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PROCEEDINGS
OF THE
CALIFORNIA ACADEMY OF SCIENCES
FOURTH SERIES

VOL. XXI, No. 8, pp. 75-86, figs. 3

SEPTEMBER 20, 1933

THE TEMPLETON CROCKER EXPEDITION OF THE
CALIFORNIA ACADEMY OF SCIENCES, 1932

No. 8

MOSES OF THE TEMPLETON CROCKER EXPEDITION

Collected by John Thomas Howell
and
Lists of the Mosses Known from the Galapagos
Islands and from Cocos Island

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Although Mr. Howell admittedly made no consistent effort to collect a complete series of mosses from the various localities in the Galapagos Islands and Cocos Island explored by the Expedition, his casual collections together with the scraps segregated from these and from the Hepatic collections make a surprisingly interesting record and add 17 species to the respective floras of these insular areas. This is a valuable addition to our meagre knowledge and suggests quite plainly that any thorough bryological exploration, especially in the Galapagos group, will surely increase the list of moss species by an appreciable number.

September 20, 1933

SAN NICOLAS ISLAND, CALIFORNIA

Barbula brachyphylla Sull.

March 13, 1932, No. 10.¹

Crossidium desertorum Holz. & Bartr.

March 13, 1932, No. 11. While this is a common species in southern Arizona, it does not seem to have been collected before in California.

Funaria Bolanderi (Lesq.) Holz.

March 13, 1932, No. 12.

GUADALUPE ISLAND, LOWER CALIFORNIA

Weisia viridula Hedw.

Slopes above Northeast Anchorage, Nov. 14, 1931, No. 51.

Pottia Fosbergii Bartr.

Mt. Augusta Trail, March 17, 1932, No. 4 in part. This unique little moss was described a few years ago² from a collection made near Los Angeles. The plants from Guadalupe Island agree perfectly with the original collection and are mixed with *Tortula atrovirens*.

Tortula atrovirens (Sm.) Lindb.

Slopes above Northeast Anchorage, Nov. 14, 1931, Nos. 44, 49 in part, 52 in part.

Tortula muralis Hedw.

Mt. Augusta Trail, March 17, 1932, No. 5; slopes above Northeast Anchorage, Nov. 14, 1931, Nos. 45, 46.

Tortula ruralis (Hedw.) Bry. Eur.

Mt. Augusta Trail, March 17, 1932, Nos. 2 in part, 41; slopes above Northeast Anchorage, Nov. 14, 1931, No. 43 in part.

Grimmia californica Sull.

Mt. Augusta Trail, March 17, 1932, No. 8.

¹ The numbers given to the different collections were assigned by the author as he worked up the material.—Ed.

² Bryologist 33: 18. 1930.

Grimmia leucophaea Grev.

North end of Island, Nov. 14, 1931, No. 47.

Grimmia pulvinata (Hedw.) Sm.

Mt. Augusta Trail, March 17, 1932, No. 7.

Funaria hygrometrica Hedw.

Mt. Augusta Trail, March 17, 1932, No. 3.

Bryum argenteum Hedw.

Mt. Augusta Trail, March 17, 1932, No. 1.

Bryum caespiticum Hedw.

Mt. Augusta Trail, March 17, 1932, No. 6 in part.

Anacolia Menziesii (Turn.) Par.

Slopes above Northeast Anchorage, Nov. 14, 1931, Nos. 42, 50.

Camptothecium arenarium (Lesq.) Jaeg.

Slopes above Northeast Anchorage, Nov. 14, 1931, No. 54.

I have collected this species on Santa Catalina Island but its occurrence on Guadalupe Island is an interesting extension of its geographical range.

Scleropodium illecebrum (Hedw.) Bry. Eur.

Slopes above Northeast Anchorage, Nov. 14, 1931, No. 53.

GALAPAGOS ISLANDS

Sphagnum erythrocalyx Hampe

Near the summit of Indefatigable Island on wet slope, May 10, 1932, No. 23.

Sphagnum cuspidatum Ehrh. var **serrulatum** Schlieph.

Near the summit of Indefatigable Island on wet slope, May 10, 1932, No. 22.

This variety seems to have a more austral distribution than the typical form. It has been recorded from South America but this seems to be the first record for the Galapagos Islands.

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Fissidens (Semilimbidium) Howelli Bartr., spec. nov.

Figure No. 1.

Autoicous. Caulis procumbens, circa 1 cm. altus. Folia 20-30 juga, oblongo-lanceolata, acuminata, ad 1.5 mm. longa; lamina dorsali rotundata, inferne et superne immarginata, medio marginata, lamina apicali superne immarginata, inferne marginata, limbo laminae duplicatae e cellulis 4 seriatis composito; cellulis hexagonis, obscuris, papillosis; costa ante apicem evanescente. Seta rubella, 3-3.5 mm. longa; capsula inclinata.

Autoicous; male buds in the axils of the stem leaves; perigonal leaves few, 0.4 mm. long, abruptly contracted to a short stout point. Rather robust pale green plants growing in dense mats. Stems procumbent, up to 1 cm. or more long with 20-30 pairs of leaves, radiculose at base, 2 mm. wide with leaves, simple or innervating below the flowers. Leaves well spaced, not overlapping, slightly contorted with decurved points when dry, erect-spreading when moist, 1-1.5 mm. long by 0.4 mm. wide, oblong-lanceolate, sharply acuminate, duplicate blades ending obliquely about half way up, dorsal blade ending abruptly in a rounded lobe at the insertion, border of elongated cells about 4 rows wide on the duplicate blades, irregular and narrower on the apical blade and ending abruptly about half way to the apex, variable on the dorsal blade but confined to the median portion of the leaf and never extending to either the base or the apex; margin distantly denticulate on the bordered portion, erose-denticulate and crenulate with papillae on the

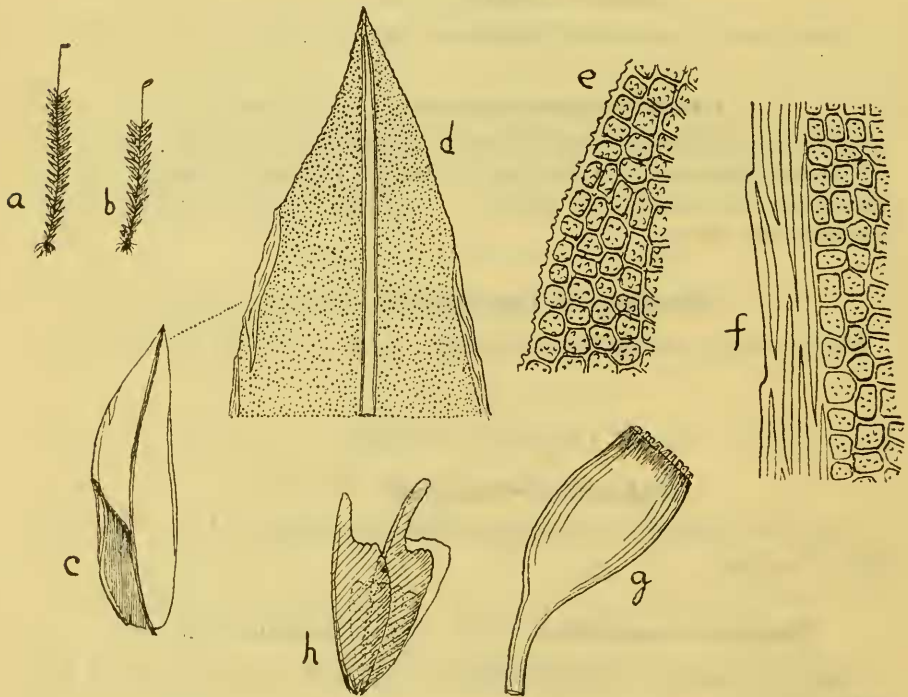


Fig. 1. *Fissidens Howelli* Bartr.; a, b, plants $\times 2$; c, leaf $\times 32$; d, apex of leaf $\times 160$; e, upper leaf cells and margin $\times 500$; f, margin of duplicate blade $\times 500$; g, capsule $\times 32$; h, 2 perigonal leaves $\times 80$.

unbordered parts; costa pale, ending a few cells below the apex; leaf cells hexagonal, up to 7 μ in diameter, thin walled, very dense and obscure, papillose. Perichaetial leaves scarcely differentiated; seta terminal, reddish, 3-3.5 mm. long; capsule inclined, ovoid-cylindric, reddish brown; urn about 0.7 mm. long.

Type: above Fortuna, in the rain forest, Indefatigable Island, May 9, 1932, collected by John Thomas Howell, No. 21 (C. A. S. Herb. No. 203284).

In spite of the fact that the apical and dorsal blades of this species are provided with a variable border of elongated cells I am inclined to think the dense, obscure, papillose areolation is a more weighty character and that the species belongs in the Section *Semilimbidium* near *F. Ravenelii* Sull. The border is quite variable, often entirely lacking on the apical and dorsal blades of the young leaves and when well developed is confined to the lower half or two thirds of the apical blade and to the middle portion of the dorsal blade.

***Campylopus subleucogaster* (C. M.) Jaeg.**

First Camp, Mt. Crocker, Indefatigable Island, May 10, 1932, No. 104.

This species is recorded on the basis of a small tuft of plants that was segregated from a collection of Hepatics. The large, subquadrate, juxtacostal basal cells are characteristic of this species. It is a common moss in Costa Rica and the range might naturally be extended to include the Galapagos.

***Campylopus Anderssonii* (C. M.) Jaeg.**

First Camp, Mt. Crocker, Indefatigable Island, May 10, 1932, No. 102; on ground and rocks, Floreana Peak, Charles Island, May 15, 1932, No. 103.

Through the kindness of Dr. Reimers I have been able to examine a part of the type collection of this species from the Muller Herbarium. The specimens cited above correspond exactly with the type material.

This species is readily identified by the short cells of the leaf base which are subquadrate or even transversely elongated and not at all narrower at the margins. This distinctive basal areolation is of infrequent occurrence in the genus and assists materially in identifying the species.

***Campylopus* (*Eucampylopus*) *insularis* Bartr., spec. nov.**

Figure No. 2.

Caulis ad 6-7 cm. altus, simplex vel parce ramosus. Folia sicca et humida erectopatula, flexuosa, subsecunda, anguste lanceolata, longe subulata, canaliculata, integerrima, 6-7 mm. longa, 0.4-0.5 mm. lata, auriculis distinctis; costa basi circa 375 μ lata, dorso laevi; cellulis alaribus numerosis, fuscis, supra-alaribus rectangu-

laribus margines versus linearibus, caeteris minutis, oblongis vel subrhomboidalibus. Caetera ignota.

Sterile. Stems flexuose, tomentose, up to 6-7 cm. long, simple or sparingly branched. Leaves 6-7 mm. long by 0.4-0.5 mm. wide, narrowly lanceolate, subulate-acuminate, canaliculate, erect-spreading, flexuose, slightly secund; costa about 375μ wide below, smooth on the back, in cross-section showing a ventral row of large, empty cells and a dorsal stereid band with the cells differentiated on both sides; margins erect, entire; alar cells reddish brown, conspicuously auricled, extending to the costa, supra-alar cells rectangular, narrower and linear at the margins, becoming gradually shorter and rhomboidal upward, the upper lamina cells small, chlorophyllose, oblong and rhomboidal.

Type: on ground and slopes at Second Camp, Mt. Crocker, alt. ca. 2000 ft., May 9, 1932, collected by John Thomas Howell, No. 101 (C. A. S. Herb. No. 203283); Duncan Island: Alban Stewart No. 3323, 1905-1906 [det. by R. S. Williams as *C. Anderssonii* (C. M.)].

This species is similar in gross appearance to *C. Anderssonii* (C. M.) but quite distinct in the entire leaves with the costa smooth on the back above and, especially, in the elongate basal cells which are narrower and linear at the margins.

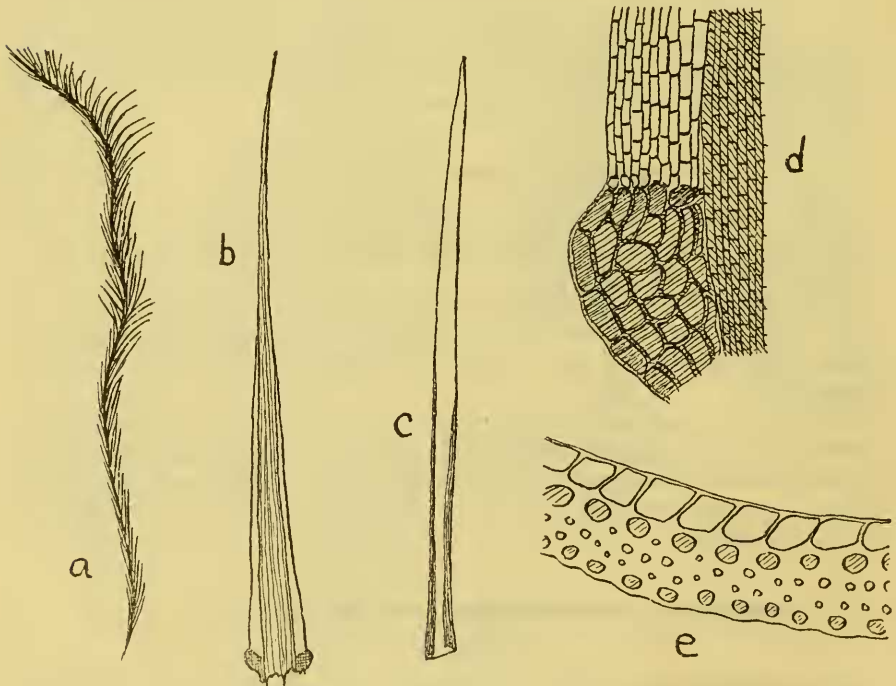


Fig. 2. *Campylopus insularis* Bartr.; a, plant $\times 1\frac{1}{2}$; b, leaf $\times 12$; c, apex of leaf $\times 80$; d, one side of leaf base $\times 160$; e, part of cross section of costa $\times 500$.

Campylopus introflexus (Hedw.) Mitt.

On rocks near Academy Bay, Indefatigable Island, May 14, 1932, No. 16.

Octoblepharum albidum Hedw.

Rain forest near Fortuna, Indefatigable Island, May 12, 1932, No. 17.

Syrrhopodon Guadichaudii Mont.

First Camp, Mt. Crocker, Indefatigable Island, May 10, 1932, No. 105.

Syrrhopodon parasiticus (Sw.) Besch.

First Camp, Mt. Crocker, Indefatigable Island, May 10, 1932, No. 106.

It is not surprising to find this species in the Galapagos Islands as Brotherus has recorded it from Ecuador. The plants average smaller than those from Florida and Yucatan, the narrow border of pale, elongated cells is better developed and extends further down the leaf but I doubt if these differences are either constant enough or of sufficient value to establish any distinct separation.

Hyophila Tortula (Schwaegr.) Hampe

On wet rocks at the spring east of Floreana Peak, Charles Island, April 25, 1932, No. 107.

Only a few plants of this widely distributed tropical American species were found but they are sufficient to establish its occurrence here for the first time.

Philonotis gracillima Aongstr.

On wet rocks at the spring east of Floreana Peak, April 25, 1932, No. 108.

Macromitrium mucronifolium (Hook. & Grev.) Schwaegr.

On rocks near the spring, Charles Island, April 25, 1932, No. 14; on ground, north side of Floreana Peak, Charles Island, May 15, 1932, No. 24.

Squamidium leucotrichum (Tayl.) Broth.

Rain forest above Fortuna, Indefatigable Island, No. 13.

Squamidium Caroli (C. M.) Broth.

From trees of Villamil Mt., above Santo Tomas, Albemarle Island, April 29, 1932, Nos. 18, 19; First Camp, Mt. Crocker, Indefatigable Island, May 10, 1932, No. 109.

Papillaria nigrescens (Sw.) Jaeg.

On ground and rocks, Floreana Peak, Charles Island, May 15, 1932, No. 110; near Fortuna, in rain forest, Indefatigable Island, May 12, 1932, No. 111.

Sematophyllum galipense (C. M.) Mitt.

Rain forest near Fortuna, Indefatigable Island, May 12, 1932, No. 20; on rocks near spring, Charles Island, April 25, 1932, No. 15.

Isopterygium tenerum (Sw.) Mitt.

First Camp, Indefatigable Island, May 10, 1932, No. 112.

These plants represent a rather robust form but they seem clearly to belong here. This species does not seem to have been collected before in either the Galapagos Islands or Cocos Island.

COCOS ISLAND

Calymperes Donnellii Aust.

Chatham Bay, June 28, 1932, No. 122; Wafer Bay, June 28, 1932, No. 37.

The range of this species is from Florida through the West Indies to northern South America but it does not seem to have been noted before from the west coast except in Panama. As far as I can see the plants from Cocos Island agree perfectly with specimens from other regions.

Rhizogonium spiniforme (Hedw.) Bruch.

Wafer Bay, June 28, 1932, No. 27.

Squamidium leucotrichum (Tayl.) Broth.

Wafer Bay, June 28, 1932, No. 30.

Meteoriopsis patula (Sw.) Broth.

Wafer Bay, June 28, 1932, Nos. 29, 32.

These collections are certainly inseparable from *M. patula*. I have seen no specimens of this species from the Galapagos Islands but it seems likely that *M. Anderssonii* (C. M.) Broth. will prove to be nothing more than a form of this widely distributed species.

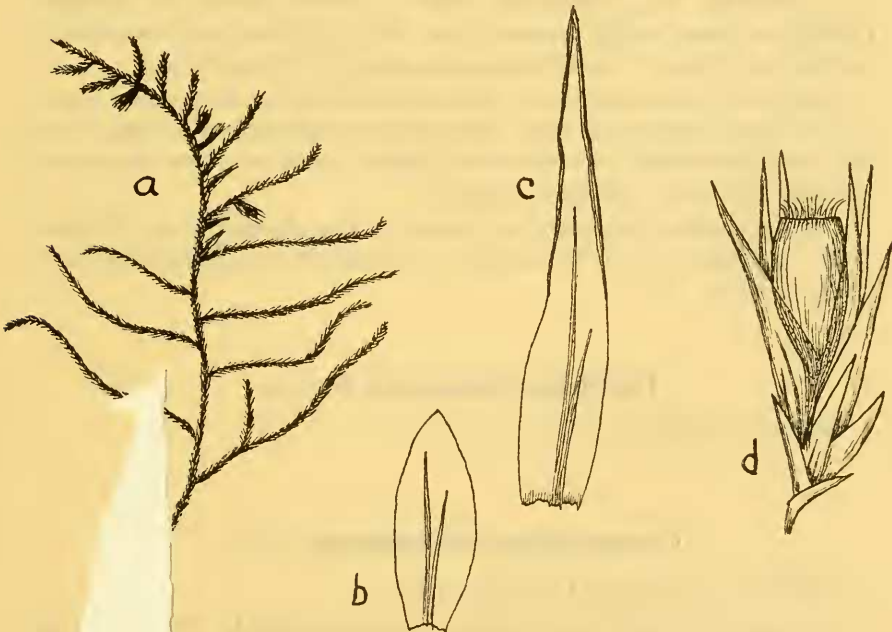
***Pilotrichum rugifolium* C. M.**

Wafer Bay, June 28, 1932, Nos. 34, 36. Figure 3.

These highly interesting collections seem to definitely establish the status of a moss that has never been recollected since the original gathering in 1794.

The species was described by Muller in 1849⁸ from a specimen in the Hooker Herbarium and the locality cited as "Insula Owyhee Australiae." One might infer that this is a phonetic spelling of Hawaii but in a recent critical study of the Hawaiian mosses I felt obliged to relegate this species to the list of "Uncertain Species." The genus *Pilotrichum* is an unusually compact one, confined exclusively to the American tropics, and the Hawaiian record seemed to be a rather dubious one.

These collections from Cocos Island have the capsules immersed in the perichaetial leaves and immediately suggested a comparison with *P. rugifolium*. The agreement was complete and convincing. The sporophyte characters correspond exactly to the original description and furthermore the vegetative features are in complete accord with a mount of several leaves taken from a scrap of the type col-



Pilotrichum rugifolium C. M.; a, upper part of plant $\times 1\frac{1}{2}$; b, leaf $\times 20$; c, $\times 20$; d, capsule and perichaetium $\times 12$.

lection which was sent to me along with a sketch of the entire plant by Dr. A. W. Evans some years ago. The packet from Yale was labelled as follows: "Herb. Kew, Menzies, 1794." Did Menzies ever collect on Cocos Island?

This query is answered by the following extract from Mr. Howell's letter in response to inquiry. "It was of much interest to me to trace Vancouver, bound for home from his surveys in the Pacific Northwest, down the coast of North America until on Jan. 23, 1795, he sighted the Island of Cocos. The vessels, the *Discovery* and *Chatham*, were in need of both fuel and water, so they put in at Cocos, probably at Chatham Bay. By Jan. 27 refueling and watering the ships were accomplished and the two vessels sailed southward for Cape Horn. In this part of Vancouver's account no mention is given of Menzies, let alone word that he went ashore, but of course he was with the expedition at the time. However, to collect a moss, Menzies did not have to go ashore for wood was brought aboard for fuel and surely the wood was heavy with epiphytes."

The following transcript of the label on the type collection in the Hooker Herbarium was very kindly made by Mr. H. N. Dixon, "N. hypnoides. Owyhee 1794. A. M. No. 96."

As Menzies was notoriously rather careless about his localities I think we may safely assume that the collection was incorrectly labelled and that *P. rugifolium* is endemic to Cocos Island.

Another endemic species, *P. obtusatum* Williams, has rugose leaves but the apex is more obtuse, the capsule exerted on a longer seta and the perichaetial leaves scarcely longer than the stem leaves and not scabrous with spiculate papillae.

The accompanying sketch of some of the characteristic features of *P. rugifolium* may be useful as the species is unrepresented in most herbaria.

***Pilotrichum obtusatum* Williams**

Wafer Bay, June 28, 1932, No. 35.

***Crossomitrium Oerstedianum* C. M.**

Wafer Bay, June 28, 1932, No. 121.

This collection adds a new genus to Cocos Island. The stems are robust for the group with stems about 3 mm. wide. The lateral leaves are not shrivelled when dry and the peristomes are ves. The lateral leaves are not shrivelled when dry and the peristomes are ters of the plants correspond very closely to the description of *di- anum* from Costa Rica.

Thuidium involvens (Hedw.) Mitt.

Wafer Bay, June 28, 1932, No. 25.

Although meagre, the specimen is fortunately in fruit. The scabrous setae identify it clearly with this well known species of the mainland. It seems to be the only *Thuidium* reported so far from either Cocos Island or the Galapagos.

Sematophyllum galipense (C. M.) Mitt.

Wafer Bay, June 28, 1932, No. 31.

Taxithelium planum (Brid.) Mitt.

Wafer Bay, June 28, 1932, Nos. 28, 38.

Both of these collections are typical of this familiar species in all respects. I have seen a scrap of the type collection of *T. laxiusculum* R. & C. through the kindness of Mr. Williams and must confess my inability to separate it from the common *T. planum* which, like most widely distributed types, is subject to some variation within reasonable limits.

Isopterygium tenerum (Sw.) Mitt.

Wafer Bay, June 28, 1932, Nos. 33, 120.

NICARAGUA

Calymperes Richardi C. M.

Near the shore of the Gulf of Fonseca, Coseguina Volcano, July 7, 1932, No. 40.

Stereophyllum leucostegium (Brid.) Mitt.

East base of Coseguina Volcano on west shore of Gulf of Fonseca, July 6, 1932, No. 39.

A summary of the mosses of the Galapagos Islands and Cocos Island is given below. The additions to the flora found in Mr. Howell's collections are preceded by an asterisk.

GALAPAGOS ISLANDS

- | | |
|---|---|
| Sphagnum erythrocalyx Hampe | *Philonotis gracillima Aongstr. |
| *Sphagnum cuspidatum Ehrh. var. ser-
rulatulum Schlieph. | Macromitrium mucronifolium (Hook.
& Grev.) Schwaegr. |
| *Fissidens Howelli Bartr. | Macromitrium longifolium (Hook.)
Brid. |
| Campylopus Anderssonii (C. M.) Jaeg. | Micromitrium fragile (Mitt.) Jaeg. |
| Campylopus introflexus (Hedw.) Mitt.
(<i>C. lamellatus</i> Mont.) | Schlotheimia Jamesoni (W. Arn.) Brid. |
| *Campylopus subleucogaster (C. M.)
Jaeg. | Squamidium nigricans (Hook.) Broth. |
| *Campylopus insularis Bartr. | Squamidium leucotrichum (Tayl.)
Broth. |
| Campylopus Sprucei Mitt. | Squamidium Caroli C. M. |
| Octoblepharum albidum Hedw. | Meteoriopsis Anderssonii (C. M.) Broth. |
| Syrrophodon incompletus Schwaegr. | Papillaria nigrescens (Sw.) Jaeg. |
| Syrrophodon Guadichaudii Mont. | Daltonia longifolia Tayl. (<i>D. robusta</i>
Aongstr.) |
| *Syrrophodon parasiticus (Sw.) Besch. | Daltonia Lindigiana Hampe (<i>D. Stew-</i>
<i>artii</i> Williams) |
| Tortella caespitosa (Schwaegr.) Limp. | Cyclodictyon albicans (Sw.) Broth. |
| *Hyophila Tortula (Schwaegr.) Hampe | *Sematophyllum galipense (C. M.) Mitt. |
| Funaria calvescens Schwaegr. | *Isopterygium tenerum (Sw.) Mitt. |
| Orthodontium confine Hampe | |
| Brachymerium imbricatum Schp. | |

COCOS ISLAND

- | | |
|---|--|
| Fissidens Garberi S. & L. | *Crossomitrium Oerstedianum C. M. |
| Octoblepharum albidum Hedw. | Leucomium cuspidatifolium (C. M.)
Mitt. |
| Syrrophodon Bernoullii C. M. | *Thuidium involvens (Hedw.) Mitt. |
| *Calymperes Donnellii Aust. | Sematophyllum galipense (C. M.) Mitt. |
| Rhizogonium spiniforme (Hedw.)
Bruch. | *Taxithelium planum (Brid.) Mitt. (<i>T.</i>
<i>laxiusculum</i> Ren. & Card.) |
| Philonotis gracillima Aongstr. | Glossadelphus cocoensis (Williams)
Bartr., comb. nov. ⁵ . (<i>Hookeriopsis</i>
<i>cocoensis</i> Williams; <i>Glossadelphus</i>
<i>longisetus</i> Bartr.) |
| *Squamidium leucotrichum (Tayl.)
Broth. | *Isopterygium tenerum (Sw.) Mitt. |
| *Meteoriopsis patula (Sw.) Broth. | Vesicularia vesicularis (Schwaegr.)
Broth. |
| Pilotrichum obtusatum Williams | |
| *Pilotrichum rugifolium C. M. | |
| Callicostella depressa (Sw.) Jaeg. | |
| Hookeriopsis diffusa (Wils.) Jaeg. ⁴ | |
| Lepidopilum crassisetum Williams | |

⁴ Collected by Mr. H. K. Svenson, in connection with the Astor Expedition, along brook flowing into Wafer Bay, alt. approx. 1000 ft., April 19, 1930. A rare species previously known only from Panama.

⁵ I have seen a part of the type collection of *Hookeriopsis cocoensis* through the courtesy of Mr. Williams. It is evidently a *Glossadelphus* and seems to be identical with the plant I described from Costa Rica as *G. longisetus*. As Mr. Williams' name has priority the new combination will stand as noted above. This species will be readily separated from *G. truncatulus* (C. M.) by the nearly smooth leaf cells with minute papillae over the upper ends. In *G. truncatulus* the leaf cells show several sharp salient papillae over the lumens giving the surface of the leaf a peculiar rasp-like appearance under the microscope.