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I. VARIOUS SPERMATOPHYTES

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I. VARIOUS SPERMATOPHYTES

mostly from the

CAPTAIN MARSHALL FIELD EXPEDITIONS TO PERU

J. Francis Macbride

1. NOTES ON THE PERENNIAL SOUTH AMERICAN PAROSELAS

In attempting to determine the collections of Paroselas secured on the Captain Marshall Field Botanical Expeditions to Peru in 1922 and 1923 it became evident that no satisfactory results could be obtained until a synopsis was prepared of all of the known South American species. Accordingly a key was worked out, largely from descriptions, and it is here published entirely with the knowledge that it is artificial and at best merely suggestive of the possible relationship of the thirty odd species accounted for.

If it had been possible to see types of some of the earlier and meagerly described species, as well as several of those more recently proposed, or even to obtain carefully drawn diagnoses of their calyx-characters, the application of several of these names could have been made with a greater degree of certainty. However, this information did not seem to be obtainable from herbaria where presumably the types of the species concerned are deposited. Consequently it has been necessary to "reason out" the probable application of several names and, no doubt, as usual in such cases, with only a modicum of success.

Dalea leptostachya DC. Prod. ii. 246 (1825) has been omitted from the key as it seems probable that it is not South American. An outstanding characteristic would appear to be the *acuminate* leaflets. *D. enneaphylla* Willd. Sp. Pl. iii. 1338 (1800), based on *Psoralea carthagenensis* Jacq. Hist. Stirp. Am. 206 (1763), may be *P. emphysodes* (Jacq.) Rydb. in a broad sense but it also has not been placed[1]. The somewhat aberrant *P. multifoliolata* (Clos) Macbr. or *Errazurizia multifoliolata* (Clos) Johnston, Proc. Calif. Acad. Sci. ser.4, xii, 1043 (1924) of Chile is at once recognizable by its white tomentose stems and very loosely spicate

[1] *P. pilocarpa* Rusby, Mem. N. Y. Bot. Gard. vii. 261 (1927) has not been seen. It is apparently allied to *P. microphylla* or related species and, if so, seems to be unique.

inflorescence. Whether or not it is regarded as generically distinct is largely an academic matter but I am inclined to concur in Johnston's viewpoint and so have not included it.

Since European botanists continue to use the term *Dalea* for this group of plants, it seems in order to call attention to the fact that *Dalea* Gaertn. Fruct. i. 235. t.51 (1788) is the legal name for *Microdon* Choisy, Mém. Soc. Phys. Genève, ii. 2. 97 (1823) and that the *Dalea* of Linnaeus, technically published in synonymy, has no valid standing, according to Articles 37 and 38 of the International Rules, prior to 1789, when taken up by Jussieu and again, in 1799, by Ventenat. In the meantime Gaertner published his *Dalea* which, as it clearly antedates *Microdon*, must be recognized as the name for that Scrophulariaceous group. The use of *Dalea* for *Parosela* can be established only by adding it to *nomina conservandae*, as indicated by Parish, Bot. Gaz. lv. 300 (1913). In view of the fact that the majority of the species are now known as Paroselas (and, since the appearance of Rydberg's monograph, many have yet to be transferred to *Dalea*) the arbitrary establishment of the Linnaean *Dalea* would be most unfortunate. On the other hand, the conservation of *Microdon* would avoid a transfer of only three names: obviously Gaertner's well-published name ought to be permitted to supplant the much later proposed *Microdon*.

I acknowledge with appreciation loans of the South American material of this group from the U. S. National Herbarium, courtesy of Dr. Maxon, The Academy of Natural Sciences of Philadelphia, courtesy of Dr. Pennell, and the Gray Herbarium, courtesy of Dr. Robinson. Except when otherwise indicated (by initial), the specimens cited are in the herbarium of the Field Museum.

A KEY TO THE SOUTH AMERICAN PERENNIAL PAROSELAS

a. Flowers racemose, shortly pedicellate ..... *33. P. Jamesonii*
a. Flowers spicate.
  b. Spikes short, subcapitate (cf. No. 12) ..... Section I.
  b. Spikes elongate, cylindrical or ovate-cylindrical (cf. No. 16).
    c. Flowers yellow, or yellow and red, sometimes fading brown or brown-violet ..... Section II.
    c. Flowers at least in part blue or violet or rose.
      d. Leaflets broader than linear ..... Section III.
      d. Leaflets narrowly linear ..... Section IV.

SECTION I

a. Bracts obtuse to acuminate in the same head ..... 3. *P. exilis.*
a. Bracts not diverse.
  b. Calyx-teeth slender, about equalling or longer than the tube.

c. Calyx-glands more conspicuous than the pubescence; spikes mostly sessile.....1. *P. emphysodes.*
c. Calyx pubescence more noticeable than the glands; spikes more or less peduncled.
d. Leaflets pubescent.....2. *P. trichocalyx.*
d. Leaflets glabrous.....4. *P. microphylla.*
b. Calyx-teeth broad and distinctly shorter than the tube.
c. Leaflets 2-4 pairs.
d. Leaflets glabrous.....17. *P. Hofstenii.*
d. Leaflets pubescent.....12. *P. catatona.*
c. Leaflets 7-9 pairs.
d. Glabrous.....4a. *P. microphylla*, var. *brevis.*
d. Sparsely long-villous.....5. *P. vicina.*

SECTION II

a. Calyx-tube pubescent.
b. Calyx-teeth pubescent.
c. Leaves glabrous; shrubs.
d. Leaflets 6-10 pairs; spikes 1-2.5 cm. long.
e. Calyx-teeth subulate, the shortest nearly equalling the tube.....4. *P. microphylla.*
e. Calyx-teeth ovate-based, all but the lower much shorter than the tube.....4a. *P. microphylla*, var. *brevis.*
d. Leaflets 3-5 pairs; spikes elongate.....6. *P. galbina.*
c. Leaves somewhat hairy; perennial herb.....7. *P. calocalyx.*
b. Calyx-teeth glabrous.....8. *P. sulfurea.*
a. Calyx-tube glabrous.....32. *P. cylindrica.*

SECTION III

a. Leaflets densely sericeous or tomentose-villous, at least beneath.
b. Flowers showy, 9-12 mm. long.
c. Calyx-tube pubescent.
d. Calyx-teeth much shorter than the tube.
e. Leaflets white-pubescent; plants shrubby.
f. Small (3-4 mm.) Leaflets 4-7 pairs.....9. *P. Weberbaueri.*
f. Larger (6-8 mm.) Leaflets 3-4 pairs.....10. *P. sericophylla.*
e. Leaflets greenish; perennial herb.....15. *P. Pennellii.*
d. Calyx-teeth as long as the tube.....29. *P. Fieldii.*
c. Calyx-tube glabrous.
d. Leaves green at least above.....26. *P. coerulea.*
d. Leaves silvery-pubescent.....27. *P. Killipii.*
b. Flowers small, 5-6 mm. long.....11. *P. humifusa.*
a. Leaflets glabrous, or lightly pubescent, especially in youth.
b. Calyx-tube more or less hairy without.
c. Calyx-teeth broad at least at base and shorter than the tube.
d. Low and diffuse or prostrate shrubs, or perennial herbs; leaflets mostly 3-7 mm. long.
e. Flowers about 6 mm. long.
f. Leaflets and bracts pubescent.
g. Leaflets cuneate-oblong; pubescence subappressed 11. *P. humifusa.*
g. Leaflets obovate; pubescence spreading.....12. *P. catatona.*
f. Leaflets and bracts glabrous.....13. *P. peruviana.*
e. Flowers showy, 8-12 mm. long.
f. Leaflets 7-9 pairs.
g. Bracts hairy without.
h. Bracts persistent.....14. *P. boliviana.*
h. Bracts early caducous.
i. Mature leaflets pubescent; perennial herb....15. *P. Pennelli.*
i. Mature leaflets glabrous; spreading shrub.....16. *P. azurea.*
g. Bracts glabrous without.
h. Leaflets 2-3 pairs.....17. *P. Hofstenii.*
h. Leaflets 5-8 pairs.

i. Densely glandular-tuberculate shrub.....18. *P. myriadenia*
i. Moderately glandular perennial herb.....14a. *P. boliviana* var. *Herrerae.*
f. Leaflets 12-14 pairs.....21. *P. eosina.*
d. Tall (3-8 dm.) erect shrubs or half-shrubs; leaflets 6-10 mm. long (cf. 11a).
e. Calyx-teeth very short or bracts persistent.
f. Calyx-teeth subequal.....19. *P. Onobrychis.*
f. Calyx-teeth very unequal.....20. *P. pazensis.*
e. Calyx-teeth one-half as long as tube; bracts caducous....16. *P. azurea.*
c. Calyx-teeth linear-subulate or subulate-tipped, usually as long as or longer than the tube.
d. Young branches glabrous.
e. Leaflets oblong-spatulate.....22. *P. onobrychioides.*
e. Leaflets linear-oblong-cuneate.....23. *P. elegans.*
d. Young branches more or less, at least minutely, hairy.
e. Ciliate calyx-teeth lax, at least equalling the tube...24. *P. astragalina.*
e. Glabrous-pointed calyx-teeth rigid, shorter than the tube..25. *P. nova.*
b. Calyx-tube glabrous without.
c. Calyx-teeth at least as long as the tube.
d. Peduncles mostly shorter than the subtending leaves.....26. *P. coerulea.*
d. Peduncles mostly longer than the leaves.
e. Spikes in flower 2.5-3 cm. broad; leaflets mostly 1.5-2 cm. long.....28. *P. ayavacensis.*
e. Spikes in flower 1-2 cm. broad; leaflets mostly 6-10 mm. long.....24. *P. astragalina.*
c. Calyx-teeth distinctly shorter than the tube.....31. *P. cylindrica.*

SECTION IV

a. Leaflets 12-18 mm. long.....30. *P. rubricaulis.*
a. Leaflets 4-8 mm. long.....31. *P. Kuntzei.*

1. P. EMPHYSODES (Jacq.) Rydb. N. Am. Fl. xxiv. 113 (1920). *Psoralea emphysodes* Jacq. Coll. iv. 144 (1790).—Venezuela to southern Colombia, apparently Ecuador and, according to Rydberg, l.c., also in Costa Rica and Porto Rico.

The Mexican, Central American and West Indian species (as defined by Rydberg, l.c.) of the group to which *P. emphysodes* belongs are very closely related. I question the validity of some of them and I also have not been able to separate satisfactorily the evident variations or races of the South American plant. Indeed, it may not be specifically distinct from one of the earlier described Central American forms. The most diverse state occurs in Ecuador (*Hitchcock 20120*, Province of Guayas) with less glandular calyx and mostly slender-peduncled spikes. It suggests both *P. microphylla* and *P. trichocalyx* (for neither of which I have authentic material) and may be a distinct species.

2. **P. trichocalyx** (Ulbrich), comb. nov. *Dalea trichocalyx* Ulbrich, Rep. Nov. Spec. ii. 7 (1906).—PERU: near Curaz, Dept. of Ancachs, *Weberbauer 2994* (not seen); between San Bartolomé & Puente de Verrugas, Dept. of Lima, *Weberbauer 5212.*

The Field Museum specimen consists only of a small branch and may not represent Ulbrich's species, as it bears another (but unpublished)

name by the same author. It appears, however, from description not to be specifically distinct.

3. **P. exilis** (DC.), comb. nov. *Dalea exilis* DC. Prod. ii. 247 (1825). —PERU (not seen).

To judge from the original description this species resembles most *P. microphylla* or its var. *brevis*. It is at once distinct from any described species, however, by the diverse bracts. As DeCandolle emphasizes this character by repetition it can hardly be an error in observation. A further distinction from its apparent relatives is found in the glabrousness of the bracts.

4. P. MICROPHYLLA (HBK.) Rose, Contrib. U. S. Nat. Herb. x. 106 (1906). *Dalea microphylla* HBK. Nov. Gen. & Sp. vi. 482 (1823).—ECUADOR: between Loja and Portovelo, *Rose, Pachano & Rose 23350* (U.S., G.).

Although this material does not satisfy in all respects the requirements of the original description it does so essentially. Furthermore, it comes from the same general region as the type. An immature specimen from Sorata, Bolivia (*Mandon 701*) suggests this species more than any other.

4a. P. MICROPHYLLA (HBK.) Rose, var. **brevis,** var. nov., foliolis 5-9 jugis 4-7 mm. longis 2-3 mm. latis obovato-cuneatis obtusis vel mucronulatis; spicis breviter pedunculatis circa 1 cm. longis; bracteis calyce brevioribus ovato-acutis 2-2.5 mm. longis, calycis lobis ovato-acutis vix 1.5 mm. longis inferioribus paulo longioribus; tubo 2 mm. longo; floribus ut apud *P. microphyllam.*—PERU: between Shumba and Taen, Dept. of Cajamarca, April, 1912, *Weberbauer 6191* (TYPE, Field Museum); valley of the river Huancabamba near Las Huertas, Dept. of Cajamarca, May, 1915, *Weberbauer 7119.*

If *Weberbauer 7119* did not appear to conform more exactly than *6191* with the description of *P. microphylla*, I should regard the var. *brevis* as representing a new species. That it is only a variant, however, with shorter and broader calyx-lobes and shorter bracts seems probable also from the fact that both Weberbauer specimens are from the type region of *P. microphylla.*

5. **P. vicina,** spec. nov., fruticosa ut videtur 1 m. alta plus minusve; ramis gracilibus certe erecto-patentibus, apice, 3-4 furcatis, parce subadpresse pilosis et remote glanduloso-tuberculatis; foliis 1.5-2 cm. longis, 13-21 (plerumque 15)-foliolatis; foliolis subsessilibus fere ovalibus (basi subcuneatis) circa 3 mm. longis, fere 2.5 mm. latis, apice rotundatis, subtus solum punctatis vel parce pilosis supra praecipue ad marginem aliquid pubescentibus cum pilis subpatentibus infirmis; spicis subcapi-

tatis vel globosis; bracteis ovatis subabrupte caudato-acuminatis, circa 3 mm. longis calyce paulo brevioribus valde ciliatis dorso glanduloso-punctatis fere glabris; calycibus obscure et parce glandulosis, tubo villoso circa 2 mm. longo; laciniis subulatis villosis fere 2 mm. longis; floribus flavis (?) ut apud *P. microphyllam* sed solum circa 6 mm. longis; ovario villoso.—PERU: between Olleros and the valley of the Quiros, Province of Ayavaca, Dept. of Piura, May, 1912, *Weberbauer 6350* (TYPE, Field Museum).

P. vicina in many respects resembles its neighbor *P. microphylla*, but that it is not referable to the latter as described, HBK., l.c., is scarcely refutable in view of its subglobose spikes, pubescent leaves and small flowers.

6. **P. galbina,** spec. nov., fruticosa 1-1.5 m. alta erecta stricta vel remote ramosa, fere glabra; ramis subvirgatis, gracilibus, apice, circa 5-furcatis; ramulis mediocriter glanduloso-tuberculatis glabris vel infrequens parce pubescentibus cum aliquot pilis plus minusve patentibus; foliis 8-10 mm. longis, 7-11 foliolatis; foliolis oblongo-elliptico-cuneatis obtusis circa 2 mm. latis, 5 mm. longis crassiusculis utrinque punctatis, glabris; spicis oblongis vel oblongo-linearibus 4-6 cm. longis, vix 1 cm. crassis pedunculatis; pedunculo circa 2 cm. longo sub spica dense glanduloso et strigoso; bracteis subrotundatis abrupte cuspidatis dorso valde convexis dense glandulosis minute strigosis circa 3 mm. longis; calycibus villosis vel subhirsutis, tubo mediocriter glanduloso circa 2 mm. longo, laciniis subaequalibus subulatis vix 2 mm. longis e basi circa .05 mm. latis; floribus flavo-viridis, fere 1 cm. longis; carina vexillum alasque aequilongas multo excedente; vexillo circa 6 mm. longo rotundato ad basim glanduloso-punctato.—PERU: southwestern rock-outcrops, Huanuco, April 26, 1923, *Macbride 3500* (TYPE, Field Museum).

Apparently this species does not resemble closely any described *Parosela*. Probably, however, it bears some relationship to *P. microphylla*, etc. The field-notes recorded the flowers as greenish-yellow with two green spots on the lower portion of the standard. They did not fade at all to brown or violet with age.

7. **P. calocalyx** (Ulbrich), comb. nov. *Dalea calocalyx* Ulbrich, Rep. Nov. Spec. ii. 10 (1906).—PERU: region of Matucana, Huillacachi Valley, Dec. 28, 1901, *Weberbauer* (not seen).

This species appears from description to be related to the *Aureae* or *Flavae* as defined by Rydberg, N. Am. Fl. xxiv. 67 (1920) rather than to the *Tuberculatae* as suggested by the author. It may well belong to a distinct and as yet undefined group of species.

8. **P. sulfurea** (Ulbrich), comb. nov. *Dalea sulfurea* Ulbrich, Rep. Nov. Spec. ii. 5 (1906).—PERU: below San Miguel, Dept. of Cajamarca, May 5, 1904 *Weberbauer* (not seen).

Although this procumbent shrub is compared by its author to *Dalea Mutisii* Kunth, i.e. *P. coerulea* (L.f.) Macbr., the habit and the pubescent calyx-tube with very short teeth do not suggest such a relationship.

9. **P. Weberbaueri** (Ulbrich), comb. nov. *Dalea Weberbaueri* Ulbrich, Rep. Nov. Spec. ii. 9 (1906).—PERU: between Tarma and Palea, Nov. 26, 1902, *Weberbauer 1739* (not seen); near Tarma, Feb. 9, 1903, *Weberbauer 2371* (not seen); heavy stony soil of steep southwestern slope, Tarma, June 1-6, 1922, *Macbride & Featherstone 1017*.

The wings and standard of the last mentioned collection were white, turning purplish with age; the keel petals blue-purple from anthesis.

10. **P. sericophylla** (Ulbrich), comb. nov. *Dalea sericophylla* Ulbrich, Rep. Nov. Spec. ii. 7 (1906).—PERU: near Hualgayoc, Dept. of Cajamarca, May 12, 1904, *Weberbauer 4017* (not seen).

The author, l.c., does not find any near relatives for this plant but it appears to be allied to *P. tomentosa* (Cav.) Rose by virtue of the crowded spikes and other characteristics typifying that species.

11. P. HUMIFUSA (Benth.) Macbr. Contrib. Gray Herb. lxv. 23 (1922). *Dalea humifusa* Benth. Pl. Hartw. 170 (1845).—ECUADOR: *Lehman 4789* (U.S.); near San Vicente, June 6, 1876, *André 3536, 3550*; *Spruce 5033, 5840, 5866* (G); plains of Riobamba, Sept. 1864, *Jameson* (U.S.); near Quito, *Jameson 193* (G.); Quitensian Andes, 1855, *Couthouy* (G.); near Riobamba, May, 1922, *Mille 29* (U.S., G.).

This is somewhat variable in degree of pubescence, size of leaves and habit. An extreme variation may be distinguished as

11a. P. HUMIFUSA (Benth.) Macbr., var. **anatona,** var. nov., ramis suberectis elongatis 3 dm. longis; foliolis 4 mm. longis.—ECUADOR: near Riobamba, 1922, *Mille 60* (TYPE, U.S.).

12. **P. catatona,** spec. nov., fruticulosa; caulibus mediocriter numerosis flexuosis gracilibus procumbentibus 1-2 dm. longis; ramis glabris vel juventate parce pubescentibus cum pilis aliquid patentibus, obscure glanduloso-punctatis; stipulis persistentibus setiformibus parce strigillosis circa 3 mm. longis; foliis 5-7 mm. longis, 7-9-foliolatis; foliolis obovato-ovalibus plus minusve involutis circa 2 mm. longis, circa 1 mm. latis, obtusis vel rotundatis, supraglabris, subtus strigillosis cum pilis patentibus et minute glanduloso-punctatis; spicis longius pedunculatis vix 1 cm. longis remotifloris; bracteis ovato-acuminatis fere 3 mm. longis calyce paulo brevioribus plus minusve pubescentibusque glanduloso-punctatis; calycis dentibus ovato-acuminatis dense pubescentibus tubo parce strigilloso brevioribus; floribus 3-5 circa 6 mm. longis; carina alisque purpureis, vexillo flavido-albo minute rubro-punctato.—PERU: prostrate on sunny slope in shallow soils, Chasqui, Dept. of Huanuco, July 27—Aug. 13, 1922, *Macbride & Featherstone 1770* (TYPE, Field Museum).

P. catatona will probably be found restricted, like its abundantly different relatives *P. humifusa* and *P. Hofstenii*, to the high Andes. The type is from an altitude of about 10,500 feet.

13. **P. peruviana,** spec. nov., perennis; caulibus herbaceis, procumbentibus suberectis vel erectis sed semper flexuosis mediocriter gracilibus plerumque glabris quandoque juventate pilosis, plus minusve obscure glanduloso-punctatis, 1.5-4 dm. longis, simplicibus vel remote ramosa; stipulis filiformibus, 4-6 mm. longis; foliis 2-4 cm. longis, 7-15-foliolatis; foliolis ovalibus, apice rotundatis abrupte apiculatis, circa 3 (-5) mm. longis, circa 1.5 (-2.5) mm. latis, glabris, subtus minute punctatis; spicis terminalibus longius pedunculatis fructiferis oblongo-cylindraceis, 1.5-3.5 cm. longis, circa 7 mm. crassis; pedunculis 4 (2)-6 (10) cm. longis; bracteis subovali-ellipticis submembranaceis glandulosis-punctatis glabris abrupte caudato-acuminatis fere 6 mm. longis, calyce paulo longioribus; calycis dentibus ovato-acuminatis dense villosis tubo villoso haud vel obscure glanduloso circa 2-plo-brevioribus; floribus circa 6 mm. longis, carina alisque coeruleis vel ad marginem albis, vexillo albo vel solum alis coeruleis.—PERU: prostrate to nearly erect, Ambo, Dept. of Huanuco, April 5, 1923, *Macbride 3193* (TYPE, Field Museum); erect on shrubby southern slope, Yanahuanca, Dept. of Huanuco, June 16-22, 1922, *Macbride & Featherstone 1167*; erect on stony southwestern slope, Huanuco, April 26, 1923, *Macbride 3507*; prostrate on heavy stony soil of steep southwestern hillside, Tarma, Dept. of Junin, June 1-6, 1922, *Macbride & Featherstone 1016*; prostrate in firm disintegrated granite of very rocky slope, Matucana, Dept. of Lima, April 12-May 3, 1922, *Macbride & Featherstone 301.*

P. peruviana suggests *P. exilis* except for the elongate spikes and uniform bracts.

14. P. BOLIVIANA (Britton) Macbr. Contrib. Gray Herb. lxv. 23 (1922). *Dalea boliviana* Britton, Bull. Torr. Club, xvi. 259 (1889). *D. retusifolia* Harms ex Kuntze, Rev. Gen. iii. 59 (1898)?—BOLIVIA: open stony banks above La Paz, petals violet, May 19-20, 1925, *Pennell 14259*; near La Paz, April, 1885, *Rusby 959* (G., Phil., F.); near La Paz, 1889, *Bang 106* (G., Phil., F.); La Paz, 1919, *Buchtien 1594* (U.S.) and *555*; also 1907 *Buchtien 3132* (U.S.), *1394* (G.), and 1912, *134* (G., F.); near La Paz, 1861, *Mandon 702* (G.).

I have not seen Dr. Harms' species and hesitate therefore to key it out as distinct with the necessity of making a new combination since the description does not convince me that it is a specifically recognizable form. The author distinguishes *D. retusifolia* from *P. boliviana* by the longer (5 mm.) calyx and purple-violet flowers. However this description characterizes *P. boliviana!*

14a. P. BOLIVIANA (Britton) Macbr., var. **Herrerae,** var. nov., *P. boliviana* peraffinis; caulibus subglabris; foliis glabris 1.5-3 cm. longis,

plerumque 9-15-foliolatis; foliolis oblongo-obovatis subemarginatis 4-6 mm. longis, fere 2.5 mm. latis; bracteis glabris, basi plus minusve chartacea, apice valde glanduloso-punctatis, abrupte aristatis, circa 5 mm. longis; calycibus mediocriter subadpresse villosis 4-5 mm. longis; laciniis vix 1.5 mm. longis.—PERU: rocky slope of canyon, San Sebastian, Dept. of Cusco, April 25, 1925, *Pennell 13602* (TYPE, Field Museum); Cusco, July, 1923, *Herrera* (U.S.); Ollantaytambo, Dept. of Cusco, April 26, 1915, *Cook & Gilbert 322* (U.S.); Ayacucho, May, 1910, *Weberbauer 5526*?

From the collections at hand this appears to merit specific rank but its salient character—glabrous abruptly aristate bracts—is likely to be found exhibiting variations toward *P. bolivana* when both the Peruvian and Bolivian plants become better known. It is a pleasure to name this interesting variant after the well-known student of the Cusco flora, Dr. F. L. Herrera of the University of Cusco.

15. **P. Pennellii,** spec. nov., *P. boliviana* affinis, caudice lignoso-caulibus, ut videtur suberectis, minute strigillosis vix glanduloso-tuber, culatis rubicundis, gracilibus simplicibus vel, apice, parce ramosa; 1.5-3 dm. longis; foliis plerumque 3 cm. longis; 9-11 foliolatis; foliolis oblongo-ovalibus basi subcuneatis apice rotundatis vel subretusis, circa 6 mm. longis, 3 mm. latis, viridibus, utrinque plus minusve adpresse strigillosis, subtus etiam obscure punctatis; spicis longius pedunculatis ovato-cylindraceis vel fructiferis oblongis plerumque 3-6 cm. longis; pedunculis saepius 8 cm. longis; bracteis caducissimis ovato-lanceolatis subabrupte caudato-acuminatis circa 6 mm. longis calyce paulo longioribus dense molliter pilosis minute et obscure punctatis; calycibus membranaceis haud glandulosis, dense pilosis, tubo vix 3 mm. longo; laciniis subulatis basi ovatis subaequalibus, circa 1.5 mm. longis; floribus 10-12 mm. longis; carina alisque purpureis, vexillo pallidis vel flavido-albo, minute flavo-punctato.—PERU: open sandy soil above Arequipa, April 7-16, 1925, *Pennell 13171* (TYPE, Field Museum); above Salamanca, Dept. of Arequipa, March, 1914, *Weberbauer 6854*?

There are a number of differences between this beautiful species of Peru and *P. boliviana*, notably the minutely silky leaves, the softly pubescent bracts, that are promptly caducous, the sparse glandular-tuberculosity, etc. The purple color in the flowers was recorded by the collector as "mulberry purple".

16. **P. azurea** (Phil.), comb. nov., *Psoralea azurea* Phil. Fl. Atac. 14 (1860). *Dalea azurea* (Phil.) Reiche, Fl. Chile, ii. 77 (1898).—CHILE: vicinity of Paposo, Prov. Antofagasta, Dept. Taltal, Dec. 8, 1925, *Johnston 5584, 5585*; also at Aguada Panulcito, Prov. Antofagasta, Dec. 5, 1925, *Johnston 5455*.

I have been able to include this interesting species—wholly obscure to me from the description—because of the thoughtfulness of Dr. Johnston who sent me the specimens cited before they had become available in

the Gray Herbarium mounted collection. *P. azurea* suggests both *P. boliviana* and *P. pazensis* from each of which it may be distinguished by the promptly caducous bracts. When I first saw it I was reminded of *P. Pennellii* but it is too shrubby for that species and its mature leaves are glabrous. Johnston's field notes described it as a "depressed shrub 1.5-3 dm. tall and 6-12 m. broad; standard white, wing and keel blue" (*5455*); a "loose widely spreading bush 3-6 dm. tall and 6-12 dm. broad; flowers blue" (*5584*); or "stems decumbent; flowers rich blue" (*5585*), this number from the type locality compared by Johnston with the Philippi type at Santiago.

17. **P. Hofstenii** (Fries), comb. nov. *Dalea Hofstenii* Fries, Nov, Act. Soc. Sci. Upsal. Ser. 4, i., no. I. 132 (1905). *D. calliantha* Ulbrich. Rep. Spec. Nov. ii. 11 (1906). *P. calliantha* (Ulbrich) Macbr. Contrib. Gray Herb. lxv. 23 (1922).—BOLIVIA: Puna Patanca, March 26, 1904, *Fiebrig 3189* (G.). ARGENTINA: Moreno, Jujuy, Dec. 15, 1901, *Fries 927* (U.S.).

18. **P. myriadenia** (Ulbrich), comb. nov. *Dalea myriadenia* Ulbrich. Rep. Nov. Spec. ii. 9 (1906).—PERU: above Balsas, Chachapoyas, Dept of Amazonas, *Weberbauer 4279* (not seen).

19. **P. Onobrychis** (DC.), comb. nov. *Dalea Onobrychis* DC. Prod. ii. 247 (1825).—PERU: moist western slope, Matucana, April 12-May 3, 1922, *Macbride & Featherstone 347*; also gravelly river bluff, *244*.

In Contrib. Gray Herb. lxv. 23 (1922) I recorded my inclination to agree with Ball's interpretation of *D. Onobrychis* as a synonym of *D. Mutisii*, i. e. *D. coerulea*, cf. Journ. Bot. xxii. 36 (1885). The reasonableness of this now seems to me to be questionable. In the first place De Candolle's own characterization does not agree with his understanding of *D. Mutisii* and in the second place there are now before me the Peruvian collections cited above which either represent a new species or *D. Onobrychis*. They agree exactly with the description of De Candolle's plant but unfortunately his diagnosis fails to record a salient character,—namely the nature of the calyx-lobes. The calyx of the *Macbride & Featherstone* specimens is sparsely long-villous, about 3.5 mm. long, the ovate shortly subulate-tipped teeth scarcely 1 mm. long. The leaflets are mostly 8-10 mm. long. Number *244* was much branched and spreading, 2-3 feet high, with dark blue keel petals, the wings and standard in part greenish-white. The flowers of *347* were recorded as very dark blue.

20. P. PAZENSIS (Rusby) Macbr. Contrib. Gray Herb. lxv. 23 (1922). *Dalea pazensis* Rusby, Mem. Torr. Bot. Club, iii. pt. 3. 18 (1893).

D. tapacariensis Harms ex Kuntze, Rev. Gen. iii. 59 (1898)?—BOLIVIA: La Paz, 1919, *Buchtien 554* (U.S.); Cotana, 1911, *Buchtien 3193, 3194* (U.S.), and *162* (G.,F.); Cochabamba, 1909, *Buchtien 2384* (U.S.), and *Holway 401, 333* (U.S.,G.); Rio Palco Valle, *Bro. Julio 7* (U.S.); La Granja, Dec. 1925, *Bro. Julio 131* (U.S.); near La Paz, 1890, *Bang 678* (G., Phil., U.S.,F.); vicinity of Sorata, 1889, *Mandon 699* (G.)?; Rio Tapacari, 1892, *Kuntze*? PERU: Dept. of Cuzco, Oct. 1839-Feb. 1840, *Gay* (G.)?

This shrub, *P. boliviana*, and other apparent segregates[1] may constitute one species but at present any attempt to give them relative taxonomic values would seem to be inexpedient.

21. **P. eosina,** spec. nov., perennis sed haud fruticosa; caulibus herbaceis adscendentibus vel suberectis flexuosis mediocriter gracilibus basi ad apicem parce strigillosis, 2-3 dm. longis; stipulis filiformibus circa 2 cm. longis; foliis circa 2 cm. longis; foliolis plerumque 10-14 jugis, glabris, subtus parce glanduloso-punctatis, oblongis minute retusis basi subcuneatis, 3-4 mm. longis, circa 1 mm. latis; spicis circa 4 cm. longis; bracteis valde convexis suborbiculatis abrupte aristatis circa 6 mm. longis plus minusve pilosis et glandulosis; calycibus mediocriter villosis ut videtur haud glandulosis, tubo circa 3 mm. longo; laciniis late subulatis (basi ovata), circa 1 mm. longis; floribus violaceis (?), 8-10 mm. longis.—BOLIVIA: Tucumilla near Tarija, Nov. 30, 1903, *Fiebrig 2442* (TYPE, Gray Herbarium; also U.S.).

This species was distributed as *D. pectinata* Kunth, a Mexican plant which it suggests only in a general way. It is more suggestive of *D. elegans* Gill. ex Hook. Bot. Misc. iii. 183 (1833), of Argentina, which, however, it can scarcely be, for that is described as shrubby, glabrous, erect, with leaflets very glandular beneath and calyx-lobes setaceous.

22. **P. onobrychioides** (Griseb.), comb. nov. *Dalea onobrychioides* Griseb. Goett. Abh. xix. 118 (70 in reprint) (1874).—ARGENTINA: Canyon of San Lorenzo near Salta, March, 9, 1873, *Lorentz & Hieronymus 537* (U.S., F.).

23. **P. elegans** (Gillies), comb. nov. *Dalea elegans* Gillies ex Hook. Bot. Misc. iii. 183 (1833).—ARGENTINA: El Cerro del Moro, Prov. of San Luis, *Gillies* (not seen).

24. **P. astragalina** (HBK.) Killip, ex herb. *Dalea astragalina* HBK. Nov. Gen. & Sp. vi. 484 (1823).—ECUADOR: Huigra, Province of Chimborazo, 1923, *Hitchcock 20302, 20368* (U.S.); vicinity of Huigra, 1918, *Rose & Rose 22139* (G.,U.S.); Pichincha, 1855, *Couthouy* (G.,

[1] *P. oblongifolia* Rusby, Mem. N. Y. Bot. Gard. vii. 262 (1927) would "key" to this species. It is comparable to *P. boliviana* and allies but is moderately pubescent, as *P. Pennellii*. The bracts are persistent.. BOLIVIA: Espia, *White 608*, (G., courtesy Dr. Johnston).

Phil.); vicinity of Quito, 1918, *Rose & Rose 23545* (U.S.,G.); also *Jameson* (U.S.,G.); vicinity of Cuenca, *Rose, Pachano & Rose 22937* (U.S.,G.); Riobamba, Aug. 11, 1920, *Holway* (G.); Ambato, Province of Tungurahua, 1919, *Pachano 118* (U.S.); also *Tate 544* (U.S.); Provinces Imbarbura & Pachincha, 1923, *Hitchcock 20816* (U.S.).

The specimens cited after the *Jameson* one have the calyx-tube more or less pubescent, but appear to possess no other distinguishing characteristics. The flowers of this species apparently are blue.

25. **P. nova** (Ulbrich), comb. nov. *Dalea nova* Ulbrich, Rep. Nov. Spec. ii 5 (1906).—ECUADOR: vicinity of Cuenca, 1918, *Rose, Pachano & Rose 22815* (U.S.); Loja, 1918, *Rose, Pachano & Rose 23303* (U.S., G.); Huigra, 1923, *Hitchcock 20745* (U.S.). PERU: above San Pablo, Dept. of Cajamarca, April 26, 1904, *Weberbauer 3838* (not seen); Province of Chachapoyas, *Mathews* (G.); Uspachaca, Dept. of Junin, June 23, 1922, *Macbride & Featherstone 1302.*

If I am right in my interpretation of *P. nova*, it grows, at least at times, with *P. astragalina*, of which it may be only a variety. However, the nature of the calyx-lobes, as indicated in the key, appears to be definitely different and the flowers apparently are violet, rather than blue. The *Macbride & Featherstone* specimen is not typical but, except for a greater number of leaflets (sometimes as many as 11 pairs), it seems referable to *P. nova.*

26. P. COERULEA (L.f.) Macbr. Contrib. Gray Herb. lxv. 23 (1922). *Galega coerulea* L.f. Suppl. 335 (1781). *Dalea coerulea* (L.f.) Schinz & Thellung, Mém. Soc. Neuchât. Sci. Nat. v. 370 (1913). *D. Mutisii* Kunth, Mim, 161 (1824).—COLOMBIA: Bogota, Oct., 1917, 1920, *Bro. Ariste-Joseph A169* (U.S.); Bogota, Nov. 22, 1852, *Holton* (G.,Phil.); Chipaque, *Bro. Ariste-Joseph* (U.S.); southwest of Las Cruces, Bogota, Sept. 24-25, 1917, *Pennell 2184* (U.S.); Rio San Francisco, above Bogota, Sept. 27-29, 1917, *Pennell 2215* (U.S.,G., F.); below Jambalo, Cauca, Feb. 5, 1906, *Pittier 1447*; near Rio Cauca, Dept. of Cauca, June 18, 1922, *Killip 6881* (U.S.).

27. **P. Killippii,** spec. nov., fruticosa ut videtur erecta, mediocriter ramosa, aliquot dm. (vel 1 m.) alta; ramulis (et ramis?) molliterque valde cum pilis paulo fulvescentibus villosis; stipulis filiformibus circa 7 mm. longis; foliis utrinque cum pilis subadpresse sericeo-strigosis; foliolis 3-5-jugis, oblongo-ellipticis vel basi subcuneatis abrupte apiculatis, circa 1 cm. longis, 6 mm. latis, subtus haud (?) vel obscure glanduloso-punctatis, costa media prominente; spicis subpaniculatis, vix pedunculatis, oblongo-linearibus, 3-10 cm. longis, circa 1 cm. crassis; bracteis persistentibus ovato-lanceolatis basi scariosis parce glandulosis valde convexis sensim caudato-acuminato circa 10 mm. longis, subadpresse villosis; calycibus fructiferis circa 8 mm. longis, laciniis setaceis 4-5 mm. longis, valde ciliatis; tubo glabro sed copiose striato-glanduloso, circa

3 mm. longo; corolla ut videtur coerulea vel purpurea calycem paulo superanti; capsula dense villosa minute glanduloso-punctata.—ECUADOR vicinity of Nabón, Sept. 26, 1918, *Rose, Pachano & Rose 23033* (TYPE, U.S., also G.).

The silvery pubescence and the nature of the calyx serve to distinguish this species easily from *P. coerulea*. The calyx-glands are confluent into striae. Mr. E. P. Killlip marked the type sheet "n.sp." but erased his choice of name: I have selected "*Killippii*" as most appropriate.

28. P. AYAVACENSIS (HBK.) Macbr. Field Mus. Publ. Bot. iv. 86 (1925). *Dalea ayavacensis* HBK. Nov. Gen. & Sp. vi. 486 (1823). *D. longispicata* Ulbrich, Rep. Nov. Spec. ii. 6 (1906).—PERU: Tambillo, Dept. of Huanuco, May, 8, 1923, *Macbride 3576*; between Tambo and Rio Apurimac, Dept. of Ayacucho, May, 1910, *Weberbauer 5570*; 15 miles s.e. of Huanuco, May 31-June 3, 1922, *Macbride & Featherstone 2085*; valley of the Rio Choimacota, Dept. of Ayacucho, March 11, 1926, *Weberbauer 7580*; Tomaiquichua, near Ambo, Dept. of Huanuco, Sept. 19, 1922, *Macbride & Featherstone 2427*.

The last cited specimen in all probability represents *D. longispicata*, l.c. It seems to be only a very mature specimen. As the author remarks, an old rachis with the calyces fallen, resembles a pine branchlet with the needles gone, so prominent are the calyx-attachments. This, however, seems to be a development at least in part associated with age and at any rate, as there seem to be no good concomitant characters, is scarcely a specific distinction. It is possible, however, that none of the specimens represent true *P. ayavacensis* of northern Peru, but rather *D. longispicata*.

29. **P. Fieldii,** spec. nov., fruticosa laxe ramosa ubique plus minusve pubescentibus; ramis suberecto-patentibus 6-12 dm. longis mediocriter flexuosis; ramulis gracilibus basi ad apicem fere aequabiliter foliosissimis aliquid glanduloso-punctatis subadpresseque crispe hirtellis vel strigillosis; stipulis pilosis setaceis 4-6 mm. longis; foliis 1.5-2.5 cm. longis; foliolis circa 5(-7) -jugis, utrinque subadpresse sericeo-strigosis vel subviridibus sed numquam subglabris, oblongo ovalibus apice acutis, 6-9 mm. longis, 2-fere 5 mm. latis; spicis pedunculatis ex ovatis demum cylindraceis circa 4 cm. longis, 2 cm. crassis, plus minusve mutantibus; pedunculatis plerumque 5 cm. longis; bracteis setaceis basi ovatis scariosis convexis, circa 5 mm. longis dense subadpresse piloso-hirtellis; calycibus minute glanduloso-punctatis dense villoso-hirsutis, tubo circa 2 mm. longo; laciniis setaceis (basi ovatis) subaequalibus, 2 vel fere 2.5 mm. longis; floribus circa 10 mm. longis; carina alisque caerulea, vexillo albo sed ad marginem caeruleo.—PERU: shrubby canyon side, Huariaca, Dept. of Junin, April 3, 1923, *Macbride 3117* (TYPE, Field Museum); also *Macbride 3108*.

It is fitting to commemorate the Capt. Marshall Field botanical expeditions to Peru by naming this beautiful new species for their sponsor. It is a low, very bushy half-shrub producing an abundance of spikes of dark blue flowers. Its very pubescent foliage and calyx separate it at once from other species having setaceous calyx-teeth. Perhaps it is related to *P. sericophylla* but that has shorter calyx-teeth, only 3-4 pairs of leaflets and somewhat paniculate spikes.

30. **P. rubricaulis** (Ulbrich), comb. nov. *Dalea rubricaulis* Ulbrich, Meded. Rijks Herb. xxvii. 50 (1915).—BOLIVIA: valley of the Rio de la Vieja, March, 1911, *Herzog 1711a* (not seen).

Allied, by the author, to *P. boliviana* but certainly very distinct by virtue of the extremely long and narrow leaflets.

31. **P. Kuntzei** (Harms), comb. nov. *Dalea Kuntzei* Harms ex Kuntze Rev. Gen. iii. 59 (1898).—BOLIVIA: Sierra de Santa Cruz, *Kuntze*.

32. P. CYLINDRICA (Hook.) Macbr. Contrib. Gray Herb. lxv. 23 (1922). *Dalea cylindrica* Hook. Bot. Misc. ii. 213 (1831). *D. samancoensis* Ulbrich, Rep. Nov. Spec. ii. 8 (1906). *P. rubricaulis* Rusby, Bull. N.Y. Bot. Gard. vi. 511 (1910).—PERU: Arequipa, Aug. 8, 1901, *Williams 2523* (U.S.); 1838-42 *Wilkes* (U.S., G.); Arequipa, 1892, *Douglas* (G,); Arequipa, April 7-16, 1925, *Pennell 13155, 13153*; San Buenaventura, Dept. of Lima, June 17, 1925, *Pennell 14549*; along Rio Chillón, above Obrajillo, Dept. of Lima, June 13-23, 1925, *Pennell 14374*.

A rather anomalous species related, perhaps, as Hooker suggests, to *P. coerulea* and its relatives, but also possessing characters that seem to ally it to *P. calocalyx* and its associates. The original specimens came from the valley of Canta (Central Peru), but I have been unable to separate the plant of Arequipa described as *P. rubricaulis*. The rachis varies from glabrous to hairy, the leaves from 6-15 mm. long, the habit from erect and forming clumps to low and lax. And of still greater interest, the color of the flowers is sometimes "sulfur yellow changing to rosolane purple" (*Pennell 14374*), sometimes "violet" (*Pennell 14549*) or "violet-purple" (*Pennell 13155*) or again "amethyst violet" (*Pennell 13153*). Furthermore *Weberbauer 3136* (*D. samancoensis*) had a yellowish-white standard and *Pennell 14549* has faded in drying to yellowish-white, at least in part. In spite of the fact that the color of the flowers elsewhere in the genus is correlated with characters peculiar to the species concerned, such does not seem to be the case here.

33. **P. Jamesonii,** spec. nov., fruticosa, ut videtur erecta et circa 1 m. alta mediocriter ramosa; ramis ramulisque fere glabris vel adpresse

strigillosis parce vel obscure glanduloso-tuberculatis; stipulis persistentibus sericeo-strigosis setaceis, 2-3 mm. longis; foliis circa 3 cm. longis, 9-13-foliolatis; foliolis oblongo-ellipticis, circa 8 mm. longis, 3 mm. latis, apice subrotundatis apiculatis, basi subcuneatis, supra glabris, subtus nigro-punctatis et paulo adpresse strigillosis vel subglabris; racemis pedunculatis solum mediocriter congestis 1.5-2 cm. longis; pedunculis gracilibus remote vel haud glanduloso-tuberculatis adpresse strigillosis, 3-5 cm. longis; pedicellis erectis dense strigosis (etiam rachis) brevissimis, vix 1 mm. longis; bracteis prompte deciduis late ovato-lanceolatis circa 5 mm. longis sensim caudato-acuminatis, adpresse strigillosis parce glanduloso-punctatis; calycibus circa 7 mm. longis, tubo glabro lucido mediocriter glanduloso circa 4 mm. longo; laciniis ovato-subulatis subadpresse strigosis circa 3 mm. longis; floribus circa 12 mm. longis; carina alisque ut videtur caeruleis, vexillo in sicco pallidis dense glanduloso.—ECUADOR: Guaceo, Prov. of Cuenca, Sept., 1864, *Jameson* (TYPE, U.S.); vicinity of Azogues, Prov. of Cuenca, Sept. 16, 1918, *Rose & Rose 22790* (U.S.).

As noted by Killip on the type sheet this was referred by Jameson, Syn. Pl. Aeq. i. 147 (1865), to *P. ayavacensis*. It has indeed the general aspect of that species and its relatives *P. astragalina* and *P. coerulea*. But all of these are described as having *sessile* flowers! It is scarcely conceivable that the distinctly developed pedicels, though short and thick, could escape notice. However, even if one disregards them *P. Jamesonii* appears to be distinct enough by virtue of its comparatively short, and strigose, calyx-teeth.

2. FURTHER PERUVIAN PSORALEAS

Psoralea remotiflora, spec. nov., fruticosa 2-3 m. alta; ramulis pedunculis petiolisque minute subadpresse strigillosis vel subglabris parce cum glandulis sessilibus glanduliferis; foliis obscure sed mediocriter dense fulvo-punctatis, glabris; petiolo circa 5 cm. longo; stipulis ovato-acuminatis adpresse strigillosis circa 3 mm. longis; foliolis ovato-lanceolatis basi subrotundatis apice acuminatis sed abrupte apiculatis, 6-8 cm. longis, circa 2.5 cm. latis; spicis etiam ante anthesin laxifloris post anthesin circa 12 cm. longis mediocriter dense cum pilis albisque negris strigosis, pedunculis circa 12 cm. longis; floribus plus minusve fasciculatis (vel solitariis); bracteis ovato-lanceolatis mediocriter abrupte acuminatis circa 6 mm. longis; bracteis calycisque eglandulosis strigosis cum pilis adpressis nigris et albis intermixtis; calycibus circa 8 mm. longis, tubo fere 5 mm. longo; laciniis subaequalibus auguste ovato-lanceolatis acutis, circa 3 mm. longis; corolla 10 mm. longa violacea Dauphinae.—PERU: open, rocky slopes, Tingo, Dept. of Arequipa, April 8, 1925, *Pennell 13146* (TYPE, Field Museum).

This seems to be unique because of the very remotely flowered spikes. In some characters it approaches *P. maleolens* Macbr. Field Mus. Publ. Bot. iv. 82 (1925) from which it differs radically, not only as regards the

inflorescence but also as to size of flowers and leaves. In other respects it suggests *P. yurensis* Rusby, Bull. N. Y. Bot. Gard. vi. 511 (1910) but that has the dense spikes usual to all Peruvian species except *P. remotiflora* and is differently pubescent both as to character and distribution.

PSORALEA FEATHERSTONEI Macbr. Field. Mus. Publ. Bot. iv. 84 (1925). This species has been secured by Dr. Pennell from along the Rio Chillon, above Obrajillo, Dept. of Lima, number *14371*. His material matches the type from Matucana except that the branches are somewhat less pubescent.

PSORALEA POTENS Macbr. Field Mus. Publ. Bot. iv. 85 (1925). Dr. Pennell's *13632* from San Sebastian, Dept. of Cusco, extends the range of this species from Tarma, Dept. of Junin, the type locality. It is most readily distinguished from *P. Featherstonei* by the strongly glandular calyx, even in bud.

3. AN EARLIER NAME FOR MUEHLENBECKIA WITH NOTES ON A FEW SPECIES

CALACINUM Raf.Fl. Tellur. ii. 33-34 (1837). *Karkinetron* Raf., l.c. iii. 11(1838). *Sarcogonum* G. Don in Sweet, Hort. Brit. Ed.3. 577 (1839). *Conobaea* Bert. ex Steud. Nom. Ed. 2. i 404 (1840). *Muehlenbeckia* Meisn. Gen. 316 (1840) et Comm. 227 (1840).

In the course of determining some Peruvian material of *Muehlenbeckia* and especially a specimen of *M. chilensis* Meisn. secured by Mr. C. C. Sanborn on the Capt. Marshall Field Chilean Expedition of 1923, my attention was called to Dr. Rusby's reference of the plant to *Sarcogonum*, Bull. Torr. Club, xxvii. 128 (1900). However, as may be seen from the citations listed above, the earliest name for this group is rather *Calacinum* Raf., validly published and apparently in every respect tenable. Possibly Dr. Rusby regarded *Sarcogonum* as generically distinct, but as usual he makes the transfer without explanatory comment. No one else seems to have proposed any modification in the definition of *Muehlenbeckia*, the genus remaining intact even under so recent a worker as Jaretzky, Rep. Spec. Nov. xxii. 82 (1925).

The following species are represented in the herbarium of the Field Museum.

CALACINUM ADPRESSUM (Labill.) Raf. Fl. Tellur. ii. 34 (1837). *Polygonum adpressum* Labill. Nov. Holl. Pl. i. 99. t.127 (1804). *Muehlenbeckia adpressum* (Labill.) Meisn. Comm. 227 (1840).

CALACINUM AUSTRALE (Forst.f.) Raf. Fl. Tellur. ii. 34 (1837). *Coccoloba australis* Forst.f. Prod. 29. n.176 (1797). *Muehlenbeckia australis* (Forst.f.) Meisn. Comm. 227 (1840).

Calacinum axillare (Hook.f.), comb. nov. *Polygonum axillare* Hook.f. in Hook. Lond. Journ. Bot. vi. 278 (1847). *Muehlenbeckia axillaris* (Hook.f.) Walp. Ann. i. 552 (1848-49).

Calacinum complexum (A. Cunn.), comb. nov. *Polygonum complexum* A. Cunn. Ann. Nat. Hist. Ser. 1.i. 455 (1838). *Muehlenbeckia complexa* (A. Cunn.) Meisn. Comm. 227 (1840).

Calacinum diclinum (F. Muell.), comb. nov. *Polygonum diclinum* F. Muell. Trans. Phil. Soc. Vict. i. 23 (1855) and Hook. Kew Journ. viii. 203 (1856). *Muehlenbeckia polyganoides* F. Muell. Fragm. v. 73 (1865-66).

Calacinum ephedrioides (Hook.f.), comb. nov. *Muehlenbeckia ephedrioides* Hook.f. Fl. Nov. Zel. i. 211 (1853).

Calacinum platycladum (F. Muell.), comb. nov. *Polygonum platycladum* F. Muell. Trans. Phil. Inst. Vict. ii. 73 (1858). *Muehlenbeckia platyclados* Meisn. Bot. Zeit. xxiii. 313 (1865).

Calacinum fruticulosum (Walp.), comb. nov. *Polygonum fruticulosum* Walp. Nov. Act. Ac. Leopold. xix (1843): Supp. i. 407. *Sarcogonum fruticulosum* (Walp.) Rusby, Mem. Torr. Club, iv. 251 (1895). *Muehlenbeckia rupestris* Wedd. Ann. Sci. Nat. Sèr. 3. xiii. 256 (1850).

This plant is either variable in habit or more than one species has been included under the name *fruticulosum* or *rupestris*. Weddell, l.c., cites the former as a synonym of his plant and, if one may judge from description, Walper's *fruticulosum* is indeed the same. But both Walper's and Weddell's characterizations suggest very strongly Bentham's *Polygonum volcanicum* to which their species possibly should be referred. In this case the material that has been currently passing in herbaria as *rupestris* (i.e. *fruticulosum*) would require a new name. It appears to be distinguishable, however, mainly, if not entirely, by its erect or suberect and bushy habit, attaining a height of even 1 meter. *Macbride & Featherstone 245* from Matucana, Peru, alt. 8000 ft., noted as semierect, agrees more nearly than most herbarium material with the original descriptions of *fruticulosum* and *rupestris*. Such specimens as *Weberbauer 7483* from Carumas, Prov. Moquegua, Peru, and *Buchtien 519* and *Bang 132* from La Paz, Bolivia, apparently represent an extreme development of the same plant as an erect shrub.

Calacinum volcanicum (Benth.), comb. nov. *Polygonum volcanicum* Benth. Pl. Hartw. 81 (1841). *Muehlenbeckia volcanica* Endl. Gen. Suppl.

iv. ii. 51 (1847). *M. vulcanica* Meisn. in DC. Prod. xiv. 148 (1856). *M. rupestris* Wedd., var. *nivalis* Wedd. Ann. Sci. Nat. Sèr. 3. xiii. 256 (1850), probably.

Two collections of this species were made on the Capt. Marshall Field Botanical Expedition to Peru in 1923: *Macbride 3002* at 15000 ft. near Rio Blanco, Dept. of Lima, and *Macbride 4406* at 13000 ft. in patches on mossy rocky upland near Tambo de Vaca, Dept. of Huanuco. They match closely the figure in Weddell, Chloris Andina, ii. pl.89 (1857).

Calacinum sagittifolium (Ort.), comb. nov. *Coccoloba sagittifolia* Ort. Dec. v. 60 (1797-1800). *Polygonum acetosaefolium* Vent. Jard. Cels. 88. t. 88 (1800). *Muehlenbeckia sagittifolia* (Ort. Meisn. Comm. ii. 227 (1840).

Calacinum hastulatum (Smith), comb. nov. *Rumex hastulatus* Smith in Rees Cycl. 29 (1802-20). *Muehlenbeckia chilensis* Meisn., var. *fascicularis* Meisn. in DC. Prod. xiv. 149 (1856); var. *injucunda* (Lindl.) Meisn., l.c.

As the nature of the inflorescence appears to be a specific character in this genus, Meisner's variety may appropriately be treated as specifically distinct from the next which is characterized by elongate and more or less open racemes.

Calacinum chilense (Meisn.), comb. nov. *Muehlenbeckia chilensis* Meisn. in DC. Prod. xiv. 148 (1856).

Calacinum tamnifolium (HBK.), comb. nov. *Polygonum tamnifolium* HBK. Nov. Gen. et. Sp. ii. 180 (1817). *Muehlenbeckia tamnifolia* (HBK.) Meisn. Comm. ii. 227 (1840). *Sarcogonum tamnifolium* (HBK.) Rusby, Mem. Torr. Club, vi. 111 (1896).

Macbride & Featherstone 1221, pendant 20 or more feet from canyon walls at Yanahuanca, Dept. of Huanuco, seems to be referable to this variable species. This Peruvian material may represent *M. Steubelii* Lindau ex Hieron. Bot. Jahrb. xxi. 307 (1895), said to differ from *tamnifolium* in its subsimple inflorescences and attenuate leaf-bases. These are characters of very doubtful significance, however, since they are exhibited in varying degree in *tamnifolium* as interpreted by Meisn. in DC. Prod. xiv. 149. According to his apparently reasonable treatment *M. Steubelii* would be included in *M. tamnifolia* (HBK.) Meisn., var. *Hartwegii* Meisn., l.c. The plant is known at Yanahuanca, Peru, as "Huano negro".

Calacinum leptobotrys (Meisn.), comb. nov. *Muehlenbeckia leptobotrys* Meisn. in DC. Prod. xiv. 149 (1856).

This species appears to be represented by *Macbride 3166*, on shrubs, fruit purplish-black, Ambo, Dept. of Huanuco, Peru. It is very close to *M. tamnifolia*, var. *laxiflora* Meisn. in DC. Prod. xiv. 149 (1856), as suggested by its author, and perhaps is not specifically distinct.

Calacinum tiliaefolia (Wedd.), comb. nov. *Muehlenbeckia tiliaefolia* Wedd. Ann. Sci. Nat. Sèr. 3. xiii. 255 (1850).

Dr. Standley has referred here *Macbride & Featherstone 754*, trailing over rocks and shrubs, Viso, Dept. of Lima, Peru, and it agrees fairly well with the original diagnosis. The herbaceous branches, particularly, are strongly angled. Some of the larger leaves on these are 11 cm. long and 8 cm. wide and are very abruptly short acuminate or apiculate. The pubescence is minute and sparse, especially on the upper surfaces. The spreading branches of the inflorescences are 3-4 cm. long and rather openly flowered. *Pennell 14447* from thickets along Rio Chillón near Viscas, Dept. of Lima is the same.

Calacinum peruvianum (Meisn.), comb. nov. *Muehlenbeckia Peruviana* Meisn. in DC. Prod. xiv. 150 (1856).

Perhaps, as Meisner, l.c., suggests, this is only a variety of the foregoing but if *Macbride 4165* (in flower) and *4189* (in fruit) from Huacachi, near Muña, Dept. of Huanuco, Peru, represent it, it appears to be distinct. The branches are striate rather than angled (or obscurely so), the leaves are much smaller (2.5-4 cm. long, 2-3 cm. wide), thicker, veinier and more densely pubescent, and the inflorescence-branches are densely flowered.

4. NEW PERUVIAN MALESHERBIAS

Malesherbia ardens, spec. nov., fruticosa erecta non vel vix ramosa .5 m. alta; caulibus (parti superiori) molliter cinereo-villosis et cum pilis nonnullis longioribus firmiusculis intermixtis; foliis caulinis superioribus flavescentibus sessilibus oblongo-lanceolatis 3-4 cm. longis 6-12 mm. latis apice obtusis, basi cuneatis inaequaliter crispe crenato-dentatis vel profunde serratis imprimis ad basin utrinque mediocriter subadpresse hirsutis margine valde ciliatis cum pilis aliquid fulvescentibus; foliis racemis similibus paullo reductis; racemis 1-3 dm. (plus minusve) longis; pedicellis 1-1.5 cm. longis; bracteis anguste oblongo-lanceolatis circa 1 cm. longis; receptaculo cylindrico 2.5-3 cm. longo, 8-10 mm. lato, medio paullo inflato leviter piloso; sepalis ovato-acutis circa 6 mm. longis, basi 2 mm. lata; petalis anguste oblongo-lanceolatis circa 5 mm. longis; corona circa 3 mm. alta profunde lobatis, et lobis acute dentatis; staminibus saepe 8 mm. exsertis; fructibus pilosis longe exsertis; seminibus ovalibus foveolatis.—PERU: Shrub in dry ravines with scattered shrubs and herbs; no cacti; flowers fiery red. Hills S.E. of Moquegua,

Prov. of Moquegua, Mar. 22-24, 1925, *Weberbauer 7436a* (TYPE, Field Museum); dry ravines with scattered shrubs; scarcely branched, to ½ m. high; flowers fiery red. Mts. between Moquegua and Torata, Prov. Moquegua, March 21, 1925, *Weberbauer 7436*.

This species apparently is most nearly related to *M. thyrsiflora* R. & P. Fl. Peru, iii. 30. t. 254 (1802) and *M. cylindrostachya* Urb. & Gilg, Engl. Bot. Jahrb. xxxvii. 592 (1906), from both of which it may readily be distinguished by the shape of the flowers and the deeply lobed corona.

Malesherbia turbinea, spec. nov., ut videtur planta ut apud *M. haemantham* set receptaculo turbinato 12-15 mm. longo 7 mm. crasso, parce piloso; corona 13 mm. alta marginem solum irregulariter denticulato-crenatum; sepala 8-9 mm. longa; pedicellis fere 1.5 cm. longis; staminibus vix exsertis; fructibus pilosis receptaculum parum superantibus; seminibus obscure transversaliter sed valde longitudinaliter striatis circa 1 mm. latis et fere 2.5 mm. longis.—PERU: Shrub to 1 m. high, in open formation of herbs, rainy-green shrubs and Cereus, near Lake Huananhuata, Candarave, Dept. of Tacna, Mar. 11-13, 1925, *Weberbauer 7364* (TYPE, Field Museum).

The specimens of *M. turbinea* consist of flowering-branches only but their oblong-ovate bract-like leaves are all, even the lowest, merely crenate and sparsely ciliate-margined and give no indication, by the presence of occasional deeper serrations, of passing into deeply pinnatifid lower leaves such as are described for *M. haemantha* Harms, Notizblatt, viii. 211 (1922). It seems inadvisable, therefore, to refer this plant to Dr. Harms' species or to consider it a seasonal condition, especially in view of the very different floral measurements as indicated above. There is also an apparent difference in color, Dr. Weberbauer having recorded the flowers of *M. turbinea* as "blood-red" (without mention of a black border), and the anthers appear to have been white or yellowish.

MALESHERBIA GALJUFII Macbr. Field Museum Pub. Bot. iv. 92 (1925) differs from both *M. thyrsiflora* R.& P. and *M. cylindrostachya* Urb. & Gilg, Engl. Bot. Jahrb. xxxvii. 592 (1906) not only as already indicated but noteworthily, also, by the included or barely exserted capsule. This conspicuous character is called to my attention by the excellent material of *M. thyrsiflora* R.& P. obtained by Dr. Pennell in June, 1925 along Rio Chillón, near Viscos, Dept. of Lima, Peru, number *14476*. This conforms satisfactorily with the original description and emphasizes as correct the interpretation of the species by Drs. Urban and Gilg, l.c. Dr. Pennell's specimens are from the region of the type.

5. A DEFENSE OF ALLOCARYA

The following names made by Johnston in *Plagiobothrys* are to be transferred to *Allocarya* or restored.

Allocarya Kunthii (Walp.), comb. nov. *Anchusa Kunthii* Walp. Nov. Act. Nat. Cur. xix. suppl. 1, 372 (1843). *Plagiobothrys Kunthii* (Walp.) Johnst. Contrib. Gray Herb. lxviii. 74 (1923).

Allocarya pygmaea (HBK.), comb. nov. *Anchusa pygmaea* HBK. Nov. Gen. et Sp. iii. 92 (1818). *Plagiobothrys pygmaeus* (HBK.) Johnst. l.c.

Allocarya congesta (Wedd.), comb. nov. *Eritrichium humile* (R. & P.), var. *congestum* Wedd. Chlor. And. iii. 88 (1857). *Plagiobothrys congestus* (Wedd.) Johnst. l.c. 75.

ALLOCARYA MICROCARPA Piper, Contrib. U. S. Nat. Herb. xxii. 91 (1920). *Plagiobothrys Piperi* Johnst. l.c.

Johnston changes the name of this plant because of the existence of *P. microcarpa* Greene (1887) which, however, he treats as a synonym of *P. canescens* Benth. Therefore, according to a strict interpretation of the International Rules, there is no call for renaming Piper's species. However it has been suggested to me that the author proposed a new name for reasons of expediency and that this moderate concession to individual judgment ought to be permitted. This may be agreed to in general but it is customary to offer in such a case some explanation of the action.

ALLOCARYA COOPERI (Gray) Greene, Pitt. i. 19 (1887). *Plagiobothrys Parishii* Johnst. l.c. 78.

Here again the original name technically remains available for use in *Plagiobothrys* and the author makes no comment upon his change, justifiable though it may be.

Dr. I. M. Johnston has recently published "A Synopsis and Redefinition of Plagiobothrys", Contrib. Gray Herb. lxviii. 57-80 (1923) extending the genus to include not only *Echidiocarya* and *Sonnea* but also *Allocarya*. As he has devoted six pages to argumentative exposition intended to prove the correctness of his conclusion, it appears that he has accepted literally my suggestion, Contrib. Gray Herb. lix. 34 (1919), which he quotes, that some well-taken arguments for the reduction of *Allocarya* to *Plagiobothrys* could be presented. In fact his arguments are so well-taken and so adroitly presented that they are, by themselves, convincing and I wish now I had written less casually

regarding these genera when commenting, l.c., upon Mr. Druce's reduction of *Allocarya* to *Lappula*. My remarks that the leaves of *Plagiobothrys* are never opposite and that no species fails in any degree to conform to the generic character in each case seem, as off-hand impressions of the two groups, correct enough but become inaccurate characterizations when regarded as a definite expression of criteria for the maintenance of the genera.

I am sorry that I cannot consider the reduction of *Allocarya* justifiable. Johnston's work on the *Boraginaceae* has been characterized by a commendably frank and explanatory method of approach so that his conclusions as a rule may be accepted with confidence.

Johnston first considers the respective habits of the two genera; or, rather, their common habit, for he writes that "it can be positively said that the species of *Allocarya* do not have a common and distinctive aspect, and furthermore that they are not as a group habitally distinct from *Plagiobothrys*". The six species used to illustrate the first part of the statement exhibit the extremes in vegetative development in the genus but they present no greater diversity in aspect than a suite of specimens selected purposely to show an equivalent degree of aspectual variation within the genus *Cryptantha* as defined by Johnston, l.c., lxxiv (1925). The remainder of his premise is more to the point and of some significance. But closely related groups are apt to simulate each other vegetatively and in habit—who but those with much botanical experience distinguish many Tournefortias from Heliotropiums, Erigerons from Asters, or species of Coreopsis from Bidens?—and furthermore there surely is a certain facies, even though undescribable, about *Allocarya* and *Plagiobothrys* (including *Sonnea* and *Echidiocarya*) for which a student soon acquires a feeling eliminating a sense of confusion between the two genera, at least as regards most species, that possibly may have existed in his mind. Even in the case of *A. mollis*, for instance, which as Johnston remarks, "is in gross aspect strikingly like southern forms of *P. canescens*", the nutlet characters that serve with reasonable reliability to distinguish the two genera are diagnostically developed. And so with the other Allocaryas that simulate species of *Plagiobothrys*.

Anyway the easily debatable question of aspect is trivial when used as an argument pro or con in the drawing of generic lines. Accordingly Johnston seeks more tangible evidence in support of his contention, and apparently finds it in the discovery that *P. fulvus* and *A. Greenei* have nutlets with "similarly placed, very similar excavated scars" that possess as well "a remarkable agreement in size and shape . . . and in the ar-

rangement of keels and ridges upon them". Furthermore lower opposite leaves, regarded as a character peculiar to *Allocarya*, are found to exist in at least two species that in other respects might be referred to *Plagiobothrys* and the character itself is shown to be quantitative in its development. Therefore the recognition of *Allocarya* must obviously depend upon a redefinition and somewhat different analysis of those characteristics that have heretofore been regarded as salient.

These may be expressed and contrasted as follows:

Nutlets strongly incurved (in greater or less degree) and with a lateral medial or nearly medial or excavated scar of attachment, or this rarely raised on an obscurely or prominently developed stipe; leaves in most species all alternate or if not the nutlet characters pronounced ..... *Plagiobothrys.*

Nutlets erect and with basal scar (this rarely stipitate), or somewhat incurved and scar lateral and sometimes excavated, but then clearly suprabasal or nearly basal rather than submedial; lower leaves always opposite..... *Allocarya.*

It may be admitted that the essential weakness of these characters is demonstrated in *Allocarya Greenei*, which Johnston maintains "is an Allocarya only in its lower leaves". Its nutlets simulate those of *P. fulvus* in the nature of the scar but the position of this is actually suprabasal rather than submedial, and furthermore the nutlets are essentially erect. Except in the nature of the scar, *A. Greenei* illustrates its genus quite as satisfactorily as *P. fulvus* typifies its group. For instance, *P. fulvus* bears most of its alternate leaves at the base of the stem, has a distinctly fulvescent more or less spreading pubescence in the inflorescence and definitely developed processes in the corolla throat,—all characteristics that at once assign it to *Plagiobothrys*. On the other hand *A. Greenei* bears its opposite lower leaves in the more open manner usual with species of its genus, its fine silky pubescence if fulvescent in youth is scarcely so in age and, again as usual in *Allocarya*, there is hardly a suggestion of processes in the corolla throat, so weakly are they developed. In my judgment Johnston chose a poor example when he cited *A. Greenei* and *P. fulvus* to illustrate the similarity of the genera in aspect. It is thus seen that *A. Greenei* in all its general makeup tends much more strongly to *Allocarya* than to *Plagiobothrys*. It is interesting that in one respect it suggests a species of the latter but this fact alone can scarcely be regarded as a feasible argument for the reduction of its genus, especially since this is a reasonably well-marked group as regards the vast majority of its components.

In view of the fact that it has been shown definitely that "opposite leaves are not particularly characteristic of *Allocarya*" but are found also in *Cryptantha*, as well as in *Allocarya*, in a varying degree, so that

"the use of opposite leaves as a generic criterion is arbitrary", it is surprising indeed to find Johnston arguing that "*Echidiocarya* is not a part of *Plagiobothrys* but belongs rather to *Allocarya*", because of "the occurrence of lower opposite leaves in all three species"! As a matter of fact *Echidiocarya* is probably nearer Johnston's section *Amsinckiopsis* of *Plagiobothrys* than *Allocarya*, as evidenced by the fact that the scar of its nutlets is developed similarly on or from the keel. *Echidiocarya* thus is no more aberrant in *Plagiobothrys* than are those species constituting the section *Amsinckiopsis* and, moreover, there is a remarkable similarity in aspect between *P. Harknessii* and *E. arizonica*. Furthermore the nutlets of the latter are strongly incurved in the typical *Plagiobothrys* manner and the processes in the corolla throats are strongly developed as might be expected.

All things considered then, *Allocarya* appears to me to be a fairly well-marked group, ordinarily distinct enough from *Plagiobothrys* to justify its acceptance for the sake of convenience, if nothing else. The discovery of *P. patagonicus* Johnston[1] with opposite lower leaves strengthens the genus *Allocarya* rather than otherwise, as its author implies, because, in spite of its lower leaves, it retains, according to description, the salient characters of its genus. As Johnston has shown conclusively, the presence or absence of opposite leaves is of no particular significance. If *A. Greenei* is the connecting species and if its nearest relative is *P. fulvus* as Johnston suggests, there would be argument for placing these species in the same genus provided it is the intent to have the generic concept conform exactly to the evolutionary or phylogenetic relationship. But even so, this may not be desirable from a practical standpoint. Apparently Johnston himself yields to this factor of practicability in his maintenance of *Oreocarya* distinct from *Cryptantha*[2]. The distinction there seems to me to be purely arbitrary. Certainly *Allocarya* is a sounder generic concept, all factors considered.

6. NOTES ON CUCUMIS, PALAFOXIA, LIATRIS

CUCUMIS DIPSACEUS Ehrenb. in Spach, Hist. Nat. Veg. Phan. vi. 211 (1838).—PERU: roadsides, April 8, 1922, Lima, *Macbride & Featherstone 55*.

This wild melon of Africa with small spine-covered fruits, not uncommon in places as a roadside weed, is called by the natives "Frega

[1] Dr. Johnston has recently referred this plant to *P. verrucosa* (Phil.) Johnst., Contrib. Gray Herb. lxxviii. 39 (2927) comparing it with the variety of a characteristic species of *Plagiobothrys*, *P. Torreyi*.

[2] Recently Johnston has reduced *Oreocarya*, cf. Contrib. Gray Herb. lxxviii. 31 (1927).

mate". Its occurrence beyond its natural range does not seem to have been recorded; cf. Cogniaux & Harms in Engler's Pflanzenreich, iv. 275. ii. 148 (1924). Perhaps it is an escape from the Botanic Garden at Lima.

A Redefinition of Palafoxia.—The genus *Othake* Raf. New Fl. iv. 73 (1838), has been resurrected by Bush, Trans. Acad. St. Louis, xiv. 174 (1904) and also by Rydberg in N. Am. Fl. xxxiv. 58-61 (1914), to take care of those species of *Palafoxia* Lag. Gen. Sp. Nov. 26 (1816) with disk corollas so deeply cleft that they have no obvious, "or scarcely any" corolla throat. *Palafoxia* is then restricted to include plants with very shortly cleft corollas, the throat-portion of the flower remaining even longer than either the tube or lobes, while *Polypteris*, to which Gray, Proc. Am. Acad. xix. 31 (1883), referred the species now relegated to *Othake*, is delimited to its original species, *P. integrifolia* Nutt. Gen. ii. 139 (1818), characterized essentially by imbricate more or less scarious bracts and deeply cleft corollas with short funnel-form throats.

This division of the *Palafoxianae* might be desirable even though it may be artificial if the characters relied upon were uniformly constant for all the species. Unfortunately the chief characteristics of each of these three groups are either inconstant or relative in nature, or both, all species considered. This is the case whether the degree of development of the corolla throat in relation to the lobes and tube or the degree of imbrication of the more or less herbaceous or scarious bracts are taken as diagnostic characters. That the triple segregation of *Palafoxia* on such grounds is unnatural is further shown by consideration of *P. Feayi* Gray, Proc. Am. Acad. xii. 59 (1876) of which its author wrote, l. c. xix. 31 (1883), "is certainly a connecting species [with *Polypteris*], the corolla lobes being fully half the length of the cylindraceous throat, and the tips of the involucral bracts obscurely sphacelate." Moreover this plant resembles *Polypteris integrifolia* in achenes and in habit and, like it, is Floridan, the other species all ranging west of the Mississippi. Its genetic relationship is almost surely with its similar neighbor and if the genus *Polypteris* merits recognition, it should comprise these two Florida plants, so like except as to involucral bracts and development of the corolla throat.

It seems evident that undue taxonomic importance has been given these floral and bracteal characters in the *Palafoxianae* when their use for the drawing of generic lines has resulted in the separation of such closely related entities as *Polypteris integrifolia* and *Palafoxia Feayi*.

It is apparent therefore that there is no merit in maintaining the segregate genus *Othake*, based so purely upon characters that are rela-

tive and noncomitant with those of achenes or pappus. Its species are all easily referable to *Palafoxia* whether or not the latter includes *P. integrifolia*, but if it is removed, as it might be for convenience, but scarcely could be from the standpoint of sound taxonomy, *Palafoxia Feayi* ought to go with it. The maintenance of *Othake* can be made to appear logical only so long as the two Florida plants are kept in separate genera, an unnatural disposition that discloses the fallacy of the characters upon which the generic segregation of *Palafoxia* has been based. Acceptance of the foregoing interpretation of *Palafoxia* would necessitate one new transfer as indicated by the following citations.

Stevia sphacelata Nutt.; Torr. Ann. Lyc. N. Y. ii. 214 (1827). *Palafoxia Hookeriana*, β *subradiata* T. & G. Fl. N. Am. ii. 368 (1842). *Polypteris sphacelata* (Nutt.) Trel. in Branner & Coville, Rep. Ark. Geol. Surv. 1888[4]: 197 (1891). *Othake sphacelatum* (Nutt.) Rydb. Bull. Torr. Club, xxxvii. 331 (1910).

A White Form of Liatris scariosa.—In spite of the great number of vegetative variations of this variable plant that have received formal designation, no one seems to have named the white state although, near Chicago at least, it is not uncommon. It was referred to by Torrey and Gray in their Flora of North America ii. 75 (1841), and Higley and Raddin mentioned a single example collected in 1887 near Waldheim Cemetery, Bull. Chi. Acad. Sci. ii, no.1. 53 (1891). During the season of 1926 a number of plants with entirely white flowers were observed at both Pine and Clarke, Indiana. In accordance with present day custom, then, the color form seems worth recording. A similar variation for the closely related species, *L. spicata*, has been indicated as forma *albiflora* Britton. Therefore I am avoiding the use of this or other descriptive term and am naming the form for one of its collectors,—an action that is a little unusual in the case of color forms, but for which there is some good precedent. It is appropriate, moreover, to associate with the local flora the name of one of its most enthusiastic observers.

LIATRIS SCARIOSA (L.) Willd., forma **Benkei,** form. nov. corollis albis.—Indiana: common; flowers gleaming white; near Clarke, Sept. 1, 1926, *J. F. Macbride 1078* (TYPE, Field Museum); pure white, Miller, Sept. 8, 1923, *H. C. Benke 3740*, in part; a "light pink" specimen is associated with this.

MOSSES OF PERU

Collected by the

CAPTAIN MARSHALL FIELD PERUVIAN EXPEDITION, 1923

R. S. Williams

Aongstroemia jamaicensis C. M.
Mito, on grasslands, about 9000 ft., April, *J. F. Macbride, no. 2375*[1].

Dicranella apolensis Williams.
At mouth of Chinchao river on clay, about 3500 ft., July, *no. 720.*

Dicranum Mittenii C. M.
Mito, on tree trunk, about 9000 ft., April, *no. 250* and *306.*

Dicranum paramicola C.M.
Tambo de Vaca, on trees, about 13000 ft., June, *no. 573.*

Dicranum spiripes C.M.
Tambo de Vaca, on ground, about 13000 ft., June, *no. 553.*

Campylopus Chrismari (C.M.) Mitt.
Tambo de Vaca, on logs and ground in woods, about 13000 ft., June, *no. 575.*

Campylopus densicoma (C.M.) Par.
Tambo de Vaca, in damp, shaded spots, about 13000 ft., June. *no. 567.*

Campylopus gracilicaulis Mitt.
Muña, on stump in jungle, about 7000 ft., May 23-June 4, *no. 489.*

Campylopus introflexus (Hedw.) Brid.
Mito, on partly shaded rock, about 9000 ft., April 8-18, *no. 323.*

Campylopus luteus (C.M.) Par.
Mito, on wet bank in canyon, about 9000 ft., April 8-18, *no. 251.*

Pilopogon gracilis (Hook.) Brid.
Matucana, on wet bank, about 8000 ft., March 14-19, *no. 346.*

Thysanomitrium Richardi Schwaegr.
Cushi, in thick tufts on mountain top, June 19-23, *no. 661.*

Dicranodontium longisetum (Hook.) Williams.
Tambo de Vaca, on logs and ground, about 13000 ft., June 10-24, *no. 575 a.*

Leucobryum giganteum C.M.
Cushi, on soil, June 10-23, *no. 663.*

Octoblepharum albidum (L.) Hedw.
La Merced, on tree trunk, about 2000 ft., Aug. 10-24, *J. F. Macbride, no. 5503.*

Fissidens crispus Mont.
Mito, on exposed rock, about 9000 ft., *no. 225;* on shaded bank, about 9000 ft., *no. 295,* April 8-18.

Fissidens Donnellii Aust.
Mito, on damp bank, about 9000 ft., April 8-18, *no. 291 a.*

[1] When not otherwise stated, the collections were made by George S. Bryan.

Fissidens filirameus sp. nov.

PLATE I

Pseudoautoicous, one or two ♂ plants attached by radicles to the base of the fruiting plant, the inner perigonial leaves mostly truncately narrowed to a lanceolate point, the antheridia few and paraphyses lacking: plants very small, growing loosely over clayey soil, the fertile stems about .5 mm. high with 2 or 3 pairs of leaves; leaves smooth and entire, the upper about 1.5 mm. long, lanceolate, acute, bordered all round, the dorsal lamina narrow, mostly ending well above the leaf-base, the vaginant lamina extending about half way up and ending next the costa, with borders mostly broader than in upper part of leaf; lower leaves short, mostly without dorsal lamina and border; costa stout, shortly excurrent; cells of leaf irregular, angular, 6-12 μ long by 4-6 μ wide, with thin walls; seta mostly 3-5 mm. long; capsule usually erect, oblong, without lid .5 to .8 mm. long, with an erect, shortly beaked lid about half as long, the median exothecal cells not mamillose, up to 30 μ long by 25 μ wide, with thin walls, those about the rim small, often nearly square, in 2 or 3 rows; stomata 4-5, imperfect, near base of capsule; peristome dark red, the teeth with close articulations, divided for more than two-thirds their length into filiform, spirally papillose forks, which, on opening of the capsule bend inward and hang down almost to the middle of the capsule; calyptra not seen; spores smooth, up to 12 or 14 μ in diameter.

On damp bank at about 9000 feet, Mito, Peru. *G. S. Bryan*, April 8-18, 1923, *no. 291*.

A species belonging to Sec. Bryoidium; the leaves rather like those of *F. Lindigii* but the capsule not curved as in that, the seta shorter and cells of leaf somewhat smaller.

FISSIDENS KEGELLIANUS C.M.
Mito, on damp bank, about 9000 ft., April 8-18, *no. 291 b*.

FISSIDENS OLIGOPHYLLUS C.M.
Mito, on damp bank, about 9000 ft., April 8-18, *no. 291 c*.

FISSIDENS REPANDUS Wils.
Mito, on damp bank, about 9000 ft., April 8-18, *no. 261 a*.

FISSIDENS SCALARIS Mitt.
Rio Blanco, on ground shaded by grass, about 9000 ft., March 20-25, *no. 121*.

GYROWEISIA OBTUSIFOLIA (Hpe.) Broth.
Mito, on exposed bank, about 9000 ft., April 8-18, *no. 270*.

LEPTODONTIUM GRACILE C.M.
Huariaca, in shade on wet slope, about 9500 ft., April 3, *no. 158 & 164*.

HYOPHILA TORTULA (Schwaegr.) Hampe.
Muña, on exposed rock, about 7000 ft., May 23-June 4, *no. 442*.

BARBULA AUSTRALASIAE Hook. & Grev.
Muña, on shaded bank, about 7000 ft., May 23-June 4, *no. 507 a*.

BARBULA COSTATA (Mitt.) Jaeg.
Rio Blanco, on shaded bank, about 15000 ft., March 20-25, *no. 119*.

Barbula munyensis sp. nov.

PLATE II

Dioicous, the ♂ plants mingled with the fertile, mostly simple, rather slender, bearing usually a single flower a little below the apex of the stem, the 10-12 antheridia with abundant paraphyses, enclosed by 8-10 leaves, the inner 2 or 3 leaves very short: growing in compact, greenish yellow cushions with simple or somewhat branching stems about 2 cm. high and slightly radiculose below; leaves flexuous, more or less crispate when dry, gradually lanceolate from an ovate base, about 3 mm. long, the apex mostly abruptly apiculate, the borders entire and recurved nearly to base; costa excurrent, near base about one-fifth the width of the leaf, in cross-section showing about 4 guide-cells, two stereid bands and rather large outer cells all round; cells of upper part of leaf obscure, densely papillose, about 4 μ in diameter, the small papillose cells extending sometimes to near the base along margin, those next the costa smooth, rectangular, 6 μ wide by 20-40 μ long; inner perichaetial leaf with enlarged base convolute nearly one-half up, the upper part of leaf about like that of stem-leaf; pedicel 1.5 cm. high; capsule without lid about 2.5 mm. long, nearly cylindric, slightly curved; lid conic-cylindric, about 1.25 mm. long; annulus none; peristome red, the slender teeth very papillose, 2-3 times twisted, divided almost to the rim of capsule; calyptra 2.5 mm. long, almost cylindric, descending to a little below the lid, split on one side one-fifth up; spores smooth, 8-10 μ in diameter.

On shaded bank at about 7000 ft., Muña, Peru. *G. S. Bryan*, May 23-June 4, 1923, *no. 507*.

A species somewhat like *B. flexifolia* but stouter, the leaves broader above and abruptly narrowed to a smooth apiculus; the capsule more slender and about one-half again longer, the inner perichaetial leaf convolute and rather gradually lanceolate.

BARBULA REPLICATA Tayl.
Huariaca, on earth bank, about 9500 ft., April 9, *no. 150*.

BARBULA SUBULATULA C.M.
Muña, on sunny rock, about 7000 ft., May 23-June 4, *no. 481*.

STREPTOPOGON ERYTHRODONTUS (Tayl.) Wils.
Mito, on trees in wet canyon, about 9000 ft., April 8-18, *no. 210*.

ALOINA CALCEOLIFOLIA (Spruce) Broth.
Rio Blanco, on rocky slope, about 15000 ft., March 20-25, *no. 142*.

TORTULA AFFINIS Hampe.
Matucana, on rocky slope, about 8000 ft., March 14-18, *no. 53;*
Rio Blanco, on wet rock, about 15000 ft., March 20-25, *no. 116*.

TORTULA FRAGILIS Tayl.
Huariaca, in deep shade, about 9500 ft., April 9, *no. 163*.

TORTULA PINCHINCHENSIS Tayl.
Huariaca, on wet and shaded rock, about 9500 ft., April 9, *no. 152 & 153*.

Crossidium elatum sp. nov.

PLATE III

Apparently dioicous, no antheridia found: growing in rather compact tufts with simple or slightly branching stems up to 2 cm. high; stems in cross-section showing a large central strand 40-50 μ in diameter, with outer walls in lower part of stem mostly of 3 thicknesses of small, thick-walled cells; leaves erect-appressed or incurved when dry, rather widely spreading when moist, those of upper stem about 2 mm. long, ovate-lanceolate, apiculate, entire, more or less recurved on the borders; costa stout, percurrent, widest above the middle, in cross-section in the widest part showing about 6 guide-cells, a large stereid band on the under side and about two rows of cells on the upper side bearing a dense mass of filaments some 4 or 5 cells high, the terminal cell smooth and mostly convex or somewhat mamillosely pointed above; leaf-cells smooth, the median nearly square or slightly transversely elongate, up to 4 by 6 μ to 6 by 6 μ, the small cells often extending to near the leaf-base toward the margin, the basal cells larger, short-rectangular at the angles, often much longer toward the costa; perichaetial leaves very similar to those of the stem, but base of costa narrower and basal cells longer; seta 10-12 mm. long, bearing an erect, nearly cylindrical capsule about 2 mm. long without the lid, the lid with a subulate, slightly oblique beak about 1 mm. long, with cells in somewhat oblique rows; stomata crowded, in about 2 rows at base of capsule; peristome teeth (all immature or in very poor condition) apparently rather short, nearly erect, densely papillose, from a basal membrane extending well above the rim of capsule; spores minutely punctate, about 12 μ in diameter; calyptra cucullate, slender, slightly rough at apex, slit nearly half way up and extending well down the capsule.

Matucana, Peru, on rocky slope at about 8000 ft., March 14-18, 1923. *G. S. Bryan, no. 52.*

Tortula subobliqua sp. nov.

PLATE IV

Dioicous, the ♂ plants simple, 3-4 mm. high, the broad, apiculate and slightly serrulate perigonial leaves enclosing 5 or 6 antheridia with few, filiform paraphyses: growing in thin cushions with simple stems 3-6 mm. high, in cross-section showing a central strand and outer walls of 2 rows of slightly thicker-walled cells; lower stem-leaves small, the upper and perichaetial crowded together at the apex of the stem, incurved and crenulate on the borders when dry, rather obovate-oblong to somewhat spatulate, up to 2.5 mm. long and about 1 mm. wide, the apex mostly short-apiculate, the margins above flat and irregularly crenate and serrulate, below somewhat recurved and entire; costa tapering upward, vanishing below the apex, in cross-section showing 2 guide-cells, a single row of large cells on upper side and on under side a distinct stereid band in the basal part; leaf-cells not papillose but more or less mamillose, mostly on the upper side, the median cells nearly

square to hexagonal, 16-20 μ in diameter, in the basal part square to rectangular, up to 40 μ long; seta 5-8 mm. high; capsule cylindric, smooth, about 2 mm. long without lid, with a few scattered stomata at its base, the exothecal cells thin-walled and elongate; lid high-conic, about .5 mm. high with elongate cells in oblique rows; annulus of mostly two rows of easily separating cells; peristome from a low basal membrane, of 32 papillose, erect or somewhat oblique, slender teeth sometimes more or less united and with often a distinct median line, with the cross-walls mostly indistinct; spores smooth, 6-10 μ in diameter; calyptra narrow, almost cylindric, smooth, split on one side almost half way up.

On earth bank at about 9500 ft., Huariaca, Peru. *G. S. Bryan*, April 3, 1923, *no. 353*.

A smaller plant than *T. minifolia* with leaves somewhat similar in outline but not bordered nor entire and with leaf-cells smaller.

ENCALYPTA ASPERIFOLIA Mitt.

Rio Blanco, on rocks, about 15000 ft., March 20-25, *no. 108*.

Coscinodontella, gen. nov.

Genus near *Coscinodon* but stems without central strand, leaves broadly ovate with cucullate apex, the upper part of leaf of a double layer of cells, the capsule with a well defined annulus, the peristome less cribose and more irregular.

Coscinodontella Bryani sp. nov.

PLATE V

Dioicous, ♂ plants similar to the fertile, the ovate flower mostly solitary and terminal in the axil of an upper leaf, the 3-4 antheridia without paraphyses: growing in compact cushions with mostly simple stems, 4-5 mm. high, having no central strand and scarcely thickened outer cell-walls; leaves of stem very small below, the upper mostly broadly ovate, up to about 1.25 mm. long with incurved or cucullate, rather obtuse apex, the blade above of a double layer of smooth cells; costa stout, vanishing below the apex, in cross-section showing in the lower part a small stereid band on the under side; cells of upper part of leaf mostly quadratic and scarcely elongate, about 6 μ wide, the basal cells larger, about 12 μ wide and from nearly square to about twice longer than wide; seta exserted, about 1mm. long; capsule oblong, smooth, wide-mouthed when empty, scarcely 1 mm. long, the exothecal cells irregularly elongate with thin, nearly straight walls; peristome red, papillose, of 16 rather irregular, more or less split and cribose teeth, separate to below the rim of capsule; annulus persistant, two rows of cells high; calyptra mitrate, plicate, the apex smooth, the base deeply lacerate; spores smooth, about 10 μ in diameter.

On earth at about 8000 ft., Matucana, Peru. *G. S. Bryan*, March 14-18, 1923, *no. 60*.

GRIMMIA LONGIROSTRIS Hook.

Matucana, on rock, about 8000 ft., March 14-18, *no. 85;* Rio Blanco,

on wet rock, about 15000 ft., March 20-25, *no. 122;* Mito, on tree trunk, about 9000 ft., April 8-18, *no. 249.*

ANOECTANGIUM BECHLERIANA Mitt.

Huariaca, on shaded bank, about 9500 ft., April 9, *no. 154.*

ANOECTAMGIUM LINEARE (C.M.) Broth.

Muña, on shaded bank, about 7000 ft., May 23-June 4, *no. 508.*

Anoectangium platyphyllum sp. nov.

PLATE VI

Apparently dioicous, the antheridial bud scarcely .25 mm. high, of 4 or 5 leaves, the inner broadly ovate, obtuse, ecostate, with margin denticulate with high, papillae-like teeth; growing in compact cushions, the branching stems, with central strand, up to 1 cm. high; stem-leaves incurved-appressed when dry, rather widely spreading when moist, about 1 mm. long, broadly ovate-lanceolate, acutely or somewhat bluntly pointed, the margins flat or somewhat recurved and rough with papillae; costa not quite percurrent, rough on the back to near the base, in cross-section showing about 5 guide-cells, with stereid bands above and below, in lower part; cells of leaf rather obscure and densely papillose to well below the middle, the median nearly square or slightly transversely elongate, about 6 μ by 6-8 μ, the basal cells rectangular, at least toward the costa and mostly smooth; inner perichaetial leaves often a little longer than the stem-leaves, with broader base and much narrower, more or less denticulate point, the 6 or 7 archegonia without paraphyses; seta 3-5 mm. long; capsule erect, oblong, scarcely 1.5 mm. long without lid, the convex lid with oblique beak nearly 1 mm. long, the exothecal cells about rim slightly transversely elongate in 1 or 2 rows, below much larger, rather irregular, 2 to 4 times longer than wide with nearly straight walls, the stomata lacking or very imperfect; peristome none; annulus narrow, persistant; spores slightly roughened, 10-12 μ in diameter; calyptra cucullate, smooth, extending half way down the capsule.

In crevices of rock at about 15000 feet, Rio Blanco, Peru. March 20-25, 1923, *G. S. Bryan. no. 117.*

ZYGODON LINEARIFOLIUS Mitt.

Mito, on trees, in woods, about 9000 ft., April 8-18, *no. 240* and *354;* Tambo de Vaca, on trees in woods, about 13000 ft., June 10-24, *no. 570 & 640.*

Zygodon longisetus sp. nov.

PLATE VII

Dioicous, the ♂ flower conspicuous on a rather smaller, less branching plant than the fruiting ones; the inner perigonial leaves about as broad as high, entire, almost truncate below the short, acute apex and about one-half costate; the slender antheridia and filiform paraphyses numerous: growing in yellowish-green cushions with branching stems about 3 cm. high, very tomentose below; stem-leaves about 4 mm. long, crispate when dry, more or less spreading-incurved when moist, from

a nearly erect, oblong base gradually narrowed to a lanceolate, acute point with flat, crenulate margins; costa smooth, not quite percurrent; cells of stem-leaves roundish to oblong two-thirds way or more down the leaf, about 6 μ by 6-8 μ in diameter with 1-3 minute papillae to to each cell surface, the basal cells smooth, very narrow and elongate with thickened, sometimes slightly pitted walls, about 5 μ wide by 60-80 μ long; outer perichaetial leaves rather longer and narrower pointed than the stem-leaves, in the upper part sometimes with short papillose cells, the smaller inner leaves mostly smooth with elongate cells throughout; pedicel up to 4.5 cm. long; capsule subcylindric, nearly straight, up to 5 mm. long without the lid, the lid with slightly oblique beak about 2.5 mm. long; exothecal cells about mouth small, rounded to transversely elongate, in 10-12 rows, the median cells more or less rectangular with thickened lateral walls, the stomata superficial and numerous in the neck; peristome and annulus none; calyptra slender, 4-5 mm. long, slit to above the middle, the apex slightly rough; spores rough, 25-30 μ in diameter.

Tambo de Vaca, Peru, on tree, about 13000 ft., *G. S. Bryan*, June 10-24, 1923, *no. 576*.

Zygodon petrophilus sp. nov.

PLATE VIII

Dioicous, the ♂ plants branching and bearing 1-5 lateral flowers, the 6 or 8 antheridia with paraphyses enclosed by broadly ovate-acute, entire, very concave, more or less costate leaves about .6 mm. long, with mostly somewhat elongate, smooth cells: growing in compact cushions with branching, tomentose stems 3-4 cm. high; stem-leaves closely imbricate and somewhat 5-ranked when dry, recurved-squarrose when moist, about 2 mm. long, ovate-lanceolate, the apex acute with a few irregular teeth a little below the point, the margins flat or somewhat recurved below; costa not quite percurrent, rough on the back about three-fourths way down; leaf-cells with walls thickened throughout, rounded or somewhat elongate, 5 μ by 5-10 μ and densely papillose two-thirds way down or more, the basal cells smooth, up to 30 or 40 μ long; perichaetial leaves entire, the inner narrower and rather longer than stem-leaves with more elongate, smooth cells extending higher up; seta 5-6 mm. long; capsule nearly straight to somewhat curved and nodding, 5-ribbed, ovate-cylindric, with distinct neck, containing a few superficial stomata, about 2 mm. long without lid, the low-convex lid with slender, oblique beak about 1 mm. long; annulus of 1 or 2 rows of small cells; persistome double, of 16 pale, papillose teeth in pairs, often very irregular or imperfect, with 8 slender, more or less papillose cilia sometimes longer than the teeth; spores minutely roughened, 12-16 μ in diameter; calyptra mitrate, smooth, split on side about half way up.

Tambo de Vaca, on exposed rock about 13000 ft., Peru. *G. S. Bryan*, June 10-24, 10923, *no. 604*.

ORTHOTRICHUM AEQUATORIUM Mitt.

Mito, on small bushes, about 9000 ft., April 8-18, *no. 243a*.

ORTHOTRICHUM ARISTATUM Hpe.
Mito, on small bushes, about 9000 ft., April 8-18, *no. 243 b.*

ORTHOTRICHUM PARIATUM Mitt.
Mito, on small bushes, about 9000 ft., April 8-18, *no. 243.*

MACROMITRIUM SERRULATUM Mitt.
Muña, on trees, about 7000 ft., May 23-June 4, *no. 486.*

MACROMITRIUM TOCAREMAE Hampe.
Muña, on trees, about 7000 ft., May 23-June 4, *no. 498.*

TAYLORIA JAMESONI (Tayl.) C.M.
Tambo de Vaca, on trees, about 13000 ft., June 10-24, *no. 569 & 608*, the last on shaded bank.

TAYLORIA MAGELLANICA (Brid.) Mitt.
Tambo de Vaca, in wet woods, about 13000 ft., June 12-24, *no. 606.*

FUNARIA ACUTIFOLIA (Hpe.) C.M.
Mito, on wet bank, about 9000 ft., April 8-18, *no. 272.*

FUNARIA CALVESCENS Schwaegr.
Matucana, on earth, about 8000 ft., March 14-16, *no. 88;* Huariaca, on sunny slope, about 9500 ft., April 3, *no. 162;* Mito, on wet bank, about 9000 ft., April 8-18, *no. 273 & 401*, the last on grassy slope.

FUNARIA JAMESONI Tayl.
Matucana, exposed situations along trail, about 8000 ft., March 14-18, *no. 51.*

FUNARIA MACROSPORA Williams.
Rio Blanco, on wet bank in shade, about 15000 ft., March 20-25, *no. 120;* Cerro de Pasco, in exposed situations, about 14000 ft., March 26, *no. 146.*

FUNARIA MEGALOSTOMA Mitt.
Rio Blanco, on wet, shaded bank, about 15000 ft., March 20-26, *no. 118.*

FUNARIA SORATENSIS (Par.) Broth.
Mito, on sunny bank, about 9000 ft., April 8-18, *no. 403.*

FUNARIA SUBERECTA Mitt.
Cerro de Pasco, on wet bank, about 14000 ft., March 26, *no. 144;* Huariaca, on exposed hillside, about 9500 ft., April 3, *no. 159 & 165.*

MIELICHHOFERIA BOLIVIANA Schp.
Rio Blanco, in crevices of rock, about 15000 ft., March 20-25, *no. 141.*

MIELICHHOFERIA CAMPYLOTHECA C.M.
Cerro de Pasco, on bank, about 14000 ft., March 20, *no. 145.*

MIELICHHOFERIA CYGNICOLLA Schp.
Cerro de Pasco, abundant on hills, about 14000 ft., March 26, *no. 148.*

MIELICHHOFERIA LONGIPES C.M.
Mito, on shaded cliff, about 9000 ft., April 8-18, *no. 268.*

HAPLODONTIUM ARGENTIFOLIUM (Mitt.) Jacq.
Rio Blanco, on steep bank, about 15000 ft., March 20-25, *no. 124.*

HAPLODONTIUM JAMESONI (Tayl.) Hampe.
Rio Blanco, on earth of rocky hillside, about 15000 ft., March 20-25, *no. 105.*

WEBERA COSTESII Card. & Ther.
Rio Blanco, in shade of rock, about 15000 ft., March 20-25, *no. 106.*

WEBERA SPECTABILIS (C.M.) Jacq.
Mito, on wet bank, about 9000 ft., April 8-16, *no. 265 & 359,* the last on open hillside.

BRACHYMENIUM CONSIMILE (Mitt.) Jacq.
Muña, on small tree, about 7000 ft., May 23-June 4, *no. 497.*

ACIDODONTIUM LONGIFOLIUM (Schp.) Broth.
Tambo de Vaca, on tree trunks, about 13000 ft., June 10-24, *no. 571, 642* and *643.*

ANOMOBRYUM FILIFORME (Dicks.) Husn.
Matucana, on earth, about 8000 ft., March 14-18, *no. 87;* Rio Blanco, in crevices of rock, about 15000 ft., March 20-25, *no. 107;* Huariaca, on sunny slope , about 9500 ft., April 3, *no. 161.*

BRYUM ANDICOLA Hook.
Mito, shaded places, about 9000 ft., April 8-18, *no. 255.*

BRYUM ARGENTEUM L.
Matucana, abundant on mountain and along railway, about 8000 ft., March 14-18, *no. 59;* Rio Blanco, in shade of rock, about 15000 ft., March 20-26, *no. 109 & 123.*

BRYUM CHRYSOBLASTUM C.M.
Matucana, on rock and earth, about 8000 ft., March 14-18, *no. 86 & 89.*

BRYUM SCHISTONEURON (Kze.) Par.
Huariaca, in shaded places, about 9500 ft., April 3, *no. 166.*

BRYUM SERICEUM var. **denticulatum,** var. nov.

PLATE IX

This variety differs from the type in having the leaves sharply denticulate in the upper part and the cilia usually much less developed.

RHODOBRYUM BEYRICHIANUM (Hsch.) Par.
Mito, on ground in wet woods, about 9000 ft., April 8-18, *no. 400;* Muña, in damp woods, about 7000 ft., May 23-June 4, *no. 441.*

RHODOBRYUM CAULIFOLIUM (C.M.) Par.
Mito, on damp ground, about 9000 ft., April 8-18, *no. 247.*

MNIUM LIGULATUM C.M.
Muña, on rocks, about 7000 ft., May 23-June 4, *no. 493 and 519.*

BARTRAMIA HUMILIS Mitt.
Mito, on bushes, about 9000 ft., April 8-18, *no. 243 b.*

BARTRAMIA ITHYPHYLLOIDES Schp.
Mito, on shaded, wet bank, about 9000 ft., April 8-18, *no. 352.*

BARTRAMIA LONGIFOLIA Hook.
Tambo de Vaca, on tree trunk, about 13000 ft., June 19-24, *no. 600.*

BARTRAMIA PERPUSILLA C.M.
Huanuco, on wall, about 7000 ft., April 26, *no. 170;* Mito, on damp and shaded banks, about 9000 ft., April 8-18, *no. 237, 263 & 302.*

BARTRAMIA THRAUSTA Schp.
Mito, on wet, shaded bank, about 9000 ft., April 8-18, *no. 360.*

PHILONOTIS TENELLA (C.M.) Jacq.
Mito, on wet bank, about 9000 ft., April 8-18, *no. 261.*

PHILONOTIS UNCINATA (Schwaegr.) Brid.
Muña, shaded bank, about 7000 ft., May 23-June 4, *no. 475;* at mouth of Chinchao Rio, on rocky bank, about 3500 ft., July 19-25, *no. 733.*

BREUTELIA BRYOCARPA Herz.
Mito, abundant in canyons and on heights, about 9000 ft., April 8-18, *no. 281.*

BREUTELIA TOMENTOSA (Sw.) Schimp.
At mouth of Chinchao Rio, about 3500 ft., July 19-25, *no. 715.*

OLIGOTRICHUM EROSUM (Hpe.) Lindb.
Mouth of Chinchao Rio, damp, open places, about 3500 ft., July 19-25, *no. 734.*

POLYTRICHADELPHUS ARISTATUS (Hpe.) Mitt.
Mito, about 9000 ft., April 8-18, *no. 274.*

POLYTRICHADELPHUS UMBROSUS Mitt.
At mouth of Chinchao Rio, about 3500 ft., *no. 714.*

POGONATUM ABBREVIATUM Mitt.
At mouth of Chinchao Rio, on damp shaded soil, about 3500 ft., July 19-25 *no. 721.*

POGONATUM CAMPYLOCARPUM C.M.
Mito, on shaded bank, about 9000 ft., April 8-18, *no. 228 & 358;* Cushi, on ground near mountain top, June 19-23, *no. 667.*

POGONATUM OLIGODUS (Kunz.) Mitt.
Matucana, on earth, about 8000 ft., March 14-18, *no. 50;* Mito, on shaded and exposed places about 9000 ft., April 8-18, *no. 267;* Muña, on shaded wall, about 7000 ft., May 23-June 9, *no. 480.*

POLYTRICHUM ANTILLARUM Rich.
Huariaca, on wet, sunny slope, about 9500 ft., April 3, *no. 157;* Mito, on exposed bank, about 9000 ft., April 8-18, *no. 298, 303 & 355.*

POLYTRICHUM ARISTIFLORUM Mitt.
Rio Blanco, on earth bank, about 15000 ft., March 20-25, *no. 139.*

ACROCRYPHAEA GARDNERI (Mitt.) Jaeg.
Muña, on trees in dry woods, about 7000 ft., May 22-June 4, *no. 483.*

CRYPHAEA PATENS Hornsch.
Muña, on trees, about 7000 ft., May 22-June 4, *no. 490.*

PRIONODON BOLIVIANUS C.M.
Mito, on trees in wet woods and on shaded bank, about 9000 ft., April 9-18, *no. 235 & 292.*

SQUAMIDIUM ROTUNDIFOLIUM (Mitt.) Broth.
Muña, on limbs of trees, about 7000 ft., May 23-June 4, *no. 447.*

POROTRICHUM LONGIROSTRUM (Hook,) Mitt.
Mito, on ground and trees in wet woods, about 9000 ft., April 8-18 *no. 216.*

CLASTOBRYUM AMERICANUM Card.
Mito, on trees in wet woods, about 9000 ft., April 8-18, *no. 353.*

ENTODON ERYTHROPUS Mitt.
Mito, on bank in deep shade and on trees in wet woods, about 9000 ft., April 8-18, *no. 269 & 288.*

ENTODON JAMESONI (Tayl.) Mitt.
Mito, on trees in wet wood, about 9000 ft., April 8-18, *no. 211, 223 & 230.*

FABRONIA ANDINA Mitt.
Huariaca, on shaded limbs, about 9500 ft., April 9, *no. 155; Mito,* on rock, about 9000 ft., April 8-18, *no. 256.*

FABRONIA JAMESONI Tayl.
Mito, on bank and in shade on under side of rock, about 9000 ft., April 8-18, *no. 276 & 398.*

HYPOPTERYGIUM TAMARISCI (Sw.) Brid.
Muña, on rocks and trees in damp woods, about 7000 ft., May 23-June 4, *no. 476;* Huariaca, on rocks, about 9500 ft., April 3, *no. 167.*

RHACOPILUM TOMENTOSUM (Sw.) Brid.
Muña, on rocks and trees, about 7000 ft., May 23-June 4, *no. 479.*

LESKEA GRACILLIMA Tayl.
Huariaca, on rocks and shaded limbs, about 9500 ft., April 3, *no. 149, 155a & 156a;* Matucana, on rock, about 8000 ft., March 14-18, *no. 84.*

THUIDIUM PERUVIANUM Mitt.
Huariaca, in shade on wet slope, about 9500 ft., April 3, *no. 160.*

AMBLYSTEGIUM VARIUM (Hedw.) Lindb.
Chosica, on wet bank of ditch, about 3000 ft., March 11-13, *no. 8.*

MITTENOTHAMNIUM REPTANS (Sw.) Card.
Mito, on ground and trees in wet woods, about 9000 ft., April 8-18, *no. 224, 233 & 404.*

PLAGIOTHECIUM DENTICULATUM (L.) Bry. Eur.
Tambo de Vaca, on trees, about 13000 ft., June 10-24, *no. 572.*

SEMATOPHYLLUM CYPARISSOIDES (Hornsch.) Broth.
Mito, on trees in wet woods, about 9000 ft., April 8-18, *no. 229;* Tambo de Vaca, on dead log, about 13000 ft., June 10-24, *no. 641.*

Eroiodon longipes sp. nov.

PLATE X

Dioicous, the ♂ plants similar to the fertile and often bearing numerous flowers on stems and branches, the perigonial leaves nearly or quite ecostate and entire, of elongate cells with slightly thickened and pitted walls, the 6-8 antheridia nearly as long as the inner leaf, with few slightly longer paraphyses: growing in loosely entangled mats with dusky stems and numerous, irregular branches and branchlets, up to 7 cm. high; lower stem-leaves scale-like, those above oblong, about 2 mm. long, with costa extending about two-thirds up the leaf, the apex rather abruptly short-apiculate and slightly dentate, the margins near the base recurved; leaves of branches much smaller, entire, shortly costate to ecostate; leaf-cells smooth, narrow, with slightly sinuous walls, pitted in the basal part of the leaf, the median cells of upper stem leaves 20-40 μ by 4-6 μ, the alar cells forming a small golden brown cluster; perichaetial leaves broadly oblong-lanceolate, closely convolute below with spreading, entire, acute point, ecostate to more or less costate, the very narrow cells, except those near the base with thicker, more pitted walls than in the stem-leaves; seta red, flexuous, 4 cm. or more long; capsule nodding, more or less curved, without lid about 2.5 mm. long, the lid with a subulate, curved beak sometimes of equal length; peristome double, teeth narrowly lanceolate, finely papillose above, striate papillose below, fragile, forming, on fall of lid, either a cone or widely spreading and spirally incurved above with the inner peristome cone-like; inner peristome finely papillose, the lanceolate segments about as wide as and longer than the teeth, with filiform apex, pertuse along the median line, from a basal membrane about one-fifth the height of the peristome; annulus broad, persistant; spores minutely punctate, 16-20 μ in diameter; calyptra nearly cylindric, 4 mm. long, smooth.

Tambo de Vaca, Peru, on trees, about 13000 ft., June, 1923. *G. S. Bryan, no. 574.*

BRACHYTHECIUM ASPERULUM (Hpe.) Jacq.
Mito, on rock by stream, about 9000 ft., April 8-18, *no. 264 & 296.*

RIGODIUM IMPLEXUM Kunz.
Mito, on wet, shaded bank, about 9000 ft., April 8-18, *no. 405.*

RHYNCHOSTEGIUM AQUATICUM (Hpe.) Jacq.
Chosica, in fast flowing water, about 3000 ft., March 11-13, *no. 9.*

RHYNCHOSTEGIUM CONCHOPHYLLUM (Tayl.) Jacq.
Huariaca, on shaded rock, about 9500 ft., April 3, *no. 151;* Mito, on rock and on wet, shaded ground, about 9000 ft., April 8-18, *no. 283 & 321;* Muña, on rock, about 7000 ft., May 23-June 4, *no. 482.*

RHYNCHOSTEGIUM SCARIOSUM (Tayl.) Jacq.
Mito, on trunks in wet woods, about 9000 ft., April 8-18, *no. 215*.

FISSIDENS FILIRAMEUS sp. nov.

PLATE I

Fig. 1. Plant × 12
2. Capsule × 20
3. Part of peristome × 180
4. Median exothecal cells × 180
5. Cells near base of capsule with stoma × 200
6. Middle stem-leaf × 50
7. Male plant × 100
8. Part of upper stem-leaf × 270
9. Lower stem-leaf × 50
10. Upper stem-leaf × 50

BARBULA MUNYENSIS sp. nov.

PLATE II

Fig. 1. Plant about natural size
2. Stem-leaf × 20
3. Apex of stem-leaf × 200
4. Two inner perichaetial leaves and base of pedicel × 20
5. Cross-section of costa × 200
6. Median cells of leaf × 200
7. Perigonium × 20
8. Cells at basal angle × 200
9. Lid and calyptra × 20
10. Capsule with peristome × 20

CROSSIDIUM ELATUM sp. nov.

PLATE III

Fig. 1. About natural size
2. Capsule × 14
3. Calyptra × 14
4. Upper stem-leaf × 25
5. Middle stem-leaf × 25
6. Perichaetial leaf × 25
7. Cross-section of stem-leaf × 180
8. Cross-section of stem × 180
9. Median cells of leaf × 180
10. Cells at basal angle × 180

TORTULA SUBOBLIQUA sp. nov.

PLATE IV

Fig. 1. Plants, ♀ and ♂, about natural size
2. Upper and lower stem leaves × 14
3. Part of rim of capsule with annulus and teeth × 130
4. Upper part of capsule with lid × 14
5. Calyptra × 14
6. Median exothecal cells × 130
7. Cross-section of leaf near apex of costa × 180
8. Cross-section of costa in basal part × 180
9. Basal cells of leaf × 200
10. Apex of leaf × 130

COSCINODONTELLA BRYANI gen. et sp. nov.

PLATE V

Fig. 1. Plant enlarged about 5 times and natural size
2. Calyptra × 5
3. Median exothecal cells × 180
4. Part of rim of capsule, annulus and peristome × 180
5. Inner perichaetial leaf × 35
6. Upper stem-leaf and perigonial bud × 35
7. Cross-section of leaf toward apex × 180
8. Cells in upper part of leaf × 200
9. Cross-section of leaf below the middle × 180
10. and 11. Upper stem-leaves × 35
12. Cells at basal angle × 180

ANOECTANGIUM PLATYPHYLLUM sp. nov.

PLATE VI

Fig. 1. Plant about natural size
2. Capsule with lid × 12
3. Calyptra and lid × 12
4. Stem-leaf × 40
5. Perichaetial leaf × 40
6. Part of upper capsule with persistant annulus × 180
7. Median cells of stem-leaf × 180
8. Apex of perichaetial leaf × 180
9. Apex of stem-leaf × 180
10. Cross-section of lower part of stem-leaf × 180
11. Perichaetium × 40
12. Perigonial leaves × 50
13. Basal cells of stem-leaf × 180

ZYGODON LONGISETUS sp. nov.

PLATE VII

Fig. 1. Plants, ♂ and ♀ about natural size
2. Calyptra × 9
3. Capsule × 9
4. Stem-leaves × 10
5. Capsule × 9
6. Outer and inner perichaetial leaf × 10
7. Inner perigonial leaf with antheridium and paraphyses × 180
8. Median cells of stem-leaf × 180
9. Median exothecal cells × 180
10. Stoma × 180
11. Apex of stem-leaf × 180
12. Cells at basal angles × 180

ZYGODON PETROPHILUS sp. nov.

PLATE VIII

Fig. 1. Plant about natural size
2. Capsule × 15
3. Stem-leaf × 20
4. Inner perichaetial leaf × 20
5. Apex of stem-leaf × 180
6. Calyptra × 15
7. Inner perigonial leaf × 40
8. Stoma × 180

9. Median exothecal cells × 180
10. Part of peristome, annulus and rim of capsule × 180
11. Median leaf-cells × 180
12. Cells at basal angle of leaf × 180

BYRUM SERICEUM, var. DENTICULATUM var. nov.

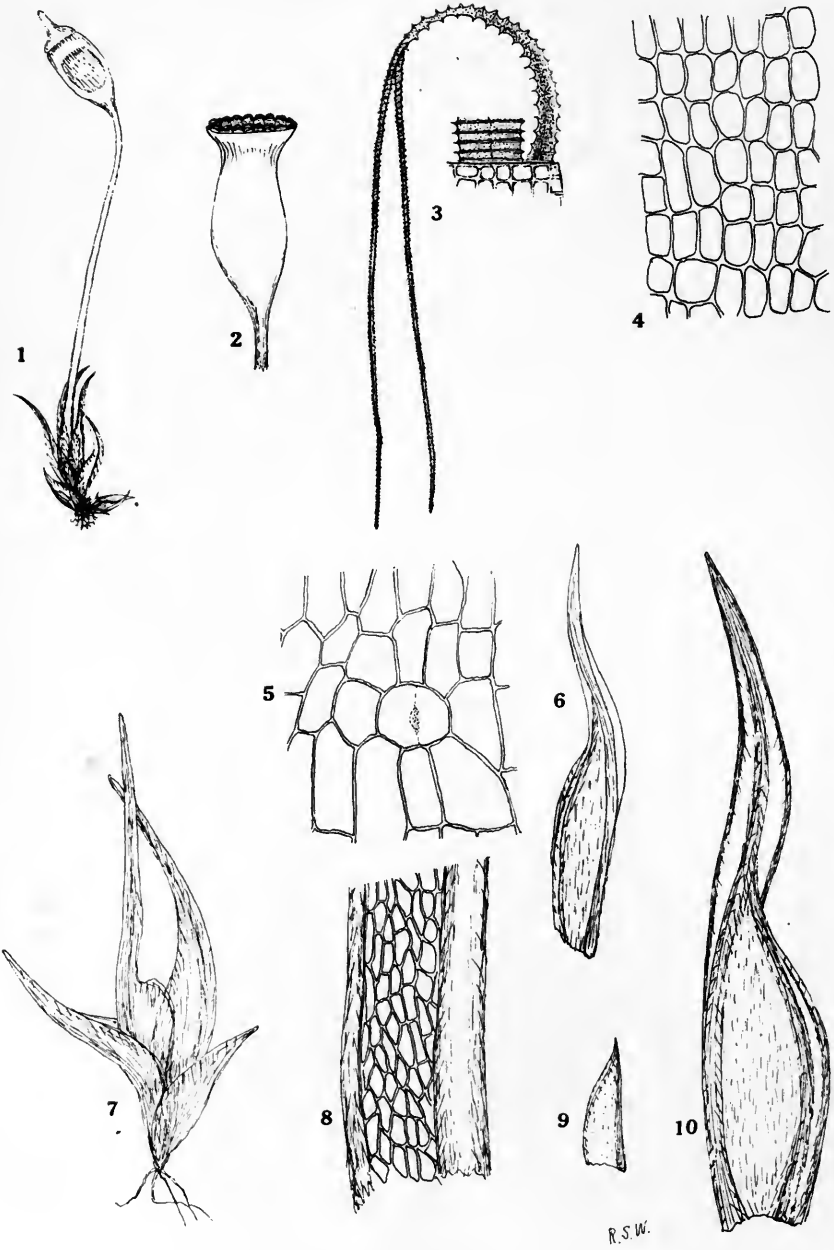
PLATE IX

Fig. 1. Plants ♀ and ♂ about natural size
2. Capsules × 16
3. Stem-leaf × 30
4. Apex of stem-leaf × 200
5. Perigonium and inner leaf × 30
6. Perichaetium and inner leaf × 30
7. Stoma × 150
8. Cells and border about half way down leaf × 200
9. Part of peristome and annulus × 150
10. Peristome tooth in inner face × 150
11. Green basal cells of stem-leaf × 200

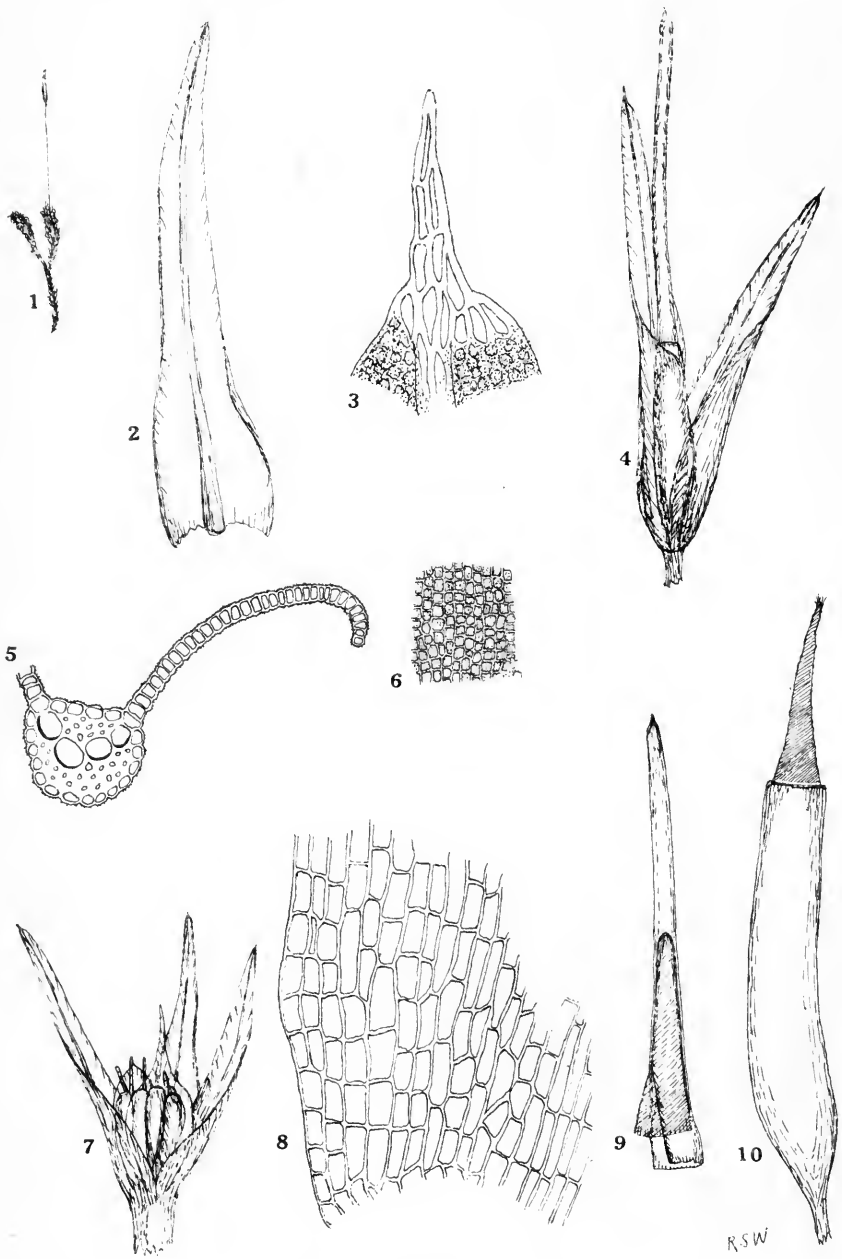
ERIODON LONGIPES sp. nov.

PLATE X

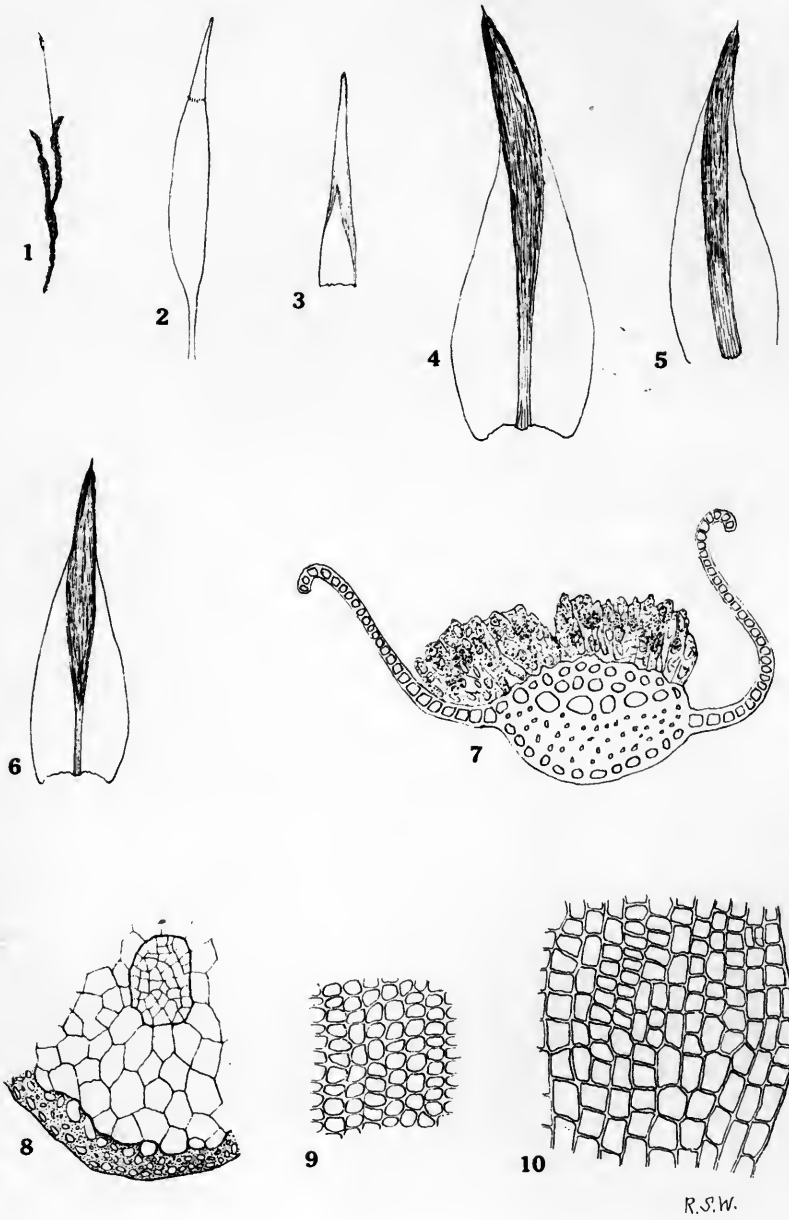
Fig. 1 Plant about natural size
2. Stem-leaf × 20
3. Branch leaves × 20
4. Four median cells of stem-leaf × 270
5. Inner perichaetial leaf × 16
6. Alar cells × 270
7. Apex of stem-leaf × 200
8. Perichaetium × 18
9. Perigonium and part of same × 25
10. Rim of capsule and peristome × 25
11. Part of peristome and annulus × 80



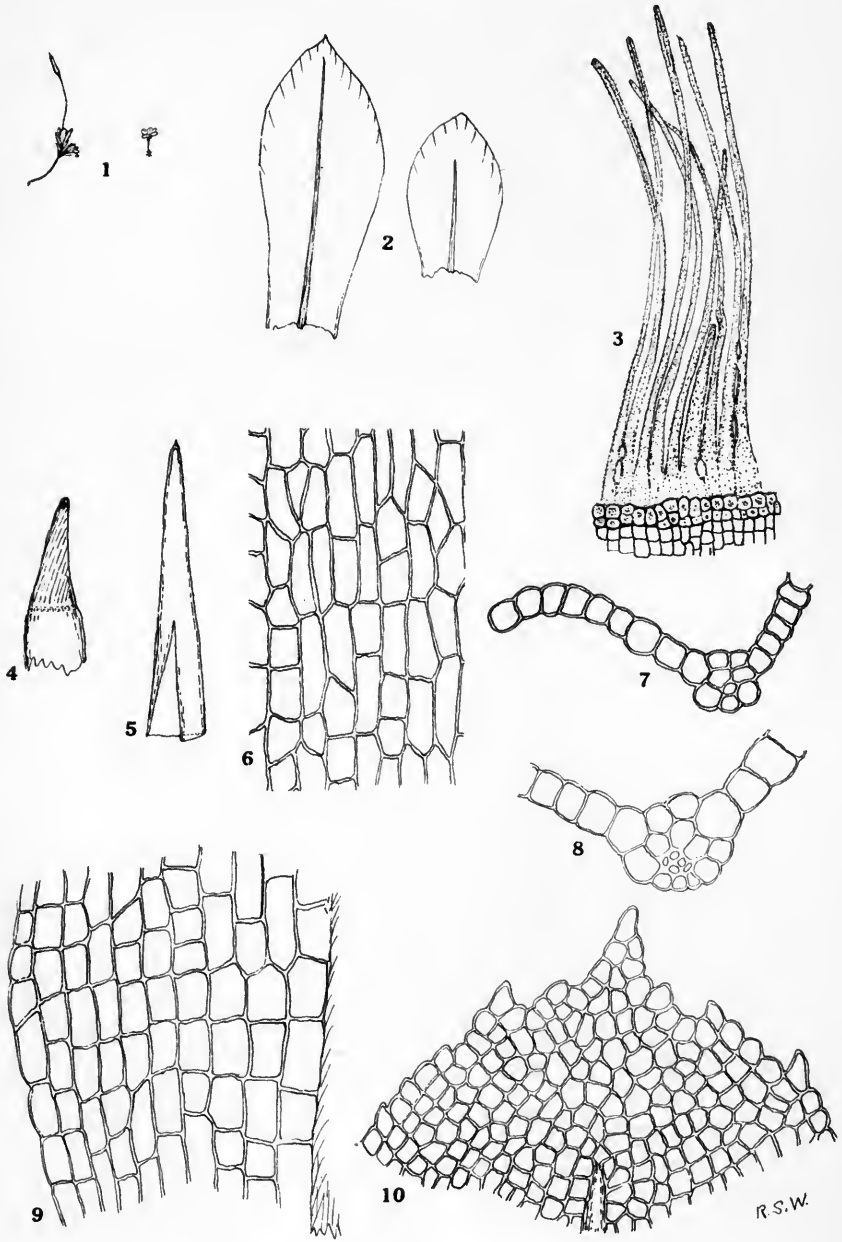
FISSIDENS FILIRAMEUS sp. nov.



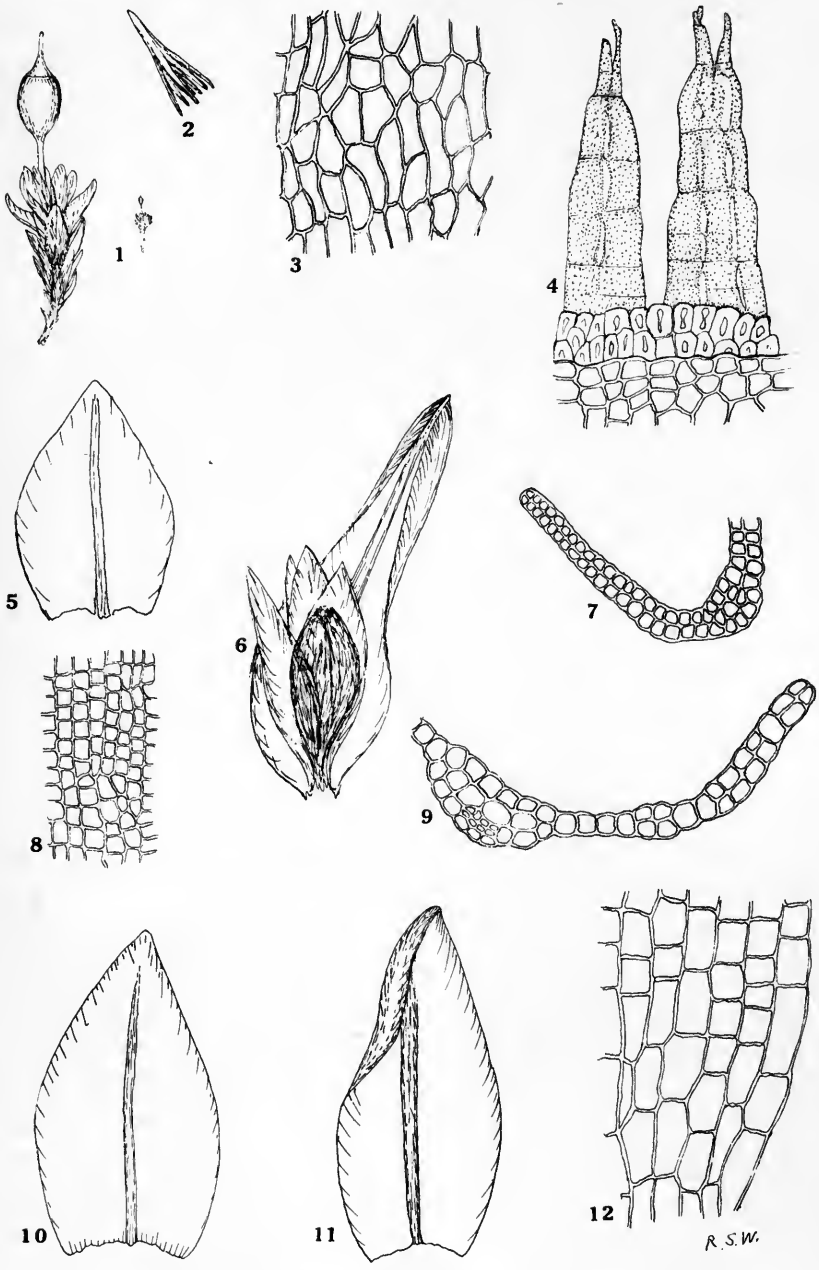
BARBULA MUNYENSIS sp. nov.



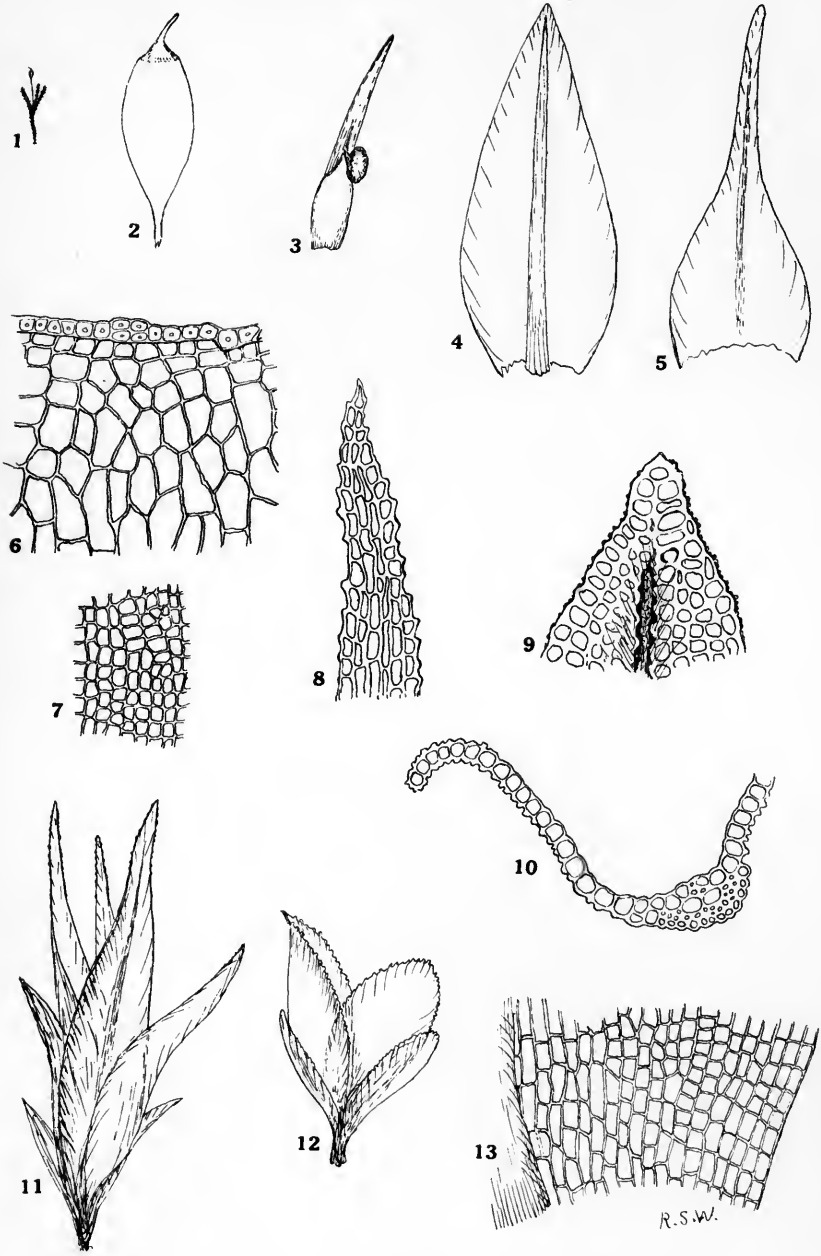
CROSSIDIUM ELATUM sp. nov.



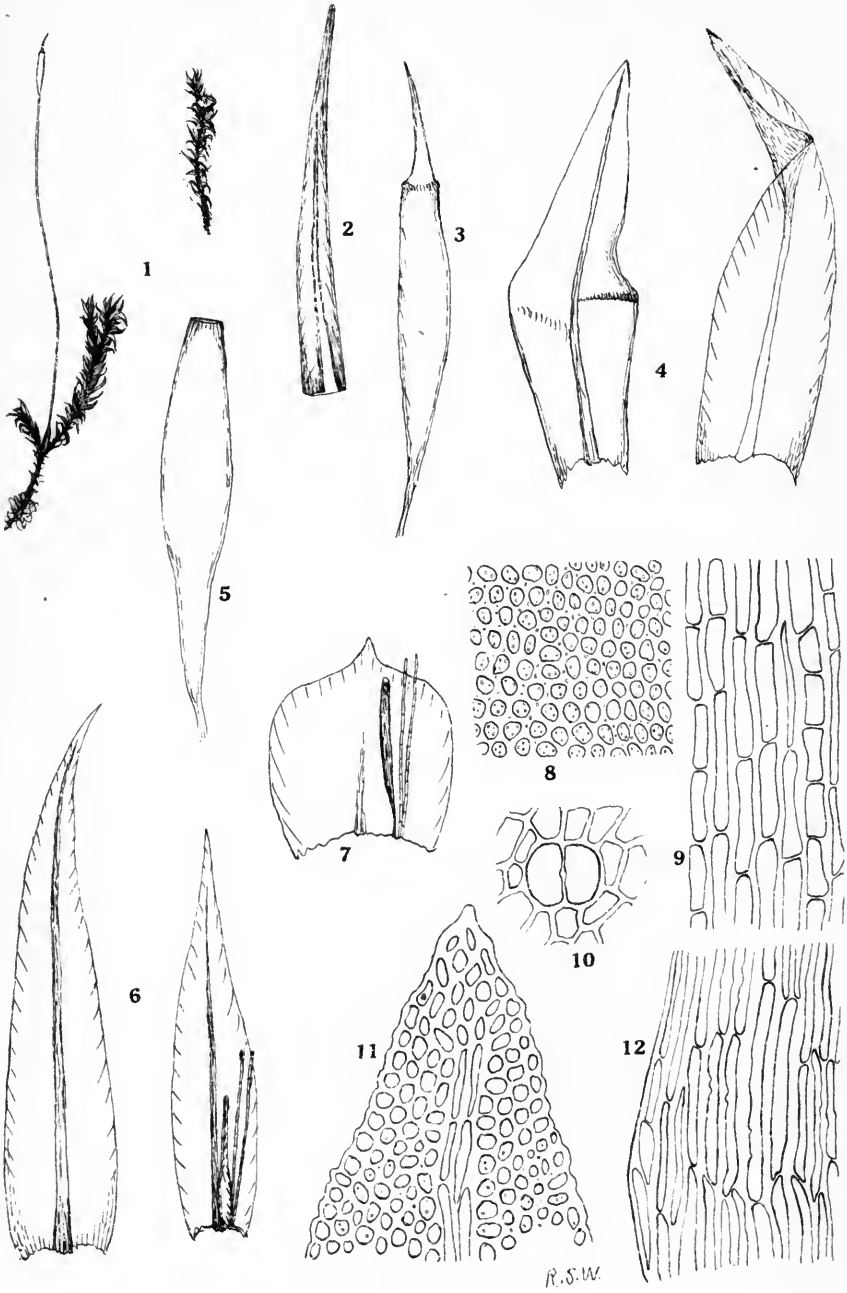
TORTULA SUBOBLIQUA sp. nov



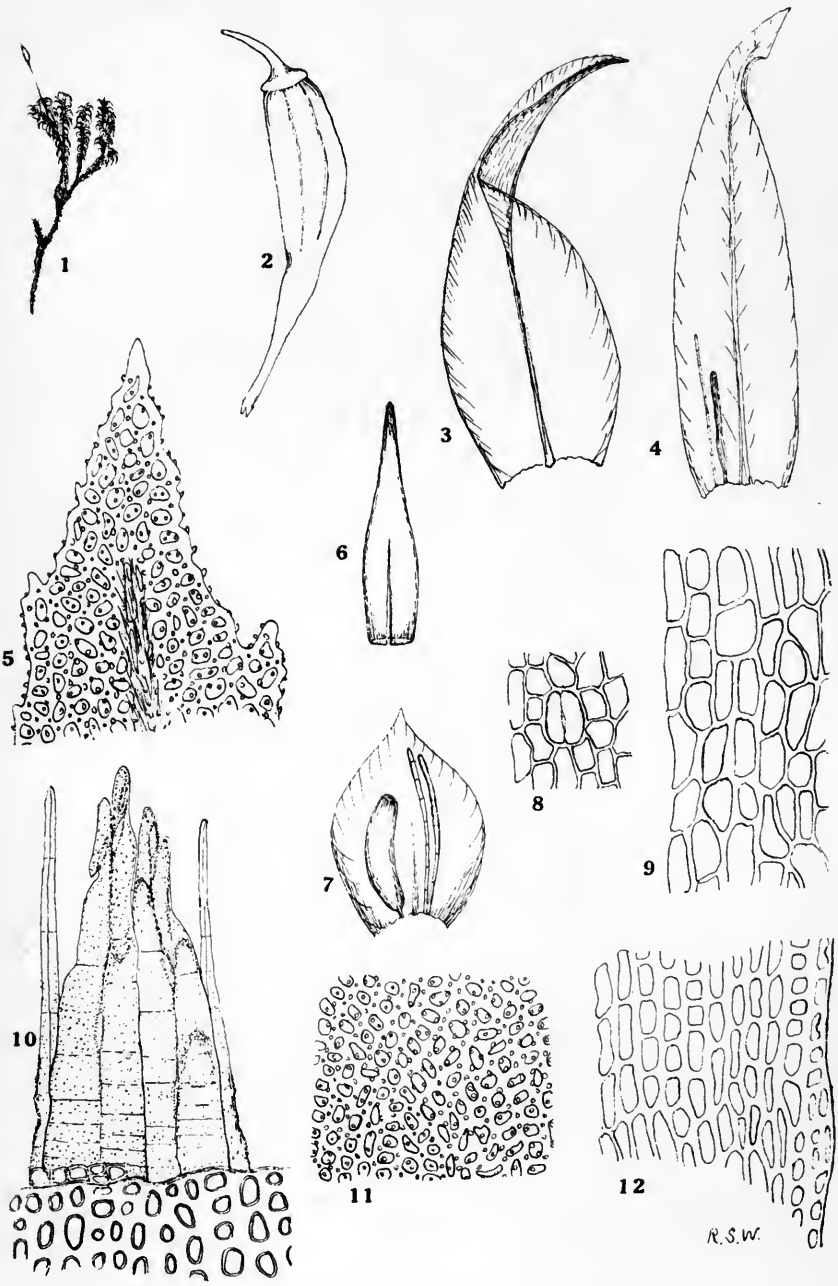
COSCINODONTELLA BRYANI gen. et sp. nov.



ANOECTANGIUM PLATYPHYLLUM sp. nov.



ZYGODON LONGISETUS sp. nov.



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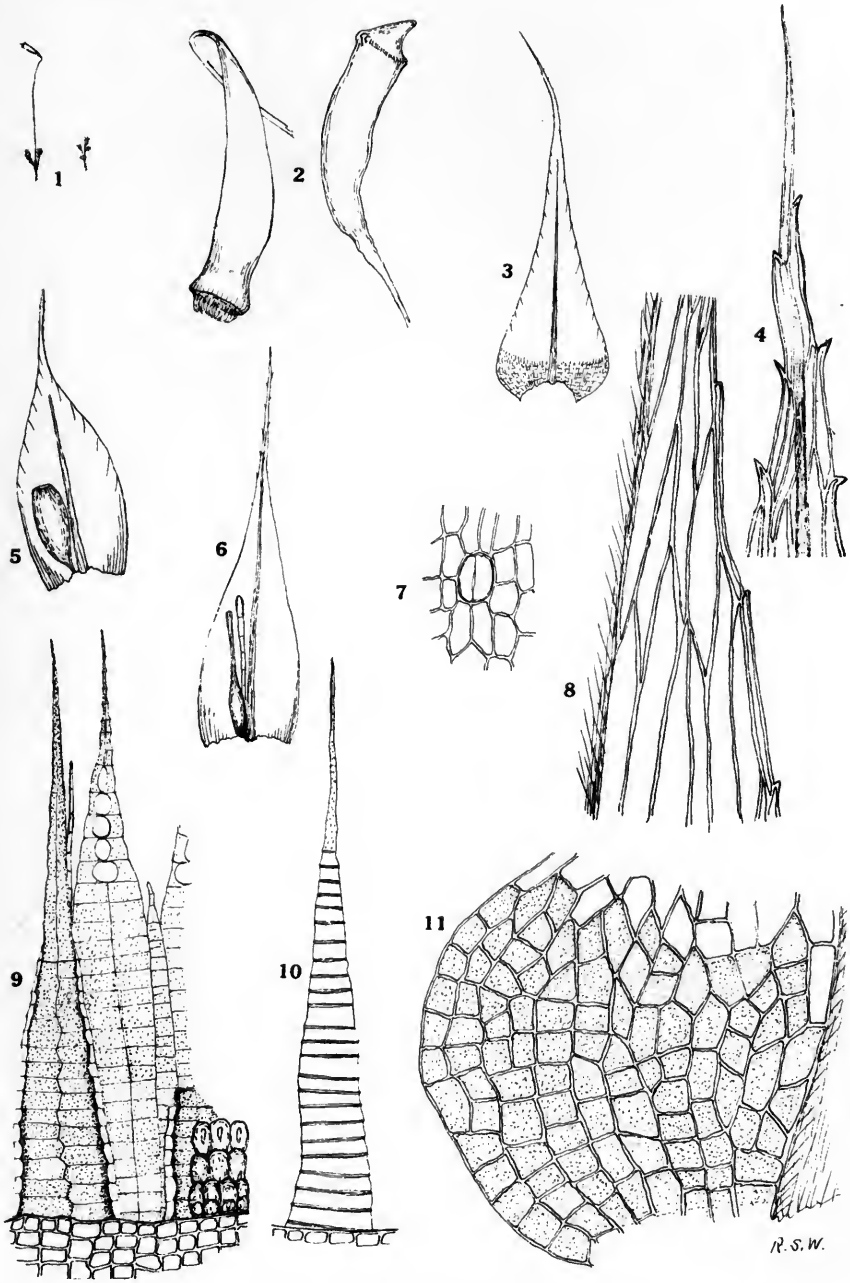
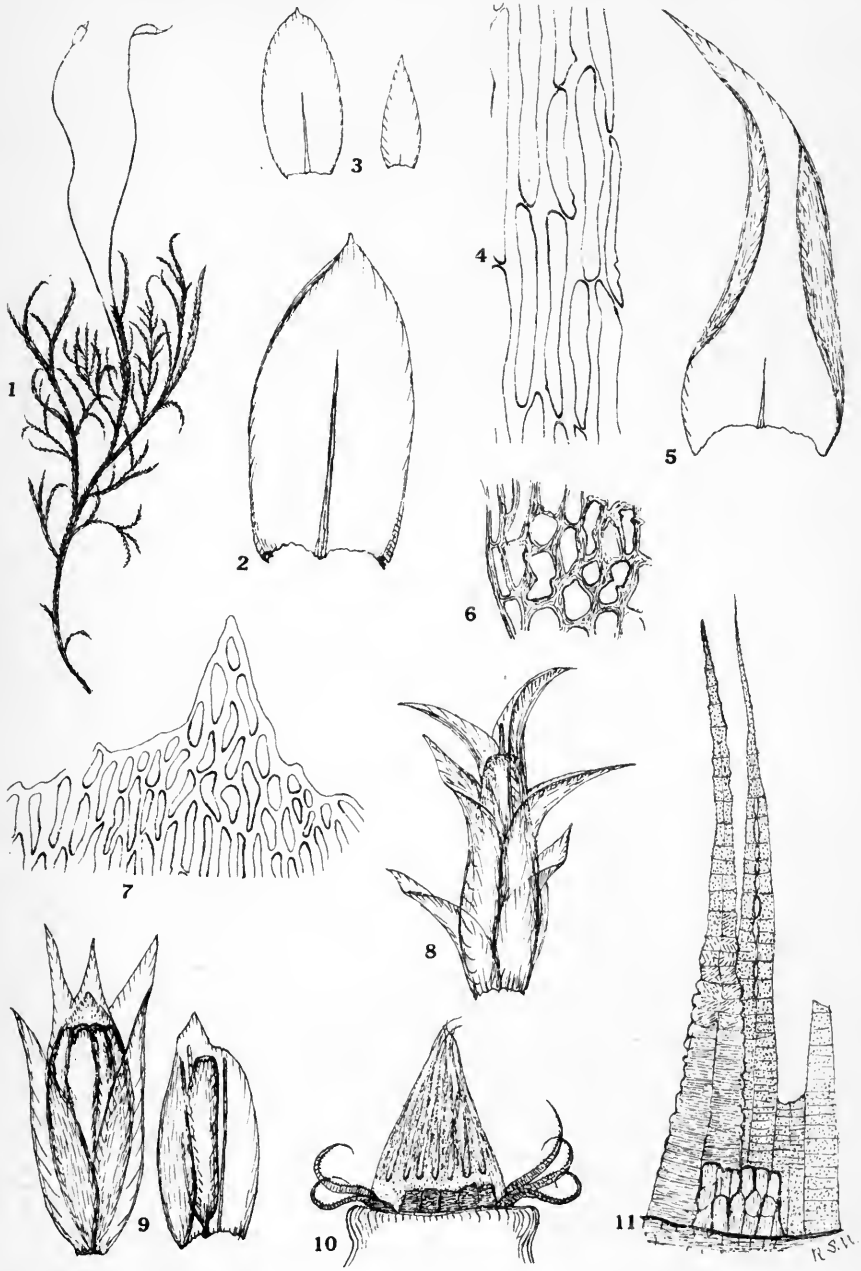


BRYUM SERICEUM, var. DENTICULATUM var. nov.



ERIODON LONGIPES sp. nov.