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MEXICAN MOSSES COLLECTED BY
BROTHER ARSÈNE BROUARD

BY

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MEXICAN MOSSES COLLECTED BY BROTHER
ARSÈNE BROUARD¹

By I. THÉRIOT

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Brother Arsène (F. S. C.), who resided in Mexico previous to 1914, made important collections of mosses, more especially in the states of Puebla and Michoacán. Compelled by war and revolution to leave the country, he saved what he could of his collections and tendered the mosses to the U. S. National Museum at Washington.

The specimens had still to be named. Himself of French descent, Brother Arsène preferred that his collections be entrusted to a French bryologist for identification. My friend Cardot was the one fitted for this undertaking, but unfortunately, having suffered much during the war, he had given up bryological study completely. Brother Arsène asked me to take M. Cardot's place. At first I demurred, since the Mexican flora was almost unknown to me; then I considered that this flora had been studied more especially by the French bryologists (as witness the number of species bearing the authority Beschreelle or Cardot), and it seemed to me a duty to receive their legacy and to carry on their labor.

Further, the determination of Brother Arsène's mosses would not require of me an all-inclusive knowledge of the Mexican flora. Though the collection totaled more than 1,000 numbers, the number of species would scarcely exceed 200, less than one-third of the moss flora known at present.

I have found the study of the material very attractive and very profitable, since each species is represented by numerous specimens from different localities. The bryologist, elaborating in his study the flora of a distant region, can not but be most grateful to collectors as wise as Brother Arsène, whose generous gatherings permit one the better to appreciate the range of variation in each species, the stability or instability of distinguishing characters, and the worth of species already described, and hence to bring about clearer understanding and to make reductions.

¹ With M. Thériot's permission, the comments and critical notes, written in French, were translated by the late Edward B. Chamberlain.

The larger proportion of the collections comes from the states of Michoacán and Puebla. To avoid frequent repetitions, I give below a list of the localities most frequently cited and their altitudes. The reader will surely be willing, if he deems it worth while, to refer to this tabulation.

STATE OF MICHOACÁN, NEIGHBORHOOD OF MORELIA

Jesús del Monte, 2,000 meters.
 Campanario, 2,200-2,300 meters.
 Cerro Azul, 2,300-2,400 meters.
 Cerro San Miguel, 2,200 meters.
 Loma Santa María, 2,000 meters.
 Loma del Zapote, 1,950 meters.
 Loma de la Huerta, 2,000 meters.
 Carrindapaz, 2,100 meters.
 Rincón, 1,950-2,100 meters.
 Bosque San Pedro, 1,950 meters.
 Andameo, 2,100 meters.

STATE OF PUEBLA

Huejotzinco, 2,200 meters.
 Esperanza, 2,400 meters.
 Xúchitl, 2,400-2,800 meters.
 Vicinity of Puebla: Cholula road, 2,180 meters.
 Hacienda Alamos, 2,170 meters.
 Hacienda Batán, 2,120 meters.
 Rancho Guadalupe, 2,150 meters.
 Cerro Tepoxúchitl, 2,370 meters.
 Rancho Posadas, 2,170 meters.
 Cerro Guadalupe, 2,200 meters.

The present contribution covers but a portion, around a third, of Brother Arsène's rich collections. Others will follow in accordance with the progress of my identification of the specimens.

DICRANACEAE

CERATODON STENOCARPUS Bry. Eur. (29-30:) Cerat. 4. 1846 (*nom.*);
 C. Müll. Syn. 1: 647. 1849

Campanario (7459); Jalápa, Veracruz, 1,400 m. (7970a).

AONGSTROEMIA PUSILLA Thér., sp. nov.

(FIG. 1)

Jesús del Monte (7605 p. p.), among tufts of *Pogonatum toluense* var.

Pusillus. Caulis simplex, interdum ramosus, 2-3 mm. altus. Folia appressa, inferiora ovato-acuminata, costa percurrente, ceteris sensim majora, costa excurrente, haud attenuata, basi 40-50 μ crassa, marginibus planis, superne sinuolatis; rete pellucido, cellulis basilaribus breviter rectangularibus, ceteris hexagonis vel rhombeis, 24-30 μ longis, 8 μ latis, parietibus tenuibus flexuosis. Folia perichaetalia longiore cuspidata, pedicellus brevissimus, vix 1 mm. longus, capsula immersa, subglobulosa, 0.6 mm. longa, 0.5 mm. crassa, calyptra minuta, cucullata, operculum tantum obtegens. Caetera desunt.

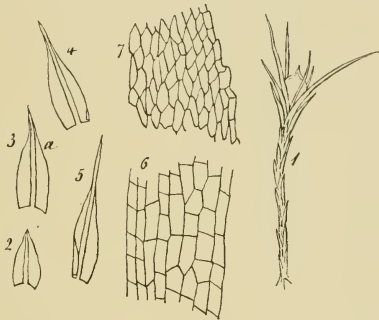


FIG. 1.—*Aongstroemia pusilla* Thér. 1, entire plant, $\times 12$; 2, 3, 4, leaves, $\times 17$; 5, perichaetial leaf, $\times 17$; 6, basal areolation, $\times 200$; 7, areolation at point *a*, $\times 200$.

This species is scarcely to be compared with any save *Aongstroemia jamaicensis* C. M. (*A. brevipes* Hpe., fide R. S. Williams in N. Amer. Flora 15: 79. 1913), which is distinguished by greater robustness and taller stems (up to 6 cm.); by longer, perfectly entire, more gradually acuminate leaves; by the median and upper leaf cells being longer and narrower, and with the walls very incrassate; by the costa being thin basally and widened above; and by the thicker, more elongate capsule. Since the plant is abundantly distinct from all its congeners, it seemed rather superfluous to destroy the solitary capsule available in order to study the peristome.

AONGSTROEMIA ORIENTALIS Mitt. Trans. Linn. Soc. II. 3: 154. 1891

(FIG. 2)

Mixed with other mosses, especially *Campylopus Arsenci* and *Anomobryum* sp.: Rincón (s. n.); Campanario (7559 p. p., 7561 p. p., 7577 p. p.).

Statura reteque *A. julacae* (Hook.) Mitt. sat similis, differt foliis apice patulo-arcuatis, parum secundis, subacutis, marginibus sinuolatis, costa percurrente, angustiore, vix $30\ \mu$ crassa.

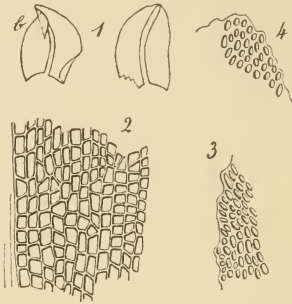


FIG. 2.—*Aongstroemia orientalis* Mitt. 1, leaves, $\times 30$; 2, basal areolation, $\times 200$; 3, areolation at point *b*, $\times 200$; 4, apical cells, $\times 200$.

DICRANELLA VARIA (Hedw.) Sch. *Corol. Bry. Eur.* 13. 1855, forma

Hacienda Alamos (4632, 4633).

A form with short, short-acuminate leaves, which are at most 1 to 1.2 mm. long.

ORTHODICRANUM FLAGELLARE (Hedw.) Loesk. *Studien* 85. 1910

(FIG. 3)

Cerro Azul (4989).

Sterile. Caespites compacti. Caulis 1-2 cm. altus, apice ramulis numerosis, gracilis, flagelliformis, folia parva, remota, obtusa emitens. Folia caulina sicca crispato-circinata, humida erecta parum patula, flexuosa, e basi oblonga sensim longe et tenuiter acuminata, canaliculato-tubulosa, superne denticulata, dentibus minutis et remotis, marginibus haud incrassatis, 3-3.8 mm. longa, 0.5 mm. lata, folia inferiora breviora, basi longiora, marginibus saepe integris, omnia fragilia, frequenter effracta; costa percurrente vel breviter excurrente, basi $90\ \mu$ lata, dorso remote et obtuse dentata, cellulis alaribus (7-9-seriatis) hexagonis, fuscis, $15-20\ \mu$ latis, auriculas parum excavatas et totam basin laminae efficientibus, cellulis suprabasilaribus linearibus, firmis, ceteris quadratis vel breviter rectangularibus, valde chlorophyllosis, diam. $10\ \mu$.

The species has the habit and color of *H. arborcum* Mitt., to which it seems to be related, though more slender. It is distinguishable

at once by the flagelliform branches covering the upper part of the stems, by the more fragile, often broken leaves which are shorter, narrower, and only slightly dentate, by the smaller, more numerous alar cells, and by the flattened costa. *H. proliferum* Mitt. also differs decidedly, according to description, in the ligulate, obtuse, strongly dentate leaves, etc.

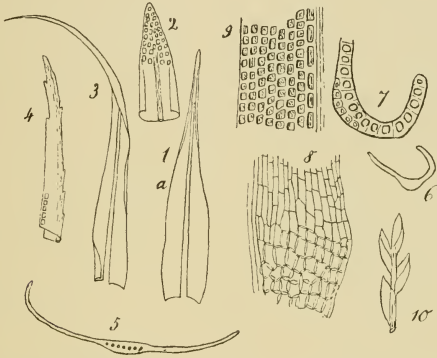


FIG. 3.—*Orthodicranum flagellare* (Hedw.) Loesk. 1, leaf from midstem, $\times 17$; 2, its acumen, $\times 90$; 3, upper leaf, $\times 17$; 4, its acumen, $\times 90$; 5, transverse basal section of a leaf, $\times 90$; 6, section of leaf in upper third, $\times 90$; 7, the same, $\times 200$; 8, basal areolation, $\times 90$; 9, areolation at point *a*, $\times 200$; 10, portion of a flagelliform branch, $\times 17$.

DICRANUM FRIGIDUM C. Müll. Bot. Zeit. 17: 219. 1859

Vicinity of Puebla (4957).

CAMPYLOPUS (*Pseudocampylopus*) ARSENEI Thér., sp. nov.

(FIG. 4)

Rincón (s. n.); Cerro Azul (4981); Campanario (7573).

Caespites densissimi. Caulis valde radiculosus, 1-3 cm. altus, dense foliosus. Folia erecto-appressa, apice plus minus flexuosa, lanceolato-lineararia, longe et tenuiter subulata, superne denticulata, e basi valde concava, deinde involuto-tubulosa, alis angustissimis (e medio ad summum e cellulis 1-seriatis compositis), 3.5-4 mm. longa, 0.4-0.5 mm. lata; auriculis minutis, vix excavatis, cellulis alaribus (2-ser.) laxis, hyalinis vel fuscis; rete suprabasilari hyalino, cellulis marginalibus (5-6-ser.) linearibus, internis rectangularibus, cellulis laminae anguste rectangularibus vel rhomboidalibus, 35-40 μ longis, 6 μ latis,

parum chlorophyllosis, parietibus haud incrassatis; costa basi 0.35 mm. crassa, excurrente, dorso superne sulcata, in sectione transversali e 3-4 stratis cellularum formata, ventrali e cellulis amplis, inanis, interno e cellulis (eurycystis) incrassatis, dorsali (1-2) e cellulis parvis, incrassatis (substereidis). Pedicellus 5 mm. altus, calyptra ciliata, capsula oblonga, symmetrica, sicca suberecta, sulcata, sporae 12-15 μ crassae.

The structure of the costa is a little ambiguous. If a section is made in the lower third, among the substereid cells of the dorsal epidermis, there are a few of smaller lumen which may be considered stereids. A section from the acumen, however, shows no stereids at

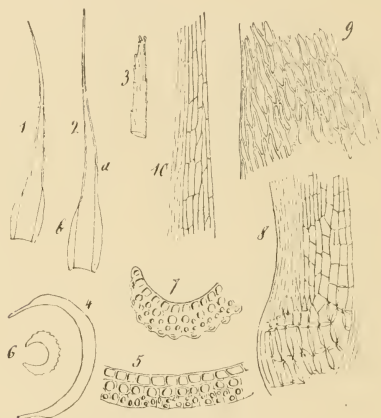


FIG. 4.—*Campylopus Arsenci* Thér. 1, 2, leaves, $\times 12$; 3, acumen, $\times 90$; 4, basal cross section of a leaf, $\times 90$; 5, portion of same, $\times 300$; 6, cross section of leaf towards apex, $\times 90$; 7, portion of same, $\times 300$; 8, auricle and supra-basal areolation, $\times 130$; 9, cells of lamina at point *b*, $\times 200$; 10, cells at point *a*, $\times 200$.

all. The species is surely one of the links in the chain connecting *Pseudocampylopus* and *Eucampylopus*. In the shape and size of the leaves it bears an odd resemblance to *Campylopus subturfaccus* Card., but the stems of the latter are very short and the auricles of the leaves, above the base, are composed of subquadrate or rhomboidal, chlorophyllose cells of large diameter. *C. Chrismari* (C. M.) Mitt. has a non-ciliate calyptra, a pedicel 10 mm. long, and the leaves 5 to 7 mm. long.

CAMPYLOPUS SUBTURFACEUS Card. Rev. Bryol. 37: 119. 1910

Campanario (7561 p. p.).

Young, incompletely developed plants. It is necessary to place here also a moss collected by Liebmann and labeled *Campylopus pusillus* by Schimper (Herb. Mus. Paris); it is totally different from the Orizaban *C. pusillus* (collected by F. Müller), which, as Mr. R. S. Williams has already observed, belongs to *Campylopodium*.

CAMPYLOPUS (Atrichi) MEXICANUS Thér., sp. nov.

(FIG. 5)

Campanario (7576, type); Cerro Azul (4544 p. p., 4781, 4797 p. p.).

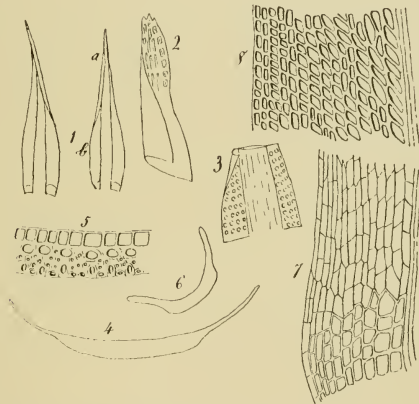


FIG. 5.—*Campylopus mexicanus* Thér. 1, leaves, $\times 12$; 2, acumen, $\times 90$; 3, portion of acumen at point *a*, $\times 90$; 4, basal cross-section of leaf, $\times 90$; 5, portion of same, $\times 300$; 6, apical cross-section, $\times 90$; 7, auricle and supra-basal areolation, $\times 130$; 8, areolation of the lamina at point *b*, $\times 200$.

Mollis, caespites densi. Caulis 1.5-2 cm. altus, radiculosus, basi terra obrutus, dense foliosus, saepe in axillis foliorum superiorum ramuli flagelliformes. Folia mollia, erecto-appressa, apice flexuosa, humida parum patula, lanceolata, breviter acuminata, integra vel superne denticulata, parum concava, marginibus planis superne leviter involutis, 3 mm. longa, 0.55 mm. lata; costa 0.25-0.30 mm. crassa, percurrente, dorso laevi, in sectione transversali structura normali, auriculis planis male limitatis; cellulis suprabasilaribus hyalinis vel parum chlorophyllosis, marginalibus (4-5 ser.) linearibus,

juxtacostalibus rectangularibus, cellulis laminae quadratis vel rhomboidalibus, magnis, diam. $10\ \mu$, sed valde inaequalis, recte seriatis, parietibus parum incrassatis, Pedicellus 6 mm. altus, calyptra ciliata, capsula immatura.

I can compare this moss only with *Campylopus Roellii* R. & C., but that species has the leaves longer, with a more slender, involute-tubulose acumen, and the nerve proportionately broader.

CAMPYLOPUS INTROFLEXUS (Hedw.) Brid. Bryol. Univ. 1: 472. 1826

Loma Santa María (7862, 7871, 7873, 7877); Andameo (4817, 4837); Rincón (4563); Loma de la Huerta (4835); Tlaxcala, Santa Ana Chiautempan (4853).

Nearly all these specimens differ one from the other, showing once more the extreme variability of this species: The leaves may be auricled or not; the hair point long or short; the costal lamellae, of 2, 3, or 4 cells, may begin at the very base or appear only in the lower third of the leaf; the capsule may be more or less elongate, and more or less costate.

METZLERELLA LEPTOCARPA (Sch.) Card. Rev. Bryol. 38: 100. 1911

Leptotrichum leptocarpum Besch. Prodr. Bryol. Mex. 34. 1871.

Cerro Azul (4544, 4547, 4555, 4774); Campanario (4771, 7511, 7551, 7574, 7928).

I notice a rather wide variation in the height of the plants, in the direction and length of the leaves (erect or falciform-secund), in the length of the seta, and also in the capsule, which is sometimes a little arcuate (no. 7551).

FISSIDENTACEAE

FISSIDENS PRINGLEI Card. Rev. Bryol. 36: 69. 1909

Hacienda Alamos (4724); Camino de Cholula (4848, 4860 p. p.).

FISSIDENS HERIBAUDI Broth. & Par.; Card. Rev. Bryol. 40: 33. 1913

Rancho Guadalupe (4604, 4609); Morelia, Parque de San Pedro (4920).

FISSIDENS ARSENEI Broth. & Par.

Cerro Guadalupe (685, 803); Hacienda Alamos (4768).

An unpublished species; I furthermore believe that it is simply a form of the preceding species. The leaves are smaller, crisped

when dry, and not readily flattening out when moist, with a hyaline margin that is much widened at base, and with shorter, usually erect capsules. Further, there are transitional forms, as for example one received from Brother Héribaude (under name of *Fissidens Heribaudei*) which matches exactly neither *F. Arsenei* nor *F. Heribaudei*, but is intermediate between the two extreme forms. No. 4768 is another form, with a narrower margin (4 to 6 cells), that tends to approach the next species.

FISSIDENS TORTILIS Hpe. & C. M. Bot. Zeit. 22: 340. 1864

Puebla, without definite locality (695); Rancho Guadalupe (4610); Huejotzinco (4858); Andameo (4823, 4825, 4839); Loma Santa María (4903, 5064, 7859, 7863); Querétaro, Jurica (11003).

This species, which Bescherelle lists in his Prodrômus (Mém. Soc. Sci. Nat. Cherbourg 16: 170. 1872), seems to have been lost sight of or misunderstood since the publication of that work, yet it is not rare in Mexico. I have come to the conclusion that the moss distributed in the Pringle collection under the name *Fissidens reclinatulus* C. M. should be referred to *F. tortilis*, and further am of the opinion that the Costa Rican *F. reclinatulus* should not be kept specifically distinct from *F. tortilis*. At the same time it should be stated that the specimens of Tonduz's collecting which I have studied have been polyoicus (the male flowers sometimes terminal on a special branch, sometimes on a short branch at the base of the fruiting stem), and that I have seen nothing like this condition in the Mexican plants studied.

According to my observations, *Fissidens tortilis* Hpe. & C. M. is characterized as follows: Leaves unequal, crisped when dry, not readily flattening out when moist, with the dorsal lamina a little decurrent, the margin usually of the same coloration as the rest (but sometimes hyaline) and reaching the apex of the leaf, the margin formed of 2 or 3 cells in the apical lamina, and of 3 or 4 cells in the true lamina. The capsule is inclined.

FISSIDENS TORTILIS Hpe. & C. M. var. **BREVIFOLIUS** (Card.) Thér.,
comb. nov.

Fissidens reclinatulus var. *brevifolius* Card. Rev. Bryol. 36: 69. 1909.

Fissidens pennaeformis Par. MS.

Morelia, Bosque San Pedro (4575); Puebla, in horto archiepiscopali (ex hb. Paris sub nom. *F. pennaeformis*).

Cardot established his variety *brevifolius* upon no. 10699 of Pringle's collection, but the latter subsequently distributed under no. 10699 another plant that does not differ from *F. tortilis*.

FISSIDENS (Bryoidium) LONGIDECURRENS Thér., sp. nov.

(FIG. 6)

Morelia, Loma Santa María (4892, 4906).

Dioicus? Caulis 7-12 mm. altus. Folia 12-15-juga, inaequalia, sicca crispata, difficile emollentia, oblongo-lanceolata, late acuminata, subacuta, marginata, 1.2-2 mm. longa, 0.4-0.5 mm. lata, lamina apicali $\frac{1}{4}$ ad $\frac{1}{3}$ folii aequante, lamina dorsali longe decurrente, limbo angusto hyalino e 1-2 seriebus cellularum angustarum composito, limbo

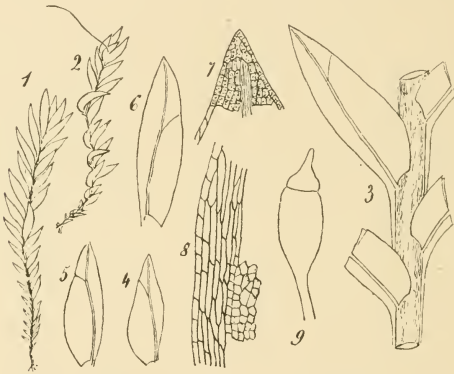


FIG. 6.—*Fissidens longidecurrens* Thér. 1, 2, entire plants, $\times 4$; 3, portion of a stem, $\times 17$; 4, 5, median stem leaves, $\times 17$; 6, upper stem leaves, $\times 17$; 7, apical cells, $\times 200$; 8, margin of the true lamina, $\times 200$; 9, moist capsule, $\times 17$.

laminae verae dilatato e 6-8 seriebus cellularum composito; costa concolore, basi 40μ lata, sub apice evanescente; rete obscuro (alis pellucido), cellulis minutis, irregularibus, parietibus tenuibus, diam. 6-7 μ . Pedicellus geniculato-flexuosus, 3 mm. longus, capsula sub-erecta, oblonga, basi attenuata, operculum conicum, brevirostratum.

This species is surely close to *F. Pringlei* Card., but differs in the longer stems, the greater decurrence of the leaves (they unite with the leaf below), and the smaller cells, especially those in the true lamina. It is also close to *F. aequalis* Salm. in size and in the measurements and shape of the leaves and in their areolation, but is nevertheless distinct in the unequal leaves with a shorter apical lamina and a more decurrent dorsal lamina.

FISSIDENS (Bryoidium) **FLEXUOSUS** Thér., sp. nov.

(FIG. 7)

Morelia, Andameo (4824).

Caulis erectus, flexuosus, 1.5 cm. longus. Folia 15–20-juga, inferne minuta, cetera sensim majora, sicca applanata, haud crispata, marginata, 2–2.5 mm. longa, 0.5–0.6 mm. lata, oblongo-lanceolata, acuminata, acuta, lamina apicali $\frac{1}{3}$ folii aequante, lamina dorsali parum decurrente, limbo lamina apicali hyalino e 1–2 seriebus cellularum angustarum composito, limbo lamina vera dilatato, e 4–5 seriebus cellularum composito; costa concolore, basi $36\ \mu$ crassa, sub apice finiente; rete obscuro, cellulis hexagonis, parietibus tenuibus, diam. $6\ \mu$, basilariibus vix majoribus. Caetera ignota.



FIG. 7.—*Fissidens flexuosus* Thér. 1, whole plant, $\times 4$; 2, medium stem leaf, $\times 17$; 3, upper stem leaf, $\times 17$; 4, apical cells, $\times 200$; 5, median cells, $\times 200$; 6, margin of true lamina, $\times 200$.

This differs from *F. aequalis* Salm. in its greater size and its unequal leaves, which are longer and neither secund nor crisped when dry. From all Mexican species of the section *Bryoidium* it differs in the elongate stems having large flat leaves with a compact obscure areolation.

FISSIDENS (Semilimbium) **BROUARDI** Thér., sp. nov.

(FIG. 8)

Morelia, Loma Santa María (7858).

Rhizautoicus, pusillus, terrestris. Caulis brevis, simplex, vix 2 mm. altus. Folia 5–7-juga, inferiora remota minuta, sensim majora,

oblongo-lanceolata, breviter acuminata, acuta, 0.8-1.2 mm. longa, 0.25-0.35 mm. lata, alis vaginantibus; limbo pellucido, lutescente. sinuato, e cellulis 4-seriatis composito marginatis, laminis apicali et dorsali cimbatis, crenulatis, lamina dorsali attenuata haud decurrente; costa sub apice evanida, basi 20-30 μ lata; rete obscuro, cellulis rotundato-hexagonis, papillosis, diam. 6 μ . Pedicellus erectus, 2 mm. altus. Caetera ignota.

This species differs from *Fissidens Ravenelii* Sull. in the smaller size, shorter leaves with the apical lamina reaching hardly one-third of the leaf, etc. It is distinguished from *F. Nicholsoni* Salm. and

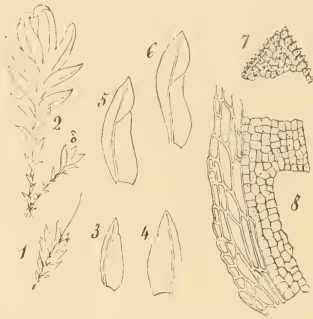


FIG. 8.—*Fissidens Brouardi* Thér. 1, plant with seta, $\times 4$; 2, another plant with male and female flower, $\times 12$; 3, 4, 5, stem leaves, $\times 17$; 6, perichaetial leaf, $\times 17$; 7, apical cells, $\times 200$; 8, margin of true lamina, $\times 200$.

F. hemicraspedophyllus Card. by the terrestrial habitat and the shape of the leaves; from the first also by the broader margin, and from the second in not having the margin extended to the apex of the vaginant lamina.

FISSIDENS (Semilimbidium) MICHOCANUS Thér., sp. nov.

(FIG. 9)

Morelia (7892).

Diocis? Terrestris, pusillus. Caulis 2 mm. altus. Folia 5-8-juga, inaequalia, media 0.7 mm. longa, 0.25 mm. lata, lamina apicali brevi, immarginata, lamina dorsali anguste basi attenuata vel rotundata, immarginata, lamina vera ad $\frac{2}{3}$ vel $\frac{3}{4}$ folii producta, marginata tantum in foliis perichaetialibus, limbo e cellulis 2-3-seriatis superne et inferne evanescente; costa ante apicem dissoluta angusta, basi 12-18 μ

lata; rete obscuro, cellulis rotundato-hexagonis, chlorophyllosis, papillosis indistinctis. Pedicellus geniculatus, vix 2 mm. longus, capsula erecta, oblonga, e basi breviter attenuata, operculum conicum longirostratum capsulam aequante, peristomii dentes sub ore inserti, 0.27 mm. longi, usque fere ad basin fissi. Caetera desunt.

This species is near the preceding in the sum of its characters, but is readily distinguishable by its appearance. The fertile stems are more densely leafy, and are accompanied by sterile stems that have more numerous, shorter, subequal leaves. The leaves also, save the perichaetial ones, are marginless, the costa is only half as wide, and



FIG. 9.—*Fissidens michoacanus* Thér. 1, entire fertile plant, $\times 12$; 2, portion of fertile stem, $\times 30$; 3, leaf from a sterile stem, $\times 30$; 4, margin of true lamina (perichaetial leaf), $\times 200$; 5, moist capsule, $\times 17$; 6, teeth of peristome, $\times 90$.

the pedicel is geniculate. The capsule of *F. Brouardi*, which I have not seen, will doubtless furnish other distinguishable marks. The plant is close also to *F. Ravenelii* Sull., but differs in having a short apical lamina, no dentation in the true lamina, the costa always terminating below the apex, the areolation more opaque, the pedicel shorter, and the peristome teeth divided almost to the base.

FISSIDENS (Heterocaulon) PSEUDO-EXILIS Thér., sp. nov.

(FIG. 10)

Morelia, Loma Santa María (4899, 4928).

Rhizautoicus. Caulis fertilis 2 mm. altus. Folia 3-4-juga, inaequalia, integra, lamina apicali breviter acuminata, acuta, $\frac{1}{3}$ folii aequante, lamina dorsali immarginata, attenuata, lamina vera tantum e medio marginata (cellul. 2-3-seriatis); rete pellucido, cellulis mediis

et superioribus hexagonis, laevibus, parce chlorophyllosis, diam. 7-9 μ , basilaribus (lamina vera) majoribus, breviter rectangularibus; costa valida, 30-36 μ lata, ante apicem evanescente. Caulis sterilis dense foliosus, 3 mm. altus; folia 12-15-juga, subaequalia, duplo minora, subobtusa, immarginata, lamina dorsali ad insertionem evanescent. Pedicellus pallidus, gracilis, 3-4 mm. longus, capsula erecta vel parum inclinata, ovata, brevicollis, leptoderma, operculum conicum brevisstratum, peristomii dentes usque ad $\frac{2}{3}$ fissi, sporae laeves, 18 μ crassae.

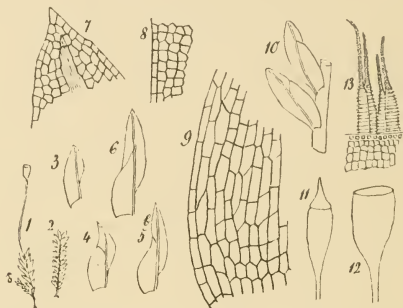


FIG. 10.—*Fissidens pseudo-cvilis* Thér. 1, fertile plant, $\times 4$; 2, sterile plant, $\times 4$; 3, 4, 5, 6, leaves from a fertile stem, $\times 17$; 7, apical cells, $\times 200$; 8, marginal cells at point *b*, $\times 200$; 9, basal areolation of true lamina, $\times 200$; 10, leaves from a sterile stem, $\times 30$; 11, very young capsule, $\times 17$; 12, deeperculate capsule, $\times 17$; 13, teeth of peristome, $\times 90$.

In habit and size the fertile stems recall *F. cvilis* Hedw., but our species is easily distinguished by its dimorphous stems, its entire leaves with smaller cells and the true lamina partially marginate, its larger spores, etc. This species is the first member of the section *Heterocaulon* reported from North America.

FISSIDENS ASPLENIODES (Sw.) Hedw. *Musc. Frond.* 3: 65. *pl.* 28. 1801

Cerro Azul (5097); Morelia (7888, 7898, 7899, 7910, 7919); Campanario (7942a).

TRICHOSTOMACEAE (in part)

PLEUROCHAETE LUTEOLA (Besch.) Thér., *comb. nov.*

Trichostomum luteolum Besch. *Mém. Soc. Sci. Nat. Cherbourg* 16: 178. 1872.

Pleurochaete mexicana Broth. MS. in hb. Levier, no. 7458.

Puebla: Esperanza (4661).

A stouter plant than *P. squarrosa* (Brid.) Lindb. of Europe. The basal areolation of the leaves is composed of much longer rectangular cells, and the margin, which is formed of more elongate cells, extends sensibly farther up the leaf.

LEPTODONTIUM EXASPERATUM Card. Rev. Bryol. 36: 74. 1909
Esperanza (4728).

LEPTODONTIUM HELICOIDES Card. Rev. Bryol. 36: 75. 1909
Cerro Azul (4538, 4549, 4776 p. p., 4790); Campanario (7444, 7517, 7929).

These specimens which I have referred to *L. helicoides* have scarcely more in common than the helicoid arrangement of the leaves on the stem. They differ among themselves in respect to the length of the leaves, in the width of the acumen or revoluteness of the border, and in regard to the development of the papillae. On the other hand, I am unable to refer them to any other American species, and am forced to the opinion that *L. helicoides* is an extremely variable species, perhaps an extreme form of *L. ulocalyx* (C. M.) Mitt. Thus no. 7444, from Campanario, with elongate, less dentate leaves, indicates a tendency toward this latter species, while nos. 4549 and 4776, from Cerro Azul, with more incrassate cells and long, salient, sometimes bifurcate papillae, approach *L. exasperatum*. Many species, often based on a single specimen, have been proposed in this genus; I am confident that when it proves possible to study these in the field, or with ample material, the number will have to be greatly reduced.

BRYACEAE (in part)

LEPTOBRYUM PIRIFORME (L.) Wils. Bry. Brit. 219. pl. 28. 1855
Puebla: Río San Francisco (922, 5002).

EPIPTERYGIUM MEXICANUM (Besch.) Broth. in E. & P. Nat. Pflanzenfam.
t²: 555. 1903

Loma Santa María (4900).

BRYUM (*Argyrobryum*) **CINEREUM** Thér., sp. nov.

(FIG. 11)

Finca Guadalupe (736).

Sterile, pusillum, viride cinereum, innovationibus gracilibus, 0.5 cm. longis, dense foliosis, julaceis, arcuatis. Folia minuta, imbricata,

cordato-ovata, subobtusa vel acuta, 0.36-0.50 mm. longa, 0.36 mm. lata; rete denso, pellucido, ad $\frac{2}{3}$ folii chlorophylloso; cellulis basilariibus marginalibus quadratis, diam. 10 μ , juxtacostalibus rectangularibus vel rhombeis, mediis et superioribus hexagonis, parietibus valde incrassatis, 30-40 μ longis, 10 μ latis; costa ultra medium evanida, basi 30 μ crassa.

This species is essentially characterized by its slender, julaceous, arcuate branches, its small leaves, almost as wide as long and strictly imbricate even when moist, and its compact areolation, the median and upper cells with walls much thickened, especially at the angles. It

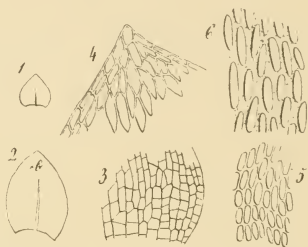


FIG. 11.—*Bryum cinereum* Thér. 1, leaf, $\times 17$; 2, another leaf, $\times 30$; 3, basal areolation, $\times 130$; 4, apical cells, $\times 130$; 5, upper cells at point *b*, $\times 130$; 6, the same, $\times 200$.

may be compared to *B. amblyolepis* Card., but that has soft, laxly foliolate innovations, larger leaves with laxer areolation, and the upper leaf cells not incrassate.

BRYUM (Argyrobryum) ARSENEI Thér., sp. nov.

(FIG. 12)

Puebla (724).

Habitu *Acaulon mutico* (Schreb.) sat simile. Caules et innovationes valde breves, vix 1 mm. longi, gemmiformes. Folia sicca et humida dense imbricata, concava, cordata, suborbicularia, obtusa vel subacuta, marginibus planis, 0.4-0.5 mm. longa, 0.4-0.5 mm. lata; rete pellucido, vix ubique chlorophylloso, cellulis basilaribus quadratis, ceteris breviter rectangularibus, mediis et superioribus breviter hexagonis, parietibus parum crassioribus, viridibus, 25-30 μ longis, 10-12 μ latis, costa apicem attingente, basi 30-36 μ lata. Pedicellus rubellus, 7 mm. altus, capsula pendula, oblonga, collo brevi, ruguloso, attenuato, 1.5 mm. longa, operculum convexo-conicum, haud mamil-

latum, annulus latus (2-3 cell.), peristomii dentes aurantico-purpurei, 0.30 mm. longi, trabeculis prominentibus, membrana ad $\frac{1}{2}$ dentium producta, processus lanceolati, perforati, cilia inaequalia, nunc evoluta appendiculataque, nunc rudimentaria, spores laeves, 8-10 μ crassae.

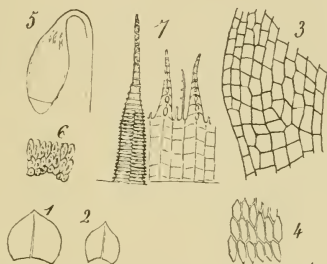


FIG. 12.—*Bryum Arsenei* Thér. 1, 2, leaves, $\times 17$; 3, basal areolation, $\times 130$; 4, upper cells, $\times 130$; 5, moist capsule, $\times 12$; 6, annulus, $\times 90$; 7, portion of peristome, $\times 90$.

BRYUM ARGENTEUM L. Sp. Pl. 1120. 1753

Puebla, Boca del Monte (4675); Mayorazgo (5974); Morelia (7604, 7884, 7964).

BRYUM ARGENTEUM L., forma

Morelia, Loma del Zapote (4640).

A form which fluctuates between the variety *majus* Schwaegr. and *B. amblyolepis* Card.

BRYUM ARGENTEUM L. var. COSTARICENSE R. & C. Bull. Soc. Bot. Belg. 31: 167. 1893

Puebla: Cerro Guadalupe, Cerro Tepoxúchitl, Rancho Guadalupe (689, 4522, 4606, 4816, 4864). Michoacán: Loma Santa María (4914, 7856); Cerro Azul (4931); Loma del Zapote (7605); Jesús del Monte (7616); Campanario (7944). Distr. Federal: Mixcoac (9429).

It will be readily understood that all these specimens are neither identical among themselves nor an exact match for the var. *costaricense*. Also I regard this variety as one which ought to be included among the forms of the var. *lanatum* (P. B.) Bry. Eur., as it is scarcely distinguishable save by the paler color of the tufts and by having the leaves chlorophyllose to the middle or a little beyond.

BRYUM MINUTULUM Sch.; Besch. Mém. Soc. Sci. Nat. Cherbourg 16:
197. 1872

Puebla, Camino de Cholula (4861).

BRYUM INSOLITUM Card. Rev. Bryol. 36: 112. 1909

Puebla (908); Rancho Posadas (4805).

The latter plant corresponds well with the description; I feel less certain of the other, since the fruit is young and the capsules unformed.

MNIACEAE

MNIUM ROSTRATUM Schrad. in L. Syst. Nat. ed. 13. 2^o: 1330. 1791

Morelia (7903); Cerro Azul (5054); Campanario (7709).

The last specimen is a robust form with much larger leaves.

BARTRAMIACEAE

ANACOLIA INTERTEXTA (Sch.) Jaeg. Adumb. 2: 699. 1877-78

Cerro Azul (4783, 4976); Cerro San Miguel (5100, 7501); Campanario (7563).

This species is absolutely different from *Anacolia setifolia* (Hook.) Jaeg., and one can hardly understand how Mitten could have confused it with that. Reading the two descriptions is enough to satisfy one. C. Müller (Syn. 1: 574. 1848) thus describes the areolation of *A. intertexta*: "Folia . . . e cellulis ubique aequaliter minutissimis, densis firmis rotundatis areolata." And Mitten (Journ. Linn. Soc. 12: 268. 1869) says of *A. setifolia*. "Folia . . . basi cellulis angustis pellucidis areolati . . . cellulis angustis obscuris." Accordingly, the characters given by Brotherus in Engler & Prantl (Nat. Pflanzenfam. 1²: 634. 1904) as referring to *A. setifolia* should be understood as belonging to *A. intertexta* (cf. l. c. 635. fig. 478).

ANACOLIA INTERTEXTA (Sch.) Jaeg. var. **ARISTIFOLIA** Thér., var. nov.

Cerro San Miguel (4873, 5076).

The variety differs from the type in that the leaves are narrower at the base, more gradually and more finely acuminate, less strongly revolute and for a shorter distance, and less sulcate; also in that the costa is excurrent into a long slender awn, and that the median cells are narrower (6-7 μ) with less thickened walls.

ANACOLIA SUBSESSILIS (Tayl.) Broth. in E. & P. Nat. Pflanzenfam. 1³: 634. 1904

Esperanza (4727); Hacienda Batán (4939); Morelia (7908); Jesús del Monte (7963). Several forms.

This species has the lamina of the leaves of two layers of cells and the areolation obscure, while *A. intertexta* has the lamina of a single layer and the areolation pellucid.

PHILONOTIS VIRIDANS Card. Rev. Bryol. 38: 36. 1911

Loma Santa María (7646). Dioicous!

This species is surely close to *P. graminicola* (C. M.) Jaeg. I am unable to detect any difference in habit, size, form, and measurements of the leaves, areolation, and length of pedicel. (It is true that Brotherus in E. & P. Nat. Pflanzenfam. 1³: 646. 1904, says that *P. graminicola* has a pedicel 3 cm. long, but in a specimen I have from C. Müller the seta is not over 12 mm. long.) The two species differ, then, solely in the inflorescence: autoicous in *P. graminicola*, dioicous in *P. viridans*. Is this enough? I should admit readily that *P. viridans* is a dioicous form of *P. graminicola*.

PHILONOTIS CURVATA (Hampe) Jaeg. Adumb. 1: 545. 1873-74

Puebla, Camino de Cholula (4860). Autoicous!

This species differs from *P. radicalis* (P. B.) Brid. in its smaller size, floral verticels, shorter seta, and smaller capsule. The species is new to Mexico and to North America.

PHILONOTIS ELEGANTULA (Tayl.) Jaeg. Adumb. 1: 543. 1873-74

Andameo (4826); Loma Santa María (4898); Campanario (7632, 7634b, 7637, 7639). Identifications confirmed by Dismier.

A species new to the Mexican flora; the greater portion of the specimens differ from the type in their more robust size. *P. amblyoblasta* C. M. is distinguished from *P. elegantula* by the oval-cordate, proportionately wider leaves, and by the much stronger costa (50-60 μ , as against 30-36 μ), which retains its width nearly to the apex of the leaf and is exactly percurrent. However, it is undoubtedly a closely related species.

PHILONOTIS MARCHICA (Willd.) Brid. Bryol. Univ. 2: 23. 1827

Campanario (7538, 7709a).

This species has not been known previously from Mexico.

PHILONOTIS JAMAICENSIS (Mitt.) Card. Rev. Bryol. 38: 102. 1911

Morelia, Loma Santa María (4911, 5098).

BREUTELIA TOMENTOSA (Sw.) Sch.; Paris, Ind. Bryol. 155. 1894

Puebla (4950). A form with secund leaves.

BREUTELIA INTERMEDIA (Hampe) Besch. Prodr. Bryol. Mex. 60. 1871

Cerro San Miguel (5072); Campanario (7447, 7540, 7925).

Since all the material of this species and the preceding is sterile, the determinations remain doubtful.

POLYTRICHACEAE

ATRICHUM MUELLERI Sch. var. **CONTERMINUM** (Card.) Thér., comb. nov.

Atrichum conterminum. Card. Rev. Bryol. 37: 5. 1910.

Cerro Azul (5095); Campanario (7562, 7641, 7753); Cerro San Miguel (5039, 5056, 5094).

Cardot recognized (cf. Rev. Bryol. 38: 37. 1911) that the majority of the characters, save the height of the lamellae, by which he separated his *A. conterminum* from *A. Muelleri* were not constant. The material from Cerro San Miguel, however, weakens this latter character. Thus, no. 5056 shows 4 lamellae of 4 or 5 cells, and nos. 5039 and 5094, collected at the same locality on another date, show lamellae of 6 to 8 cells. The height of the lamellae, therefore, is no more constant here than in the case of our *A. undulatum* P. B. Since the plants from Cerro San Miguel link *A. conterminum* closely to *A. Muelleri*, it becomes necessary to reduce Cardot's species to a variety.

POGONATUM CYLINDRICUM Sch.; Besch. Mém. Soc. Sci. Nat. Cherbourg

16: 111. 1872

Cerro Azul (5052); Cerro San Miguel (5060, 7544), Campanario (7458); Carrindapaz (7543).

Naming these mosses has been laborious. They are certainly related to *P. ericaefolium* Besch. and *P. Lozanoi* Card., but they differ in their more robust habit, longer leaves with plane or involute (not revolute) margins, larger teeth, higher lamellae (of 4 or 5 cells), and longer capsule. It occurred to me to compare this material with *P. comosum* Sch. and *P. cylindricum* Sch., species belonging to the group of *P. ericaefolium*, according to Brotherus. The Director of the Royal Botanic Garden at Kew was kind enough to lend me the

Schimper types, preserved in that collection. To my surprise I found that the moss labeled *P. comosum* by Schimper is not a *Pogonatum* but is identical with *Polytrichum alpiniforme* Card. The tables are turned, however, since so far as I can see, *Pogonatum cylindricum* Sch., which Brotherus (E. & P. Nat. Pflanzenfam. 1³: 691. 1905) makes a synonym of *P. comosum*, differs only in unimportant characters from the specimens collected by Brother Arsène.

POGONATUM BARNESI Card. Rev. Bryol. 38: 38. 1911

Cerro San Miguel (5057, 5068); ruisseau de Santa María (5096); Campanario (7577, 7578, 7943).

A rather variable species.

POGONATUM TOLUCENSE (Hampe) Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 107. 1872

Cerro San Miguel (5088, 5099); Campanario (7461); Loma Santa María (7861); Andameo (4838).

POGONATUM TOLUCENSE (Hampe) Besch. var. **CHIAPENSE** (Broth.) Thé., comb. nov.

Pogonatum chiapense Broth. in Card. Rev. Bryol. 37: 5. 1910.

Andameo (4840); Jesús del Monte (7605).

Judging from specimens collected at Las Chiapas (ex herb. Levier), *P. chiapense* Broth. differs so little from *P. toluicense* that I consider it preferable to subordinate the first species to the second as a variety. It is distinguished by the less dentate leaves with the sheathing portion oblong, scarcely dilated, and very gradually narrowed into the lamina. No attention is paid to the differences in the length of the seta. for anyone knows the value of this character in the various species of *Pogonatum*! The plant I received from Pringle under the name of *P. chiapense* (no. 10698) does not differ from *P. toluicense*.

POLYTRICHUM ANTILLARUM Rich.; Brid. Bryol. Univ. 2: 138, 747. 1827

Puebla (4954); Xúchitl, 2800 meters (7983).

POLYTRICHUM JUNIPERINUM Willd. Fl. Berol. Prodr. 305. 1787

Campanario (7443, 7572).

HEDWIGIACEAE

HEDWIGIA ALBICANS (Web.) Lindb. Musc. Scand. 40. 1879

Puebla: Cerro Tepoxúchitl (4852); Malinche (6001); Cerro San Miguel (4878). Often accompanied by *Braunia Andrieuxii*.

BRAUNIA LIEBMANNIANA Sch.; Besch. Mém. Soc. Sci. Nat. Cherbourg
16: 185. 1872

Cerro Azul (4536, 4539, 4550, 4776, 4780); Cascade de Coincho (4714).

This imperfectly understood species differs from *B. squarrosa* (Hampe) Broth. by the less robust growth, the stems and branches being only about half as thick, by the smaller leaves, which when moist are spread out nearly at right angles, and by the shorter cells. The inflorescence is autoicous!

For a long time I hesitated to refer these collections of Brother Arsène to *B. Liebmanniana* on account of inability to verify in this material two characters mentioned by C. Müller, viz: *Leaves imbricate, inflorescence hermaphrodite*. The difficulty was solved only by comparison with Schimper's type (collected by Liebmann), which the authorities at Kew, whom I thank most appreciatively, were so kind as to lend me. This showed the leaves sometimes imbricate, sometimes a little patent; hence the leaf arrangement is not a character of much value. I dissected also a perichaetium without being able to discover a single antheridium; but below the female flower I found a thick bud, full of antheridia and paraphyses and surrounded by short leaves of different shape from the perichaetial ones. This bud is a true male flower, and the species is autoicous, not hermaphrodite as C. Müller declares.

I believe that the following explains the source of the error: When the male flower was examined, among the ripe inflated antheridia were some narrow withered organs which I suppose to be aborted antheridia, but which C. Müller doubtless took for archegonia. This hypothesis seems to be confirmed by the phrase which follows the description: "*Hermaphrodita antheridiis et paraphysibus copiosissimis archegoniis paucis.*" The male flowers of Brother Arsène's plants are exactly like those just described, and present the same peculiarity. To my knowledge, *B. Liebmanniana* has not been collected in Mexico since Liebmann's time. It is true that in the great herbaria, especially that at Paris, there are specimens collected by Bourgeau and by Hahn which are so named by Bescherelle. But the error of determination is clear; these plants, which really belong to *B. secunda*, have pedicels at least 1 cm. long; they are also paroicous, which character is doubtless the source of Bescherelle's error. Finally, this author did not know the type of *B. Liebmanniana*, as is shown by his placing the closely related to *B. Liebmanniana* and *B. squarrosa* in two different genera.

BRAUNIA PLICATA (Mitt.) Jaeg. Adumb. 2: 87. 1869-70

Campanario (7933).

This number represents a form with the leaf cells less incrassate than those of the Quito type.

Cardot founded a variety *canescens* (Rev. Bryol. 38: 38. 1911) on Pringle's no. 10627 from Cuyamaloya. The plant I received from Pringle under this number is not the same as that which Cardot saw, and does not differ from *B. secunda*. It is useful to note this error, since it may exist in other sets of the exsiccatae.

BRAUNIA SECUNDA (Hook.) Sch.

and

BRAUNIA ANDRIEUXII Lor.

These two species are very closely related, and the distinctive characters are few. *B. secunda* may be recognized by the slender branches, whose leaves are very patent when moist, and by the slightly plicate stem leaves, which are strongly revolute from base to apex. *B. Andrieuxii* has short, thick branches with erect-patent leaves, and the stem leaves are plane or very narrowly revolute toward the base only, as well as being broader and more abruptly acuminate. These characters, however, are not always associated on the same plant. Some forms have the cauline leaves plane-margined but less broadly oval than those of *B. Andrieuxii*; others have the stem leaves of *B. Andrieuxii* and the branch leaves very patent; still others (no. 4851) have leaves plane-margined but only very slightly plicate, etc. It is necessary to recognize that the characters given for each species lack constancy, and that *B. Andrieuxii* is only an extreme form of *B. secunda*. For these reasons I have reduced it to varietal rank.

While studying the numerous specimens from Brother Arsène and those in the Pringle collection, I was astonished to find that all of them that could be referred to *B. secunda* were paroïcus, while those with the characters of *B. Andrieuxii* were autoïcus. This would be a specific difference, if *B. secunda* were always paroïcus, but such is not the case. According to the description, and to the precise statements of Bridel, Schwaegrichen, and Schimper, the type of this species is autoïcus. Furthermore, I have recently seen a specimen (Holzinger, Musc. Ac. Bor. Am. no. 480) of *B. secunda* which certainly has an autoïcus inflorescence. The Mexican plants collected by Brother Arsène and by Pringle prove that the inflorescence of *B. secunda* is variable; I have therefore grouped these plants as forma *paroïca*.

BRAUNIA SECUNDA (Hook.) Sch. f. **PAROICA**

Michoacán: Santa Clara (leg. Abb. Treviño, 4884); Morelia, Cerro Azul (4556); Campanario (7442, 7571).

BRAUNIA SECUNDA (Hook.) Sch. var. **ANDRIEUXII** (Lor.) Thér., comb. nov.

Braunia Andrieuxii Lor. Moosst. 164. 1864.

Morelia (7904); Carríndapaz (7542); Dos Tetillas (7658); Andameo (4832, 4847); Cerro San Miguel (4869, 4872, 5045, 5077, 5104, 7541); Punguato (4880, 4882, 5047, 5050, 5092); Cerro Tepoxúchitl (4523, 4851).

BRAUNIA SECUNDA (Hook.) Sch. var. **CRASSIRETIS** Thér., var. nov.

Morelia, Campanario (7448).

This variety resembles *B. secunda* in the paroicous inflorescence and the position and shape of the leaves; but it differs clearly in the more deeply plicate cauline leaves, which are less widely revolute and terminated by a short, hyaline acumen, also in the rhacomitrioid areolation like that of *B. cirrifolia* (cells elongate with much thickened, sinuate walls), and, finally, in the longer (17 to 20 mm.) pedicel. It is perhaps a new species.

LEUCODONTACEAE

LEUCODON CURVIROSTRIS Hpe. Icon. Musc. pl. 16. 1844

Jalapa (Veracruz), 1400 m. (7970, 7992); Hacienda Batán (4963, 4971); Esperanza (4660, 4670, 4734, 4803, 7979); Xúchitl (8005); Cerro Azul (4528, 4537).

PRIONODONTACEAE

PRIONODON MEXICANUS Thér., sp. nov.

(FIG. 13)

Jalapa (8000); Cerro Azul (4980); Campanario (7569).

Habitu *P. Piradae* Par. sat similis, differt foliis brevioribus latioribusque, magis dentatis, magis abrupte in acumen duplo breviorum contractis, valde fragilis.

This species may be distinguished from *P. lacviusculus* Mitt. by its leaves, which are stiff, imbricate when dry, very clearly plicate longitudinally, and with a somewhat longer and more slender acumen. From *P. densus* (Sw.) C. M. it differs in its shorter yet more robust

stems and in having the erect-imbricate leaves nearly twice as wide and abruptly contracted to a much shorter acumen which is less sharply dentate, etc.

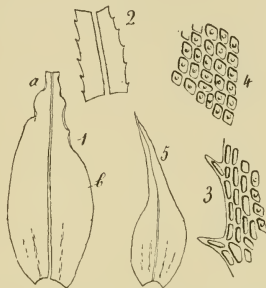


FIG. 13.—*Prionodon mexicanus* Thér. 1, mature, broken leaf, $\times 12$; 2, portion of the acumen near *a*, $\times 30$; 3, leaf-margin near *b*, $\times 200$; 4, median cells, $\times 200$; 5, young leaf, $\times 12$.

PRIONODON ARSENEI Thér., sp. nov.

(FIG. 14)

Esperanza (4747).

Caulis robustus, 4-8 cm. altus, ramosus, ramis brevibus, crassis, dense foliosis. Folia erecto-appressa, plicata, fragilia, e basi oblonga

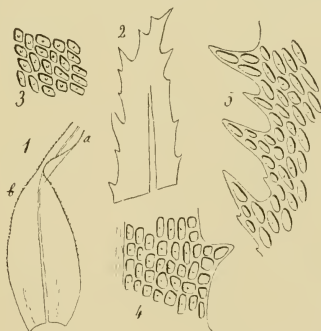


FIG. 14.—*Prionodon Arseni* Thér. 1, leaf, $\times 12$; 2, acumen of a young leaf, $\times 90$; 3, median cells, $\times 200$; 4, margin of leaf near *a*, $\times 200$; 5, margin of leaf near *b*, $\times 200$.

abrupte in acumen loriformum contracta, fere e basi runcinato-dentatis, cellulis ovatis, papillosis, diam 15μ , basilaribus juxtacostalibus line-

aribus, porosis, marginalibus parvis, quadratis, valde incrassatis; costa angusta infra summum evanida.

The leaves of this species are notable for the large teeth which are often again dentate, like those of *P. ciliatus* Besch. from Reunion. *P. lycopodium* (C. M.) Jaeg., from New Grenada, is easily distinguishable from our species by its habit, its elongate, often flagelliform branches, its flexuose, undulate, crisped leaves, etc.

ENTODONTACEAE

ENTODON ERYTHROPUS Mitt. var. **MEXICANUS** Card. Rev. Bryol. 37:
11. 1910

Loma Santa María (5091); Carrindapaz (7579a); Teocalli de Cholula (4859); Hacienda Alamos (4630); Rancho Guadalupe (4603, 4611); Tlaxcala, Santa Ana Chiautempan (4854 p. p.).

ENTODON ERYTHROPUS Mitt. var. **INTERMEDIUS** Thér., var. nov.

Campanario (7512, 7518, 7522, 7580).

The leaves are small and very concave as in the var. *Muenchii*, but the plant has the size, areolation, peristome, and annulus of var. *mexicanus*. It is possible to look upon this variety as forming a transition between var. *mexicanus* and var. *Muenchii*, and it justifies Cardot's action in joining *E. Muenchii* Broth. to the polymorphous *E. erythropus*.

ENTODON ERYTHROPUS Mitt. var. **MUENCHII** (Broth.)
Card. Rev. Bryol. 37: 11. 1910

Fort Guadalupe (4619, 4623); Cerro Guadalupe (654, 656, 684, 686); Hacienda Alamos (4693, 4695, 4762, 4765, 4767, 4782); Rincón (4566, 4568); Jesús del Monte (7615). Distrito Federal, Mixcoac (9459).

The variety appears to me to differ from var. *mexicanus* by the rather less robust size, the less complanate branches, and the smaller, very concave leaves, which are more laxly areolate and have fewer quadrate basal cells and a larger costa.

ENTODON ERYTHROPUS Mitt. var. **BREVISETUS** Card. Rev. Bryol. 40:
39. 1913

Morelia: Bosque San Pedro (4572).

ENTODON ABBREVIATUS (Br. Eur.) Jaeg. Adumb. 2: 356. 1875-76

Cerro Azul (4779).

ERYTHRODONTIUM CYLINDRICAULE (C. M.) C. M. Bull. Herb. Boiss.
5: 208. 1897

Xúchitl, at foot of Orizaba, 2800 m. (7990). Morelia: Cascade de Coincho (4715); Cerro Azul (5081); Campanario (7466, 7527, 7530, 7633a).

No. 7466 is a form with shorter and more concave leaves; no. 7633a has shorter setae (6 to 7 mm.).

ERYTHRODONTIUM DENSUM (Hook.) Par. Ind. Bryol. ed. 2. 2: 158. 1904

Puebla: Hacienda Santa Bárbara (4516). Mexico: El Oro (leg. Rangel, 4881). Morelia: Cerro Azul (4534, 4542, 4553, 4787); Campanario (7450, 7525); Andameo (4846 p. p.).

The specimens numbered 4534, 4542, 4787, 4846 p. p., and 7450 have the cauline leaves shorter and more quickly contracted to a short acumen; they doubtless represent Cardot's var. *brevifolium* (cf. Rev. Bryol. 37: 12. 1910). No. 7525 is a more slender form with filiform branches; the solitary capsule seen has a short, conic operculum.

ERYTHRODONTIUM PRINGLEI Card. Rev. Bryol. 37: 11. 1910

Morelia: Cascade de Coincho (4710); Campanario (7519).

PLATYGYRIELLA HELICODONTOIDES Card. Rev. Bryol. 37: 9. 1910

Cerro Azul (4546, 4551, 4778, 4795, 4796), Jesús del Monte (7614).

PLATYGYRIELLA IMBRICATIFOLIA (R. S. Will.) Thér., comb. nov.

Erythrodontium imbricatifolium R. S. Will. in Card. Rev. Bryol. 37: 12. 1910.

Morelia: Jesús del Monte (7602, 7603, 7606, 7618, 7624); Cerro San Miguel (5101); Bosque San Pedro (4584); Carrindapaz (7953)

Since several of the plants are fertile, it is possible now to determine that the systematic position of this species, mentioned by Cardot in Rev. Bryol. 37: 12. 1910, is not in the genus *Erythrodontium* but in *Platygyriella*. Actually, the capsule is annulate, the exostome has the structure of that of *P. helicodontoides*, and, finally, the endostome is composed of a short exerted membrane bearing slender fragile cilia that nearly equal the teeth in length.

PYLAISIA SCHIMPERI Card. Bull. Herb. Boiss. 7: 373. 1899

Morelia: Campanario (7457).

A species not previously known from Mexico.

PYLAISIA SUBFALCATA Sch. Bry. Eur. (46-47:) Pylaisaea 3. 1851 (nom.);
Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 147. 1872

Puebla: Hacienda Batán (4938, 4970 p. p.).

PYLAISIA FALCATA Sch. var. **INTERMEDIA** Thér., var. nov.

Puebla: Esperanza (4663, 4667, 4678, 4688a, 4735).

The leaves are as long as those of *P. falcata*, the acumen long and slender, the alar cells small and obscure, the capsule short as in the species, but in the direction of the leaves and in their median areolation the moss recalls *P. subfalcata*. It is probably an intermediate form, unless it be a new species. That the length of the seta is greater than in either of the two related species would seem to confirm the latter view. Unfortunately the lack of capsules in good condition renders examination of the peristome impossible.

ROZEA BOURGEANA Besch. Mém. Soc. Sci. Nat. Cherbourg 16: 142. 1872

Morelia: Campanario (7565).

FABRONIACEAE

FABRONIA PERIMBRICATA C. M. Flora 83: 334. 1897

Morelia: Loma Santa María (7866).

A species not previously collected in Mexico.

FABRONIA FLAVINERVIS C. M. Linnaea 38: 645. 1874

Morelia: Calzada de Mexico (5066). Veracruz: Córdoba (s. n.).

FABRONIA PATENTIFOLIA Card. Rev. Bryol. 37: 49. 1910

Puebla (4512, 4814).

In the Revue Bryologique 38: 41. 1911, Cardot expresses the view that this species is only a variety of the preceding; I consider it, on the contrary, sufficiently distinct from *F. flavinervis*. Besides the characters mentioned by Cardot, it has a capsule attenuate at base into a rather long neck, a conical obtuse operculum, a peristome made up of 8 pellucid, striate teeth, and small ($13\ \mu$) spores. *F. flavinervis* has an oblong capsule, abruptly contracted into a short neck, a convex, rostrate operculum, a peristome made up of 16 opaque, papillose teeth, and spores 15 to $18\ \mu$ in diameter.

RHACOPILACEAE

RHACOPILUM TOMENTOSUM (Sw.) Brid. Bryol. Univ. 2: 719. 1827

Puebla: Hacienda Alamos (4698, 4719). Morelia (7739, 7895); Campanario (7453, 7521); Cerro San Miguel (7441); Loma Santa María (4918, 4928, 7867, 7868 p. p.); Santa Clara (4887, leg. *Abb. Treviño*). Tlaxcala: Santa Ana Chiautempan (4854).

It is possible to separate these specimens into two groups, one composed of plants with large stipules that are almost as wide and as long as the leaves, which latter are crisped when dry and not complanate-distichous. These forms I judge to represent *R. latistipulaceum* Card. (Rev. Bryol 38: 41. 1911). The second group contains the plants with leaves erect-distichous when dry, little or not at all crisped, and the stipules not more than half the size. This group represents *R. tomentosum*.

But there are some specimens that do not readily fall into these groups; that is, the characters mentioned above are neither constant nor always concurrent in the same plant. The stipules, especially, display much variation in size. Further, it is the opinion of Mrs. E. G. Britton that the species should be united.