

***Sciuro-hypnum sichuanicum* (Brachytheciaceae, Bryophyta), an interesting new record for Japanese bryophyte flora**

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Abstract – *Sciuro-hypnum sichuanicum* Ignatov & Hedenäs, a rare species previously recorded in China, has been newly reported in the Japanese Alps. A description of the species based on Japanese samples, some ecological and conservational notes, as well as a comparison table among this species and some similar species of the same genus have also been provided.

Distribution / ecology / East Asia / moss / Mount Ontake

Résumé – *Sciuro-hypnum sichuanicum* Ignatov & Hedenäs, une espèce rare reportée de Chine, a été découverte dans les Alpes japonaises. Les auteurs décrivent l'espèce sur la base des échantillons japonais, en ajoutant des notes écologiques, son statut de conservation, et un tableau comparatif avec les espèces semblables du même genre.

Distribution / écologie / Asie Est / mousses / Mont Ontake

INTRODUCTION

Sciuro-hypnum (Hampe) Hampe is a widespread moss genus distributed mainly in temperate and boreal regions. Since Ignatov and Huttunen (2002) published the circumscription and nomenclature of this genus within *Brachytheciaceae*, a significant number of studies have been carried out (Ignatov & Milyutina, 2007; Draper & Hedenäs, 2009; Orgaz *et al.*, 2011) even though our knowledge about *Sciuro-hypnum* has increased during recent years, the distribution of some species remains understood. In Japan, the circumscription of this genus has not been properly studied yet and the number of species is still doubtful. *Sciuro-hypnum sichuanicum* Ignatov & Hedenäs was recently described by Hedenäs *et al.* (2012) as a new species based on morphological and molecular analyses of some samples collected by T. Koponen in Sichuan province in China. Until now, this species is only known for Sichuan and Yunnan provinces in China (Hedenäs *et al.*, 2012).

During a revision of genus *Sciuro-hypnum* in Japan, we found two specimens previously identified as *S. reflexum* (Starke) Ignatov & Huttunen, which we regard as misidentifications of *S. sichuanicum*. Consequently, this paper

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presents the new records for Japan as well as a description of the species based on Japanese samples. In addition, a comparison table has been provided among *S. sichuanicum* and some *Sciuro-hypnum* species with which *S. sichuanicum* could be easily confused.

MATERIAL AND METHODS

The present study is based on a revision of more than 100 specimens deposited in HIRO, NY and NICH, and the study of the type material of the species, deposited in H. Under "specimens studied", only the specimens corresponding to *S. sichuanicum* are listed. Microscopic examinations and measurements were taken with a Nikon Optiphot-2 light microscope, while microphotographs were obtained with a Nikon Dxm1200 digital camera mounted on that microscope.

RESULTS

Sciuro-hypnum sichuanicum Ignatov & Hedenäs, *The bryologist* 115(1): 169. 2012.

Type: China, NW Sichuan, Minshan Range, Songpan Co., Huanlong Temple. Upper oroboreal *Betula utilis-Larix-Sorbus-Rhododendron watsonii* forest, 1km NW of the main temple, alt. 2250 m, 32°43'N, 103°50'E, 11/9/1991, *Koponen 45490* (Holotype: H!).

Plants medium-sized, pale green to yellow-green. **Stems** prostrate, 25-40 mm long, pinnately branched. **Branches** straight, 1-6 mm long. **Axillary hairs** with 1 brownish basal cell and 1 upper hyaline cell. **Pseudoparaphyllia** somewhat ovate-triangular, 0.4-0.6 × 0.35-0.40 mm. **Stem leaves** erect when dry, broadly ovate-triangular, generally straight, 1.5-2.2(-2.5) × 0.75-1 mm, not plicate, somewhat concave, abruptly narrowed into acuminate, reflexed apex of 600-950 µm long; **margins** denticulate to almost entire, plane, rarely recurved in basal part of the leaf; **leaf base** broadly and long decurrent, with decurrencies of (350-)400-800 µm long. **Costa** single, to 0.95-1 way up leave, smooth. **Median and upper laminal cells** linear, 60-80(-90) × 7-10 µm, smooth; **alar cells** broadly rectangular, 16-40 × 8-20(-24) µm, somewhat inflated, thin-walled, forming more or less defined group, triangular, ascending along leaf margins, not reaching the costa, not excavated. **Branch leaves** ovate-lanceolate, 0.9-1.6 × 0.5-0.8 mm; margins serrulate; leaf base decurrent, decurrencies shorter than in stem leaves, other characters similar to stem leaves. **Sporophytes** not found in Japanese samples.

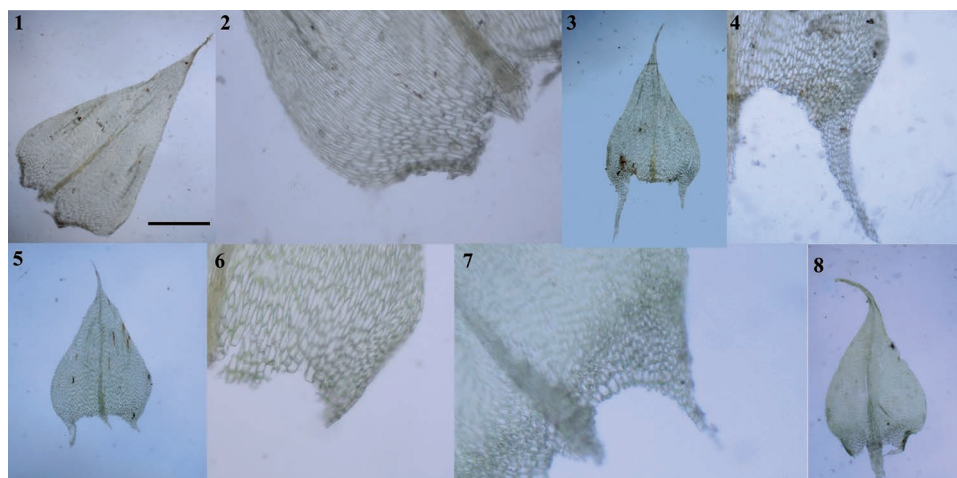
Specimens studied: JAPAN Honshu, Chubu, Nagano Prefecture, Mount Ontake, Sannoike, 2650 m, 27/8/1953, *Nakajima s.n.* (NICH 156454); Honshu, Chubu, Nagano Prefecture, Mount Ontake, 2700 m, 26/8/1953, *Nagano 4635* (NICH).

Ecology: The samples were collected from Mount Ontake, a volcano in Central Honshu Island. This mountain, with 3067 m high, is the second highest volcano in Japan after Mount Fuji. Both samples were collected under a *Pinus pumila* (Pall.) Regel, at high altitude (2650 and 2700 m) between the limit of

subalpine and alpine vegetation areas. The dominant vegetation is the subalpine coniferous forest, dominated by the trees *Picea jezoensis* (Siebold & Zucc.) Carr. and *Abies* spp. and with some shrubs as *Pinus pumila*, *Vaccinium* spp. or *Ilex rugosa* F. Schmidt (Ando & Sasaki, 1958; Franklin *et al.*, 1979).

DISCUSSION

Although available Japanese samples are sterile, the identification of this species is not difficult. *Sciuro-hypnum sichuanicum* is characterised by broadly ovate-triangular leaves that narrow abruptly into a long acuminate apex, and leaf bases, with long and broad decurrencies that are longer than 400 μm . *S. reflexum*, known from Asia, Europe and North America (Orgaz *et al.*, 2011; Ros *et al.*, 2013), is morphologically very similar to *S. sichuanicum*, but it is commonly a slender plant, with usually shorter leaf apex and shorter and narrower decurrencies than in *S. sichuanicum* (Figs 3-6). Another similar species which *S. sichuanicum* could be confused with is *Sciuro-hypnum uncinifolium* (Broth. & Paris) Ochyra & arnowiec, reported for China, Japan, Russia, and North America (Alaska) (Ignatov & Milyutina, 2007), but the latter has laminal cells shorter than 60 μm and alar cells reaching the costa (Fig. 7). The Asian *Sciuro-hypnum brotheri* (Paris) Ignatov & Huttunen (Ignatov & Milyutina, 2007) has also broadly ovate-lanceolate leaves, but could be easily distinguish by its shorter costa, reaching 0.5-0.7 of leaf length, and the absence of decurrencies (Fig. 1). Table 1 sums up diagnostic characters of *S. sichuanicum* compared with other similar *Sciuro-hypnum* species.



Figs 1-8. **1. 2.** *Sciuro-hypnum brotheri* (Inoue 20268, NUM 40690). **1.** Stem leaf. **2.** Alar group. **3-4.** *S. sichuanicum* (Nakajima s.n., NICH 156454). **3.** Stem leaf. **4.** Alar group. **5-6.** *Sciuro-hypnum reflexum* (Takenaka 2465, HIRO 1012915). **5.** Stem leaf. **6.** Alar group. **7-8.** *S. uncinifolium* (Takenaka 2527, HIRO 1012977). **7.** Alar group. **8.** Stem leaf. Scale bars: 1 = 0.5 mm; 2, 4 = 150 μm ; 3 = 0.7 mm; 5 = 0.4 mm; 6 = 200 μm ; 7 = 80 μm ; 8 = 0.3 mm.

Table 1. Diagnostic characters of *Sciuro-hypnum sichuanicum* compared with other similar *Sciuro-hypnum* species

	<i>S. sichuanicum</i>	<i>S. brotheri</i>	<i>S. reflexum</i>	<i>S. uncinulatum</i>
Leaf shape	Broadly ovate-triangular	Broadly ovate-triangular	Ovate to triangular-ovate	Ovate
Costa	Reaching 0.95-1 of leaf length	Reaching 0.6-0.85(-0.90) of leaf length	Reaching 0.9-1 of leaf length	Reaching 0.95-1 of leaf length
Alar cells	Broadly rectangular, somewhat inflated, not reaching costa	Broadly rectangular, inflated, not reaching costa	Quadrate to quadrate-rectangular, not reaching costa	Quadrate to quadrate-rectangular, reaching costa
Alar group shape	Triangular, ascending along leaf margins	Ovate, not ascending along leaf margins	Triangular, ascending along leaf margins	Somewhat rectangular, slightly ascending along leaf margins
Laminal cells	60-80(-90) × 7-10 µm	90-130 × 6-8 µm	30-80 × 6-10 µm	30-60 × 6-9 µm
Leaf base	Broadly and long decurrent; decurrencies (350-) 400-800 µm long	Somewhat cordate, not decurrent	Decurrent; decurrencies less than 400 µm long	Decurrent; decurrencies 200-500 µm long

The samples were collected from active volcano that in September 2014 furiously erupted. Populations have not been searched for after eruption and therefore current state of the species in Japan remains uncertain. Another field trip to try to find this species again may be planned in order to study if the eruption destroyed the populations of this plant. Additional conservation actions might be taken out if the plants are still living there.

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