NOTE

Supplements to the Lycophytes in Taiwan (I): A newly Recorded Species *Selaginella lutchuensis* Koidz. (Selaginellaceae)

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ABSTRACT: This paper reports a new recorded lycophyte, *Selaginella lutchuensis* Koidz., collected from eastern Taiwan. This species can be distinguished from other congeners by its resupinate strobili, long-tailed apex of ventral (lateral) trophophyll and distinctly white-callous margin of dorsal (median) one. In the present work, taxonomic description, distribution information, line drawing, and photographs of this newly recorded species are provided. A key is also provided to distinguish the morphologically related species of Taiwan.

KEY WORDS: new recorded species, lycophytes, *Selaginella*, *Selaginella lutchuensis*, Sealginellaceae, Taiwan.

INTRODUCTION

In both editions of Flora of Taiwan, 14 species of *Selaginella* were recorded native to Taiwan (DeVol, 1979; Tsai and Shieh, 1994). In addition to these 14 species, Kuo (1999) argued that there were another two species, *S. pseudonipponica* Tagawa, which was treated as synonym of *S. nipponica* Franch. & Sav. in his previous study (Kuo, 1985), and *S. satakeana* Koidz., distributed in Taiwan. In the present work, we found another spike-moss species, *S. lutchuensis* Koidz., in eastern Taiwan. It was published as a new species based on materials collected from Ryukyu Archipelago (Koidzumi, 1935) and regarded as an endemic lycophyte of Japan (Nakaike, 1992; Iwatsuki, 1995). Until now, only 4 populations have been discovered in Taiwan (Fig. 1).

Morphologically this new taxon looks more or less like the young creeping stage of many other *Selaginella* species in Taiwan, e.g., *S. heterostachys* Baker, *S. nipponica*, *S. pseudonipponica*, *S. remotifolia* Spring, and *S. repanda* (Desv. *ex* Poir.) Spring. However, *S. lutchuensis* has creeping habit throughout its life cycle, narrow stem (including microphylls), long-tailed apex of ventral (lateral) trophophyll, distinctly white-callous margin of dorsal (median) trophophyll, and resupinate strobili (sporophylls dimorphic: dorsal ones conspicuously larger than ventral ones). This character set (Figs. 2A-D & 3) could be easily distinguished it from other spike-mosses in Taiwan. In this paper, taxonomic description, distribution information, line drawing, and photographs of this newly recorded species are provided.

TAXONOMIC TREATMENT

Selaginella lutchuensis Koidz., Acta Phytotax. Geobot. **1**: 165. 1932; Nakaike, New Fl. Jap. Pter., Rev. & Enl. 42. 1992; Iwatsuki, Fl. Jap. **1**: 16. 1995. 琉球卷柏 Figs. 2 & 3

Evergreen creeping lycophytes, without erect or ascending stems. Stems 3-5 cm long, 2.5-3.5 mm wide (including microphylls), rarely longer than 10 cm, decumbent or creeping, undersides and uppersides differentiated, irregularly and dichotomously branched. Rhizophores present, short, originated from the upperside of stem at the branch site, 0.1-0.2 mm in diameter; axillary trophophylls present at branching points, lanceolate, ciliate along margin. Trophophylls conspicuously dimorphic, arranged in 4 ranks (2 dorsal & 2 ventral), margin more or less white-callous; ventral (lateral) trophophylls ovate, 1.2-2 mm long, usually less than 1 mm wide, attached by broad base, caudate at apex, loosely serrulate along margin but ciliate at acroscopically basal part; dorsal (median) trophophylls broadly lanceolate to ovate, 1.2-1.8 mm long, 0.6-0.8 mm wide, base rounded, apex caudate or long-tail, margin loosely serrulate, conspicuously white-callous. Strobili usually solitary, sometimes twin on the forked branches, resupinate, 0.4-1.5 cm

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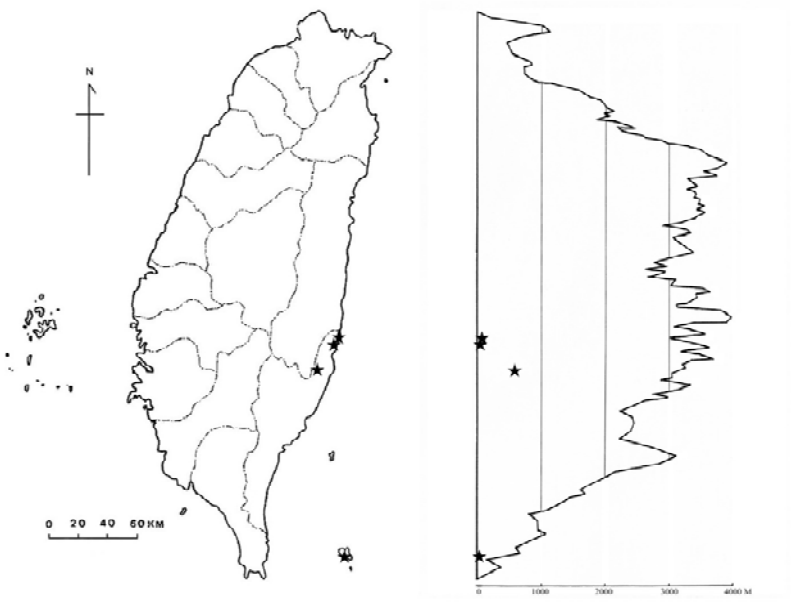


Fig. 1. Distribution of *Selaginella lutchuensis* Koidz. in Taiwan.

long, megasporangia usually formed at basal sporophylls and microsporangia formed at upper ones; dorsal sporophylls folded, 2-2.5 mm long, lanceolate by one side, ciliate along margin of basal part, acuminate or tailed at apex, rounded at base; ventral sporophylls shovel-like, ovate or broadly ovate, keeled, *ca.* 1.6-2 mm long, 1-1.2 mm wide, ciliate along margin, acuminate or tailed at apex, rounded at base. Megaspore (Figs. 2E & F) anisopolar, radiosymmetrical, trilete, yellow, usually 4 in a megasporangium, equatorial diameter 280-300 μm; perispore rugulate or rugulo-reticulate, with well-defined irregular wrinkles. Microspore (Figs. 2G & H) anisopolar, radiosymmetrical, trilete, reddish orange, numerous in a microsporangium, equatorial diameter 35-37 μm; perispore verrucate, with coral-like structures on the surface.

Specimens examined: TAIWAN: Tatung County: Changpin Township, Pahsientung, 30-50 m alt., on the moist rock. *P.-F. Lu 1311* (TAIF), *C.-F. Chen s.n.*, Dec. 12, 2001 (TAIF), *H.-M. Chang 6341* (TNU), Mt. Hsinkanshan, *ca.* 750 m alt., *H.-M. Chang 6917* (TAIE, TAIF), Changyun, *M.-Y. Sheng 4570* (TAIE); Lanyu, Yehyu, 10 m alt., on the laying stones, *P.-F. Lu 8575* (TAIF), *H.-M. Chang 6633* (TAIE).

Distribution: This species distributes from Kyushu (Southern part of Kagoshima-ken) to Ryukyu Archipelago of Japan, and Taiwan. In Taiwan, it grows on the moist rocky slope with some shade, and 4 populations were found in eastern Taiwan (Fig. 1).

Note: *Selaginella* of Taiwan has 5 different habit forms: (1) branches tufted on the pseudo-stem, e.g., *S. tamariscina* (Beauv.) Spring; (2) leaf-like branches grown on a single, erect, stock-like branch which connected to underground rhizome-like branch, e.g., *S. delicatula* (Desv.) Alston, *S. involvens* (Sw.) Spring, *S. mollendorffii* Hieron., and *S. stauntoniana* Spring; (3) young branches creeping but fertile branches erect or suspended, e.g., *S. heterostachys, S. labordei* Hieron *ex* H. Christ, *S. leptophylla* Baker, and *S. repanda*; (4) young branches creeping but strobiliferous stem solely erect, and sporophylls loosely developed, e.g., *S. nipponica* and *S. pseudonipponica*; (5) both sterile and fertile branches creeping, e.g., *S. boninensis* Baker, *S. ciliaris* (Retz.) Spring, *S. doederleinii* Hieron., and *S. remotifolia*. The new recorded species, *S. lutchuensis*, has the last type of growth habit. Additionly, it has resupinate strobili that can be distinguished from *S. doederleinii* and *S. remotifolia*, and caudate apex of ventral trophophyll and distinctly white-callous margin of dorsal trophophyll that can be distinguished from *S. boninensis* and *S. ciliaris*.

Key to *Selaginella* with creeping sterile and fertile branches in Taiwan

1. Margin of ventral trophophyll serrulate ……..…….. 2
1. Margin of ventral trophophyll serrulate but ciliate at acroscopically basal part 4
2. Strobili resupinate, sporophylls dimorphic ……..… *S. boninensis*
2. Strobili quadrangular in cross-section, sporophylls monomorphic …….. 3
3. Branches long-creeping; base of dorsal trophophyll oblique …….. *S. remotifolia*
3. Branches short-creeping; base of dorsal trophophyll symmetric ……..... *S. doederleinii*
4. Stem including trophophylls 2.5-3.5 mm wide; apex of ventral trophophyll caudate; margin of dorsal trophophyll conspicuously white-callous ……..…… *S. lutchuensis*
4. Stem including trophophylls 3.8-4.5 mm wide; apex of ventral trophophyll acute; dorsal trophophylls without white-callous margin ……..…… *S. ciliaris*

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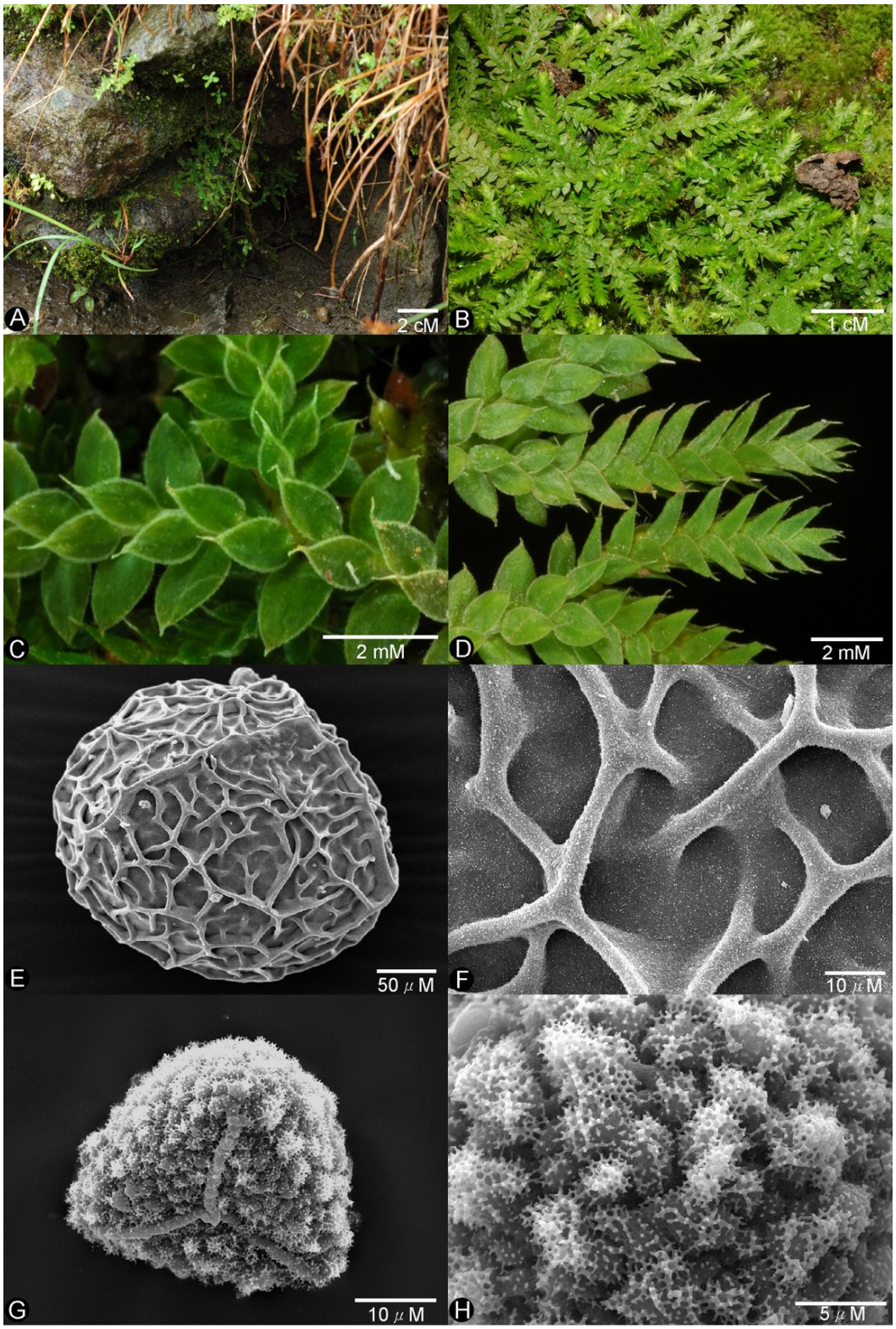


Fig. 2. *Selaginella lutchuensis* Koidz. A & B: Habit. C: Ventral and dorsal trophophylls. D: Resupinate strobili. E & F: SEM micrographs of megaspore. F: Surface structure of megaspore. G & H: SEM micrographs of microspore. H: Surface structure of microspore.

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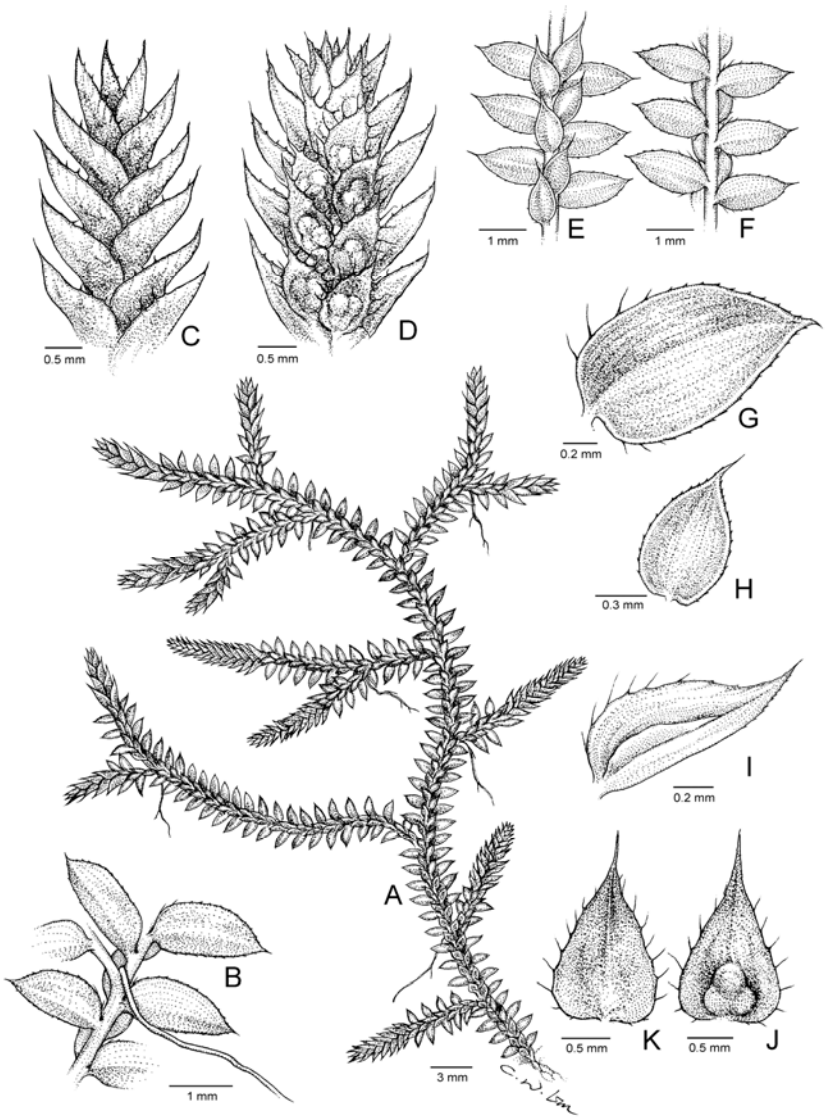


Fig. 3. Illustration of *Selaginella lutchuensis* Koidz., according to *Chang 6917* (TAIF). A: Mature individual. B: Ventral view of branch and a rhizophore. C: Dorsal view of strobilus. D: Ventral view of strobilus. E: Dorsal view of sterile branch. F: Ventral view of sterile branch. G: Ventral trophophyll. H: Dorsal trophophyll. I: Ventral view of dorsal sporophyll. J: Dorsal view of ventral megasporophyll and megasporangium. K: Ventral view of ventral sporophyll.

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LITERATURE CITED

DeVol, C. E. 1979. A check list of the vascular plants of Taiwan I. Pteridophyta. In: Li et al. (eds.), Flora of Taiwan **6**: 5-21. Epoch, Taipei, Taiwania.

Iwatsuki, K. 1995. Selaginellaceae. In: Iwatsuki, K. et al. (eds.), Flora of Japan **1**: 12-17. Kodansha, Tokyo, Japan.

Koidzumi, G. 1935. Japanese species of *Selaginella*. Acta Phytotax. Geobot. **4**: 220-230.

Kuo, C.-M. 1985. Taxonomy and phytogeography of Taiwanese pteridophytes. Taiwania **30**: 5-100.

Kuo, C.-M. 1999. Manual of Taiwan Vascular Plants, Vol. 1., 2nd ed. The Council of Agriculture, Taipei. (In Chinese).

Nakaike, T. 1992. New flora of Japan: Pteridophyta, revised & enlarged. Shibundo Co., Tokyo, Japan. P. 42.

Tsai, J.-L. and W.-C. Shieh. 1994. Selaginellaceae. In: Huang, T.-C. et al. (eds.), Flora of Taiwan 2nd ed. **1**: 29-44. Editorial Committee, Dept. Bot., NTU, Taipei, Taiwan.

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臺灣石松類植物補遺 (一)：新紀錄種琉球卷柏 (卷柏科)

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摘要: 本文新紀錄一種產於臺灣東部之石松類(lycophytes)植物－琉球卷柏 (*Selaginella lutchuensis* Koidz.)。此物種可藉其轉置的孢子囊穗、營養葉腹葉 (側葉) 葉片先端長尾狀與背葉 (中葉) 具有顯著的白色軟骨質邊緣等特徵，而與臺灣產其他種類區分。本文提供其分類描述、圖片、分布資訊，以及其與形態近似種類之檢索表。

關鍵詞：新紀錄、石松類、卷柏科、卷柏屬、琉球卷柏、臺灣。

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