A new taxon of *Hymenophyllum* (Hymenophyllaceae):

*H. wrightii* f. *serratum*

**Chang Shook Lee*, Kanghyup Lee¹, Seong Gwon Lee² and Atsushi Ebihara³**

Department of Science Education, Ewha Womans University, Seoul 120-750, Korea

1 Korea National Arboretum, Pocheon 487-821, Gyeonggi-do, Korea

2 Yeongsan River Basin Environmental Office, Gwangju 502-788, Korea

3 Department of Botany, National Museum of Nature and Science, 4-1-1 Amakubo, Tsukuba 305-0005, Japan

(Received 17 November 2014; Accepted 1 December 2014)

ABSTRACT: A new taxon, *Hymenophyllum wrightii* f. *serratum* C.S. Lee & K. Lee (Hymenophyllaceae), forma nov. was collected and described from forests in Mt. Halla, Jeju-do, Korea. This taxon, *H. wrightii* f. *wrightii* was distinguished from *H. wrightii* f. *serratum* C.S. Lee & K. Lee (vernacular name: ‘Gu-reum-cheo-nyeo-i-kki’) by having smaller leaves, broader basal part of leaf blade, broad-ovate laminae, larger sori and serrate margins of lips of involucres. The new taxon’s name is based on serrate margin shape of the lips. A Korean name, ‘Gu-reum-cheo-nyeo-i-kki’, was newly given based on its habitat. Descriptions and its photograph in the habitat are provided along with a key to the species of *Hymenophyllum* from Korea.

Keywords: *Hymenophyllum wrightii* f. *serratum*, Hymenophyllaceae, new taxon, Korea

The Hymenophyllaceae family, known as filmy ferns, is characterized as rather simple, mostly single cell thick, laminae like mosses, and the monophyly of the family has not been questioned (Ebihara et al., 2006). On the other hand, the intrafamilial classification of this family is highly controversial. Copeland (1938) divide this family into 34 genera, whereas Morton (1968) split the family into only two genera, *Hymenophyllum* with bivalved involucres and *Trichomanes* with tubular involucres, which consists of nine subgenera, divided into 35 sections. Another system of consisting of 47 genera was proposed by Pichi Sermolli (1977). Iwatsuki (1984) created a new system consisting of eight genera based on morphological studies on Asiatic filmy ferns. Recent molecular systematic studies support two traditional genera showing two distinct monophyletic clades (Pryer et al., 2001; Ebihara et al., 2006, 2007). Finally, Ebihara et al. (2006) proposed a new
classification of Hymenophyllaceae, consisting of nine genera (Hymenophyllum, Didymoglossum, Cephalomanes, Polyphlebium, Vandenboschia, Abrodictyum, Trichomanes, Cephalomanes, and Callistopteris) based on morphology, chromosome data, and molecular phylogeny. The family Hymenophyllaceae in Korea contains three genera, Hymenophyllum, Cephalomanes, and Vandenboschia, according to the system of Ebihara et al. (2006). Among these taxa of Hymenophyllaceae, Cephalomanes schmidtianum was added by Lee et al. (2014) as a newly recorded species.

The genus Hymenophyllum Sm. contains about 250 species that are mostly distributed throughout the tropics to temperate regions. This genus is characterized by frequently branching, usually filiform or wiry, up to 2 mm diam., nearly glabrous or sparsely covered with multicellular hairs (exceptionally densely covered with hairs in subg. Fuciformia), protostele subcollateral, dorsi-ventral, stipes various in length, at a distance from adjacent ones, blades usually pinnate to quadripinnate or occasionally simple, venation anadromous, laminae usually one cell thick but sometimes two or more cells thick, sori paratactic, lips usually bivalve, receptacles usually included in involucres (Ebihara et al., 2006). According to Ebihara et al. (2006), this genus can be divided into 10 subgenera, Hymenophyllum, Sphaerocionium, Mecodium, Globoa, Pleurorana, Myrmecostylum, Hymenoglossum, Fuciformia, and Diplööphyllum based on morphology, cytology, and molecular phylogeny. The base chromosome number of Hymenophyllum s.l. is n = 11 to 36 (Vessey and Barlow, 1963; Dawson et al., 2000; Ebihara et al., 2006).

Wright’s filmy fern, Hymenophyllum wrightii Bosch is distributed in west Canada (Alaska) and east Asia (Japan, Korea and Siberia), and it’s habitat is rocks or tree trunks in wet forests (Iwatsuki, 1992; Iwatsuki et al., 1995). This species was classified as part of the genus Mecodium by Copeland (1938), or subgenus Mecodium according to the system of Ebihara (2006). With more than 100 species, Mecodium is the largest infrageneric taxon of Hymenophyllaceae sensu lato. It has long been considered as a natural and homogeneous group, but recent phylogenetic studies have questioned this assertion. Using rbcL, rbcL-accD, and rps4-trnS sequences, we demonstrate that Mecodium is highly polyphyletic. Several species of Mecodium form the derived clade "H. polyanthos" with H. wrightii; one species is nested within a second derived clade while remaining species are assigned to five basal clades including taxa regarded as distantly related (Hennequin et al., 2006).

The genus Hymenophyllum in Korea has been reported to contain five species, H. barbatum (Bosch) Baker, and H. polyanthos Sw., H. coreanum Nakai, H. wrightii Bosch, and H. oligosorum Makino (Park, 1975; Lee, 1980; Korean Fern Society, 2005; Lee, 2006; Korea National Arboretum, 2008). H. barbatum and H. oligosorum correspond to the subgenus Hymenophyllum, whereas remaining taxa (H. polyanthos, H. coreanum and H. wrightii) belong to the subgenus Mecodium as sensu Ebihara et al. (2006). Except for these types of simple taxonomic descriptions like this, no study on the taxa of Hymenophyllum or even Hymenophyllaceae from Korea has been carried out.

In addition to the above taxa, we found an additional new taxon, Hymenophyllum wrightii f. serratum forma nov., with about 100 individuals per 2 m². It is described as a newly found taxon from Korea, and it was collected from a forest in Mt. Halla, Jeju-do. The local name was designated as ‘Gu-reum-cheo-nyeo-i-kki’ based on its habitat. We compared and analyzed morphological characters between Hymenophyllum wrightii f. serratum and similar taxa of Hymenophyllum in order to elucidate their taxonomic relationship. Morphological characters and illustrations of Hymenophyllum wrightii f. serratum, along with photographs of the habitat, are newly reported with a taxonomic key to the species of Hymenophyllum from Korea.

Taxonomic Treatment

Hymenophyllum wrightii f. serratum C.S. Lee & K. Lee, forma nov. (Figs. 1-3)

Korean name: Gu-reum-cheo-nyeo-i-kki 구름처녀이끼

Fig. 1. Holotype of Hymenophyllum wrightii f. serratum C.S. Lee & K. Lee.
Holotype: 960 m, Mt. Halla, Jeju-do, Korea, 1 Dec. 2013
C.S. Lee & K. Lee 131201 (EWH)

Isotypes: EWH, KB, KH.

Paratypes: Mt. Halla, Jeju-do, Korea, 1 June 2014 C.S. Lee & K. Lee 14060101 (EWH); Mt. Halla, Jeju-do, Korea, 10 Nov. 2014 C.S. Lee & K. Lee 14060102-3 (KB)

Winter green herb, on rock or epiphytic, height 1.3-1.8 cm. Rhizomes long creeping, thin, 0.12-0.15 mm diameter, rarely blackish brownish hairy, hairs unicellular, 0.2-0.5 mm length. Stipes remote 1.5-2.0 cm apart, 0.3-0.7 cm length, 0.12-0.15 mm width, with flat winged at apex (sometimes decurrent to middle or near to base), rarely brownish haired in base. Laminae bipinnatifid, 1-3 lateral pinnae pairs, broadly ovate, green, membranous, 1.0-1.3 cm length, 1.0-1.5 cm width, glabrous or with a few multicellular hairs; lateral pinnae oblong or ovate, narrowing continuously from base, 0.7-1.0 cm length, 3-4 mm width; no-stalked, ultimate segments linear, margin entire, apex round, 4-6 mm length, 0.7-1.0 mm width, sometimes imbricate to the neighboring ones;costae with winged throughout; veins dichotomous, obvious. Sori terminal on short axially segments; involucres bivalved, cleft to medium, lip margin serrate, ca. 0.2-0.25 mm length, 0.2-0.27 mm diameter, apex broadly rounded, Spores trilete.

Habitat: In forests of High Mountain.

Distribution: Mt. Halla, Jeju-do, Korea

Notes: This taxon was distinguished from *H. wrightii* f. *wrightii* by having pseudo-vein, broadly winged in rachis, almost wingless in stipe, cup shaped involucres, and prominently bent back involucre margin (Table 1, Figs. 1-3).

The new taxon in Korea, *Hymenophyllum wrightii* f. *serratum* C.S. Lee & K. Lee, could be classified as a taxon of the genus *Mecodium* (Copeland, 1947) or the genus *Hymenophyllum* (Morton, 1968; Iwatsuki, 1990). Moreover, this taxon belongs to the subgenus *Mecodium* of the genus *Hymenophyllum* corresponding to Ebihara et al. (2006) based on those species by having filiform rhizomes, nearly glabrous, bivalved involucres, and receptacles included in involucres as the morphological characters.

*Hymenophyllum wrightii* f. *serratum* is distinguished with *H. wrightii* f. *wrightii* based on its smaller height and broader basal leaf blades, broad-ovate lamina, larger sori and serrated...
Table 1. Comparative morphological characters between Hymenophyllum wrightii f. serratum and H. wrightii f. wrightii distributed in Korea.

<table>
<thead>
<tr>
<th>Characters</th>
<th>H. wrightii f. wrightii</th>
<th>H. wrightii f. serratum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laminae shape</td>
<td>2-3 pinnatifid,</td>
<td>2-pinnatifid, broadly ovate</td>
</tr>
<tr>
<td></td>
<td>ovate-lancolate</td>
<td></td>
</tr>
<tr>
<td>Leaf blades length/width (cm)</td>
<td>1.5-3.5 / 1.0-1.5</td>
<td>1.0-1.3 / 1.0-1.5</td>
</tr>
<tr>
<td>Pinnae shape</td>
<td>ovate or obovate</td>
<td>oblong or ovate</td>
</tr>
<tr>
<td>Sori diameter (mm)</td>
<td>0.12-0.15</td>
<td>0.20-0.27</td>
</tr>
<tr>
<td>Involucre lips margins</td>
<td>entire</td>
<td>serrate</td>
</tr>
</tbody>
</table>

Key to the known allied taxa of Hymenophyllum wrightii f. serratum in Korea

1. Segments margins irregularly serrate
   H. barbatum 수열이끼

2. Stipes margins entire

3. Laminae 3 pinnatifid, segments attached at 45°-90° from rachis

4. Sori stuck to laminae base, segments attached at 45°-75° from rachis
   H. polyanthos 중치나이끼

5. Laminae linear lanceolate, involucre lips margins entire
   H. wrightii f. wrightii 처녀이끼

6. Laminae broadly ovate, involucre lips margins serrate
   H. wrightii f. serratum 구름처녀이끼

Acknowledgment

This search was supported by grants from “The Survey of new and unrecorded taxa in vascular plants (NIBR No. 2014-02-001)” founded by the Ministry of Environment of the Korean Government.

References


A new taxon of *Hymenophyllum* (Hymenophyllaceae): *H. wrightii f. serratum*  


