

The Taxonomic Status of *Selaginella eatonii*

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Selaginella eatonii Hieron. ex Small has long been relegated to synonymy under *S. armata* Baker, but actually it is a distinct species. The plants are among the smallest known in this predominantly tropical genus. *Selaginella eatonii* and the West Indian *S. armata* are both members of subg. *Stachygynandrum* (Pal. Beauv.) Baker, which is characterized by having dorsiventrally flattened shoots comprising two lateral rows of larger leaves plus two medial rows of smaller leaves. According to Baker's (1883-1885) scheme of classification, *S. eatonii* is closely related to the other heterophyllous *Selaginellae* of eastern North America, namely *S. apoda* (L.) Spring, *S. eclipses* Buck, and *S. ludoviciana* A. Braun.

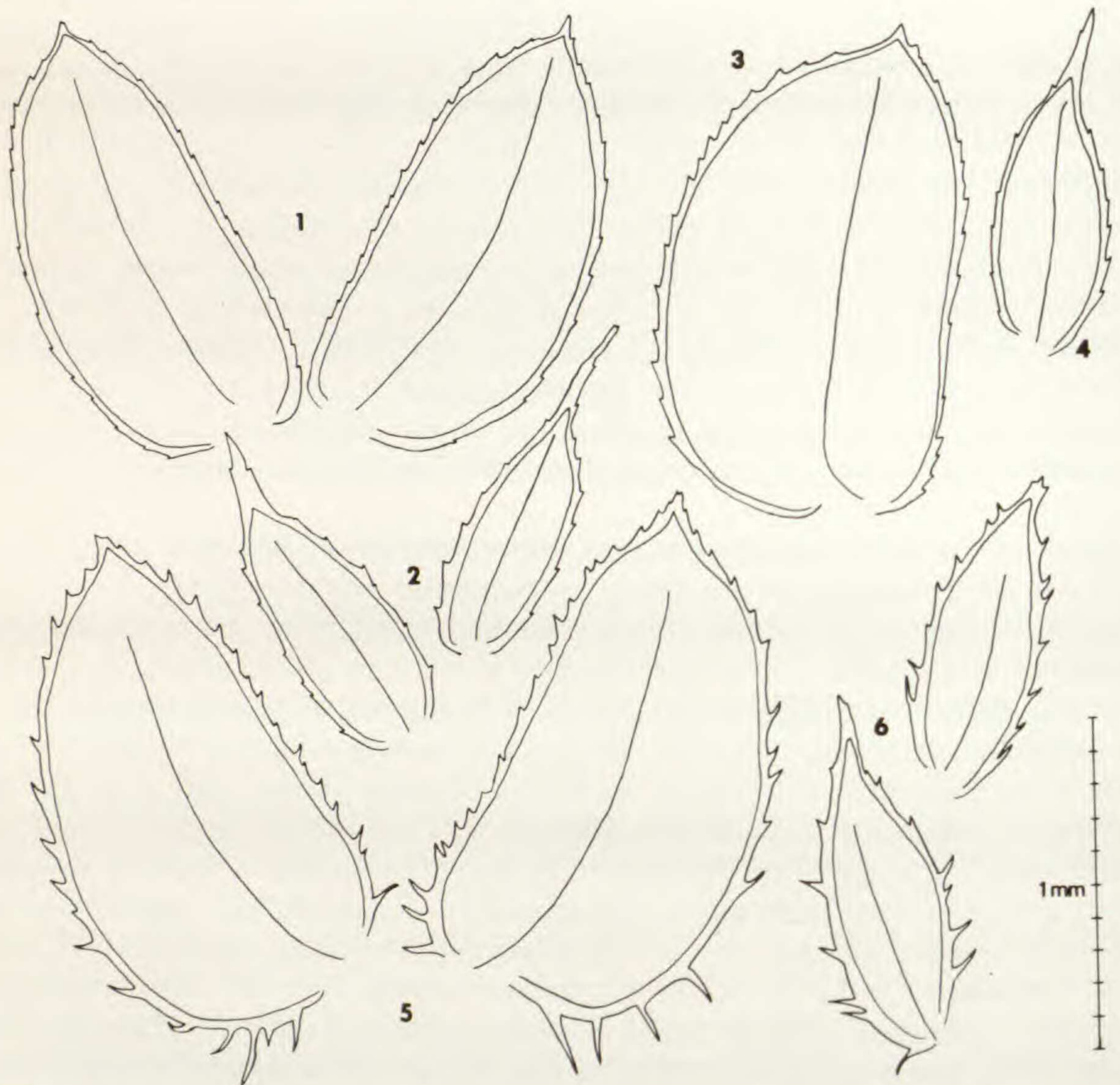
When J. K. Small (1918, p. 67) originally described *S. eatonii*, he credited Hieronymus with being the author. No specimens of it were cited, although Small reported the plant as growing on limestone in the "Everglade Keys;" he also stated that the plant was first collected in 1903. The species is quite rare in South Florida.

Much of the pertinent literature has either been misleading or in error. Small (1938, p. 422) transferred *S. eatonii* to the genus *Diplostachyum*, which was erected by Palisot de Beauvois to accommodate many of the heterophyllous species of *Selaginella*. Today this segregate genus is mostly unaccepted. Prior to this time, Britton and Millspaugh (1920, p. 477) reported *S. eatonii* as occurring in the Bahamas. However, Alston (1952, p. 44), a world authority on *Selaginella*, cited their Bahamian material as *S. bracei* Schmidt, which also is a plant of diminutive habit; it was described from Andros and Abaco Islands, Bahamas. Alston (1952, p. 43; 1955, p. 246) placed *S. eatonii* in synonymy under *S. armata*, which was described from Cuba. Unfortunately, *S. eatonii* was not typified by Alston in his publications, nor were descriptions given to any of the species; only keys, specimen citations, and brief annotations were provided. Subsequent authors who have dealt with the South Florida species, e.g., Wherry (1964, p. 276), Ward (1968), Long and Lakela (1971, p. 69), Mickel (1974), and Lakela and Long (1976, p. 27), have used the name *S. armata*.

Recent examination of type material of the three species in question has led to the conclusion that Alston (1952, 1955) was mistaken in equating *S. eatonii* and *S. armata*. Rather, *Selaginella eatonii* is synonymous with *S. bracei*. However, as *S. eatonii* was described in 1918 and *S. bracei* in 1924, *Selaginella eatonii* has to be the correct name for the species. The following key, along with descriptions and illustrations of the type material of the three species, as well as my lectotypification of *S. eatonii* and *S. bracei*, should prevent further misunderstanding, especially of South Florida material.

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- Leaf margins serrate, light-green; stomata on abaxial side of lateral leaves and adaxial side of medial leaves scattered over the whole laminar surface; megaspores yellow to orange, less than $220\ \mu\text{m}$ in diameter..... 1. *S. eatonii*
- Leaf margins ciliate, especially at the base, hyaline; stomata on abaxial side of lateral leaves and adaxial side of medial leaves arranged linearly only along the midrib; megaspores white, more than $220\ \mu\text{m}$ in diameter..... 2. *S. armata*



FIGS. 1-6. Leaves of *Selaginella*. FIGS. 1-2. *S. eatonii* (Eaton in 1903, NY). FIG. 1. Lateral leaves. FIG. 2. Medial leaves. FIGS. 3-4. *S. bracei* (Brace 1834, NY). FIG. 3. Lateral leaf. FIG. 4. Medial leaf. FIGS. 5-6. *S. armata* (Wright 3908, NY). FIG. 5. Lateral leaves. FIG. 6. Medial leaves.

1. ***Selaginella eatonii* Hieron. ex Small, Ferns Trop. Florida 67, fig. 1918. Figs. 1-4.**

Selaginella bracei Hieron. ex O. C. Schmidt, Repert. Sp. Nov. Fedde 20: 156. 1924, *syn. nov.*
LECTOTYPE: Marsh Harbour, Great Abaco Island, Bahamas, 21 Dec 1904, L. J. K. Brace 1834 (NY). SYNTYPES: Marsh Harbour, Great Abaco Island, Bahamas, *Brace 1618* (NY); Mastic Point, Andros Island, *Brace 7024, 7113* (both NY).

Diplostachyum eatonii (Hieron. ex Small) Small, Ferns Southeast. States 422. 1938.

LECTOTYPE: About lime-sinks, border of Everglades, Black Point Creek, Dade County, Florida, 13 Nov 1903, A. A. Eaton 265 (NY; islectotype US not seen).

Plants yellow-green, small, creeping over limestone with mosses; stems 1-4 cm long. Lateral leaves ovate, gradually acute, 1.25-1.4 mm long, 0.75-0.9 mm wide, serrate; midrib ending 75-125 μm below leaf apex; margin light-green, composed of 2-4 rows of linear, slightly to distinctly papillose cells, papillae arranged longitudinally; upper epidermal cells \pm isodiametric, many-sided, with several small chloroplasts per cell, lower epidermal cells \pm rectangular, 2-6 times longer than wide, with strongly sinuous walls; stomata of abaxial (aligular) surface scattered over whole lamina, those of the adaxial (ligular) surface confined to the margin. Medial leaves lanceolate, long-acuminate, 1.0-1.2 mm long, 0.3-0.35 mm wide, serrate; midrib ending 300-350 μm below leaf apex; margin light-green, composed of 1-3 rows of linear, slightly to distinctly papillose cells, the papillae arranged longitudinally; apex long-acuminate, serrate, composed of linear cells continuous from the leaf margin, not papillose; epidermis as in lateral leaves; stomata on adaxial (ligular) surface only, scattered over the whole lamina. Strobili 2-5 mm long; sporophylls ovate, ca. 1.4 mm long, 0.75 mm wide, acuminate, serrate; margin as in the trophophylls; midrib ending ca. 400 μm below the leaf apex, strongly ridged on the abaxial side from linear, papillose cells, spinose, the spines ending at about the costal apex; stomata on the abaxial surface only, scattered over the whole lamina. Megaspores yellow to orange, ca. 200 μm diameter, slightly roughened to almost smooth. Microspores orange, ca. 30 μm in diameter, rough.

2. *Selaginella armata* Baker, J. Bot. Brit. & For. 22: 90. 1884. Figs. 5-6.

Type: Cuba, C. Wright 3908 (K *fide* Alston, 1952; isotypes BM, NY!).

Plants green, small, creeping; stems 1-4 cm long. Lateral leaves oblong-ovate, abruptly tapering, ca. 1.5 mm long, 0.8-0.9 mm long, ciliate, especially near the base; midrib ending 250-400 μm from the apex; margin hyaline, composed of 2-5 rows of linear cells, smooth to slightly papillose, cilia single-celled, becoming longer toward the base, to 150 μm long; upper epidermal cells \pm isodiametric, almost circular, with a single large chloroplast per cell, lower epidermal cells \pm rectangular, 4-6 times longer than wide, with strongly sinuose walls; stomata of abaxial surface confined to the midrib region, those of the adaxial surface confined to the margin. Medial leaves elliptic-lanceolate, short-acuminate, 1.0-1.2 mm long, 0.3-0.35 mm wide, ciliate; midrib ending 300-400 μm below the apex; margin hyaline, composed of 2-4 rows of linear, smooth to slightly papillose cells, the cilia single-celled, becoming longer toward the leaf base, to 130 μm long; apex short-acuminate, with only a single pair of linear cells confluent at the apex; epidermis as in the lateral leaves; stomata on the adaxial surface only, arranged longitudinally along and over the midrib. Strobili 2-5 mm long; sporophylls ovate, ca. 1.75 mm long, 0.75 mm wide, short-acuminate, ciliate; margin as in the trophophylls but more distinctly papillose; midrib ending ca. 500 μm below the leaf apex, spinose but not ridged at the back, the spines ending above the costal apex. Megaspores white, ca. 230 μm in diameter, reticulate. Microspores orange, ca. 30 μm in diameter, \pm granular.

Selaginella eatonii is the correct name for the native heterophyllous *Selaginella* of South Florida, and *S. armata* is excluded from the North American flora. The two species are most easily separated on the basis of the serrate versus ciliate leaves in *S. eatonii* and *S. armata*, respectively. However, numerous additional diagnostic characters are present at the microscopic level. Most conspicuous of these are the differences in stomatal distribution. In *S. eatonii* the stomata of the aligular surface of the lateral leaves and of the ligular surface of the medial leaves are scattered over the whole laminar surface, whereas for the same laminar re-

gions in *S. armata*, the stomata are confined to the midrib area. Stomatal distribution was first suggested by McNab (1887) as of possible taxonomic importance in the genus. More recently, Buck and Lucansky (1976) used it as an aid in the separation of *S. apoda* and *S. ludoviciana*. An additional microscopic character useful in separating *S. eatonii* from *S. armata* is the distance from the distal end of the costa to the apex of the lateral leaf. In *S. armata* the midrib ends 250-400 μm from the apex, whereas in *S. eatonii* the equivalent distance is only 75-125 μm . Megaspore differences also exist between the two species. Although Hellwig (1969) found megaspore color of little use in segregating higher taxonomic groups of *Selaginella*, it is of value in separating these species. In *S. eatonii* the megaspores are yellow to orange; those of *S. armata* are white. Also the megaspores of *S. armata* are larger than those of *S. eatonii*. Further research on the apparent plastid differences between *S. eatonii* and *S. armata* would be rewarding.

Dr. C. E. Delchamps, of the University of Miami, Coral Gables, Florida, planned to contribute ecological data from personal field experience with *S. eatonii*. Unfortunately Dr. Delchamps died prior to contributing. I am indebted to him for first calling this problem to my attention by sending me living South Florida material.

I thank Dr. John Mickel of the New York Botanical Garden for permission to examine the type material and for the use of facilities while I was visiting there. I am also grateful to Drs. Howard Crum and W. H. Wagner, Jr. for comments and criticisms concerning the manuscript.

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