black spot "as black as a drop of ink," and I then noticed that this spot occupied about the position of the satellite then in transit. I then thought I must have made an error, but on referring to the Ephemeris, I found that no shadow could be on at that time, and that consequently it must be the fourth satellite projected on the disk as a black spot instead of the usual bead of light. This phenomenon so occupied our attention that the oc. dis. was allowed to pass unnoticed. Thereafter we watched the spot at intervals for nearly an hour, during which time it remained absolutely black."

It will be noticed that Mr. Burckhalter observed the satellite enter as a white disk on the body of the planet, and that it was subsequently seen black. He observed with a $10\frac{1}{2}$ inch Brashear reflector, but does not report the magnifying power used, and has furnished no drawings.

The *President* then referred to the earlier notices of these or similar phenomena.

THE DARK TRANSIT OF JUPITER'S SATELLITE IV.

BY PROF. GEORGE DAVIDSON.

[Meeting of June, 1885.]

The President said that he had transcribed from the memoranda of Mr. Charles Burckhalter, of Oakland, his observations of the transit of the IV Satellite on the 21st of May, made with his $10\frac{1}{2}$ inch reflector, equatorially mounted:

"At 7h. 25m. I commenced observing, and was astonished at the faint appearance of the satellite, which was then about 15″ from the limb of Jupiter. The first eye-piece applied was a Huyghenian magnifying 215 diameters, and using the full aperture of the reflector. A Ramsden of about 90 diameters gave nearly the same result, but the faintness was more decided; and with a power of 640 the satellite was scarcely visible.

"The atmosphere was much disturbed and therefore the definition was blurred. Satellite IV gave about one-fourth as much light as Satellite I, and was insignificant as compared with III. I especially noted that Satellite IV had a brownish color, something I had never noticed before.

"At 8h. 05m. and 8h. 25m. I made similar observations with similar results, using powers from 90 to 320 diameters. The only change was in the growing faintness of the satellite, which was then about one-half the magnitude of a faint star 4′ from the north, following limb of Jupiter.

"Numerous observations to 9h. 10m. showed the decreasing light of the satellite, when it became an ash or gray color, and the satellite—now shorn of its rays—appeared decidedly elongated in the direction of Jupiter's equator. The length was apparently twice the breadth, and while I have little faith in this proportion, on account of the disturbed condition of our atmosphere, I am positive about the elongation of the satellite's disk. But the most notable phenomenon was the smallness of the satellite, appearing one-third the size of Satellite I, when in the same position near the planet's limb.

"The unsteadiness of the atmosphere prevented an accurate noting of the time of contact of the limb of the satellite with the limb of the planet, and my time may easily be one or two minutes in error.

"The satellite entered on the planet's disk at the upper edge of the dark equatorial belt of the northern hemisphere. At about 9h. 25m. the second or inner contact of the two limbs occurred, and I carefully and anxiously watched for the possible dark appearance of the satellite.

"In five minutes after the second contact, I caught glimpses of the satellite as a *white spot*, after which it was invisible, but at 9h. 35m. it was recovered as a dusky spot, but not at all dark. Making allowance for the brightness of Jupiter, the satellite might be called *dark gray* in color, but it was quite easily followed, although the definition was much blurred from increasing unsteadiness of the atmosphere.

"Leaving the telescope at 9h. 40m. the observer returned at 10h. and found the satellite as a *black spot*, but apparently two-thirds smaller than before the transit."

From recollection the observer thinks that it was not so black as the transit observed in February, 1884, but as it was in the present case within the dark belt at the equator, this may have detracted from its apparent blackness.

The President said: This observation suggests the possibility that the satellite has an area of white surface (say at one or both of the poles) and a remaining larger area of dark surface. When the satellite approached the planet the white area was the visible part; but when it was well in, on the body of the planet, this white part was lost in the superior brightness of the planet, but the dark area became visible; and the intermediate phases are accounted for on this supposition. It is a very great pity the satellite was was not watched throughout the whole transit to detect its phases to the end. It might even lead to the determination of the rotation period of the satellite.

TRANSIT OF JUPITER'S IV SATELLITE. June 7, 1885.

[Abstract by Prof. GEORGE DAVIDSON of notes of observation by Charles Burckhalter at his Observatory, Oakland. Instrument, 10½-inch Brashear reflector].

The first observation was at 7h. 20m. local mean time, when the satellite was seen at once as a dark spot on the edge of the north dark belt; about four-fifths of the diameter across the disk of Jupiter. Power of eye-piece, 215 diameters. Atmosphere too much disturbed for higher powers; definition somewhat fair, but generally unsteady. The satellite exhibited no elongation, although watched for. It was particularly noticed that the north hemisphere of the satellite was apparently the darker. At 8h. 00m. the image was less dark, and it appeared only half its natural size. At 8h. 10m. the image was fainter, but in five minutes the steadiness of the atmosphere improved, and the satellite was distinctly visible but not very sharply defined. It gradually got fainter as it entered the blurred limb of the planet. Before egress, and for some minutes after predicted time of egress, the satellite was invisible; when it reappeared it was as a bright spot or projection outside the limb of Jupiter. Atmosphere too disturbed to judge of the elongation of the image of the satellite.

At 9h. 04m., the satellite being off the planet's limb, the the observer particularly noted that the satellite was north of the north dark belt; so that it would appear as if the satellite is divided into bright and dark areas, *the south pole being the dark one.*

The satellite was barely visible and exceedingly small, and when clear of the planet's disk it was about one-sixth of the brightness of Satellite II. It gradually grew brighter, and at 9h. 15m. it was about one-third as bright as Satellite II.

TRANSIT OF JUPITER'S IV SATELLITE, Sunday, June 7, 1885.

[Abstract of note by Prof. GEORGE DAVIDSON. The observations were made at the Davidson Observatory, with the 6.4 inches Equatorial; objective by Alvan Clark & Sons.]

Just after sunset the telescope was pointed to Jupiter, and instantly my eye caught the small *black* spot on Jupiter's disk near the apparent eastern edge, and going off. In the bright twilight the belt of Jupiter was not strongly marked, but when more attention was given to it the black spot was seen traversing along the apparent lower edge of the belt where it was relatively dark; it was probably one-fourth of its diameter on the belt; the area of the other three-fourths was on the bright body of the planet. The image of the planet was very much disturbed by the unsteadiness of our atmosphere, and it would not bear a power of 300 or 250 diameters. A power of 120 diameters gave the best results. The local mean time of the first observation was 7h. 28m. The satellite was watched continuously, and presented the same black image; and at momentary intervals it was sharply defined. Occasionally I think it is elongated in the line of the belt (7h. 40m. to 7h. 50m.), but I cannot be positive of its persistence, because such an appearance might be due to the atmospheric waves of disturbance. At 7h. 50m. the belt appeared darker in the decreasing twilight and the satellite jet black, approaching the planet's limb. At 8h. 00m. it was difficult to make out the satellite even when the atmosphere was somewhat steady for a moment or two. But three minutes later the image was a very black sharp point. The atmosphere was quiet for a short time and there was no doubt about its color. The image soon began to lose its color, nor did the belt appear so dark as before. When the satellite was about one diameter from the planet's limb (at 8h. 19m.) it was *very difficult* to detect the image even at the best moments; but when it had approached within half a diameter of the limb it was again seen as a dark spot. Gradually it was lost to Mr. Hill and myself.

It was next seen (8h. 30m.) as a minute button of light, projecting outside the limb of the planet; but the atmosphere was very unsteady, and the moments of partial quiet were very short. When the satellite was leaving the planet and had become tangent to its limb (8h. 41m.), it *appeared lower* than the prolonged line of its passage as a dark image would have indicated; as if the dark image were nearer the equatorial line of Jupiter and the bright image toward the pole. Had I suspected such a result I should have prepared instrumental tests to determine that.

When the bright image of the satellite was clear of the planet (8h. 44.5m.) it was not one-sixth as bright as Satellite II, which was near for comparison; yet the brightness of the planet must prevent an accurate judgment. Mr. Hill thought it only one-tenth as bright as II.

At times the image seemed a little above (apparently) the line of the lower edge of the belt projected, but the atmosphere was very unsteady.

At 9h. 01m. I had a good view. The Satellite IV was only one-sixth as bright as Satellite II; and I feel sure that it is apparently above the line of the lower edge of the belt prolonged.

Some drawings were made of the different phases above indicated.

A reasonable inference from the foregoing observations is that the face of the satellite presented to the observer was in part dark, and in part bright. A similar property in the case of the III Satellite was clearly exhibited in my observations on January 15, 1884, when the bright and dark spots of the image were visible at the same time projected on the disk of the planet.

"Sporadic" Meteors Recorded During 1882. Davidson Observatory.

Date, 1882.	Local M. T.	* Magnitude	Color.	Duration	Appearance and Duration of Train.	Course of Meteor Among the Stars, and Remarks.
March 7th.....	7h, 15m.	2	....	s	None.	From β Cancri to α Leonis; path irregular.
April 20th......	10h, 24m, 51s.	> Jupiter.	....	1¾	None.	From point between Corona and β and γ Serpentis slowly towards N.E. Several other faint ones radiated from nearly same point within next few minutes.
May 17th	8h, 52m.	> Jupiter.	bluish-wh.	¾	None.	Caught sight of at about alt. 40°, az. 270° (due east), Apparently had started from near α Lyrae. Dropped sparks like rocket.
June 9th.......	11h.	= Sirius.	bluish-wh.	Seen	with very rapid gla	nce falling from point beneath triangle of Leo.
July 5th........	9h, 47.	= Venus.	bluish.	0.4	None.	
July 7th........	10, 15.	> 1st.	red.	1¼	Reddish streak lasting until meteor disappeared.	Moved in a line parallel to one drawn from α Urs. Min. to α Urs. Maj., and about 5° below.
August 3d.....	11h, 03m.	= Jupiter.	....	....	Short streak.	Seen through arc of 5° dropping from alt. 35°, az. 250°.
			Meteors se	*en from*	*Camp on Mt. Tamal*	*pois*, 1882.
August 30th....	9h, 48m, 10s.	1	....	1½	None.	Seen through slit in transit ho. at alt. 40° moving to S. S. E.
September 4th..	8h, 33m.	Several Grew	times brigh rapidly brig	ter than hter, an	Venus; seen to mo d disappeared behi	ve slowly from centre Perseus to N. point of horizon. nd one of the tents. Very brilliant.

Numerous small meteors noticed July 14th, August 3d, July 24th, August 7th, 8th and 10th. On this last date saw 19 or 20 meteors during a 15 or 20 min. walk at about 14¼ hr. They were all seen in and about Cygnus, shooting towards east point of horizon. All sharp and short. One cluster of 5 in rapid succession at 14h, 15m. One of them = 1st mag, others all ft., and average duration ⅓ second. No close watch kept, and many probably missed.—Obsv. C. B. Hill.

Observations of the "Pons-Brooks" Comet,

Made during 1883 and 1884, with the Filar-Micrometer, on the 6.4 inch Equatorial of the Davidson Observatory, San Francisco. Lat. N. 37°47′24″; Long. W. 8 hr. 09 min. 42.6 s.

Date, 1883.	Observer.	Local Mean Time.	✱ — Comet. Obsd. dif. uncorctd. △ A.R.	△ N.P.D.	Comparisons.	Comparison Star. Letter.	Estm. Magn.	Name, if identified.
		h. m. s.	m. s.	′ ″				
Dec. 12	D.	8 29 42.5	−0 45.47	−0 21.5	3	a	8½	Radcliffe, 4 '80.
14	D.	8 15 48	— 04.66	+0 04.4	7	b	10½	Arg. +40° : 3888, 9.1 mag.
		8 37 30	— 10.32	−0 28.2	11	b	10½	do,
		8 51 26	— 13.86	−0 46.1	5	b	10½	do.
16	D.	7 59 46	— 36 60	−3 09 5	12	c	....	Anon.
		8 21 30	+ 08.61	−0 44.8	11	d	....	Anon.
18	D.	8 25 16	— 39.16	+2 18.4	5	e	11	Arg. +38° : 3954, 9.0 mag.
		8 35 16.5	−0 42.04	+1 59.5	5	e	11	do.
20	H.	7 36 49	−1 24.18	−3 44.3	6	f	....	Arg. +36° : 4065, 8.6 mag.
22	D.	7 57 38	+0 04.20	+0 00.0	1	g	10	+34° : 4117, 8.9 mag.
		8 06 17	+ 11.53	+0 18.5	9	h	10½	+34° : 4119, 9.5 mag.
		8 24 12	— 03 90	−1 05.3	9	g	10	+34° : 4117, 8.9 mag.
26	D.	8 06 19.5	— 42.77	−4 00.0	6	i	10	+30° : 4335, 9.4 mag.
		8 18 00.5	−0 46.37	−4 34.1	6	i	10	do.
27	H.	7 10 56	−2 21.60	−7 44.4	18-6	j	....	Yarnall, 9281.
	H.	7 35 15	−0 08.48	+0 09.6	6	k	....	Arg. +29° : 4362, 9.3 mag.
	D.	8 03 08½	−0 16.60	−1 21.1	14	k	....	do.
28	H.	6 26 10	−2 01.78	−2 58.7	18-6	l	8-9	Arg. +27° : 4049, 8.2 mag.
29	D.	7 57 03	−0 14.46	−0 58.7	5	m	9	+26° : 4186, 9.4 mag.
		8 01 26.5	— 16.15	−1 14.2	4	m	9	do.
		8 30 50	— 38.00	−1 20.7	6	n	9	+26° : 4184, 9.4 mag.
		8 43 29	−0 41.72	−2 07.0	4	n	9	do.
1884.								
Jan. 3	D.	8 08 30	+0 16.02	−1 05.0	5	o	10	Arg. +18° : 4934, 9.5 mag.
		8 13 00	14.44	−1 24.5	5	o	10	do.
		8 17 23.5	13.46	−1 42.8	5	o	10	do.
9	H.	7 07 21.5	09.98	−1 14.2	5	p	8½	Arg. +7° : 4932, 8.7 mag.
	H.	7 12 04.5	08.68	−1 37.0	4	p	....	do.
	D.	7 23 26	05 70	−2 32.2	4	p	....	do.
	D.	7 28 18	04.27	−2 55.1	7	p	....	do.
	D.	7 33 24	+0 02.93	−3 19.4	7	p	....	do.
10	D.	8 15 38.5	−1 14.30	+1 17.9	4	q	....	Arg. +5° : 5104, 9.5 mag.
		8 26 21	−1 16.76	+0 27.8	5	q	....	do.
11	D.	8 01 58.5	−0 22.20	−2 43.4	4	r	....	Arg. +3° : 4812, 9.4 mag.
24	D.	6 20 47	−1 46.71	−0 16.4	21-7	s	....	Wash. M. C. Zones 206, No. 36.
	D.	6 36 02 5	−1 49.43	−1 11.4	6-2	s	....	No. 36.
	D.	6 36 02.5	+1 25.45	−2 20.9	6-2	t	....	No. 39.
	H.	6 47 45.5	−1 51.57	−1 54.9	6-2	s	....	No. 36.
	H.	6 47 45.5	+1 23.36	−3 05.0	6-2	t	....	No. 39.
25	D.	6 49 59.5	+2 56.07	+1 08.6	15-5	u	7	Wash. M. T, Zones 198, No. 34.

Notes to Comparison Stars.

(j.) Pos. 1883.0: α = 21h. 9m. 10.22s.; N. P. D. = 60° 34′ 56.8″ from A. N., No. 2591.
(l.) Pos. 1883.0: α = 21h. 16m. 29.78s.; N. P. D. = 61° 55′ 44.5″ from A. N., No. 2572.
(p.) Pos. 1884.0: α = 22h. 43m. 07.57s.; N. P. D. = 82° 04′ 10.0″ from Grant, No. 1870.
(s.) Pos. 1884.0: α = 0h. 02m. 37.97s.; N. P. D. = 108° 13′ 16.5″ from A. N., No. 2591.
The ✱ is Lalande, No. 47,332.
(u.) The ✱ is Lalande, No. 257.

Observers: D., Prof. George Davidson; H., Chas. B. Hill.
(The observations are not corrected for parallax and differential refraction.)

Phenomena of the

Observed at the Davidson Observatory, San Francisco, Cal.,

No.	Date, 1884.	Satellite and Phenom.	Phase of Phenom.	Observer.	Telescope. Aper.	Telescope. Diam.	Chronometer.	Corr'n to Chron.
								m. s.
1	Feb'y 24	IV Tr. Egr.	Int. Cont.	C. B. H.	6.4	150	(Watch.)	+0 07.2
			Ext.	"	do.		"	do.
2	28	I Tr. In.	Ext.	G. D.	6.4	—	Sid. 3479.	+0 29.5
			Int.	"	do.		"	do.
3	29	I Ec. Re.	First seen.	C. B. H.	do.		"	+0 30.6
			Full br.	"	do.		"	do.
4	March 4	IV Ec. Re.	First seen.	"	do.		M. 7, 5038.	+1 24.2
5	4	II Sh. In.	Ext. Cont.	G. D.	do.		"	24.3
			Int. "	"	do.		"	24.3
6	4	II Tr. Eg.	Ext. "	"	do.		"	+1 24.4
7	11	II Tr. In.	Ext. "	"	6.4	150	Sid. 3479.	+0 43.7
			Int. "	"	do.		"	do.
8	11	II Sh. In.	Ext. "	"	do.		"	+0 43.8
			Int. "	"	do.		"	do.
9	11	II Tr. Eg.	Int. "	"	do.		"	+0 43.9
			Ext. "	"	do.		"	do.
10	15	I Sh. In.	Ext. "	"	do.		"	+0 51.4
			Int. "	"	do.		"	do.
11	15	I Tr. Egr.	Int. "	"	do.		"	+0 51.5
			Ext. "	"	do.		"	do.
12	15	I Sh. Egr.	Int. "	"	do.		"	+0 51.6
			Ext. "	"	do.		"	do.
13	22	I Sh. In.	Ext. "	"	6.4	120	"	+1 01.4
			Int. "	"	do.		"	do.
14	22	I Sh. Egr.	Int. "	"	6.4	150	"	+1 01.5
			Ext. "	"	do.		"	do.
15	23	I Ec. Re.	First seen.	C. B. H.	6.4	120	"	+0 03.9
			Brt. as III.	"	do.		"	do.
16	23	III Ec. dis.	First dark.	"	do.		"	do.
			Last seen.	"	do.		"	do.
17	23	III Ec. re.	First "	"	do.		"	+0 04.3
			Full br.	"	do.		"	do.
18	29	IV Sh, Egr.	Int. cont.	G. D.	6.4	150	"	+0 19.2
19	29	I Sh In.	" "	C. B. H.	6.4	{120 200}	"	+0 19.5
20	29	I Tr. Egr.	" "	"	do.		(Watch.)	—7 17
			Ext. "	"	do.		"	—7 17

Satellites of Jupiter.

during the year 1884. λ = 3*h* 01*m* 30.50*s*, W. of Wash.

Chron. Time as Noted.	True Local *Mean* Solar Time.	Prediction by Amer. Eph.	Apparent Corr'n to A. E.	Remarks, Etc.
h. m. s.	*h. m. s.*	*h. m. s.*	*s.*	
12 13±	12 13 07			Seeing only moderately good. A "*Black Transit*" of IV c. f. "Sidereal Messenger," May, 1884.
12 21.8±	12 21 55	12 21.5		
5 58 22	7 25 24.3	7 25 5		Seeing very bad; second observation better than first.
6 05 25	7 32 26.2			
6 22 18.5	7 45 22.1	7 45 39.2	—17.2	Possibly a little late.
6 25.8	7 49 12			Guess only.
6 06 15±	6 07 39.2	6 05 10.6	——	Too much daylight and clouds passing; obsv. probably useless.
7 17 24.5	7 18 48.8	7 18.5		Good; *decidedly on* 26 secs. later; assistant marking time.
7 20 06.2	7 21 30.5			Good; assistant marking time.
8 14 02.5	8 15 26.9	8 16.5		Good; *decidedly off* 25 secs. later; assistant marking time.
7 05 35	7 45 29.6	7 47.5		Atmos. uns.; impossible to tell within 10 secs.
7 09 54	7 49 47.9			Same remark.
9 15 40	9 55 13.4	9 55.5		
9 19 00	9 58 32.8			
9 55 25	10 34 52.0	10 41.5		
10 00 31	10 39 57.1			
6 13 20	6 37 47.2	6 37.5		Atmos. unst.; notch certain 30 secs. later.
6 16 10	6 40 36.7			
7 22 00	7 46 16.0	7 50.5		Edge of Jupiter vy. unst., and not nearly so brt. as Sat.
7 26 20	7 50 35.2			Well separated 30 secs. later.
8 26 45	8 50 50.5	8 57.5		Moderately unsteady.
8 30 52.5	8 54 57.3			Time recorded "bet. 50*s* and 55*s*" = 52.5*s* mean.
8 36 45	8 33 27.3	8 32.5		Atmos. in very bad condition.
8 40 30	8 37 11.7			Objects to-night all very unsteady.
9 42 05	9 38 36.8	9 41.5		
9 46 30	9 43 01.0			
8 08 09.0	8 00 02.8	8 00 16.0	—13.2	Atmos. mod. st.; definition good.
8 10 24	8 02 18.0			
8 19 20	8 11 12.0			
8 24 48.0	8 16 39.0	8 14 00.6	+158.4	Sparkle *lingered very* long time, time of final dis. ± 02*s*.
11 51 51.0	11 43 08.5	11 43 05.8	+02.7	Fairly well caught.
11 56 40	11 48 00.0			
8 20±	7 48 31	8 24.5		Time estimated from glimpses; clouds passing.
11 03 12	10 31 12	10 27.5		Atmos. moderately unst. Sky clear.
11 36.5	11 29 12			Seeing much worse, occasionally good definition; time checked by estimates,
12 40.9	11 33 36	11 33.5		

Observers—G. D. = Prof. Geo. Davidson.
C. B. H. = Chas. B. Hill.

Occultations of Stars

Observed at the Davidson Observatory, San Francisco.

No,	Date. 1884.		Star.	Estimated Magnitude.	Phase.	Observer.	Telescope Aper.	Telescope Pow'r	Chronom't'r
							ins.	diams.	
1	January	9.	m. Tauri.	5½	Im.	C. B. H.	6.4	120	Sid. 3479.
2	February	7.	A. + 17° : 1409.	....	"	"	6.4	120	"
3	"	29	A. + 9° : 199.	....	"	"	6.4	120	"
4	"	29.	Weisse I 600.	....	"	"	6.4	120	"
5	March	6.	Yarnall 3062.	8-8½	"	G. D.	6.4	120	"
6	"	10.	Piazzi X 241.	....	"	"	6.4	120	"
7	"	10.	p^3 Leonis.	...	"	"	6.4	120	"
8	April	1.	A. + 18° : 1178.	8-7	"	"	6.4	120	"
			do.	....	"	C. B. H.	3.0	105	M. T. 5038.
9	"	1.	A. + 18° : 1179.	9	"	G. D.	6.4	120	Sid. 3479.
			do.	....	"	C. B. H.	3.0	105	M. T. 5038.
10	"	1.	A. + 17° : 1214.	7	"	G. D.	6.4	120	Sid. 3479.
			do.	....	"	C. B. H.	3.0	105	M. T. 5038.
11	"	2.	λ Geminorum.	4	"	"	6.4	120	Sid. 3479.
12	"	28.	anon.	9½	"	"	6.4	90	M. T. 5038.
13	"	28.	anon.	8½-9	"	"	6.4	90	"
14	"	28.	anon.	9	"	"	6.4	90	"
15	"	28.	anon.	9	"	"	6.4	90	"
16	"	28.	A. + 18° : 1069.	....	"	"	6.4	90	"
17	"	29.	A. + 15° : 1263.	? 6	"	"	6.4	90	Sid'l 194.
18	May	1.	60 Cancri.	6	"	(Visitor)	6.4	....	M. T. 5038.
18	November	22.	Anon ✱ $20h, 025m; -15°.7$.	8 ?	"	C. B. H.	6.4	90	"

by the Moon.

Cal., during the year 1884.

φ = 38° 47′ 24″, 1 N.
λ = 8*h* 09*m* 42.52*s*, W. of Gr.
= 3*h* 01*m* 30.5*s*, W. of W.

Chronometer Time as Recorded.			Corr'n. to Chron.		Local Time of Observation. Mean Time.			Sider'l Time.			Remarks.
h.	*m.*	*s.*	*m.*	*s.*	*h.*	*m.*	*s.*	*h.*	*m.*	*s.*	
1	22	36.3	—0	06.17	6	06	23.65	1	22	30.13	Good.
4	06	34.8	—0	14.80	6	55	45.30	4	06	20.00	Chron. corr'n not perfect; ± 0.5 s.
5	24	13.2	+0	30.57	6	47	26.27	5	24	43.77	Good observation.
6	47	22.3 ± 1.0 s.	+0	30.63	8	10	21.80	16	47	52.93	Moon and ✱ very low; missed other ✱, which is Weisse I. 598.
6	47	42.6	+0	37.75	7	47	13.70	16	48	20.35	
9	34	17.2	+0	41.90	10	17	41.53	9	34	59.10	Very nearly full moon, ✱'s disappear very few seconds of arc from bright limb.
10	02	45.7	+0	41.93	10	46	05.39	10	03	27.63	
8	28	02.7	+0	23.74	7	44	49.84	8	28	26.44	Not *absolutely* instantaneous.
7	42	41.8	+2	08.03	7	44	49.83	8	28	26.43	Good.
8	29	26.1	+0	23 74	7	46	13.01	8	29	49.84	
7	44	06.5 ?	+2	08 03	7	46	14.53	8	29	51.36	Too faint, *very* doubtful.
9	08	41.4	+0	23.79	8	25	21.93	9	09	05.19	
8	23	13.9	+2	07.97	8	25	21.87	9	09	05.13	Good,
7	57	51.8	+0	25.40	7	58	17.20	7	10	49.64	Sharp; through clouds.
8	09	47.5 ± 0.5 s.	+3	08.00	8	12	55.50	10	43	03.64	✱ got very blurred.
8	15	25.4	+3	08.00	8	18	33.40	10	48	42.46	Good.
8	37	12.5	+3	08.00	8	40	20.50	11	10	33.14	Nthn, one of 2 ✱'s about 5′ apart.
8	38	11.8	+3	08.00	8	41	19.80	11	11	32.60	Sthn. " " "
9	08	46.3	+3	08.00	9	11	54.30	11	42	12.13	
11	19	23.85	+0	35.92	8	45	49.67	11	19	59.77	Sharp atmos. unst.
8	48	15.5	+3	15.50	8	51	31.00	11	33	35.14	C. B. H. mk. time, &c.
7	39	56.3	+5	20.65	7	45	16.95	23	55	23.88	Near N. horn—✱ gave warning by loss of lt., and tr. about 1½ secs. previous.

Observers:—G. D. = Prof. George Davidson.
C. B. H. = Chas. B. Hill.

THE TEMPERATURE OF THE WATER OF THE GOLDEN GATE.

BY GEORGE DAVIDSON.

At the tidal station of the U. S. Coast and Geodetic Survey at Fort Point on the south shore of the Golden Gate, and at Sausalito on the north shore, where it was subsequently located, the observer notes the temperature of the air and water several times each day. A tabulation of the temperature of the surface water and of the air has been made for the seven o'clock morning observations from the daily record of the ten years extending from January, 1874, to December, 1883. This condensed table shows that the lowest temperature of the water is for the month of January, 50°.49 Fahr., and the highest for the month of September, 59°.68 Fahr.; and thus the average range is only nine degrees. The lowest monthly temperature observed was January, 1883, when it reached 47°.9, and the highest in August, 1880, 61°.1. The highest range in January was 53°.9 in 1878; and the lowest in September was 57°.9 in 1874.

The temperature of the air follows very closely that of the water, being 47°.8 for January, and 58°.8 for September; but the month for the highest temperature was June, being 60°.3. The tables, however, clearly indicate in detail the great uniformity of the temperature of the water off this part of the coast, and of the air within fifteen feet of the surface of the water.

To further show the regularity of the daily change of the temperature of the water through a month, a second tabulation is made for the month of January for a period of eleven years, from 1873 to 1883, inclusive. The increase through the month is quite small but uniform.

It is this uniformity of temperature of the sea water along the Pacific Coast, and its low temperature, which conspire with the northwest winds of summer to give the peculiar foggy conditions which prevail.

Abstract of the Daily Temperature of the Water and Air in the Golden Gate.

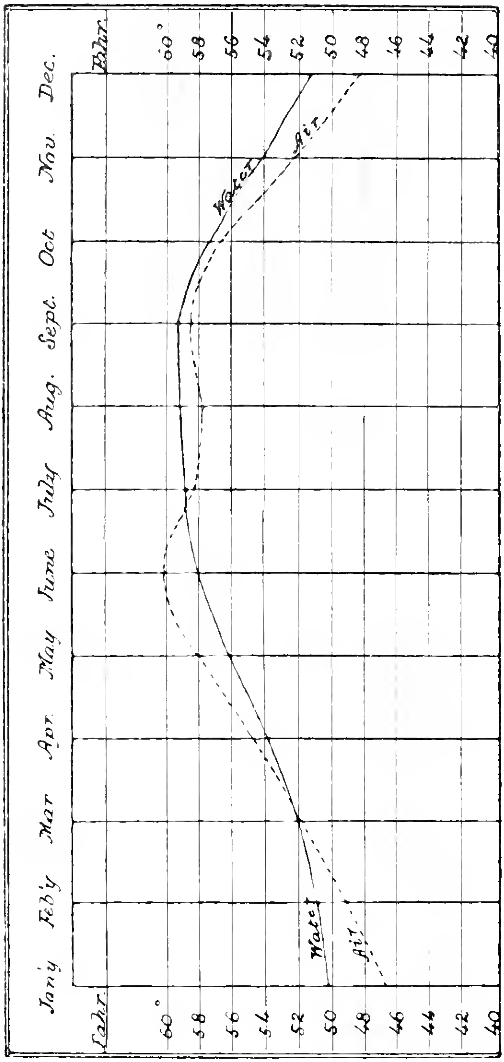
(Observations made at 7 A. M.)

TEMPERATURE OF THE WATER, FAHR.°

YEAR.	Jan.	Feb.	March.	April.	May.	June,	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Means.	W.—A.
	°	°	°	°	°	°	°	°	°	°	°	°	°	°
1874	49.7	49.5	50.2	52.3	55.7	57.0	55.6	57.0	57.9	57.5	55.5	52.2	54.18	+0.30
1875	48.9	50.3	49.6	51.4	54.9	56.2	59.2	59.4	59.8	58.7		51.5	54.66	+0.28
1876	50.2	50.8	52.3	53.4	55.7	56.5	58.6	57.6	59.4	57.9	56.5	52.8	55.15	+0.42
1877	51.7	54.9	56.0	54.4	55.9	58.8	60.0	60.1	60.0	57.8	55.6	54.2	56.62	+1.19
1878	53.9	53.9	55.5	57.3	57.3	58.6	58.3	58.7	60.4	58.9	56.7	52.2	56.81	+1.12
1879	49.7	52.6	55.4	56.6	56.6	58.4	58.9	59.9	60.8	59.2	54.9	51.4	56.19	—0.26
1880	49.2	49.0	50.4	53.6	57.2	58.8	59.5	61.1	60.4	58.2	54.5	52.5	55.37	+1.44
1881	53.6	54.1	53.9	57.4	58.8	59.4	59.4	59.5	59.1	56.6	51.7	51.0	56.28	+1.00
1882	50.1	49.4	51.5	54.3	56.7	59.4	60.5	59.9	59.6	56.1	51.9	50.1	54.96	+1.69
1883	47.9	45.4	50.1	52.0	55.7	60.4	58.7	59.1	59.4	57.2	54.6	50.5	54.26	+1.00
Monthly Means	50.49	50.99	52.49	54.28	56.46	58.35	58.88	59.23	59.68	57.83	54.66	51.94	55.45	
W.—A.	+3.60	+1.78	+0.51	—0.44	—1.87	—1.92	+0.10	+1.23	+0.82	+0.53	+2.26	+3.35	+0.82	+0.82

TEMPERATURE OF THE AIR, FAHR.°

YEAR.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Yearly Means.
1874	46.7	46.5	49.2	55.7	58.9	58.9	56.3	55.3	59.1	57.9	54.7	47.4	53.88
1875	46.8	49.4	51.5	54.0	58.2	58.7	58.5	56.6	57.0	59.0	55.3	49.5	54.38
1876	45.8	49.0	51.8	54.9	57.9	60.4	58.1	57.7	60.2	57.4	53.9	49.7	54.73
1877	50.6	55.1	55.2	54.3	55.8	62.8	59.5	57.7	58.4	54.8	51.4	48.4	55.43
1878	49.5	51.2	53.8	55.1	59.9	60.7	59.5	59.7	58.2	58.9	53.6	48.2	55.69
1879	47.1	52.7	55.2	57.6	58.7	61.1	59.7	60.8	61.7	62.1	53.9	46.8	56.45
1880	44.5	45.6	49.6	53.3	59.8	60.2	59.7	58.6	56.8	56.8	50.0	52.2	53.93
1881	50.3	52.5	52.7	57.2	58.7	59.1	60.7	58.0	58.8	55.3	51.4	48.7	55.28
1882	45.4	46.2	49.8	51.4	57.7	58.6	59.0	58.0	58.0	56.0	49.9	49.3	53.27
1883	42.2	43.9	51.0	53.7	56.7	62.2	58.8	57.6	60.4	54.8	49.9	45.7	53.08
Monthly Means	46.89	49.21	51.98	54.72	58.33	60.27	58.78	58.00	58.86	57.50	52.40	48.59	54.61



Temperatures of the WATER and the AIR in the Golden Gate at 7 A. M. for ten years 1874 – 83

Abstract of DAILY TEMPERATURE of the WATER Each Day of the Month of January, Mean of Eleven Years, 1873 to 1883.

From 1873 to 1883 Inclusive.	Mean of Daily Temp. Fahr°.
January 1	51.1
" 2	51.0
" 3	50.9
" 4	50.9
" 5	51.0
" 6	50 9
" 7	51.1
" 8	50.8
" 9	50.9
" 10	50.4
" 11	50.5
" 12	50.0
" 13	49.9
" 14	50.1
" 15	50.2
" 16	50.6
" 17	50.7
" 18	50.5
" 19	50.3
" 20	50.2
" 21	50.5
" 22	50.0
" 23	50.3
" 24	50.7
" 25	50.5
" 26	50.5
" 27	50.5
" 28	50.2
" 29	50.5
" 30	50.5
" 31	50.5
Mean.	50.54

MINERALOGICAL CONTRIBUTIONS.

BY A. WENDELL JACKSON.

(With Four Plates.)

I desire in the present paper to add some observations to those already published (see Bull. Cal. Acad. Sci., No. 2. Jan. 1885) on the morphology of Colemanite, and to refer briefly to California occurrences of Pyrite, Albite, Vivianite, and Azurite.

Colemanite.

I wish first to correct an error contained in my former paper as to the locality whence the material which formed the basis for the investigations recorded in the above mentioned Bulletin, was obtained. It appears that for several years after the original discovery of the Colemanite deposits, all knowledge of the discovery was, for commercial reasons, kept from publication. The mineral was discovered first in Death Valley, Inyo County, California, by R. Neuschwander, in Oct., 1882, and not till April, 1883, were the more extensive deposits discovered by some prospectors in Calico District, San Bernardino County, California.

The observations published in Bulletin No. II of the Proceedings of this Academy, were made on material which came from the Calico District deposits, and not from Death Valley, as therein stated.*

Since the publication of Bulletin No. II, Mr. Coleman has placed in my hands some crystallized Colemanite from Death Valley, which is in part quite similar to the Colemanite from Calico District, and in part entirely dissimilar in habit.

Before speaking of these latter, however, I wish to add something to the descriptions hastily recorded in Appendix II of my former paper.

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* The following corrections should also be made in the paper referred to: On page 26, the value of ρ for b (— P) should be 61° 35′ 12″ instead of 31° 38′ 20″. On Plate II, Fig. 5 a, the projection of the edge $b : a$ should not be parallel to $a : d$ as represented, but should be parallel to $a : x$. The edge is correctly drawn in Fig. 4 a.

Fig. 1, Plate I, represents *en face* the crystal upon which G (—7 P) was observed. On the same crystal, an extremely minute triangular face C is also observable in the angle of *b*, *σ*, and *n*. Reflections could be obtained from it only with the lens thrown in front of the telescope of the goniometer, and even then it was found desirable to remove the signal and illuminate directly from the strong lamp-flame. In this way it seemed clear that the face lay in or very close to the zone *n*. *b*. *c*.; six readings varied from 87° 5′ to 87° 59′, the mean being 87° 33′. With this reading and 49° 45′ obtained from *b*, the symbol was calculated to be — $\frac{21}{2}$ P̄ 10. The observed angles of C to the other faces in the zone *b* . *c*, agree almost exactly with the calculated values, regarding C = — $\frac{21}{2}$ P̄ 10. Considering, however, the inevitable error in taking readings after such a fashion from so minute a face, I would prefer to adopt provisionally the simpler symbol — 10 P̄ 10, until further more exact observations become possible. The face is considerably enlarged in the drawing.

Figs. 2 and 2a represent a front view, and Fig. 3 a side view of a crystal previously described* with the face W (3 P̄ ∞) largely developed. This crystal was broken from a large geode completely lined with similar forms. It is the only specimen among those from Calico District that presents crystals upon which even a trace of W is to be observed. It will be seen later that this face is the most important one on nearly all the Death Valley specimens recently examined. It is possible that a mistake has been made concerning the locality of the geode, and that it really comes from Death Valley.

Fig. 4, Pl. I, shows *en face* an interesting combination of faces, thus far observed on but a single medium sized columnar fragment from a large geode. There are present *g* (o P), *b* (— P), *k* (— 3 P̄ 3), *s* (∞ P), *t* (∞ P̄ 2), *n* (∞ P̄ ∞), *λ* (— 2 P̄ ∞), and the three new faces D, *Φ*, and *p*. The faces *g*, *b*, *s*, and *k* are all in good condition. The two faces of *k* (— 3 P̄ 3) have attained a size and brilliancy observed on no other crystal. From faultless reflections, the angle *k* : *k* was found equal to 157° 53′ 18″ (calculated 158° 0′ 24″). *λ* (— 2 P̄ ∞) and *n* (∞ P̄ ∞) are very small but brilliant, while *t*, D, *Φ*, and *p* are so minute and

* l. c. p. 32.

roughened that trustworthy measurements could not be obtained from them. ϕ lies plainly in the zone $k : n$, which with the approximate angle $k : \phi = 162° 58'$ would determine the symbol of ϕ to be — $\frac{19}{3}$ Ᵽ $\frac{19}{3}$. An attempt to determine other zonal relations with the goniometer was not very satisfactory. It seemed as though ϕ might be in the zone k (to the right) : t (to the left) which with the well marked zone $k : n$ would make ϕ = — 7 Ᵽ 7. Which of these two symbols is correct can be settled only by observation on a better developed crystal. I have provisionally entered the trace of ϕ in the linear projection Pl. III, as — 7 Ᵽ 7.

D (Fig. 4) is in the zone k (— 3 Ᵽ 3) : s (∞ P), and a very careful adjustment on the goniometer shows that it is probably also in the zone k (to the right) : t (to the right). These two zones lead to D = — 7 Ᵽ $\frac{7}{3}$. This also needs confirmation however.

About the minute face p, nothing definite, nor even approximate can be recorded, except that it lies in neither of the zones $s : \phi$ and $k : t$. It is a — m Ᵽ n with both m and n very large.

From the Death Valley locality, I have had an opportunity for studying seven specimens. All were from crystal cavities, the walls of which were thickly lined with crystals resting on massive Colemanite. Three distinct habits are represented: a short columnar with very complex terminal development (Figs. 5 and 5ᵃ), short columnar with pronounced rhombic terminal development (Figs. 6 and 6ᵃ), and thin to very delicate tabular (Figs. 7 and 7ᵃ).

Fig. 5 represents *en profil* the most highly modified crystal thus far observed, presenting no fewer than twenty-three forms, viz: s (∞ P), y (P), d (2 Ᵽ 2), v (2 P), c (Ᵽ ∞), a (2 Ᵽ ∞), b (— P), h (2 Ᵽ ∞), t (∞ Ᵽ 2), z (∞ Ᵽ 2), ω (— 3 Ᵽ 3), U (6 Ᵽ ∞), o (2 Ᵽ 2), g (o P), r ($\frac{3}{2}$ Ᵽ $\frac{3}{2}$), x (3 Ᵽ 3), T (4 Ᵽ ∞), Q (4 Ᵽ 2), σ (— 3 P), ε (3 Ᵽ $\frac{3}{2}$), e (— 2 Ᵽ 2), and m (∞ Ᵽ ∞). m is so minute as to be scarcely discernible on the acute orthodiagonal extremity. (I have omitted it from the figure.) e (— 2 Ᵽ 2) is a new form, observed only on the crystals of this specimen, sometimes on the edge b (— P) : ω (— 3 Ᵽ 3) and sometimes on c (Ᵽ ∞) : s (∞ P). The zones of these two edges determine its symbol. The crystal from which Fig. 5 was drawn is about 20 mm. across the orthodiagonal, perfectly clear and colorless, with a brilliant, nearly adamatine lustre. It is one of about forty, closely aggregated together on a thin slab about the size of the palm of the hand. The beauty of the specimen can easily be imagined.

Fig. 6, *en profil*, represents the very strikingly rhombic habit which the crystals of Colemanite may sometimes assume. Attention was called to the possibility of such a development in my former paper (note l. c. p. 7), and the crystals on one specimen from Death Valley realize it perfectly. Very minute traces of *b* (— P), *g* (*o* P), *ω* (— 3 Ᵽ 3), *r* ($\frac{3}{2}$ Ᵽ $\frac{3}{2}$), *v* (2 P), and *h* (2 Ᵽ ∞) can also be seen on these crystals, but too small to be represented on a drawing of the scale of Fig. 6.

$$c : a = 161^\circ\ 28\tfrac{1}{2}'$$
$$d : y = 161^\circ\ 30'$$

Fig. 7, *en profil*, and 7ª is from another crystal on the same specimen, with the clinodome *c* (Ᵽ ∞) so small as to be hardly discernible.

Figs. 8, *en face*, and 8ª in horizontal projection, represent the tabular habit which prevails on five of the seven specimens I have studied, from Death Valley. The tables are all implanted by one end, and either closely aggregated in parallel position over considerable areas, or with their longer dimensions radiating from a common centre in the form of large, more or less globular concretions (one of these was over 100 mm. in diameter), or again the crystals may be irregularly implanted.

The combination of W (3 Ᵽ ∞), U (6 Ᵽ ∞), *s* (∞` P), and *θ* (3 Ᵽ 3) largely developed, with small faces of *h* (2 Ᵽ ∞), *g* (*o* P), *d* (2 Ᵽ 2), *o* (2 Ᵽ 2), *y* (P), and *b* (— P), represented *en face* in Fig. 8, in horizontal projection in Fig. 8ª, is seen on these tables when they are well crystallized; but often the faces W, U, *s*, and *θ* are run into one slightly curved surface, the faces on the edge of the table become very minute or disappear entirely, and one thenhas delicate rhombic tables mainly parallel to W (3 Ᵽ ∞).

On Plate III, I have reproduced the linear projection of the Colemanite forms given in my former publication, and have added the traces of the new forms mentioned in the preceding pages, viz: *e* (— 2 P 2), C (— 10 P 10 ?), *Φ* (— 7 P 7 ?), and D (— 7 P $\frac{7}{3}$?).

COMBINATIONS.

I subjoin a list of the combinations that I have thus far observed on colemanite crystals, arranging the symbols of the simple forms in each combination in the order of their relative importance on the crystal.

From Calico District.

(1.) *s. g. h. v. b. a. c. y, d. t. n. i. o. k. m.*
(2.) *s. c. b. y. g. a. x. v. d. o. h. n. t. z. ω. m. ε. r.*
(3.) *s. a. v. y. c. b. h. d, o. n. t. g. θ. λ.* U. *i. m.*
(4.) *s. c. b. g. y. a. v. o. d. h. x. t. n. m. z. ω. ε. θ. u.* U. B. *r.*
(5.) *s. g. h. b. a. y. t. o. d. λ. e.*
(6.) *s. d. y. a. v. t. b. e. ω. g. σ. n.* U. *ε.*
(7.) *s. d. y. c. ω. v. b. t. z. m.* U. *ε. g. r. a.*
(8.) *s. c. v. b. d. t. a. y. z. m. g. ε. n. ω.*
(9.) *s. v. d. ω. b. c. a. y. i. h. t. ε. r.* T. U. *n. o.*
(10.) *s. g. h c. a. o. y. i. v. d. b*
(11.) *s. a. e. v. y. b. d. σ. t. z. n. ε. ω. g.*
(12.) *s. c. a. v. y. b. t. z. g. h. θ. d. o. r. ω.*
(13.) *s. g. h. c. a. v. t. n. d. b. k. y.*
(14.) *s. a. v. g. h. b. y. d. z. c. i. ε. x.* U. Q.
(15.) *s. v. a. d. y. ε. r. x. ω.* P.
(16.) *s. g. c. b. y. d. v. a. t. o.* B.
(17.) Fragment with *s. a. v. c. b. d. x. ε. m. z.* H. J.
(18.) *s. c. a. b. d. t. n. k.*
(19.) *s. a. v. d. t. z. m. b. y. x. ε. ω.*
(20.) *s. y. c. o. b. a. v. n .t. ε. k. λ.* V. *ρ.*
(21.) *s. t. n. v. o. h. d. y. γ. w.*
(22.) *s. c. a. o. v. h. b. d. y. i. g. t. k. λ.*
(23.) Fragment with *s. b. k. n. t.* D. *Φ. p.*
(24.) Fragment with *s. c. v. b. h. n. g. t.* G. *σ.* C.
(25.) *s.* W. *h. θ. c. y. d. o. v. g. m.*

From Death Valley.

(26.) *s. b. c. y. a. v. d. h. o.* ω. Q. ε. *z. t.* γ. *x.* σ. Ψ. U. *e. g. r. m.*
(27.) *s. c. y. d. a. b. g.* ω. *r. v. h.*
(28.) W. U. *s.* θ. *h. d. o. y. g. b.*

My former paper on the morphology of colemanite was read at the California Academy of Sciences on the evening of October 6th, 1884. An abstract was printed in the *Mining and Scientific Press*, of San Francisco, October 18th, 1884. On account of delay in engraving the plates and printing, copies of Bulletin No. II of the Cal. Acad. of Sci. were not received for distribution till early in January, 1885.

On the 17th of October, 1884, Prof. Th. Hiortdahl presented in the Vidensk.-Selsk. in Christiania, the results of his examination of some colemanite received from the Cal. State Mining Bureau.

Hiortdahl's axis ratio is:

$$\grave{a} : \bar{b} : \acute{c} = 0.7747 : 1 : 0.5418$$
$$\beta = 110^\circ\ 13'$$

and the combination forms determined by him were twenty in number, all of which are included in my original paper. Hiortdahl's analysis gave him boracic acid 47.64, lime 27.97, water 22.79, silica 1.28, ferric oxide and alumina 0.19, magnesia 0.13, leading him to the formula $Ca_3\ B_8\ O_{15} + 7\ H_2\ O$. This differs somewhat from the formula set up by Mr. Evans, but the cause of the difference evidently lies in the impurity of the material which Hiortdahl had at his disposal.

From the *Verhandlungen des Natur-historichen Vereins des preussichen Rheinlands und Westfalens* for 1884, (published at Bonn in 1885,) I copy the results of the chemical and optical investigation of colemanite by Prof. Gerhard vom Rath and Dr. C. Bodewig. The crystallographic results obtained by vom Rath were communicated to the writer in a letter under date of October 17th, 1884, and were added as Appendix II to my former paper on colemanite.

Dr. Bodewig found by analysis = *A*; and calculated from the formulæ $Ca_2\ B_6\ O_{11} + 5H_2O$ = B.

	A	*B*
Boracic acid.............	49.70	50.91
Lime	27.42	27.22
Water..................	22.26	21.87
	99.38	100.00

His results confirm consequently those already published by Mr. Evans.

Vom Rath's optical investigation found the plane of the optical axes to be normal to the plane of symmetry, making an angle of $27° 35'$ with the edge $c : m$, and an angle of $82° 42'$, for Na-yellow, with the vertical axis $\dot{c}$, lying in the obtuse angle of the morphological axes. [The writer found this angle to be $83° 25'$, with ordinary light. *Mining and Scientific Press*, l. c.]

Through cleavage lamellae parallel to m, one can apparently observe optical axes in oil. The angle is too great, however, to permit its determination in fatty oil. In cassia-oil the value of the obtuse angle of the optical axes was found.

$$2\ H\ o\ 122°\ 45'\ \text{for Na-yellow.}$$

The acute angle of the axes measured on a plate cut exactly at right angles to the bisectrix, was found—

$$\begin{aligned} & 2\ H\ a = 54°\ 48'\ \text{Na-yellow in cassia-oil.} \\ & 2\ E \quad = 95°\ 15'\ \text{``} \qquad \text{``} \\ \text{whence}\ & 2\ V\ a = 55°\ 20'\ \text{``} \qquad \text{``} \end{aligned}$$

The middle index of refraction = 1.5910. Dispersion $\rho > \beta$. Bisectrix positive. The dispersion of the axes is small, so that nearly the same values are obtained for red as for yellow.

In Appendix II, p. 33, Bull. Cal. Acad. of Sci., No. 2, I referred to a geode containing crystals that had commenced to undergo change, being converted in spots into a soft, dull, white substance which fully preserved, however, the form of the crystal. This substance was kindly examined for me in the Chemical Laboratory of the University of California, by Mr. Adolf Webber. 0.0212 gram. of the substance yielded 0.0198 gram. of carbonate of lime, the difference consisting of water and boracic acid. One has consequently a partial pseudomorph of calcite after colemanite, instead of pandermite after colemanite, as I had surmised.

Pyrite and Albite from Stanislaus Gold Mine, Calaveras County, California.

During the latter part of October, 1885, I received from Supt. Buckminster of the Melones Consolidated Mining Co., of San Francisco, a few small specimens from the Stanislaus Gold Mine, one of several mines in the Carson Hill Mining District, Calaveras County, California, operated by the Melones Co. The sharp observation of Mr. Buckminster had detected a few very delicate, metallic, speiss yellow needles, which he thought would be worthy of a closer examination.

With respect to the occurrence of the specimens, Mr. Buckminster writes, under date of December 13th, 1884, that they were taken "from the Stanislaus mine, one of the numerous "gold veins in the slate belt of the so-called 'Mother Lode' of "California, about 280 feet below the surface, a few more having "been later discovered eighty feet vertically under the former. "The specimens were taken from small lenticular secretions of "silica in a local layer of black talc slate near the line of its "contact with a continuous stratum of foliated talc, the slate and "talc both containing numerous embedded cubes of the pyrite."

The few small specimens in hand consist of small fragments of hard, dark gray, slaty material, thickly impregnated with pyritic granules and firmly cemented together by snowy white albite, in the drusy cavities of which the needles occur. These latter are long, delicate forms, the larger showing bright metallic luster and speiss yellow color. They vary in thickness from 0.05 mm. down to the size of the merest delicate hair-like form, and are sometimes 10 or 12 mm. in length. The needles are singly implanted on the walls of the crystal cavities, projecting freely out into the vacant central space. In one small cavity numerous extremely delicate, to the unaided eye barely visible, hair-like forms project from the walls freely across the center of the cavity; each needle carries two or three minute but perfect tabular crystals of albite pierced directly through the center of the table. The needles are at times quite straight, but more commonly gently curved, spirally twisted, or bent sharply about. Some of the larger needles split up at one end into two smaller ones, or again into long brush-like subdivisions.

One of the larger needles was detached and roasted, giving copious sulphur fumes, and leaving a reddish-brown powder that gave the characteristic iron reactions with borax and microcosmic salt on platinum wire. The needles at once call to mind the curiously distorted crystals described by Carl Vrba from Lillschacht in Przibram. [NOTE.—Zeitschrift der Krystallographie for 1880. Bd. IV. p. 357.]

The exact crystallographic nature of the needles was at first somewhat of a puzzle. I finally succeeded in finding one that promised results with the goniometer. It was mounted on the large Fuess-Babinet instrument with two telescopes, belonging to the Museum of the University, and the following readings were obtained:

a^1 214° 10′ fair; bright.
b^1 180° 30′ good; very faint.
$\underline{c}^2$ 94° 20′ good; bright.
$\underline{a}^1$ 34° 10′ good; very faint.
$\underline{d}^1$ 345° 30′ good; very faint.
$\underline{c}^1$ 333° 51′ good; bright.

The cross section of the needle was plotted in accordance with these readings with the result given greatly enlarged in Fig. 10a. It is at once seen from the above readings that a^1 and $\underline{a}^1$ are the only parallel faces on the needle. Inserting parallels to each of the other faces into the cross-section and adding to the preceding readings, the following which would have been obtained had these faces been present:

d^1 165° 30′
c^1 153° 51′
$\underline{b}^1$ 1° 0′
c^2 274° 20′

I find that the needle may be interpreted as a combination of the cube with three pentagonal dodecahedrons, one of which, c, is new, viz:

$$a = \infty O \infty \quad (100)$$

$$b = \frac{\infty O 2}{2} \pi \; (210)$$

$$c = - \frac{\infty O \frac{7}{4}}{2} \pi \; (470)$$

$$d = - \frac{\infty O \frac{8}{7}}{2} \pi \; (780)$$

The following table of observed angles taken from the above readings, and compared with the calculated, will make this evident:

	OBSERVED.	CALCULATED.
$a^1 : b^1$	....146° 20′	146° 19′
$b^1 : d^1$	....165 0	164 52
$c^1 : c^2$	....120 29	120 30
$c^2 : a^1$	....119 50	119 45
$d^1 : a^1$	....131 20	131 11
$d^1 : c^1$	....168 24	168 34

These needles furnish thus a very striking illustration of the extreme elongation of a tesseral crystal parallel to one of its chief axes, and of a failure of faces to develop; for of the sixteen faces that should have appeared in the lateral zone of the needle, but six are to be found. The ends of the crystal are both broken so that the original terminal development could not be studied.

Fig. 10 is a greatly enlarged drawing of the needle and Fig. 10^b, drawn in parallel position to Fig. 10, is the complete crystal with all of its faces as it would have developed under favoring conditions.

This needle was broken from a specimen coming from the upper level mentioned by Superintendent Buckminster. Another needle, from the lower level, was examined and found to contain three of the lateral faces of the cube, and the four lateral faces of the new dodecahedron $c = - \frac{\infty O \frac{7}{4}}{2} \pi$ (470). No traces of the other forms mentioned above are present.

Albite.

Two crystals of the albite accompanying the needles were measured, one of which is represented in Fig. 11, Pl. IV. It is a delicate colorless table parallel to $\infty P \breve{\infty}$, 1.25 mm. long, 0.75 mm. wide, and 0.25 mm. thick, twined parallel to the brachypinacoid. The hemiprismatic faces are very little developed. The following table gives the observed and calculated angles for both of the crystals measured. Crystal No. II is the one figured on Pl. IV, and presents a combination of—

M	=	$\infty P \breve{\infty}$	(010)
P	=	$0P$	(001)
v	=	$,P$	$(\bar{1}11)$
x	=	$,P,\bar{\infty}$	$(\bar{1}01)$
T	=	$\infty\, 'P$	$(1\bar{1}0)$
z	=	$\infty\, 'P3$	$(\bar{1}30)$

Crystal No. I is a similar combination with the addition of $n = 2\,'P \breve{\infty}$.

LETTERING AFTER NAUMANN-ZIRKEL.	OBSERVED ON CRYSTAL NO. I.		OBSERVED ON CRYSTAL NO. II.		LIMITS OF DIFFERENT OBSERVERS. FROM DESCLOIZEAUX.					CALCULATED. FROM DESCLOIZEAUX.	
P : M	85	35′	88	48	86°	24′	......	86°	41′	86°	24′
P′ : M′	86	30	86	37							
M : n	132	39			133	9	......	133	10	133	10
M′ : n'	133	28									
P : n	132	56			133	9	......	133	55	133	14
P′ : n'	133	2½									
P : P′	172	23	173	13½	172	36	......	172	44	172	48
M : z	149	23	149	49	148	30	......	149	38	149	38
M : T	117	37	120	13½	119	5	......	120	16	119	40
z : T	149	16			149	51	......	150	40	150	2
v : M′			120	11	120	11				119	31
x : M′			93	39	94	1				93	39
v : x			153	43	153	0				154	8

The few quartz crystals accompanying the pyrite and albite in the drusy cavities were the latest formed. They are the usual combination of prism with positive and negative primitive rhombohedrons and small rhombic faces of $\frac{1}{4}$ (2 P 2).

Pyrite from New Almaden.

In the latter part of 1884, I received from Mr. Eugene Hoefer, a former student of mine, at present mine surveyer at New Almaden, a beautiful little specimen from the recent workings of the quicksilver deposit, showing in a small cavity lined with crystallized rhombohedrons (R) of dolomite, four or five delicate speiss yellow needles quite similar to those from the Stanislaus mine, radiating from a common point beneath the dolomite crystals, piercing the latter, and projecting freely into the cavity. I had refrainedfrom breaking one of the needles until more of the material had been obtained. After studying the Stanislaus crystals, however, I detached and measured the angles on one of these needles. The cross-section was a nearly perfect hexagon. The angles showed that four of the faces belong to the new pentagonal dodecahedron $c^1 = -\frac{\infty O \frac{7}{4}}{2} \pi$ (470), while the other two were faces of the cube a. The following angles were measured:

	Observed.	Calculated.
$c^1 : c^2 = \infty O \frac{7}{4} : \infty O \frac{7}{4}$	$= 120^\circ\ 29'$	$120^\circ\ 30'$
$\underline{c}^1 : \underline{c}^2 = \infty O \frac{7}{4} : \infty O \frac{7}{4}$	$= 120\ \ 25$	
$c^1 : a^1 = \infty O \frac{7}{4} : \infty O \infty$	$= 119\ \ 49$	$119\ \ 45$
$\underline{c}^2 : a^1 = \infty O \frac{7}{4} : \infty O \infty$	$= 119\ \ 42$	

Vivianite from Camptonville, Yuba County, California.

The only locality in California from which crystallized Vivianite has been obtained, is Camptonville, Yuba County.

The University Mineralogical Museum possesses but a single specimen from this locality, collected many years ago by Mr. C. D. Voy, out of a clay stratum in the auriferous gravel at Camptonville. It is 100 mm. long and 40 mm. wide, entirely covered on one side with thick tabular vivianite crystals, the largest of which is 15 mm. long by 8 mm. wide, the smallest 5 mm. long by 2 mm. wide. The habit of the crystals is strikingly different from the Cornwall and Cransac crystals, in that all of the negative terminal forms are entirely wanting, bringing about a pronounced resemblance to a familiar gypsum form. The forms observed are: $b = \infty \mathrm{P} \infty$, parallel to which most of the crystals are tabular, $a = \infty \mathrm{P} \infty$ quite fully developed on some, $m = \infty$ P small, $v =$ P, and $w = \mathrm{P} \infty$, which are the principal end forms. In Fig. 12, Pl. IV, two other forms are represented, about which I am doubtful. u is in the zone v (P): a ($\infty \mathrm{P} \infty$), but it is so small and reflects so poorly that but a rough approximation to its true inclination to v or a can be obtained. I found $v : u = 141°$, with a possible error of several degrees. I have drawn u in the figure as 4 P 4, the inclination of which to v is 146° 56′. It is not quite clear that t is in the zone of the brachydigonal polar edge of u, although I have drawn it so, making $t = 4 \mathrm{P} \infty$.

Azurite from Diana Mine, Mono County, California.

In 1880, Mr. Stewart, a former student at the University, was at the Diana mine, when one of the miners brought up from below a fine slab of limonite, a foot and a half in length and half as wide, thickly studded on one side of delicate deep blue azurite crystals. The slab was broken before Mr. Stewart could prevent it, but one of the fragments was presented by him to the University Collection. The crystals of azurite are all very small, and grouped in cellular aggregates, or singly implanted in the massive limonite. The habit is rectangular-tabular, parallel to o P, the tables being extremely thin and elongated in the direction of the ortho-diagonal. Fig. 13, Pl. IV represents one of these tables 2.0 mm. long, 0.63 mm. wide, and 0.09 mm. thick. The combination consists of $h = o$ P (001), $a = \frac{1}{2} \mathrm{P} \infty$ ($\bar{1}02$), $f = \frac{1}{2} \mathrm{P} \infty$ (012), $p = \mathrm{P} \infty$ (011), $\mathrm{M} = \infty$ P (110), $k = -$ P (111).

The reflections from h and a were very good, so that the angle $h : a = o \mathrm{P} : \frac{1}{2} \mathrm{P} \infty = 132° 56′ 10″$, agrees closely with the calculated value, 132° 54′. The basal pinacoid is delicately striated parallel to the edge $h : f$. The other faces are so exceedingly small that their inclinations could be taken with only approximate accuracy.

		OBSERVED.	CALCULATED. (after Schrauf.)
$h : f =$	$0P : \frac{1}{2}\bar{P}\infty =$	138 47	138 40
$h : p =$	$0P : \bar{P}\infty =$	118 49	119 23
$h : h =$	$0P : -P =$	111 4	111 50
$h : M =$	$0P : \infty P =$	91 7	91 52
$k : M =$	$-P : \infty P =$	160 3	160 2

MUSEUM OF MINERALOGY,
UNIVERSITY OF CALIFORNIA, BERKELEY.
JANUARY 1, 1886.

In order to facilitate reference to Plates I, II and III, I give below a complete list of the combination forms discovered on colemanite up to the present time:

m =	∞ Ᵽ ∞ (010)	γ =	3 Ᵽ $\frac{3}{2}$ $(\bar{3}21)$
n =	∞ Ᵽ ∞ (100)	Q =	4 Ᵽ 2 $(\bar{2}41)$
g =	0 P (001)	r =	$\frac{3}{2}$ Ᵽ $\frac{3}{2}$ $(\bar{2}32)$
H =	∞ Ᵽ 3 (130)	d =	2 Ᵽ 2 $(\bar{1}21)$
J =	∞ Ᵽ $\frac{7}{3}$ (370)	e =	-2 Ᵽ 2 (121)
z =	∞ Ᵽ 2 (120)	x =	3 Ᵽ 3 $(\bar{1}31)$
P =	∞ Ᵽ $\frac{19}{10}$ $(10.19.0)$	ω =	-3 Ᵽ 3 (131)
s =	∞ P (110)	θ =	3 Ᵽ 3 $(\bar{3}11)$
t =	∞ Ᵽ 2 (210)	k =	-3 Ᵽ 3 (311)
c =	Ᵽ ∞ (011)	B =	4 Ᵽ 4 $(\bar{4}11)$
a =	2 Ᵽ ∞ (021)	D =	-7 Ᵽ $\frac{7}{3}$ (731)
y =	P $(\bar{1}11)$	w =	7 Ᵽ $\frac{7}{2}$ $(\bar{7}21)$
v =	2 P $(\bar{2}21)$	ϕ =	-7 Ᵽ 7 (711)
q =	3 P $(\bar{3}31)$	C =	-10 Ᵽ 10 $(10.1.1)$
b =	$-$ P (111)	U =	6 Ᵽ ∞ $(\bar{6}01)$
σ =	-3 P (331)	T =	4 Ᵽ ∞ $(\bar{4}01)$
$\triangle$ =	$-\frac{19}{6}$ P $(19.19.6)$	W =	3 Ᵽ ∞ $(\bar{3}01)$
G =	-7 P (771)	h =	2 Ᵽ ∞ $(\bar{2}01)$
o =	2 Ᵽ 2 $(\bar{2}11)$	i =	Ᵽ ∞ $(\bar{1}01)$
ρ =	2 Ᵽ 4 $(\bar{4}12)$	V =	$-$ Ᵽ ∞ (181)
ε =	3 Ᵽ $\frac{3}{2}$ $(\bar{2}31)$	λ =	-2 Ᵽ ∞ (201)

For Pyrite:

$a = \infty O \infty (100)$

$b = \dfrac{\infty O 2}{2} \pi (210)$

$c = -\dfrac{\infty O \frac{7}{4}}{2} \pi (470)$

$d = -\dfrac{\infty O \frac{8}{7}}{2} \pi (780)$

For Albite:

$M = \infty P \infty (010)$

$P = O P (001)$

$v = {}_{,}P (\bar{1}11)$

$x = {}_{,}P_{,} \bar{\infty} (\bar{1}01)$

$T = \infty {}'P (1\bar{1}0)$

$z = \infty {}'P 3 (\bar{1}30)$

For Vivianite:

$b = \infty P \infty (010)$

$a = \infty P \infty (100)$

$m = \infty P (110)$

$v = P (\bar{1}11)$

$w = P \infty (\bar{1}01)$

$u = 4 P 4 (\bar{4}11)$

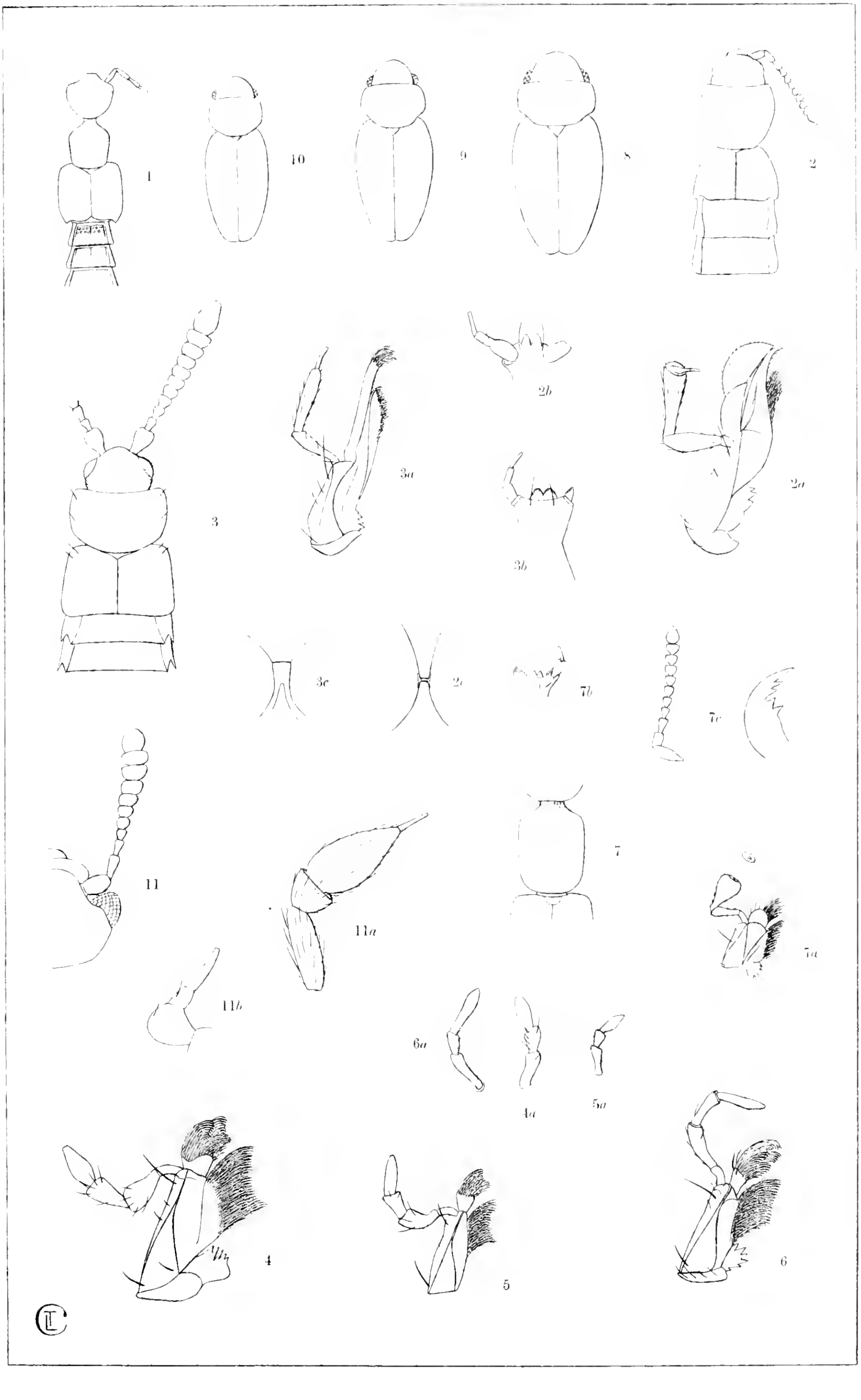
$t = 4 P \infty (\bar{4}01)$

INDEX.

Bulletin II being paged independently, references to it are marked with an asterisk.

CORRIGENDA.

PAGE.	LINE.	
10	35	hetorodoxa *should read* heterodoxa.
19	6 & S	Disporthe *should read* Diaporthe.
20	10	Dendromicon *should read* Dendromecon.
40	17	Oidum *should read* Oidium.
52	18	Agelander *should read* Argelander.
63	21	*after* appearing *supply* after.
65	23	Grate *should read* Grote.
	32	opthalmicus *should read* ophthalmicus.
134	1	Rhamus ilvicifolius *should read* Rhamnus ilicifolius.
141	21	Xylococus *should read* Xylococcus.
151	1	Stilmani *should read* Stillmani.
152	21	Astralagus *should read* Astragalus.
155	12	Astralagus *should read* Astragalus.
170	25	Gloeosporium *should read* Glaeosporium.
173	9	Loncieræ *should read* Loniceræ.
217	12	Cypressus *should read* Cupressus.
221	17	sublulata *should read* subulata.
222	23	grandiflota *should read* grandiflora.
224	17	Graphalium *should read* Gnaphalium.
227	3	Castilleria *should read* Castilleia.
248	17	limutala *should read* limatula.
254	14	Macrocyelis *should read* Macrocyclis.
258	17	varigatus *should read* variegatus.
263	2	cerealis *should read* cereale.
270	1	Gloeosporium *should read* Glæosporium.
278		Insert a dash between lines 29 and 30.
299	32	Colodera *should read* Calodera.
321	4	L. *should read* V.
327	15	Horniarum *should read* Hornianum.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2 A

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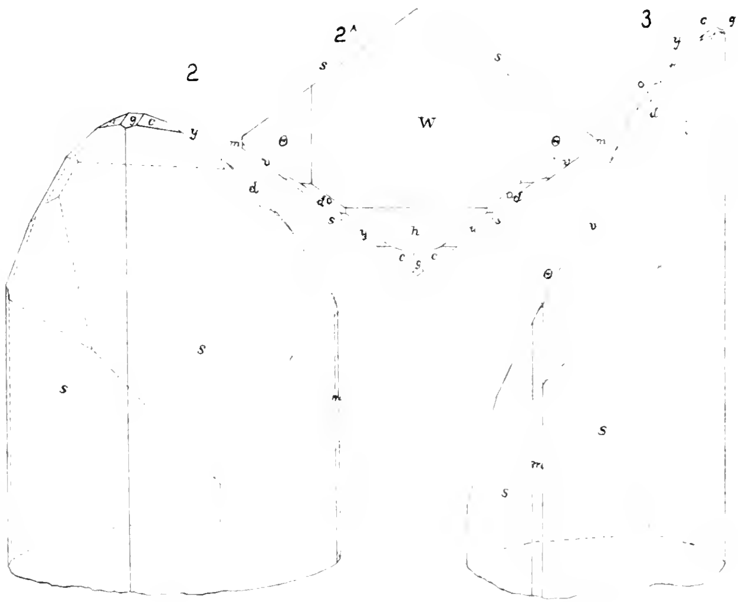

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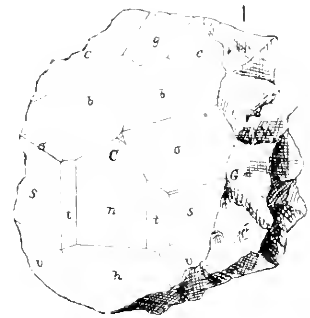

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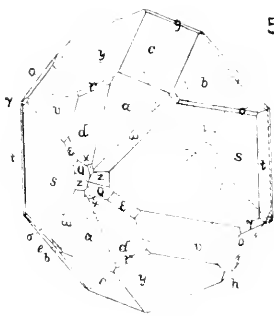

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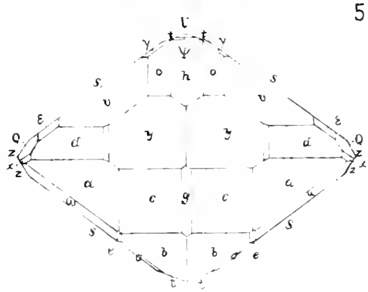

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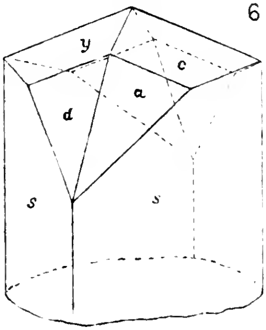
COLEMANITE

PLATE II.

6



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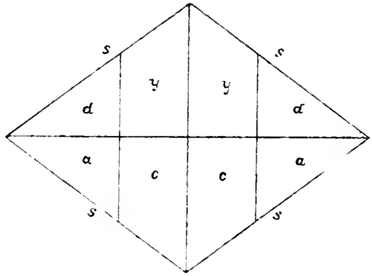

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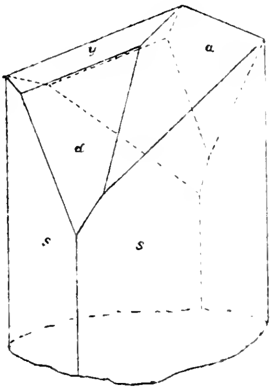

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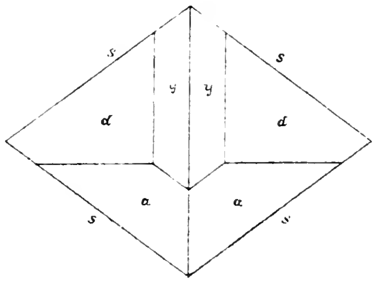

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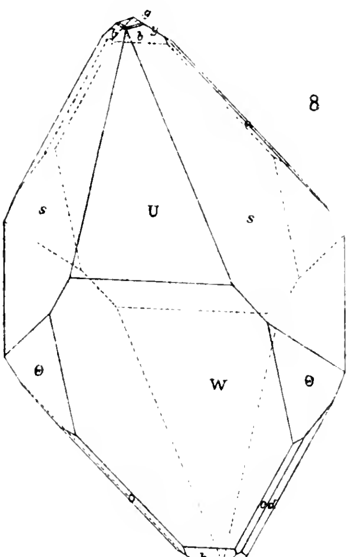

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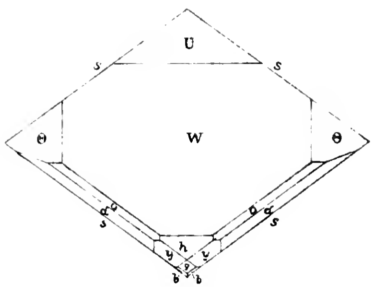

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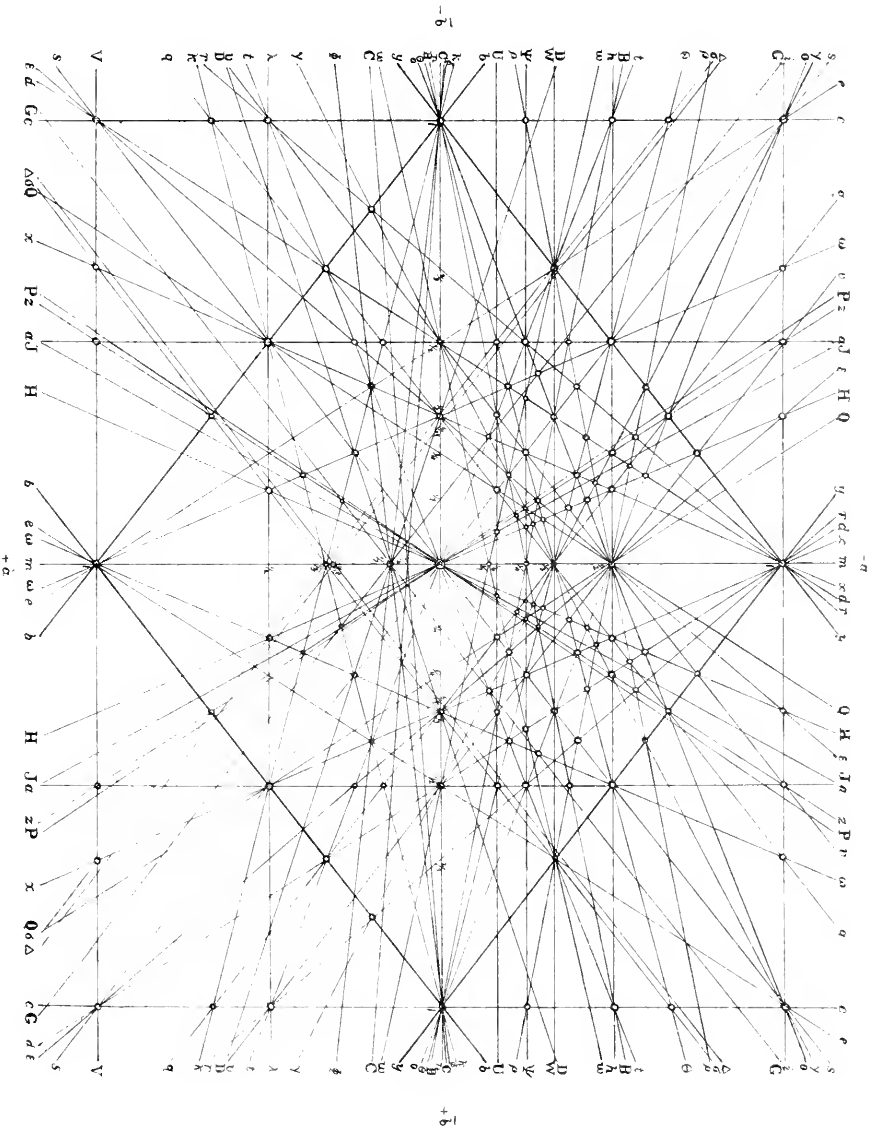
COLEMANITE — *Fig. 9* — Plate III.



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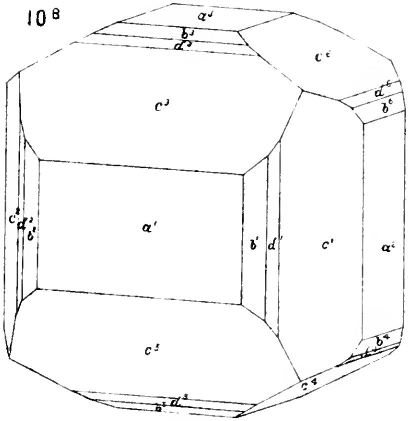
PYRITE

10 B



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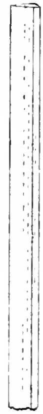

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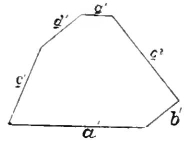
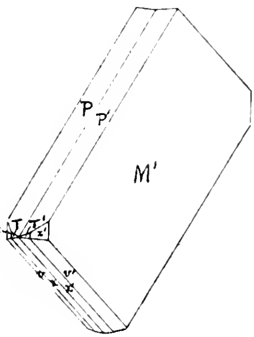


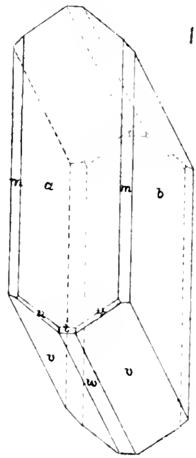
ALBITE

11



VIVIANITE

12



AZURITE

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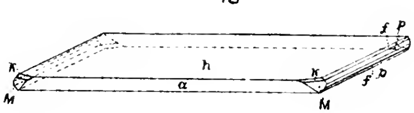

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