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THREE NEW CLUB-MOSSES FROM PANAMA

WITH THREE PLATES

BY

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THREE NEW CLUB-MOSSES FROM PANAMA¹

BY WILLIAM R. MAXON

WITH THREE PLATES

In a previous paper² relating to a singular new fern (*Polypodium podocarpum*) from Panama, I have described very briefly the mountain region above David in the province of Chiriqui, and have referred in particular to a most interesting collecting trip of three days which I took from El Boquete over "Holcomb's trail" along the Rio Caldera to "Camp I" and to the summit of the Continental Divide a few miles farther on. The heavily forested mountain slopes are here intensely wet, and, as is usual under such conditions, a large proportion of the pteridophyta are epiphytes. Species of *Lycopodium* do not appear to be very common, but of the several collected three seem to have been hitherto unknown. These may be described as follows:

LYCOPODIUM FOLIACEUM Maxon, sp. nov.

PLATE I

A coarse, stout, diffuse epiphyte, probably of ascending growth, attaining a length of 40 cm., sporangiate without interruption in the upper third or half, the sporophylls similar to the foliar leaves but gradually smaller toward the ends of the branches. Stem very stout, woody, about 4 mm. in diameter at the base, 1 to 4 times dichotomous, the branches divaricate, about 2 mm. in diameter near the tips; leaves very numerous and close, borne in 10 ranks and by torsion somewhat dorsiventrally arranged, those of the 8 under and lateral ranks usually divergent at right angles (except in drying) or slightly ascending, twisted at the base, those of the 2 uppermost rows strongly reflexed, straight, all the leaves otherwise alike, symmetrical, rigidly herbaceous to subcoriaceous, oblong-elliptic to oblanceolate from a narrowly long-cuneate base (the base reddish-punctate below), thus sometimes appearing subspatulate, 10 to 13.5 mm. long, 2.5 to 4.5 mm. broad near

¹ This paper is the fifth dealing with the results of the Smithsonian Biological Survey of the Panama Canal Zone.

² Smithsonian Misc. Coll., Vol. 56, No. 24, pp. 1-4, pls. 1-3, November 22, 1911.

the middle, the margins strongly revolute, entire except at the minutely crose-denticulate, acute or short-cuspidate apex; costæ medial, percurrent, the leaf in drying sharply carinate upon the upper surface, the costæ sometimes evident below near the base, but usually indicated along the under surface of the leaf throughout merely by a shallow medial furrow; sporophyls conform, rarely more than 10 mm. long; sporangia reniform, about 2 mm. broad, protruding beyond the narrow bases of the sporophyls a distance of about 0.5 mm. on each side.

Type in the U. S. National Herbarium, no. 676073; collected from a fallen branch in humid forest along the upper Caldera River, near Camp I, Holcomb's trail, above El Boquete, Chiriqui, Panama, altitude about 1650 meters, March 23, 1911, by William R. Maxon (no. 5628).

The specimens here described were found upon a large limb which had been broken off from an enormous forest tree upon the steep slopes above and partially obstructed the trail at a point not far above Camp I. The species is very different from any reported previously from North America, and from any South American species known to me. It is a coarse, "bushy" plant and, when in a fresh condition, very heavy. Though not succulent it was long in drying, and then very rigid. The arrangement of the leaves can scarcely be made out except by soaking the plant in water, when the number of ranks of leaves, the twisting of all but those of the two upper rows, and the reflexed position of the latter are features which become readily apparent. Including the spreading leaves the diameter of the larger stems is from 2.5 to 3 cm. The apparent abundance of leafy covering, which has suggested the specific name, is even more pronounced in the living than in the dried specimens.

LYCOPODIUM STAMINEUM Maxon, sp. nov.

PLATE 2

Plant about 20 cm. long, 3 times dichotomous (probably repeatedly so in larger specimens), the stem relatively stout, about 1.5 mm. in diameter at the base, 1 mm. in diameter near the apex, more or less succulent, flattened in drying; leaves rather crowded in attachment, borne apparently in 10 ranks, spreading at right angles to the stem, filiform, acicular in the outer part, 10 to 17 mm. long, 0.2 to 0.3 mm. broad, bright red at the base (at least upon the under side), the margins entire and in drying curved inward over the upper surface, the leaves thus broadly concave above or even subtubulose; plant fertile in the upper third, the sporangia borne in alternating zones,

the sporophylls exactly like the foliar leaves; sporangia reniform, 1.2 to 1.3 mm. broad, thus protruding beyond the base of the sporophyll a distance of about 0.5 mm. on each side.

Type in the U. S. National Herbarium, no. 676085; collected from a tree trunk in humid forest of the upper Caldera watershed between Camp I and the Divide, Holcomb's trail, above El Boquete, Chiriqui, Panama, altitude about 1750 meters, March 23, 1911, by William R. Maxon (no. 5636).

Only three plants of the present species were observed, these growing together; the largest has served for the description. Presumably the plant attains a greater size than shown by the specimens at hand; but even this small amount of material is ample to indicate the marked peculiarity and distinctness of the species. The leaves are truly capillary and mark it as the narrowest-leaved species yet discovered in tropical America. It is a member of the section *Selago*, and is related (though not at all closely) to *L. pithyoides* Schlecht. and Cham., of Mexico, Guatemala, and Cuba, a species which is equally well marked by its stout woody stems and very much longer, bisulcate, reflexed leaves about 1 mm. broad.

LYCOPODIUM WATSONIANUM Maxon, sp. nov.

PLATE 3

A slender pendent epiphyte, 35 cm. long, about 8 times dichotomous, interruptedly sporangiate in the upper third. Stem delicate, 0.5 to 0.7 mm. in diameter, yellowish green like the whole plant, the branches slender, unequally developed (perhaps through injury), forked at a slight angle; leaves numerous but not close, borne in 8 ranks, in the dried plant appearing almost whorled, divergent to obliquely ascending, mostly falcate, slender but very rigid, thick, linear-acicular from a slightly broader base, 5 to 8 mm. long, 0.4 to 0.5 mm. broad at the base, 0.3 to 0.4 mm. broad below the middle, or much narrower by the curvature of the margins, entire, all twisted at the base, the upper surface slightly convex, the lower surface broadly or sometimes deeply concave, the leaf in drying not infrequently subtubulose or irregularly plicate, the costæ very slender, concealed, or evident only by transmitted light as a whitish line; sporophylls in alternating zones 1 to 1.5 cm. long, averaging shorter than the foliar leaves (4 to 5 mm. long), linear-acicular from an irregularly ovate to broadly deltoid base (this 0.7 to 1 mm. broad), the margins here undulate to irregularly and bluntly crenate-dentate, elsewhere entire; sporangia reniform, partially concealed by the expanded bases of the sporophylls.

Type in the U. S. National Herbarium, no. 676223; collected from the trunk of a small forest tree in humid forest along the upper Caldera River, near Camp I, Holcomb's trail, above El Boquete, Chiriqui, Panama, altitude about 1600 meters, March 24, 1911, by William R. Maxon (no. 5712).

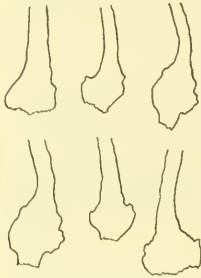
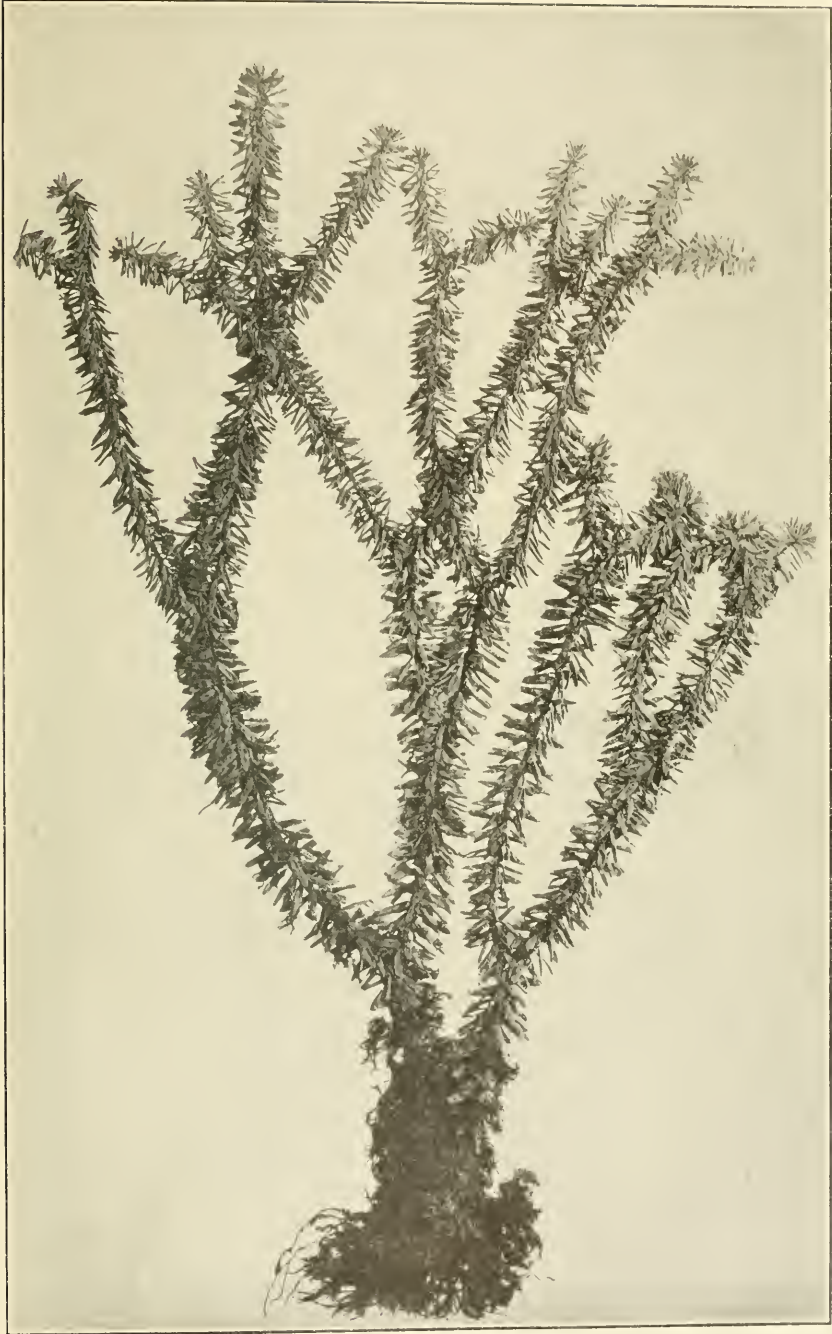


FIG. 1.—Bases of Sporophylls.

L. Watsonianum is of the section Selago and the group of *L. linifolium*, but is not closely related to any North American species. The leaves are harsh to the touch, and the branches remarkably rigid for so slender a plant. The irregular expanded bases of the sporophylls, an unusual feature for this group of species, are indicated in the text-figure herewith.

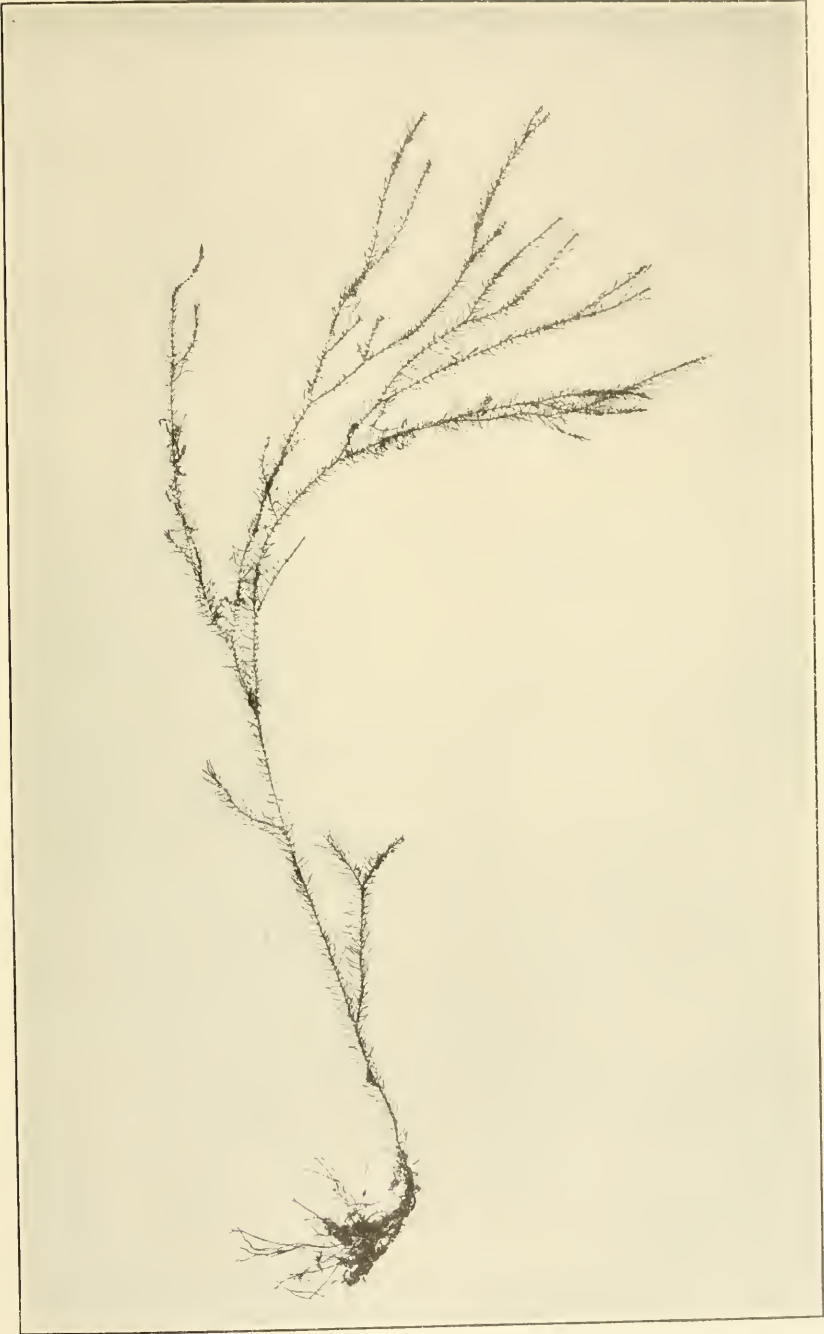
Dedicated to H. J. Watson, Esq., a resident of El Boquete, who during the last twenty years not only has been of very great assistance to naturalists visiting the mountain region of Chiriqui, but has himself made extensive zoölogical collections.



LYCOPODIUM FOLIACEUM Maxon
(TWO-FIFTHS NATURAL SIZE)



LYCOPODIUM STAMINEUM Maxon
(NATURAL SIZE)



LYCOPODIUM WATSONIANUM Maxon
(ONE-HALF NATURAL SIZE)