

BOTANY.—*Additional Costa Rican Mosses, III.*¹ EDWIN B. BARTRAM, Bushkill, Pennsylvania.

During the past three years many collections from various sources have added many new and interesting species to the Costa Rican moss flora. The number and variety of these additions indicate very plainly that the mosses of this comparatively small area are still imperfectly known. Undoubtedly further exploration, especially in the more inaccessible mountain regions, will expand the list of local species to a considerable extent. Under these circumstances it seems unwise to make up even a tentative list just yet, but I am hopeful that with the continued help of some of the active resident botanists it may be possible in the course of a few years to produce a fairly complete outline of the mosses of this rich and interesting region.

Professor Manuel Valerio, Director of the Museo Nacional in San José, continues to collect as far as his activities in the Museum will permit and expects shortly to make a trip to the Cerro del Chirripó, a practically unexplored region, from which much may be expected. As a direct result of the sustained activity and interest of Professor Anastasio Alfaro during the past year we owe the addition of many valuable records. To Señor Fed. Gutierrez, whose collections have been transmitted through the kindness of Professor Alfaro, we are indebted for an unusually valuable series of collections from the Banana River, in the low country along the Atlantic coast, which includes many novelties. The collections of C. W. Dodge and W. S. Thomas were kindly entrusted to me by Dr. Dodge for determination and a small series, including a new species of *Squamidium*, was sent in by the collector, Professor H. E. Stork of Carleton College, Northfield, Minnesota. To these gentlemen I wish to express my profound thanks. It is mainly through their efforts and cooperation that the results detailed in the following list have been made possible.

FISSIDENTACEAE

FISSIDENS MOLLIS Mitt.

Banana River, 80 m., May 23, 1934, *F. Gutierrez*; San Luís de Turribares, 450 m., Prov. San José, July 15, 1933, *M. Valerio* 359.

The agreement between these specimens and collections from the Antilles is reasonably complete, and I have but little hesitation in crediting the species to Costa Rica.

FISSIDENS KEGELIANUS C. M.

Banana River, 80 m., May 14, 1934, May 23, 1934, June 9, 1934, *F. Gutierrez*.

¹ Received July 28, 1934.

This is one of the few minute species of the section Bryoidium that seems to be fairly well defined. The enlarged, lax areolation of the duplicate blades contrasts sharply with the smaller hexagonal cells of the apical and dorsal blades and appears to be a good diagnostic character. It is an interesting addition to the local flora.

FISSIDENS GARBERI Lesq. & James.

Roadsides south of Liberia, 100 m., Prov. Guanacaste, Jan. 16, 1930, C. W. Dodge & W. S. Thomas 6595.

Fissidens Garberi is new to the Costa Rican flora, but these plants are not exactly typical. The costa ends considerably below the apex, which is broadly rounded in many leaves, and the leaf cells are rather obscure and more coarsely papillose with sharp papillae. As these distinctions may not be of much consequence in such a large and intricate group of species, I am inclined to refer this collection here as an unusual form.

DICRANACEAE

TREMATODON LONGICOLLIS Michx.

Tilarán, 700 m., March 15, 1934, A. Alfaro; La Fuente, 1200 m., Dec. 27, 1933, A. Alfaro 47.

This is one of the smaller forms that might be referred to *T. reflexus* C. M., but, as Mrs. Britton has remarked² this species is probably only a small form of *T. longicollis*. It is an interesting new record for Costa Rica and helps to bridge the gap between Guatemala and the South American stations in Brazil and Bolivia.

DICRANELLA STANDLEYI Bartr.

Additional records for this endemic species are as follows: La Fuente, 1200 m., Oct. 16, 1933 and Dec. 27, 1933, A. Alfaro.

DICRANELLA BARBENSIS Ren. & Card.

Coronado, 1500 m., Jan. 7, 1934, A. Alfaro.

Although the peristome is up to 270 μ high, almost twice the height given by Mr. Williams in North American Flora, this collection, which is in prime fruit, seems without much doubt to belong here. The teeth are coarsely papillose, not vertically striate, cleft to about the middle into 2 or 3 unequal prongs, and the leaf blade is produced nearly or quite to the apex so that the costa is barely percurrent.

CAMPYLOPODIUM PUSILLUM (Schp.) Williams.

Volcán Poás, 2500 m., Jan. 4, 1934, A. Alfaro 52a.

A number of fruiting plants of this attractive little species were separated from tufts of *Ceratodon stenocarpus*. This is the only collection I know of from Costa Rica.

² North American Flora, 15: 53. 1913.

CAMPYLOPUS FRAGILIS (Dicks.) Bry. Eur.

San Jerónimo, 1400 m., Nov. 15, 1933, *A. Alfaro*.

Not previously known from Costa Rica. This species will be separated from *C. flexuosus* (Hedw.) Brid. by the absence of any differentiated alar cells; also the leaf base is more contracted to the insertion.

LEUCOLOMA TORTELLUM (Mitt.) Jaeg.

Upper slopes of Cerro San José de Libano, 500–960 m., Prov. Guanacaste, Feb. 15, 1930, *C. W. Dodge, R. Hanckel, & W. S. Thomas* 7918.

The range of this unique species seems to be gradually expanding. Mr. Williams restricts it to Guadeloupe and Trinidad in North American Flora. It was later found by Mr. Paul C. Standley in the Lancetilla Valley, Honduras.³ The locality in Guanacaste Province, Costa Rica, not only helps to outline more clearly the area in which it may be looked for but also adds another interesting species to the local flora.

CALYMPERACEAE

SYRRHOPODON GUADICHAUDII Mont.

La Fuente, 1200 m., Dec. 4, 1933, *A. Alfaro* 37.

These collections are in fine fruit and add a second locality to the Costa Rican record.

Syrrhodon aculeo-ciliatus Bartr., sp. nov.

Figure 1.

Gracilescens, caespitosus, caespitibus laxiusculis, pallide viridibus. Caulis ad 2.5 cm. longus, basi radiculosus, dichotome ramosus vel simplex. Folia ad 2 mm. longa, sicca contorta, humida patentia, e basi vaginante auguste linearia, obtusa, limbata, limbo angusto hyalino sub apice evanido; marginibus incurvis, argute serratis, in parte superiore vaginae et summo apice dentibus aculeiformibus instructis; nervo tenui, infra apicem folii evanido, dorso scabro; cellulis laminalibus minutis rotundatis, dorso minutissime papillois, ventri mamillois; cancellina supra rotundata. Caetera ignota.

Dioicous? Slender plants growing in small lax tufts, pale green above, brownish below. Stems up to 2.5 cm. high, simple or forked above, sparingly radiculose near base. Leaves about 5 mm. long, flexuose, spreading, twisted and contorted when dry, widely spreading when moist, linear-lanceolate from a white, erect, narrow clasping base about 2 mm. long, gradually contracted to a linear, channelled or subtubulose point, blunt at apex, bordered from just below the apex to the base with 1-3 rows of elongate hyaline cells; margin erect or incurved, spinose-ciliate at shoulders of leaf and at apex, distantly spinose in median part of blade; costa pale and thin, about 45 μ wide toward base, ending just below the apex, spinose on back toward apex, smooth below, spinose on ventral side about half-way down, in cross section near midleaf showing a median row of about 6 guide cells with stereid bands on both sides, the outer layer of cells on ventral surface well differentiated;

³ Field Museum of Natural History, Bot. Series, 4: 352. 1929.

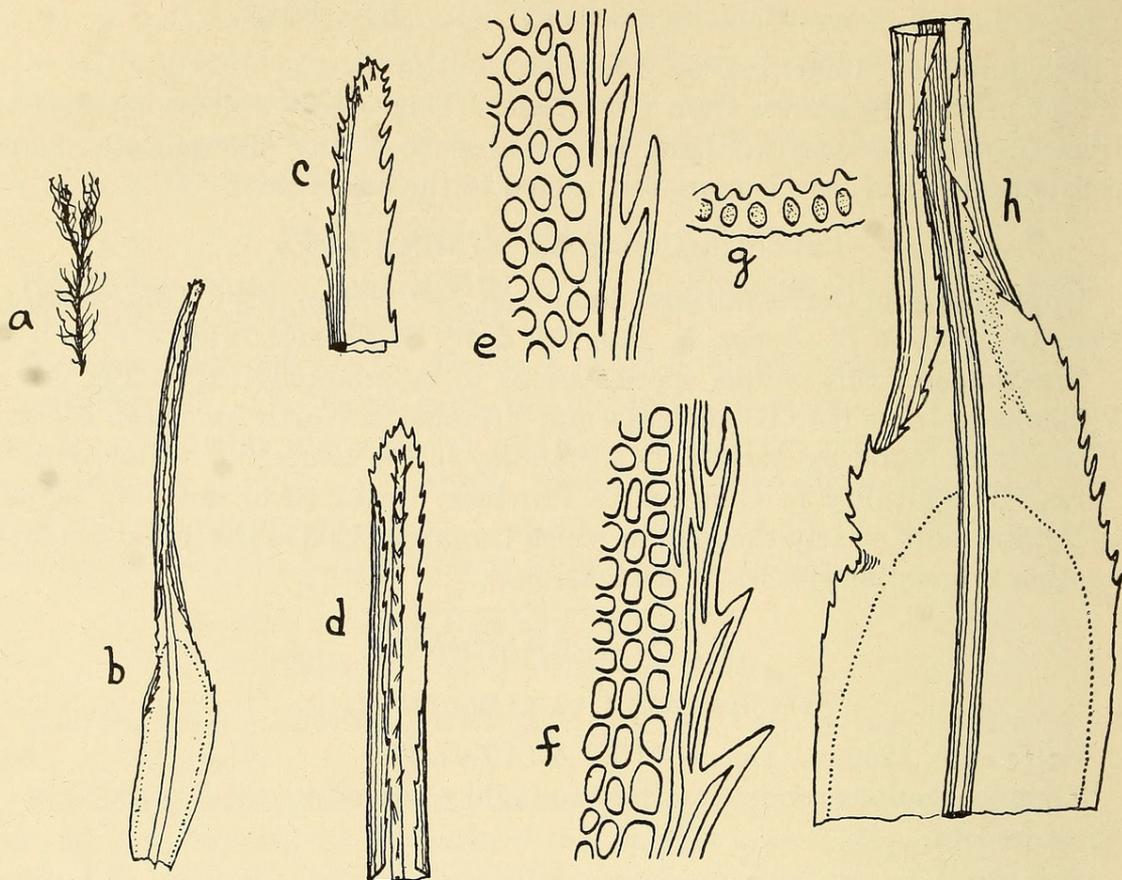


Fig. 1.—*Syrrhopodon aculeo-ciliatus* Bartr. a.—Plant $\times 1$. b.—Leaf $\times 14$. c.—Apex of leaf in profile $\times 80$. d.—Apex of leaf from upper side $\times 80$. e.—Upper leaf cells and margin $\times 400$. f.—Cells and margin near leaf shoulder $\times 400$. g.—Fragment of cross section from upper part of leaf $\times 400$. h.—Part of leaf from upper side $\times 80$.

cells of leaf blade rounded, incrassate, $6-8\mu$ in diameter, mamillöse on inner surface, minutely papillose on the back; cancellinae filling nearly all the leaf base, rounded or ending in obtuse angles above, in 8–10 rows. Sporophyte unknown.

TYPE: La Hondura, Costa Rica, August 15, 1933, *M. Valerio* 369a.

This species seems to be closely allied to *S. Leprieuri* Mont., but is noticeably different in the pale green color, the mamillöse leaf cells, and the spinose margins of the leaf blade.

SYRRHOPODON PARASITICUS (Sw.) Besch.

Tilarán, 700 m., March 15, 1934, *A. Alfaro*.

Even though the leaves of the Costa Rican plants seem to lack entirely the narrow hyaline border of elongated cells, they agree perfectly in other particulars with collections from Florida and Yucatán and evidently represent a form of *S. parasiticus*. The characteristic filiform propagula are abundant on the inner faces of the comal leaves.

CALYMPERES LONCHOPHYLLUM Schwaegr.

Banana River, 100 m., April 27, 1934, *F. Gutierrez*.

An interesting but not unexpected addition to the local flora which assists in consolidating the geographical range of the species. This species extends to northeastern Guatemala and British Honduras.

POTTIACEAE

HYMENOSTOMUM MEXICANUM Card.

Tiribí, 1100 m., Oct. 28, 1933, *A. Alfaro*.

LEPTODONTIUM ORCUTTI Bartr.

Potreros between Guayabillos and Cabeza de Vaca, 2150–2350 m., Prov. San José, Nov. 4, 1929, *C. W. Dodge & W. S. Thomas* 4922.

Evidently this species is confined to fairly high altitudes in Costa Rica. The only other local station known is at an altitude of 3300 m., on Volcán Irazú.

BARBULA SUBULIFOLIA Sull.

Syn.: *Barbula subulirostre* Bartr. in herbaria.

San Pedro, 1170 m., Sept. 1933, *A. Alfaro* 4, 27; Banana River, 100 m., April 27, 1934, *F. Gutierrez*.

It did not occur to me to associate these collections with *B. subulifolia* Sull. until after I had distributed several packets under the new name. Further study has convinced me that all the above collections are clearly referable to *B. subulifolia* Sull., which does not seem to have been noted in Central America before. The long subulate operculum, often appreciably longer than the urn, the long, tightly twisted peristome teeth, the subulate leaf points (usually obtuse and toothed at the apex), and the smooth quadrate leaf cells are fairly stable characters in the aggregate, but the leaves vary considerably in outline and it is probable that a number of nearly related "species" from the Antilles will eventually find their way into the synonymy of *B. subulifolia*.

BARBULA CRUGERI Sond.

Banana River, 80 m., May 20, 1934, *F. Gutierrez*.

New to Costa Rica, so far as I know. This well known and easily recognized species is common in the Antilles but apparently very rare in Central America. It appears again, like so many other Caribbean types, in the Andes of South America. The geographical distribution of these species seems to be in the form of a narrow band extending directly north and south through Colombia, western Venezuela, eastern Costa Rica, and the Greater Antilles to Cuba, with a few extensions to Florida and the northern shores of the Gulf of Mexico.

TORTULA MNIIFOLIA (Sull.) Mitt.

Banana River, 80 m., May 23, 1934, *F. Gutierrez*.

Only the second local record for this attractive species, which ranges from Cuba to Peru.

TORTULA CAROLINIANA Andrews.

San Ildefonso, 1500 m., Jan. 21, 1934, *A. Alfaro*; Volcán Barba, 2250 m., March 11, 1934, *A. Alfaro*.

In these collections the propagula are often scattered over the ventral surface of the leaf toward the apex, rather than congested in apical clusters, but in other respects the plants agree perfectly with the species.

SPLACHNACEAE

SPLACHNOBRYUM OBTUSUM C. M.

Banana River, 80 m., April 27 to May 20th, 1934, *F. Gutierrez*.

Five packets are included here in a collective sense without any great assurance that they are all representative of one specific type. The plants with leaves from 1 to 1.2 mm. long, are all more robust than *S. Bernoullii* C. M., but there is considerable variation in the length of the stems, the crenulation of the leaf margins, the relative length of the costa, and the shape of the apex.

BRYACEAE

BRACHYMENIUM STANDLEYI Bartr.

Coronado, 1500 m., Jan. 7, 1934, *A. Alfaro*; San Ildefonso, 1500 m., Jan. 21, 1934, *A. Alfaro*.

Brachymenium bulbiferum Bartr., nom. nov.

Syn.: *Brachymenium viviparum* Bartr. Cont. U. S. Nat. Herb. 26: 77. 1928. Not *B. viviparum* Ren. & Card. 1898-99.

Fuente, 1200 m., Dec. 8, 1933, *A. Alfaro*.

M. Theriot has kindly called my attention to the fact that the name *B. viviparum* Bartr. is preoccupied. Unfortunately the above collection fails to show any mature fruit, although the setae are well developed. Until the peristome characters are available its systematic position must remain uncertain.

ANOMOBRYUM SEMIOVATUM (Brid.) Jaeg.

San Pedro, 1170 m., Jan. 20, 1934, *A. Alfaro* 68.

Although this species has been credited to Costa Rica this is the first local collection I have seen. Through the kindness of Mr. R. S. Williams I have been able to compare the local plants with Spruce's collection from Ecuador. They are apparently exactly alike. The percurrent or slightly excurrent costa and the relatively thin-walled upper leaf cells are characters which will

readily distinguish this species from most of its allies. It forms an interesting and suggestive link with *Bryum*.

***Bryum insolitum* Card. var. *brachycarpum* Bartr., var. nov.**

Theca brevior, ovalis.

Tiribi, 1100 m., Oct. 28, 1933, *A. Alfaro* 21.

This unique species is a nice addition to the local list. Apart from the obviously shorter, more ovoid capsules these plants and those from Mexico seem to be identical.

BRYUM ANDICOLA Hook.

Syn.: *Bryum rosulicoma* Ren. & Card.

Cabeceras del Río Jorca, 1500 m., Oct. 22, 1933, *A. Alfaro*; Sarchi, 1980 m., Feb. 20, 1934, *A. Alfaro* 78.

There is no doubt in my mind but that this is one of the widely distributed types, similar to *Tortula fragilis* Tayl. and *Anacolia subsessilis* (Tayl.) Broth., ranging from the southwestern United States through Mexico, Central America, and western South America along the Cordilleran chain. *B. rosulicoma* Ren. & Card. and *B. rosulatum* C. M. are only two of what may prove to be an extensive list of synonyms.

BARTRAMIACEAE

PHILONOTIS UNGINATA (Schwaegr.) Brid.

La Fuente, 1200 m., Dec. 27, 1933, *A. Alfaro*.

The long setae and falcate leaves with long-excurrent costa seem to place this collection here rather than with *P. sphaericarpa*. Apparently not previously reported from Costa Rica.

ORTHOTRICHACEAE

MACROMITRIUM MEXICANUM Mitt.

Northwest slope of Cerro Carpintera, above La Unión de Tres Rios, 1320–1700 m., Prov. Cartago, Nov. 1, 1929, *C. W. Dodge* & *W. S. Thomas* 4789.

This appears to be the first species in the section *Macrocoma* to be recorded from Central America. The upper leaf cells are small, 5–7 μ in diameter, as in *M. filiforme* (Hook. & Grev.), but the capsules are distinctly plicate in the upper half and the peristome teeth are not in pairs but are united in a low coarsely papillose ring extending a little above the rim, as in well-fruited plants of *M. mexicanum* collected by C. A. Purpus near Zacapan, Vera Cruz. The agreement in peristome characters together with the crenulate leaf margins, especially in the lower half, suggests that the local collection may better be referred to *M. mexicanum*. Whether or not *M. mexicanum* is specifically distinct from *M. filiforme* is another question that may be deferred until better material of the latter is available for comparison.

MACROMITRIUM MUCRONIFOLIUM (Hook. & Grev.) Schwaegr.

Banana River, 80 m., May 20, 1934, *F. Gutierrez*.

Although not listed in any of the previous papers relating to Costa Rican mosses, this species proves to be not uncommon. I had confused it with *M. apiculatum*, without having a clear understanding of the relative distinctions between these two species as illustrated on Schwaegrichen's Plate no. 170.

MACROMITRIUM HIRTELLUM Bartr.

Tilarán, 700 m., March 15, 1934, *A. Alfaro* 110.

This species is probably only a trivial form of *M. pentastichum* C. M. The uniform arrangement of the leaves around the stem, instead of in 5 rows, is not a very tangible character. The leaves are less widely spreading when moist, and more sharply pointed, but the structural details are nearly identical.

MICROMITRIUM FRAGILE (Mitt.) Jaeg.

Santa María, Guanacaste, 825 m., Feb. 9, 1934, *A. Alfaro*.

I have been thoroughly unsuccessful in finding any characters to separate this species from *M. Schlumbergeri* Schp., and believe that the latter name can safely be relegated to synonymy.

SCHLOTHEIMIA OERSTEDIANA C. M.

Guanacaste, 825 m., Dec. 25, 1933, *A. Alfaro* 50; Potrereros near farmhouse at Hacienda Santa María and source of Río Liberia, Prov. Guanacaste, Jan. 21-24, 1930, *C. W. Dodge & W. S. Thomas* 6944, 6958, 6967; Roadside north of Tilarán, Prov. Guanacaste, Pacific slope, 500-690 m., Feb. 20, 1930, *C. W. Dodge & W. S. Thomas* 6579; Volcán de Barba, 1800 m., 1931, *Ruben Torres* 145.

These collections have not been referred here without considerable distrust. I have not succeeded in finding the narrowly lanceolate-acuminate inner perichaetial leaves described by Müller, but on the other hand the only inference I can draw from a careful comparison of a considerable series of specimens from southern United States, eastern Mexico, British Honduras, and Guatemala is that *S. Sullivantii* C. M., *S. Oerstediana* C. M., *S. Mohriana* C. M. and *S. Sartorii* C. M. are in reality only minor variants of one specific type. In this group the perichaetial leaves are only slightly longer than the stem leaves, longitudinally plicate, either smooth or transversely wrinkled in the upper half, and either mucronate or short-acuminate at the apex. As the differences are too slight and unstable to separate the forms clearly, I strongly suspect that *S. Sullivantii* C. M. may be used in an inclusive sense to cover the plants ranging from the southern United States to Costa Rica. A comparative study of the respective types is essential before any definite conclusion can be made.

CRYPTHAEACEAE

ACROCRYPHAEA GARDNERI (Mitt.) Jaeg.

San Ildefonso, 1500 m., Jan. 21, 1934, *A. Alfaro*; Banana River, 80 m., May 17, 1934, *F. Gutierrez*.

The strongly reflexed leaf margins definitely associate these collections with *A. Gardneri* rather than *A. julacea* (Hornsch.). I know of no previous record of *A. Gardneri* from north of Colombia.

LEUCODONTACEAE

LEUCODONTOPSIS FLORIDANA (Aust.) E. G. Britt.

Laurel, Banana River, 100 m., May 2, 1934, *F. Gutierrez*.

This is the first collection of this species I have seen from Costa Rica, although it has been credited to the local flora.

METEORACEAE

Squamidium crispipilum Bartr., sp. nov.

Figure 2.

Dioicum? Sat robustum, superne lutescenti-viride, intus fuscescens, nitidum. Caules elongati, penduli, inordinate et brevissime pinnatim ramosi.

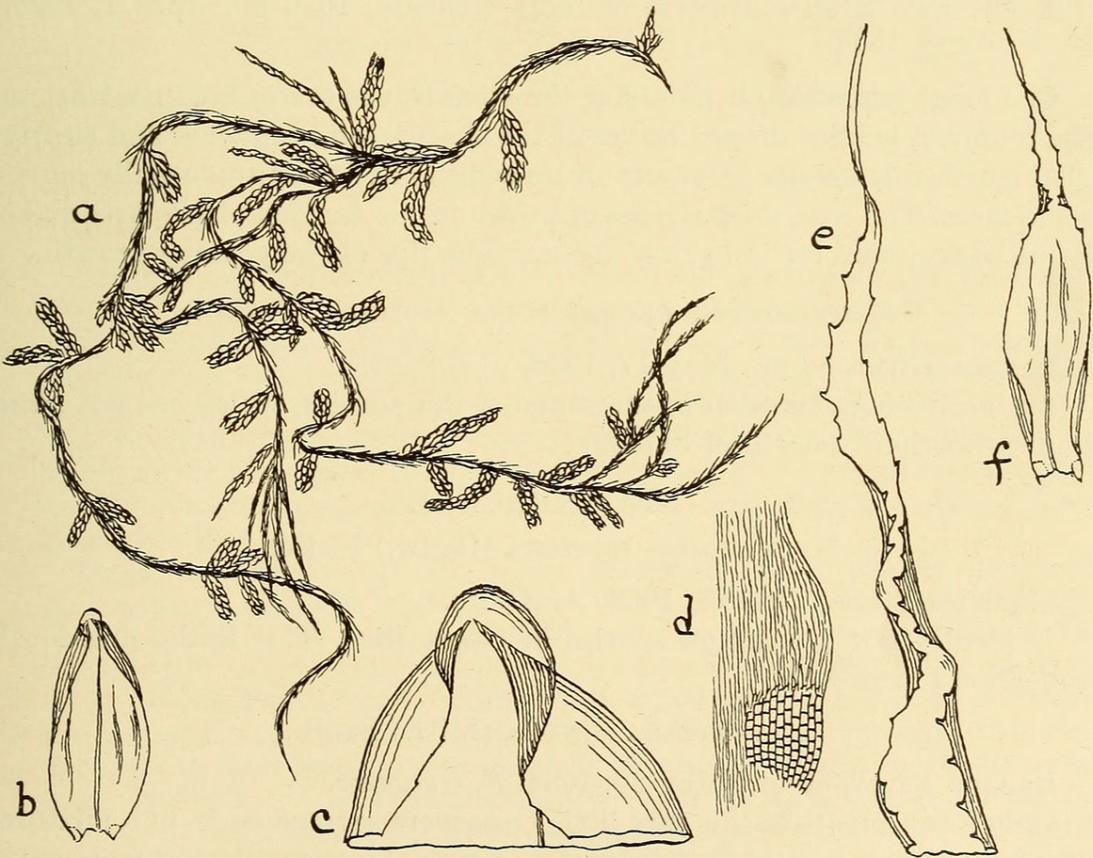


Fig. 2.—*Squamidium crispipilum* Bartr. a.—Part of plant $\times 1$. b.—Branch leaf $\times 16$. c.—Apex of branch leaf $\times 80$. d.—Basal angle of branch leaf $\times 80$. e.—Apex of stem leaf $\times 80$. f.—Stem leaf $\times 16$.

Folia dimorpha, caulina ovato-lanceolata, appressa, apice in acumen elongatum flexuosum canaliculatum argute serratum producta; nervo tenui, supra medium producto; cellulis linearibus, laevibus, ad angulos pluribus quadratis; ramulina ovalia, valde concava, apice galeata, nervo angusto sub apice evanido. Caetera ignota.

Dioicous? Rather robust plants growing in intricate masses, pale yellowish green at the tips, brown or blackish below, glossy. Stems long, flexuose, tangled, ending in slender flagellaceous tips; branches short, distant, blunt, sometimes in clusters. Stem leaves and branch leaves strongly differentiated. Stem leaves about 3.5 mm. long, erect or slightly spreading, concave, ovate-lanceolate, abruptly narrowed to a flexuose, crisped point, this slightly shorter than the leaf blade; margins erect, entire below, coarsely toothed from the base of the acumen to the apex, irregularly inflexed in the acumen; costa single, faint, ending about two-thirds up; leaf cells linear, 3-4 μ wide by 12 to 16 times as long, shorter in several rows across the insertion with sinuose, pellucid lateral walls; alar cells numerous, sharply differentiated, short-rectangular, yellowish, in 8 or 9 rows, extending about half-way to the costa; branch leaves closely imbricated, strongly concave, indistinctly seriate, ovate, about 1.8-2 mm. long, contracted just below the rounded galeate apex; costa ending below the apex; margin erect, entire or very faintly denticulate above; leaf cells short and irregular at the extreme apex with pellucid, slightly pitted lateral walls, otherwise as in the stem leaves. Fruit unknown.

TYPE: Two miles southwest of Agua Caliente, 1050 m., April 1, 1928, H. E. Stork 1338.

The long, crispate hair points of the stem leaves are in bold contrast to the rounded, helmet-shaped leaves of the short lateral branches and clearly distinguish this species from any of its congeners. It is an unusually handsome moss. The rich, deep shades of brown in the tangled older parts make a fine background for the glossy stramineous tips of the younger growth.

METEORIOPSIS RECURVIFOLIA (Hornsch.) Broth.

Banana River, 80 m., May 17, 1934, *F. Gutierrez*.

An interesting extension in the range of this species, which has not been known previously north of Panama.

NECKERACEAE

NECKEROPSIS DISTICHA (Hedw.) Fleisch.

Siquirres, 60 m., Dec. 23, 1933, *A. Alfaro*.

Evidently not a common species in Costa Rica. This is the first local collection I have seen.

PINNATELLA MINUTA (Mitt.) Broth.

Banana River, 80 m., May 20, 1934, *F. Gutierrez*.

Only a few plants of this rare little moss were segregated from a mixture of other species, but the leaf characters are so obviously distinct from anything else in the region that its identity is almost certain. I doubt if it has ever been re-collected since the original gathering by Wright in Cuba.

HOOKERIAEAE

DALTONIA TENUIFOLIA Mitt.

Coronado, 1400 m., Dec. 17, 1933, *A. Alfaro*; Cabeceras del Río Jorco, 1500 m., Oct. 22, 1933, *A. Alfaro*.

Both of these collections are in good fruit and are interesting local records for a rare species.

CROSSOMITRIUM OERSTEDIANUM C. M.

Banana River, 80 m., May 4, 1934, *F. Gutierrez*.

I have not seen the type, but the above collection agrees perfectly with Müller's description of this species. The very flat stems, closely appressed to the substratum with the leaves scarcely shrivelled when dry, give the plants the appearance of an hepatic. The lateral leaves are suborbicular, with a very short, blunt, oblique point, and show the characteristic paired teeth on the upper margins. The general aspect of the plants is very different from that of the group with arcuate, sharply pointed leaves, shrivelled when dry, which Brotherus groups in the section Phyllophila and to which the following species belongs. A critical study of the species of this strictly American genus is badly needed.

CROSSOMITRIUM PATRISIAE (Brid.) C. M.

Laurel, Banana River, 100 m., May 2, 1934, *F. Gutierrez*.

Lepidopilum apiculatum Bartr., sp. nov.

Figure 3.

Dioicum, nitide lutescenti-viride. Caulis secundarius ascendens, complanatus, 2-3 cm. longus, circa 4 mm. latus. Folia sicca contorta, vix plicata, ovato-oblonga, abrupte breviterque apiculata, 2 mm. longa; marginibus anguste revolutis, superne planis minute denticulatis; nervis supra medium evanidis; cellulis superioribus rhombeis, marginalibus uniseriatis angustioribus, basilaribus longioribus; capsula in pedicello superne scabro 6-8 mm. longo erecta; operculo subulato-rostrato; calyptra ramentosa; peristomii dentibus margine sinuosis, strato ventrali angustissimo; sporae laeves, diam. 20-25 μ .

Dioicous, densely tufted, glossy yellowish green plants. Antheridial plants mixed with the fruiting stems. Male buds 1.5 mm. long, axillary on the lower half of the stem. Secondary stems ascending, complanate, 2-3 cm. long, about 4 mm. wide with leaves. Leaves slightly contorted when dry, ovate-oblong, 2 mm. long, abruptly contracted to a short, half-twisted apiculus; margins plane and minutely denticulate above, narrowly revolute on one or both sides below; costae slightly divergent, ending above the middle; upper leaf cells oval and rhomboidal, 10-15 μ wide, with firm, yellowish walls, one row at the margins linear, forming a very narrow inconspicuous border; basal cells more elongate, linear-rhomboidal. Seta 6-8 mm. long, flexuose, scabrous above, smooth below; capsule erect, ovoid-cylindrical; lid subulate-rostrate; calyptra sparingly ramentose; peristome teeth sinuose on the mar-

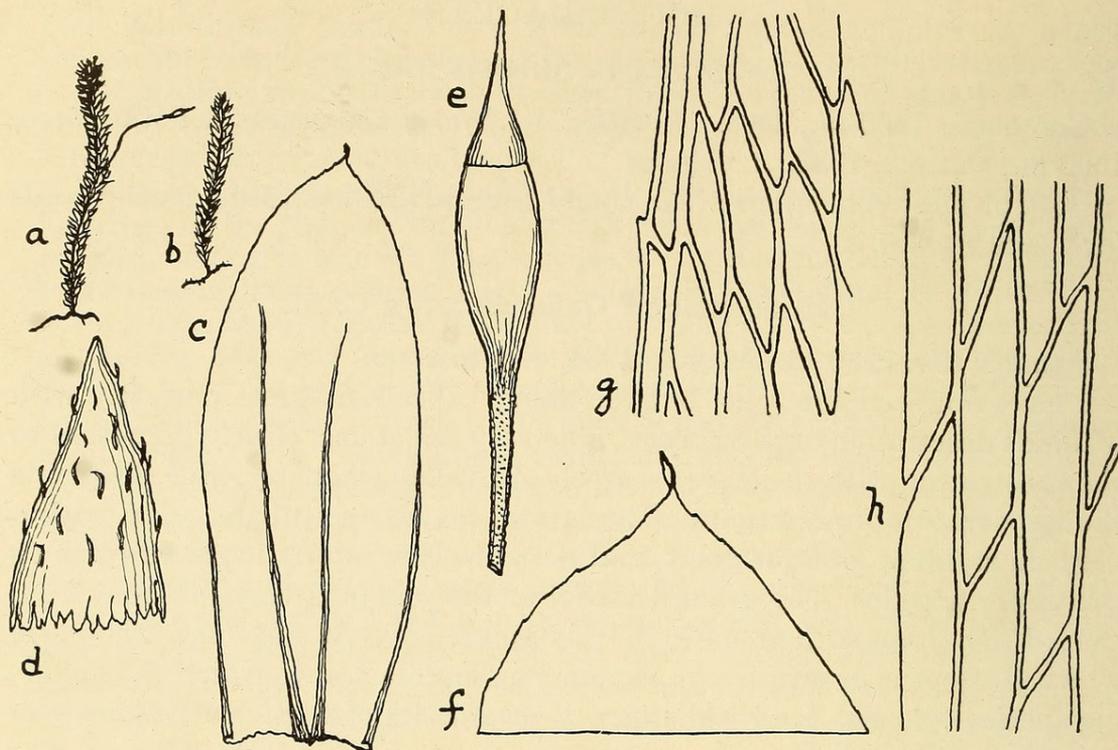


Fig. 3.—*Lepidopilum apiculatum* Bartr. a.—Fruiting plant $\times 1$. b.—Antheridial plant $\times 1$. c.—Lateral leaf $\times 35$. d.—Calyptra $\times 12$. e.—Capsule and upper part of seta $\times 12$. f.—Tip of leaf $\times 80$. g.—Upper leaf cells and margin $\times 400$. h.—Basal leaf cells and margin $\times 400$.

gins, the outer plates much wider than the inner layer; spores brownish, smooth. $20\text{--}25\mu$ in diameter.

TYPE: Banana River 80 m., *F. Gutierrez*.

This species is probably nearest *L. cubense* Sull., but is clearly distinguished by the more broadly pointed leaves (which are abruptly contracted to a short, partly twisted apiculus), the longer costae extending well above the middle of the leaf, the minutely and distantly denticulate upper margins, and the narrower basal cells, which are not as lax as in *L. cubense*.

THUDIACEAE

THUIDIUM INVOLVENS (Hedw.) Mitt.

Banana River, 80 m., May 4, 1934, *F. Gutierrez*.

BRACHYTHECIACEAE

BRACHYTHECIUM STEREOPOMA (Spr.) Jaeg.

Coronado, 1400 m., Dec. 17, 1933, *A. Alfaro*; Alajuelita, 1600 m., Dec. 18, 1933, *A. Alfaro* 33; San Ildefonso, 1500 m., Jan. 21, 1934, *A. Alfaro*; Moravia, 1300 m., Feb. 11, 1934, *A. Alfaro*.

The authors indicate that *B. costaricense* Ren. & Card. may be easily distinguished from *B. stereopoma* by the leaves strongly excavate at the base on each side of the nerve and by the more robust branches. These differences

are not at all well defined when a broad series of specimens is compared, and I am unable to find any stable characters by means of which the two species may be clearly separated. Like all widely distributed species *B. stereopoma* is variable within reasonable limits, but I doubt if these variations can be correlated with any distinct specific concepts.

ERIODON RADICALIS Spruce

Asserí, 1400 m., Feb. 4, 1934, *A. Alfaro*.

This is an unusually interesting collection and, so far as I know, the first time the species has been discovered since Spruce's original collection in Ecuador. The Costa Rican plants are identical with those from Ecuador and add a new genus to the North American moss flora.

ENTODONTACEAE

ERYTHRODONTIUM SQUARROSUM (C. M.) Par.

Guadalupe, 1200 m., Dec. 2, 1933, *A. Alfaro*.

CAMPYLODONTIUM ONUSTUM (Hpe.) Jaeg.

Pejivalle, 600 m., Sept. 30, 1933, *A. Alfaro*.

The above collection is identical with authentic specimens from Colombia and Venezuela. Apparently it is the first record of the species in North America.

ENTODON BEYRICHII (Schwaegr.) C. M.

Asserí, 1400 m., Feb. 4, 1934, *A. Alfaro*; Alajuelita, 1380 m., Jan. 20, 1934, *A. Alfaro*; Jorco, 1200 m., Oct. 21, 1933, *A. Alfaro*; Tiribí, 1100 m., Oct. 28, 1933, *A. Alfaro*.

This species has a wider distribution than Brotherus indicates. It has been collected in Jamaica and Haiti, and apparently the specimens from Costa Rica recorded in my previous papers under the names of *E. erythropus* Mitt. and *E. Bernoullii* C. M. are all referable here. There is nothing in the description of *E. Bernoullii* C. M. to distinguish it from *E. Beyrichii* and I suspect that it should be reduced to a synonym of this species.

PLAGIOTHECIACEAE

STEREOPHYLLUM RADICULOSUM (Hook.) Mitt.

Santa María, Prov. Guanacaste, 825 m., Dec. 25, 1933, *A. Alfaro*.

Although this species does not seem to have been reported from Costa Rica before, it is not an unexpected addition to the local flora. The leaf cells are often clearly unipapillate on the back, rather than consistently smooth as indicated by Brotherus.

SEMATOPHYLLACEAE

PTEROGONIDIUM PULCELLUM (Hook.) C. M.

Banana River, 80 m., May 4, 1934, *F. Gutierrez*.

The only local record that I know of for this delicate little species.

HYPNACEAE

ISOPTERYGIUM SUBTRICHOPELMA Ren. & Card.

La Fuente, 1200 m., Dec. 8, 1933, *A. Alfaro*; Cabaceras del Río Jorco, 1500 m., Oct. 22, 1933, *A. Alfaro*.

It seems very doubtful if this species is anything more than one of the variants of *I. tenerum* (Sw.) Mitt.

TAXIPHYLLUM PLANISSIMUM (Mitt.) Broth.

Asserí, 1400 m., Feb. 4, 1934, *A. Alfaro*.

Another interesting but not unexpected addition to the local list, the species having been known previously from Mexico, the West Indies, and Ecuador.

VESICULARIA CRASSICAULIS (Mitt.) Broth.

Banana River, 80 m., May 20, 1934, *F. Gutierrez*.

The slenderly acuminate, falcate-secund leaves clearly separate these plants from both *V. amphibola* and *V. vesiculare*. It extends the range of the species considerably to the southward and is a fine addition to the local flora.

BOTANY.—*Two new grasses, one from Tennessee, one from Argentina*¹
A. S. HITCHCOCK, Bureau of Plant Industry.

Recently Mr. Stanley A. Cain, of the Indiana Academy of Sciences, Bloomington, Indiana, sent to me a specimen of an apparently new grass which he had collected in the mountains of eastern Tennessee. This proved to be a new species of *Calamagrostis*, allied to *C. porteri* A. Gray and *C. perplexa* Scribn.

About the same time I received from Dr. F. C. Hoehne, of the Instituto Biologico, São Paulo, Brazil, a dwarf grass collected by Dr. A. Burkart in the high mountains of the Province of Tucumán, Argentina. This also proved to be undescribed. It is one of the smallest species of the genus *Catabrosa*, of which there are a few in southern South America. The genus is represented in the United States and northern Eurasia by *C. aquatica* (L.) Beauv., a relatively large widely distributed species, found in mountain meadows, bogs, and wet places.

Calamagrostis cainii Hitchc., sp. nov.

Perennis, dense caespitosa, rhizomatibus brevibus; culmi graciles, erecti, infra paniculam scabri, 30–40 cm. alti; vaginae glabrae; ligula 1–2 mm. longa; laminae planae, longe acuminatae, infra glabrae, supra scabrae, 20–35 cm. longae, 1–2 mm. latae, suprema 5–10 cm. longa; panícula pauciflora, pat-

¹ Received September 21, 1934.



Bartram, Edwin B. 1934. "Additional Costa Rican mosses, III." *Journal of the Washington Academy of Sciences* 24, 467–480.

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