

## SPECIES

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# *Selaginella willdenowii* (Desv.) Baker (Selaginellaceae) first record from Sitakundo Ecopark, Chattogram, for the vascular plant of Bangladesh

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## ABSTRACT

The present study provides the new distributional records of *Selaginella willdenowii* (Desv.) Baker in the Sitakundo Ecopark, located in Chattogram, Bangladesh. This is the first record of the ridges naturally found on limestone rocks and waterfalls. An updated nomenclature, important synonym, description, ecology, specimen examined, and geographic distribution are provided along with a detailed overview and pictures.

**Keywords:** *Selaginella willdenowii* (Desv.) Baker, Selaginellaceae

## 1. INTRODUCTION

The Peacock fern (*Selaginella willdenowii*) is a vascular plant species in the family Selaginellaceae. Selaginellaceae, a cosmopolitan family including a sole genus (*Selaginella*) and seven subgenera Weststrand and Korall, (2016), are the most species-rich family in extant lycophytes and estimated to have about 600–800 species (Valdespino, 2015; Zhou and Zhang, 2015). *Selaginella* is also known as spike moss or club mosses. The rhizophore in *Selaginella* is a unique kind of root-bearing organ, a positive gravitropic leafless cylinder without typical root traits such as a root cap (RC) and root hairs (Mello et al., 2019). It corresponds to a group of early vascular plants with an important place in evolutionary history (Kang et al., 2020). They belong to the Lycopodiophyta division, the oldest lineage of vascular plants on Earth (Weng and Noel, 2013). There are more than 700 *Selaginella* species distributed worldwide, in a diverse range of habitats, from deserts to tropical rainforests and mountainous regions.

Like other Selaginallales, they are sometimes included in a paraphyletic group called the "fern allies" and not a true fern, it is a type of moss. Peacock fern is a great little terrarium plant, known for its striking blue color. *Selaginella* occurs mostly in the world's tropical regions, with a handful of species to be found in the arctic-alpine zones of both hemispheres. In Bangladesh, seven species from the genus *Selaginella* have been previously documented. These species include *Selaginella biformis* A. Braun ex Kuhn, *S. ciliaris* (Retz.) Spring, *S. novae-hollandiae*

(Sw.) Spring, *S. microphylla* (Kunth) Spring, *S. tenuissima* Fée, *S. myosurus* (Sw.) Alston and *S. repanda* (Desv.) Spring. It has no data on the occurrence of Peacock ginger (*Selaginella willdenowii*) in Bangladesh in previously published literature. During a botanical exploration of Sitakundo Ecopark in Chattogram, Bangladesh, a species was found to have abundant populations. Therefore, we report it as the country's newly recorded *Selaginella* species.

## 2. MATERIALS AND METHODS

The present research work was conducted in Sitakunda Ecopark and the adjacent Botanical Garden is located along the Dhaka-Chattogram highway in Sitakunda upazila of Chattogram district. The eco-park is located between 22°36' to 22°39' North latitude and 91°40' to 91°42' East longitude and about 15 to 65m above mean sea level. The park is bordered by Mirsarai upazila to the north, Pahartali to the south, the Sandwip canal and the Bay of Bengal to the west, and Fatikchari to the east. During the documentation of the biodiversity of Sitakunda Eco - park, a plant is observed in stream bank areas on exposed rock. The place is mostly shady and wet. Along with the stream bank, the plant is also found in exposed rock with little cover of soil. The plant was collected and identified as *Selaginella willdenowii*. The voucher specimens were poisoned, dried, prepared and deposited at the herbarium for future reference.

## 3. RESULTS

*Selaginella willdenowii* (Desv.) Baker Gard. Chron. 1867 (no. 30): 783 (1867)

### Synonym

*Lycopodium willdenowii* Desv. Encycl., Suppl. 3: 552 (1814)

### Common Name

Willdenow's Spikemoss (was named after a German naturalist – Carl Ludwig von Willdenow), Peacock Fern, Blue Spike Moss, Blue Club Moss, Vine Spike Moss.

### Local name (In Bengali)

Mayur Fern

### Description

Plants terrestrial, on rock, or rarely hemiepiphytic (initially terrestrial, becoming epiphytic), vinelike or shrublike. Stems prostrate, creeping, decumbent, cespitose, climbing, or fully erect, articulate or not, slightly to greatly branched, branches 4–5-forked, glabrous. Rhizophores borne on upper side or underside of stems throughout stem length, stout or filiform 2–3 mm diam. Roots branching several times dichotomously from rhizophore tips. Leaves delicate, papery. Lateral leaves distant, iridescent, blue-green (Figure 1a), ovate to oblong, 3–4 mm long and 1.5–2 mm wide (Figure 1d); basiscopic base rounded, acroscopic base with whitish, long, downward-curving auricle; margins transparent (whitish and shiny when dry), entire; apex rounded or obtuse.

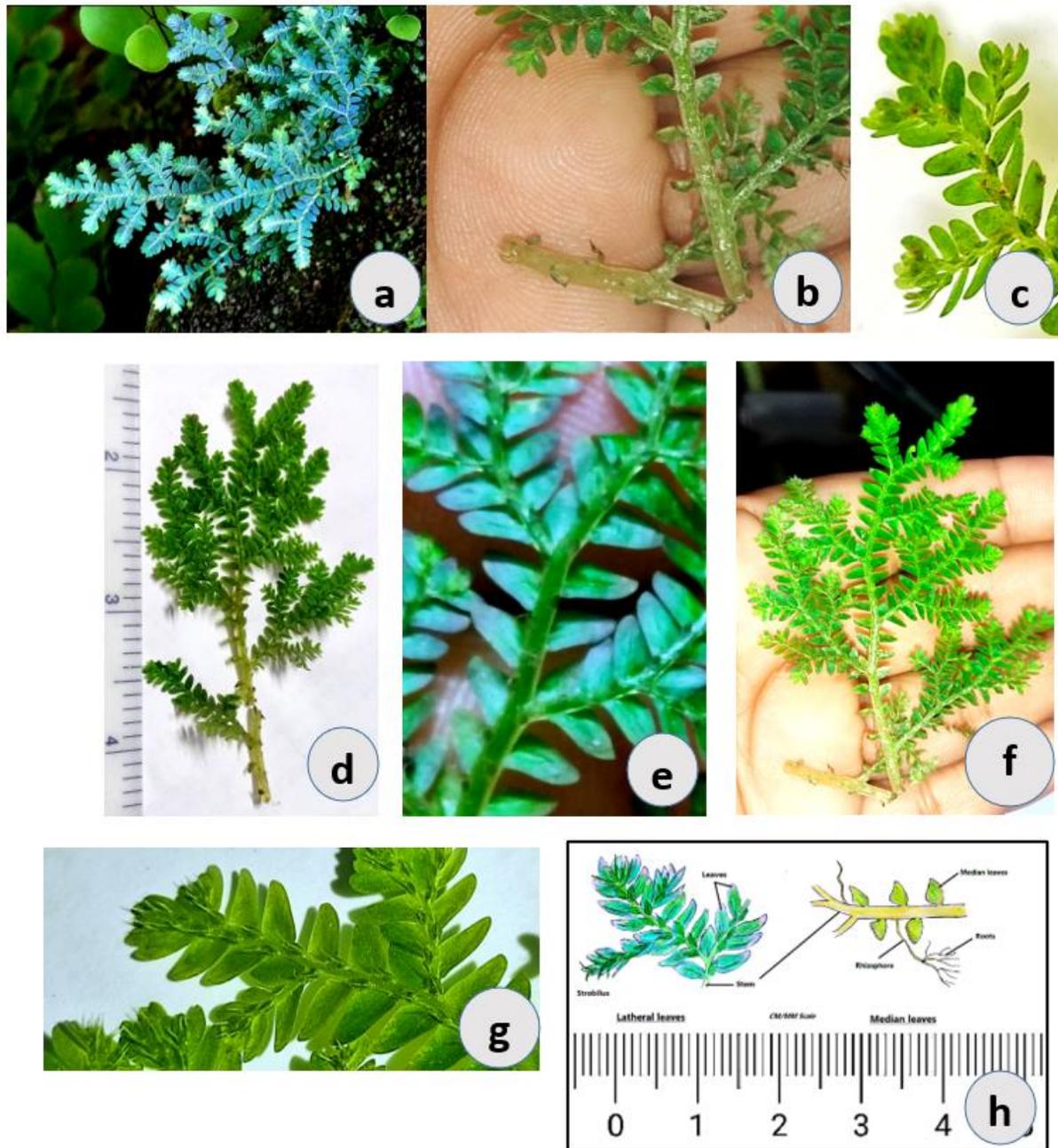
Median leaves falcate-lanceolate or oblique-ovate, 2.4–2.7 × 0.9–1.3 mm; base auriculate, outer auricle larger than inner; margins transparent, entire; apex obtuse. Strobili (Spore bearing parts) are produced at the tips (Figure 1c, g). Solitary, 0.5–2 cm; sporophylls monomorphic, cordate to ovate-deltate, base glabrous, margins green, entire, apex slightly cuspidate. Iridescent fronds look like blue-green and pinkish hues (Figure 1e). Sometimes all leaves are green depending on light, soil & water flows (Figure 1f). The presence of iridescent blue color in the leaves of *Selaginella willdenowii* indicates the presence of a layered lamellar structure within the upper cuticle of these iridescent leaves. The blue iridescence is achieved through the utilization of multi-layer structures. There are blue and green leaves from the same plant indicating that the loss of the blue iridescence corresponds to a loss of the multi-layer structure. These blue-green colors indicate the color of blue Peacock.

### Chromosome number

2n = 20.

### Ecology

Like the waterfall rocks or stony riverside (Figure 1b), having low light and moist conditions, limestone rock. Some fern species found this type of limestone mixed soil, rich in calcium carbonate and tropical rainforest weather.



**Figure 1** a. Iridescent leaves b. The muddy leaves showing the hilly river soil c. Close tips of fern d. Average size e. Blue-green-pink-hues f. Sometimes green g. Strobilus showing on the tips of upper branches h. Illustration with Scale

**Habitat**

Banks of streams, in the shade and under stones in moist hilly areas are the suitable place to grow this Peacock fern.

**Key identifying characters**

This fern is easily identified by its iridescent, metallic bluish-green fronds. When viewed at different angles, hues of green and blue.

**Specimen examined**

*Selaginella willdenowii* grows on the limestone rocks at the side of a small waterfall at Chandranath Hill at Sitakunda Eco Park. Discuss the sample plant matching with the Peacock (Mayur fern).

**Distribution**

*Selaginella willdenowii* is native to the Malay Peninsula: Like Malaysia, Indonesia, Myanmar, and Bangladesh. First recorded by Thailand on the Malay Peninsula (Parris and Latiff, 1997). Andaman Island, Cambodia, South-Central China, Southeast China, Java, Laos, the Philippines, Sulawesi, Sumatra and Vietnam.

**Economic uses/values/harmful aspects**

*Selaginella willdenowii* used as a food and medicine, and iridescent blue foliage made them attractive houseplants and good groundcover in shady conditions (De-Winter and Amoroso, 2003). Used in Chinese medicine for cardiovascular diseases, for cancer treatment in the nose, liver, throat & lungs. The most common use of this plant group is its ethnomedical use due to its healing benefits in different health issues, especially incurring fever, jaundice, diarrhea, cholecystitis, cirrhosis, dysentery, and menorrhagia, sore throat, cough of lung, silicosis, for hematemesis, hemifacial, epistaxis and curing wound, promotes blood circulation, removes blood stasis and stops external bleeding after trauma and separation of the umbilical cord. Diabetes Adnan et al., (2021), chronic and acute hepatitis, urinary tract infections Winkelman, (1986), anti-mutagenic, gastritis Han et al., (1984), skin diseases, cancer and cardiovascular problems, anti-inflammatory and cytotoxic.

**Ethical approval**

*Selaginella willdenowii* plants were used in the study. The ethical guidelines for plants & plant materials are followed in the study for sample collection & identification.

**Informed consent**

Not applicable.

**Author's contribution**

Zinia Nasrin Shumon drafted the manuscript and prepared the images, M. Ashrafuzzaman reviewed and edited the draft manuscript to its final version.

**Conflicts of interests**

The authors declare that there are no conflicts of interest.

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**Data and materials availability**

All data associated with this study are present in the paper.

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