



## *Polystichum hagiangense* (subg. *Haplopolystichum*; Dryopteridaceae), a new fern species from Ha Giang Province, northern Vietnam

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### Abstract

A new fern species, *Polystichum hagiangense* belonging to *P.* subg. *Haplopolystichum* (Dryopteridaceae), is described and illustrated from Ha Giang Province in northern Vietnam. *Polystichum hagiangense* is most similar to *P. minutissimum* by having a small habit (lamina 3.6–5.8 × 1.0–1.6 cm), but the former has the widest part of the lamina close to the base and ovate and larger pinnae (5.3–8.2 × 3.2–5.8 mm). In contrast, the latter has the widest part of the lamina above the middle and nearly rectangular and smaller pinnae (2.9–5.8 × 2.8–4.5 mm). Also, the two species have different ecological requirements. *Polystichum hagiangense* was found on limestone cliffs in forest at an elevation of 1290 m with dry and light conditions, while *P. minutissimum* grows on dripping limestone walls and stalactites inside a karst cave at an elevation of 750 m with humid and shady conditions. *Polystichum hagiangense* is currently known only from a single population occurring at Bat Dai Son community in Ha Giang Province, northern Vietnam, and would be classified as Critically Endangered (CR), following IUCN Red List criteria.

**Key words:** Limestone flora, pteridophytes, Dryopteridaceae

### Introduction

Estimated to contain ca 500 species worldwide (Zhang 2012, Zhang & Barrington 2013), *Polystichum* Roth (1799: 31; Dryopteridaceae) is one of the largest fern genera. Species of *Polystichum* are common in the temperate and subtropical lowlands and montane to alpine regions in the Northern Hemisphere, especially in southern and southwestern China, the Himalaya, Japan and Vietnam; a rich diversity of *Polystichum* is also found in Central and South America. Fifteen species of *Polystichum* have been listed in a recent checklist of ferns of Vietnam (Phan 2010) and ten new records of *Polystichum* have been reported from that country (Lu *et al.* 2014). During a visit to herbaria in Hanoi, we identified an undescribed species of *Polystichum* growing on limestone cliffs in Ha Giang Province, northern Vietnam, which is described below.

### Taxonomy

*Polystichum hagiangense* Li Bing Zhang, Ngan T. Lu & Liang Zhang, *sp. nov.* (Figure 1)

*Polystichum hagiangense* is most similar to *P. minutissimum* Li Bing Zhang & H. He (2009: 353) by having a small habit (lamina 3.6–5.8 × 1.0–1.6 cm) and the leaves are appressed to the substrate, but the former has the widest part of the lamina close to the base and ovate and larger pinnae (5.3–8.2 × 3.2–5.8 mm). In contrast, the latter has the widest part of the lamina above the middle and nearly rectangular, smaller pinnae (2.9–5.8 × 2.8–4.5 mm).

Type:—VIETNAM. Ha Giang Province: Bat Dai Son Community, Bat Dai Son Provincial Protected Area, ridge north of Bat Dai Son border station, 23°09'11"N/104°59'06"E, on sheer limestone cliff, 1290 m, 11 February 2001, D. K. Harder, N. T. Hiep, L. V. Averyanov & P. K. Loc 6162 (holotype HN!, isotypes LE, MO).

on the acroscopic pinnae bases and anastomosing venation can also be found in both genera. However, species of *Cyrtomium* have an apical pinna somewhat dissected at the base (rarely a simple lamina), while those of *Polystichum* always have a pinnatifid apical pinna (Zhang *et al.* 2013) except *P. fraxinellum* (Christ) Diels (1899: 194) and *P. minimum* (Y.T. Hsieh) Zhang (2012: 58; see Zhang & Barrington 2013). *Polystichum hagiangense* is clearly a member of *Polystichum* in having a pinnatifid apical pinna (Fig. 1).

In addition to *Polystichum hagiangense*, our recent field investigation and herbarium study showed that there are at least four species of *P.* subg. *Haplopolystichum* in Ha Giang Province: *P. fraxinellum*, *P. minimum*, and *P. tenuius* (Ching) Zhang (2012: 59). The latter three species were traditionally placed in the genus *Cyrtogonellum* Ching (1938; Hsieh 2001), which is now a section in *Polystichum* (Zhang & Barrington 2013: 678) because *Cyrtogonellum* is unambiguously resolved as part of *Polystichum* based on molecular data (Li *et al.* 2008, Liu *et al.* 2010, Zhang & He 2010). *Polystichum minimum* used to be called *Cyrtogonellum inaequale* (Christ) Ching (1938: 331), while *P. tenuius* replaces *C. caducum* Ching (1938: 330). Among these four species of *Polystichum* in Ha Giang Province, *P. hagiangense* stands out by having small and papery lamina that are appressed to the ground with ovate pinnae, while the other three all have erect or ascending leaves with much larger, leathery blades with obliquely ovate, ovate-lanceolate or lanceolate pinnae. These four species can easily be distinguished using the following key:

#### Key to species of *Polystichum* in Ha Giang Province, Vietnam

1. Plant shorter than 10 cm long; leaves appressed to the substrate; lamina papery, ca. 3.6–5.8 × 1.0–1.6 cm; pinnae ovate.....*P. hagiangense*
1. Plant up to 50 cm tall or taller; leaves erect or ascending; lamina leathery, 8–28 × 2.5–3.5 cm or much larger; pinnae obliquely ovate, ovate-lanceolate or lanceolate.
2. Lamina pinnate and with pinnatifid apex ..... *P. tenuius*
2. Lamina imparipinnate and with apical pinna of same shape as lateral pinnae.
3. Pinnae 13–24 pairs, obliquely ovate; veins free.....*P. minimum*
3. Pinnae fewer than 8(–10) pairs, lanceolate; veins with few areoles along midrib..... *P. fraxinellum*

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