zero, the temperature where the wire enters the air is 0.18 θ_o, and the heat carried away by 2 leads in 3 minutes is 0.037 θ_o calories. For 110 volts and 1 ampere the systematic error of such an arrangement with the heating coil running at 120° would be about 1 per mille, and the coil must heat less than 3° to safely avoid systematic error in work of 0.1 per mille precision. By doubling the length of lead in the inclosure the permissible heating is increased, somewhere near 8 times. A doubling of μ would have an identical effect, but would be rather hard to secure with the same size of wire. It therefore seems that it would generally be very desirable to insert portions of finer lead wire next the coil, using enough larger wire further out, but well within the calorimeter, to dissipate to the calorimeter the heat generated in the fine wire. Advantageous dimensions can be calculated from the data already given. The insertion of too much copper resistance gives the heater resistance too great a temperature coefficient. There is little danger of trouble from this cause, however, as long as its possibility is not overlooked.

The assumption of temperature equality between calorimeter and jacket, used in this section, is justified as follows: The temperature distributions and flows existing at any time are the resultant of the electric heat and of the jacket-calorimeter difference, and may be resolved into components due to these different sources. Since by a well known principle the resultants of such components can be obtained by simple addition, and since the results of the calorimeter-jacket difference are taken care of in the regular procedure, we may treat the electric effects alone, as if the others were non-existent.

BOTANY.—*The genus* Microstaphyla.[1] WILLIAM R. MAXON, National Museum.

Among the many diverse ferns comprising the tribe Acrosticheae of the family Polypodiaceae one of the most interesting of all is the diminutive plant of St. Helena first described by the younger Linnaeus in 1781 as *Adiantum furcatum*, and later by Jacquin as *Osmunda bifurcata*. By the older writers it was placed at one time or another in no less than seven different genera, before serving as the type and sole species of *Microstaphyla* Presl. This, like so many other of Presl's genera, was submerged in synonymy by later writers. In 1895 a closely related Bolivian plant, with simple instead of pinnate sporo-

[1] Published by permission of the Secretary of the Smithsonian Institution. Received November 29, 1922.

phylls, was described by Mrs. Elizabeth G. Britton as *Acrostichum moorei*. Since then the systematic status of *Microstaphyla* and the nomenclature of the Bolivian plant have received a good deal of attention at the hands of Underwood[2] and Christ.[3] Christ comes to the conclusion that, notwithstanding the close general agreement in dissected foliage leaves shown by the St. Helena and Bolivia species, the slender scaly rhizome and simple sporophylls of the latter plant form a definite connecting-link between *Microstaphyla* (in its original sense) and *Elaphoglossum*. The characters of *Rhipidopteris* and of certain small Andean species of *Elaphoglossum* are discussed in this connection, and both *Microstaphyla* and *Rhipidopteris* are reduced to the rank of subgenera under *Elaphoglossum*—the former to include the two species with pinnate sterile fronds, the latter those with palmately or flabellately divided sterile fronds. Nevertheless, both Hieronymus and Underwood have regarded *Microstaphyla* and *Rhipidopteris* as valid genera, and in this opinion the writer is obliged to concur. Christ's arguments lose none of their weight from the evolutionary standpoint; the question is merely upon the rank to be assigned to the forms as they exist today. In their peculiarly distinctive sterile fronds both *Rhipidopteris* and *Microstaphyla* depart too widely from simple-leaved *Elaphoglossum* to be retained in that genus.

Very recently a third species of *Microstaphyla* has been discovered in Colombia. This is described below. There is given also the principal synonymy of the two species previously known.

1. **Microstaphyla furcata** (L. f.) Fée, Mém. Foug. **7**: 45. *pl. 13*. 1857.
Adiantum furcatum L. f. Suppl. Pl. 447. 1781.
Osmunda bifurcata Jacq. Coll. Bot. **3**: 282. *pl. 20, f. 2*. 1789.
Acrostichum bifurcatum Swartz, Journ. Bot. Schrad. **1800**[2]: 13. 1801.
Not *A. bifurcatum* Cav. 1799.
Gymnogramma bifurcata Kaulf. Wes. Farrnkr. 81. 1827.
Darea furcans Bory, Dup. Voy. Bot. **1**: 269. *pl. 35, f. 2*. 1828.
Olfersia bifurcata Presl, Tent. Pter. 234. 1836.
Polybotrya bifurcata J. Sm. Journ. Bot. Hook. **4**: 150. 1841.
Microstaphyla bifurcata Presl, Epim. Bot. 161. 1851.

Known only from St. Helena, where it has been repeatedly collected. Of the two specimens at hand, one is no. 420 of Cuming's historic collection; the other bears no collector's name.

The present species is too well known to require detailed discussion. Besides the illustrations above given, those of Schkuhr and Hooker may be

[2] Torreya **5**: 87–89. 1905.
[3] Bull. Herb. Boiss. II. **1**: 588–592. *text fig*. 1901; ibid. II. **3**: 148. 1903: Torreya **5**: 123–126. 1905.

cited.[4] Hooker's comments on Fée's error in associating with it the plant now called *Elaphoglossum dimorphum* (Hook. & Grev.) Moore are of interest.

2. **Microstaphyla moorei** (E. G. Britton) Underw. Torreya **5**: 88. 1905.
Acrostichum moorei E. G. Britton, Mem. Torrey Club **4**: 273. 1895.
Rhipidopteris rusbyi Christ, Farnkr. Erde 46. 1897.
Elaphoglossum bangii Christ, Mon. Elaph. 99. 1899.
Elaphoglossum moorei Christ, Bull. Herb. Boiss. II. **3**: 148. 1903.
Microstaphyla bangii Hieron. Bot. Jahrb. Engler **34**: 539. 1904.

Founded on specimens collected near Yungas, Bolivia, in 1890, by Miguel Bang (no. 558), of which two sheets are at hand. The specific name is in honor of Thomas Moore, whose fern collection in the Kew Herbarium is said to contain a specimen collected by Lechler "near Sachapata, on trunks of trees, and distributed as no. 2609, Plantae Peruvianae." Hieronymus also lists *Lechler* 2609 under this species, probably with correctness. An additional specimen has recently been received from Bolivia: On tree-trunks, among moss, Hacienda Simaco, on the trail to Tipuani, altitude 1,400 meters, January, 1920, *Buchtien* 5297; this agrees very closely with the Bang material.

It is to be noted that Hieronymus cites also a Colombian specimen, collected in 1882 by Schmidtchen, the exact locality not stated. This, which has not been seen by the writer, not improbably pertains to the next species.

3. **Microstaphyla columbiana** Maxon, sp. nov.

Plants terrestrial, entangled in a loose mat. Rhizomes wide-creeping, 30 cm. long or more, about 0.5 mm. in diameter, flexuous, sparingly branched, bearing a few distant roots, brownish, sulcate, flattish or irregularly triquetrous in drying, subpersistently paleaceous, the scales loosely appressed-imbricate, pale yellowish brown, membranous, translucent, 2 to 2.5 mm. long, narrowly deltoid-ovate, attenuate, attached above the closed sinus of the very deeply cordate base (the lobes widely overlapping), with a few, mostly basal teeth. Sterile fronds numerous, borne singly 1 to 5 cm. apart, ascending, 8 to 18 cm. long; stipes continuous with the rhizome, 3 to 7 cm. long, about 0.5 mm. thick, brownish and terete at the extreme base, upward greenish and compressed, slightly alate at summit, deciduously paleaceous throughout, the scales ovate-oblong, acute, often coarsely dentate; blades lanceolate, caudate, 5 to 11 cm. long, 2 to 3 cm. broad just above the base, essentially pinnate at base, nearly so throughout; pinnae 5 to 10 pairs, oblique, subopposite at base, mostly alternate above, distant (5 to 10 mm. apart on each side), linear-cuneiform, 1 to 3 mm. broad just above the narrowly decurrent base, dichotomously forked at or beyond the middle (the divisions 2 to 8 mm. long, the distal one usually the longer, one or both deeply retuse), or those toward the apex linear-subspatulate, merely retuse, the apical ones gradually reduced, finally evident as coarse distant serrations of the long-caudate tip; veins mostly arising in pairs at base of pinnae, once or twice forked, 4 branches usually occurring at middle of pinna, 2 extending to each division, clavate; leaf tissue glabrous, dull green, membrano-herbaceous, opaque, the venation seen with difficulty. Fertile fronds wanting.

[4] Krypt. Gew. *pl. 2;* Second Cent. Ferns, *pl. 91.*

Type in the U. S. National Herbarium, no. 1,140,001, collected in dense forest above La Cumbre, Department of El Valle, western cordillera of Colombia, at about 2,200 meters altitude, September 18, 1922, by Ellsworth P. Killip (no. 11365). The description is drawn partly from a second sheet of the type collection. Duplicates will be distributed to the Gray Herbarium, the New York Botanical Garden, and the Academy of Natural Sciences, Philadelphia, in whose interests also the recent botanical exploration in western Colombia was conducted under the leadership of Dr. F. W. Pennell.

Related to *Microstaphyla moorei*, which is distinguished readily, however, by (1) its oblong, non-caudate blades, the basal pinnae not reduced and the apical ones few and abruptly discontinuous; (2) its very much narrower divisions, these acute and invariably with a single veinlet; (3) its delicately membranous, translucent leaf tissue, the venation being readily evident without the aid of transmitted light. *M. moorei* is a more delicate plant than *M. columbiana* in every way; in some fronds all the pinnae are undivided. Fertile fronds of *M. columbiana*, unrepresented in the material at hand, are presumably similar in general form to those of *M. moorei*.

SCIENTIFIC NOTES AND NEWS

A recent circular to employees of the U. S. Coast and Geodetic Survey calls attention to tests made in the section of field records which indicate that mounted drawing paper in rolls fails to give flat surfaces when cut into lengths for immediate use. Due to unequal seasoning, surplus paper exists near the lengthwise edges of the rolls and this condition brings about a noticeable distortion in projections constructed on the sheets. In order to minimize this unequal seasoning it is suggested that entire rolls of mounted drawing paper, when received in the field, be immediately cut into sheets of suitable lengths for smooth plotting work and stowed face down in a ventilated drawer.

Final tests of the new field automatic tide gauge of the U. S. Coast and Geodetic Survey were made recently at the Lighthouse Wharf in Washington. These tests showed that this tide gauge will give thoroughly satisfactory records for use of hydrographic parties.