**Selaginella mayeri** Hieron. (Selaginellaceae), a new record for Thailand

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**Keywords**: Indochina, Lycophytes, new record, Selaginella, South Thailand.

**Summary.** *Selaginella mayeri* is widely distributed in Southeast Asia and has not been reported in Thailand. We found two collections of it from Pattalung and Yala Provinces of Thailand, representing new records for this country. *Selaginella mayeri* could be distinguished from other long-creeping Southeast Asian species distributed in Thailand by the exauriculate axillary and ventral leaves and short flabellate lateral branchlets.

**Introduction**

A. H. G. Alston has made a great contribution to the study of the genus *Selaginella* P. Beauv. in different regions of the world, one of which is Southeast Asia. In Malay Peninsula, Ridley (1919) recorded 37 species of *Selaginella* for the first time. Several years later, Alston (1934) reduced list of the species to 25. Subsequently, Wong (1983, 2010) made a detailed study of *Selaginella* in Malay Peninsula and recognized 29 species. Later, Zhang and Tan (2013) added *S. braunii* Baker and *S. siamensis* Hieron. as new records for Malaysia. The studies of *Selaginella* species for Indochina were initiated by Alston (1951). A total of 43 species were recorded, of which 16 species distributed in Thailand (Alston, 1951). Tagawa and Iwatsuki (1979) recorded 29 species in Flora of Thailand. Later, a new record of *S. ciliaris* (Retz.) Spring was added by Rachata and Boonkerd (2001) to Thailand flora.

***Selaginella mayeri*** Hieron. is one of the interesting long-creeping species with short suberect and flabellate lateral branches, distributed in Malaysia, Singapore and Indonesia. This new record of it from
Thailand is based on herbarium study by the senior author in herbaria of Naturalis Biodiversity Center (L) and examination of digital images from “Global Biodiversity Information Facility” source (GBIF. URL: https://www.gbif.org).

**Material and methods**

Digital images from online databases for the Selaginellaceae species from GBIF (Selaginella mayeri Hieron., 2023) including herbaria B, BM, DUKE, L, MICH, MO, NY, P, PE, PH, U, US (acronyms according to Thiers, 2023), were careful analyzed and studied. For confirmed identifications of the new occurrences of Selaginella mayeri by analyzing images, we carefully examined types in B, K, P (and visit these herbariums by the second author ZXC) and JSTOR, and consulted with relevant literature (Alston, 1951; Tagawa, Iwatsuki, 1979; Wong, 2010; Zhang et al., 2013). Measurements were done by D 3.10 (Nikon Instruments Inc. URL: http://www.nikoninstruments.com) based on digital images from different herbarium specimens represented in GBIF.

**Description**

**Selaginella mayeri** Hieron., 1901, Engler et Prantl, Nat. Pflan. 1, 4: 700.

**Holotype**: “Singapore, VIII 1895. Mayer 532” (B [B200147122]; iso – K [K000803526], P [P00523184], B [B200147121, probably isotype, but without coll. number]).


**Holotype**: “Peninsular Malaysia, Selangor, Batu Caves, Ridley 8772” (K [K000803521]).


**Teman**: “Taman Negara, at Gua Telinga. Lowland rainforest. 2 IX 2006. P. Korall et al. FRI 51616” (L.3721980); **Indonesia**: “Indonesia. H. F. Sun 23” (P01410564); **West Java**: “Botanic Garden, Bogor, on bank of ditch near Fern Garden. Leaves bright green. Stem somewhat reddish. A. H. G. Alston 13509” (L.3498154); “Java, Bogor Botanical Garden. 7 IX 2013. X. C. Zhang 6910” (PE01962530);
**Key for Selaginella mayeri and other isophylous species in Thailand**

1. Main stems creeping or prostrate, erect, suberect, or ascending with short prostrate basal portion, not curling inward when dry .......................... 2
   + Main stems forming rosettes, curling inward when dry.........................  S. tamariscina

2. Stems and branches pubescent ...................... 3
   + Stems and branches glabrous ...................... 4

3. Dorsal leaves ovate, base obliquely cordate, margin ciliolate, apex aristate; ventral leaves oblong-falcate or falcate, margin ciliolate to denticulate ...........  S. biformis
+ Dorsal leaves elliptic or falcate, base decurrent, margin entire, apex acuminate; ventral leaves oblong-ovate or falcate, margin entire or subentire. .......................................................... S. pubescens

4. Main stems erect, suberect, or ascending from decumbent base, with creeping subterranean rhizome and stolons ........................................... 8
+ Main stems creeping or prostrate (usually less than 1 m) or scandent (up to 1–2 m or longer) .... 5
5. Axillary and ventral leaves with basal auricles .......................................................... 6
+ Axillary and ventral leaves without basal auricles ..................................................... 7
6. Axillary and ventral leaves with large basal auricles. Strobili 5–35 mm, sporophylls ovate, acute or cuspidate at apex ........................................... S. willdenowii
+ Axillary and ventral leaves with small basal auricles. Strobili 5–14 mm, sporophylls ovate-lanceolate, acuminate at apex .................................. S. helferi
7. Primary leaf branches up to 10 cm long (slightly ascending); dorsal and ventral leaves entire at margin, axillary leaves obovate or orbicular .......... .......................................................... S. mayeri
+ Primary leaf branches up to 10 cm long or more (some primary lateral branches developing into long branch systems); dorsal and ventral leaves on main stems ciliolate, on branches entire or subentire (d. l.), entire to ciliolate (v. l.) ................................ S. siamensis
8. Plants erect. Main stem in upper part dichotomous forked into two branches; ventral leaves oblong subquadangular to falcate, margin more or less involute; dorsal leaves narrowly ovate, apex acuminate, base rounded or cuneate, margin ciliate ........................................... S. ostenfeldii
+ Plants erect, suberect, or ascending from decumbent base, or creeping. Main stems not dichotomous forked in upper part, branched formed from lower part, or middle to upwards ............... 9
9. Dorsal and ventral leaves glabrous .......... 10
+ Dorsal and ventral leaves on adaxially surface with spinose .......... 17
10. Leaves hyaline at margin ................. 11
+ Margin not hyaline ......................... 12
11. Plants up to 16–35(65) cm. Dorsal leaves ovate-triangular or ovate-elliptic, base cuneate, margin denticulate; ventral leaves ovate to triangular, margin hyaline, denticulate; strobili 5–15 mm long .......................................................... S. involvens
+ Plants more than 60 cm. Dorsal leaves ovate or elliptic-ovate, base rounded, margin ciliate, with distinct whitish membranous setae, apex acute or aristate; ventral leaves narrowly deltoid, margin hyaline and ciliolate; strobili 2–4 mm long ...................... .......................................................... S. argentea
12. Plants erect, suberect, or ascending ........ 13
+ Plants suberect ..................................... 16
13. Plants erect, 10–20 cm long, lateral branches many in upper part, close to each other ............... .......................................................... S. griffithii
+ Plants erect, suberect, or ascending, near to 50 cm or more, lateral branches arranged along main stem from lower part upwards ...................................... 14
14. Main stems in apical part black when dry ........ .......................................................... S. inaequalifolia
+ Main stems in apical part not black .......... 15
15. Lateral branches simple or forked, ventral leaves oblong-ovate or oblong, margin entire and denticulate at apex .......................................................... S. delicatula
+ Lateral branches simple, ventral leaves oblong-falcate, margin subentire ................................ S. wallichii
16. Plants suberect, to 25–30 cm or more, stems subdichotomously branching; all vegetative leaves denticulate at margin; axillary leaves ovate, obtuse at base; dorsal leaves ovate-oblong, acuminate to aristate (up to ¾ lamina length); ventral leaves oblong-falcate .................................................................. S. intermedia
+ Plants suberect, to 10–40 cm high, stems pinnately branching; all vegetative leaves long ciliolate at margin; axillary leaves subcordate at base; dorsal leaves ovate to suborbiculate, aristate at apex (with arista ⅔ to nearly the same length); ventral leaves with acrosopic base enlarged and broader .......... .......................................................... S. roxburghii
17. Main stems suberect or ascending from decumbent base, ventral leaves oblong-falcate, margin subentire or denticulate; dorsal leaves aristate at apex ........................................... S. trachypylla
+ Main stems prostrate, ventral leaves oblong-ovate, margin dentate to ciliolate; dorsal leaves mucronate at apex ........................................... S. strigosa

Acknowledgments
We are grateful to curators and staff at B, DUKE, L, MICH, MO, NY, P, PH, U, US and the Global Biodiversity Information Facility (GBIF) for access to digital images collections. We would also like to thank Mr. C. R. Fraser-Jenkins and D. G. Melnikov (LE) for their help with literature.
### Morphological comparison of *Selaginella helferi*, *S. mayeri*, *S. siamensis*, and *S. willdenowii*

<table>
<thead>
<tr>
<th>Characters</th>
<th><em>S. helferi</em></th>
<th><em>S. mayeri</em></th>
<th><em>S. siamensis</em></th>
<th><em>S. willdenowii</em></th>
</tr>
</thead>
<tbody>
<tr>
<td>Habit and size (cm)</td>
<td>terrestrial, evergreen, scandent, 50–200 cm or more</td>
<td>terrestrial, creeping or slightly ascending at lateral branches, 15–100 cm or more</td>
<td>terrestrial, long creeping or ascending from decumbent base or scandent, 20–45 cm</td>
<td>terrestrial, scandent, 100–200 cm or more</td>
</tr>
<tr>
<td>Branches system arrangement</td>
<td>pseudopinnate</td>
<td>flabellate</td>
<td>pseudopinnate</td>
<td>pseudopinnate</td>
</tr>
<tr>
<td>Length of primary lateral branches (cm)</td>
<td>up to 70</td>
<td>up to 10</td>
<td>up to 20</td>
<td>up to 20(30)</td>
</tr>
<tr>
<td>Axillary leaves on main stems</td>
<td>shape: orbicular or reniform</td>
<td>obovate or orbicular</td>
<td>oblong-elliptic or oblong-ovate</td>
<td>oblong</td>
</tr>
<tr>
<td>Axillary leaves on branches</td>
<td>shape and size (mm): ovate-lanceolate or oblong, 1.4–2.5 × 0.8–1.2</td>
<td>obovate or orbicular, 0.2–3.1 × 0.2–2.7</td>
<td>ovate, 1.3–2.5 × 0.7–1.7</td>
<td>oblong or oblong-elliptic, 1.5–2.4 × 1–1.6</td>
</tr>
<tr>
<td></td>
<td>base: biauriculate (auricles smaller than those of <em>S. willdenowii</em>)</td>
<td>cuneate to obtuse (not auriculate)</td>
<td>obtuse or subcordate</td>
<td>biauriculate (auricles larger than those of <em>S. helferi</em>)</td>
</tr>
<tr>
<td></td>
<td>apex: acute</td>
<td>acuminate</td>
<td>acute and aristate</td>
<td>acute</td>
</tr>
<tr>
<td>Dorsal leaves</td>
<td>shape and size (mm): falcate, 1.2–2.5 × 0.3–1</td>
<td>ovate-elliptic, 0.9–3.3 × 0.3–1</td>
<td>ovate-elliptic or ovate-orbicular, 1.2–1.8 × 0.4–0.8 mm</td>
<td>falcate, 0.9–1.4 × 0.4–0.6</td>
</tr>
<tr>
<td></td>
<td>margin: entire</td>
<td>entire</td>
<td>entire or subentire</td>
<td>entire</td>
</tr>
<tr>
<td></td>
<td>apex: cuspidate</td>
<td>acuminate to apiculate</td>
<td>aristate, parallel to axis, arista ca. 1/3 as long as leaves</td>
<td>obtusely cuspidate</td>
</tr>
<tr>
<td></td>
<td>base of dorsal leaves: oblique</td>
<td>oblique</td>
<td>obliquely subcordate</td>
<td>obliquely subcordate</td>
</tr>
<tr>
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<td>shape and size (mm): oblong-falcate, 2.3–4.2 × 0.9–1.8</td>
<td>oblong-falcate to slightly elliptic, 0.3–4.0 × 0.1–2.1</td>
<td>ovate or oblong-ovate, 1.8–2.6 × 0.8–1.4</td>
<td>oblong-falcate, 2.8–4 × 1–1.5</td>
</tr>
<tr>
<td></td>
<td>margin: entire</td>
<td>entire or subentire</td>
<td>ciliolate</td>
<td>entire</td>
</tr>
<tr>
<td></td>
<td>apex: acute or apiculate</td>
<td>entire</td>
<td>acute and aristate</td>
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<tr>
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<td>not auriculate (oblique to rounded)</td>
<td>not auriculate (rounded, overlapping stem and branches)</td>
<td>auriculate (with rounded auricle)</td>
</tr>
<tr>
<td></td>
<td>margin: entire</td>
<td>entire</td>
<td>entire to ciliolate</td>
<td>entire</td>
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<tr>
<td>Strobili</td>
<td>size (mm): tetragonal, 5–14 × 1.6–3.4</td>
<td>tetragonal, 6–25 × 1–3</td>
<td>tetragonal, 4–10 × 1.2–2.6</td>
<td>tetragonal, 5–35 × 1.8–3.8</td>
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<tr>
<td>Sporophylls</td>
<td>shape: ovate-lanceolate (white-margined)</td>
<td>ovate-lanceolate (white-margined)</td>
<td>ovate-triangular</td>
<td>broadly ovate</td>
</tr>
<tr>
<td></td>
<td>margin: entire</td>
<td>entire</td>
<td>minutely ciliolate</td>
<td>entire</td>
</tr>
<tr>
<td></td>
<td>apex: acuminate</td>
<td>acuminate</td>
<td>acuminate</td>
<td>acute or cuspidate</td>
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</tbody>
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REFERENCES / ЛИТЕРАТУРА


