NOTES

A REMARKABLE NEW SELAGINELLA FROM VENEZUELA

Despite a recent treatment of South American spike mosses (Alston et al., 1981) in which 133 species are recognized, *Selaginella* in the Neotropics remains taxonomically difficult, with many undescribed species. In Venezuela alone, 74 species are now known, and many more will eventually be recorded. We describe one new one here, perhaps the largest known *Selaginella* in terms of girth and certainly the most robust American species.

Selaginella gigantea grows in colonies of several hundred plants in wet evergreen primary forest in the Coastal Cordillera of Venezuela. The particular site is in the Borburata Mountains of Estado Carabobo, a well-known refugium for many endemic taxa of vascular plants (Steyermark, 1979, 1982).

Selaginella gigantea Steyermark & A. R. Smith, sp. nov. TYPE: Venezuela. Carabobo: entre Los Tanques y La Toma, a lo largo del Río San Gián, al sur de Borburata, arriba de la Planta Electrica, 750 m, 1 Apr. 1966, Steyermark & Steyermark 95418 (holotype, US 2549293; isotype, VEN). PARATYPES: same locality, 27 Mar. 1966, Steyermark & Steyermark 95148 (G, VEN); 7 km S of Borburata, 10°23'30"N, 67°58'30"W, 16 Dec. 1983, Steyermark, Berry & Manara 129691 (UC, VEN). Figures 1, 2.

Planta 1-2 metralis, caulibus erectis robustis articulatis 10-15 mm diam. glabris, parte inferiore 0.5 m rhizophora elongata ferenti; internodiis usque 10 mm diam. efoliatis vel foliis dissitis patentibus ovatis acutis integerrimis $3-4 \times 1.75$ mm; parte frondosa ambitu late ovato-lanceolata 4-5-pinnata ca. 70 × 30 cm, ramulis inferioribus 9-15 cm dissitis; ramis principalibus caulium ovatis vel oblongo-ovatis 7-14 × 3.5-7 cm in 15-30 divisiones secundarias lineares; foliis lateralibus divisionum secundariarum horizontaliter patentibus 13-29 paribus plerumque 4-5 × 1.25-1.5 mm lineari-subfalcatis oblique insertis apice acutis per totam latitudinem decurrentibus, marginibus integerrimis vel apicem versus remote serrulatis utrinque glabris: foliis axillaribus ellipticis acutis 3.5 × 1.5 mm integerrimis exauriculatis; foliis intermediis 1-1.7 × 0.2-0.5 mm acutis basi paullo asymmetricis exauriculatis per latitudinem adnatis; strobilis usque 20 \times 1.5-2 mm in apicibus ramulorum singulatim dispositis; megasporophyllis basi strobili solitariis; microsporophyllis numerosis late deltoideis vel subrotundatis apice acuminatis vel breviter aristatis ca. 1.25 ×

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1.25 mm; megasporis cremeis ca. 1.2 mm diam. grosse rugosis; microsporis ca. 30 μ m longis dense papillatis, prominentiis leviter capitatis.

Plant 1-2 m tall, erect, with many strongly ascending branches arising from the lower 0.5 m of main stem; stem and main branches stout, firm, with swollen, bronze-colored nodes 10-15 mm diam., glabrous; nodes 10-15 cm apart toward base of plant, drying brown and contracted, sending out aerial roots (rhizophores) to 6.5 mm diam. at the lower nodes; internodes to ca. 10 mm diam., stramineous, lacking leaves or leaves very remote, spreading, 3-4 mm by 1.75 mm, ovate, decurrent, acute, entire; stele T-shaped or X-shaped in cross section, with arms 2-3 mm long; frondose branch system broadly ovate-lanceolate in outline, 4-5 times divided with penultimate divisions pinnately arranged, each of the penultimate divisions 7-14 cm by 3.5-7 cm with 15-30 secondary linear divisions; lateral leaves of the secondary divisions 13-29 pairs horizontally spreading, linear-subfalcate, obliquely inserted, acute at apex, 4-5 mm by 1.25-1.5 mm, decurrent and attached along their width, contiguous or slightly imbricate at the base, but spatially separated for most of their length (at least in the dried state), entire or remotely serrulate along acroscopic margin, linear-subfalcate and narrowly acute at apex, glabrous on both sides and along margins; axillary leaves ca. 1.5 mm, elliptic, acute, entire, exauriculate; median leaves 1-1.7 mm by 0.2-0.5 mm, acute, glabrous, slightly asymmetric at base, exauriculate, adnate their width; strobili to 20 mm by 1.5-2 mm, solitary on the apices of penultimate branches, maturing simultaneously; megasporophylls single at base of strobilus, ca. 2 mm by 2-2.5 mm, broadly ovate to subrotund, rounded to subacute at tip; microsporophylls numerous, ca. 1.25 mm by 1.25 mm, broadly deltoid to subrotund, acuminate or short-aristate at apex; megaspores cream-colored, ca. 1.2 mm diam., coarsely rugose, 1-4 per sporophyll; microspores beige, ca. $30 \,\mu m$ long, densely papillate with blunt, slightly capitate projections, shed singly. Figures 3, 4.

The Steyermark, Berry and Manara collection, cited with coordinate details, was collected from

 TABLE 1. Differences between Selaginella exaltata and S. gigantea.

Selaginella exaltata	Selaginella gigantea
Stem mainly clambering, sprawling, scandent, or re- clining	Stem erect
Stem, in some portion, pubescent	Stem completely glabrous
Lateral leaves 3-4 mm long	Lateral leaves 4-5 mm long
Lateral leaves (in dried state at least) contiguous	Lateral leaves (dried state at least) well separated
Lateral leaves with short and narrowly decurrent bases Axillary leaves auriculate	Lateral leaves with long and broadly decurrent bases Axillary leaves exauriculate
Median leaves of ultimate and penultimate branch- systems 0.5–1 mm wide, narrowly white-margined, and more rounded on the outer edge	Median leaves 0.2–0.5 mm wide, not white-margined, and less curved on the outer edge
Lateral branches non-articulate or occasionally weakly articulate	Lateral branches decidedly articulate
Stele basically 3-lobed or T-shaped with xylem in sev- eral patches, each patch surrounded by phloem	Stele (at least in the main axes) with xylem in a solid strand, either X-shaped or T-shaped (see Mickel & Hellwig, 1969).
Penultimate branch-systems lanceolate, 7–17 cm by 1.5–5 cm, 3–4 times longer than broad Penultimate branch-systems with 30–50 divisions	Penultimate branch-systems ovate or oblong-ovate, 7– 14 cm by 3.5–7 cm, 1.5–2 times longer than broad Penultimate branch-systems with 15–30 divisions

the type locality. Specimens have also been collected from the type locality by Aristeguieta and by Tamayo, but are not presently available.

This very distinctive and apparently taxonomically isolated species is perhaps most closely related to *S. exaltata* (Kunze) Spring, which is known from Costa Rica to Peru and western Brazil (Alston et al., 1981). That species differs in many respects from *S. gigantea*. These differences are presented in Table 1 (also see Figs. 1– 4).

Somers (1978), in an unpublished thesis on the articulate Selaginellas (subg. *Stachygynandrum* ser. *Articulatae*), considered *Steyermark* 95418 (the type) to represent a new species or possibly be of hybrid origin between *S. exaltata* and a nonarticulate taxon. The argument for hybrid origin was based partly on an examination of spores (sample of two), which Somers found to be hollow, and partly on evidence from sporangial dehiscence. According to Somers (1978,

1982), S. exaltata and other articulate species have a unique and more complex sporangial dehiscence. However, S. gigantea has the simpler bivalvate condition characteristic of the nonarticulate species. We confirm the bivalvate nature in S. gigantea. This casts some doubt on the affinities of S. gigantea, especially since it appears to have most of the other characteristics of the articulate species: single enlarged basal megasporangia, very large megaspores, beige microspores, and rhizophores orignating dorsally (Somers, 1982).

Even if the hybridization hypothesis could be shown to be true, the event most likely was ancient and the characteristics of *S. gigantea* now so distinctive that we believe it warrants description. Hybrid origin is difficult to invoke for yet another reason: *S. exaltata*, a most distinctive species itself and not likely to be overlooked by collectors, has never been found in Venezuela or the Guianas.



FIGURE 1. Paratype of Selaginella gigantea (Steyermark, Berry & Manara 129691), showing a portion of the lower stem with an elongated rhizophore.



FIGURE 2. Paratype of Selaginella gigantea (Steyermark, Berry & Manara 129691), showing an upper frondose branch.



FIGURE 3. Selaginella gigantea. -a. Portion of lower stem with rhizophore. -b. Penultimate division of branch-system. $\times 1$.

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FIGURE 4—a. Selaginella gigantea. Lateral leaves from a portion of the ultimate branch-system, ventral view. b. S. exaltata Lateral leaves from a portion of the ultimate branch-system, ventral view.—c. S. gigantea. lateral leaves from a portion of the ultimate branch-system, dorsal view.—d. S. exaltata. Lateral leaves from a portion of the ultimate branch-system, dorsal view.—d. S. exaltata. Lateral leaves from a portion of the ultimate branch-system.



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