Seven new records of overlooked South Korean moss species

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In East Asian region, Korean Peninsula has a less known moss flora (Hallingbäck & Hodgetts, 2000). Yoon et al. (2015) presented a brief review of the history of Korean bryology. The first modern illustrated moss flora was prepared by Choe (1980) and the most recent updated checklist of mosses of Korean Peninsula was published by Park and Choi (2007) who reported a total of 645 species of mosses.

In two recent phytogeographical analyses of the moss flora of Korea, it was suggested that its affinity is closer to the Japanese flora than to the Chinese flora (He & Song, 2007), and Jeju Island was shown to be also an important refugium for mosses in their postglacial migration and recolonization of the peninsula (Yoon et al., 2015).

In spite of numerous recent publications focused on the Korean moss flora (Li et al., 2007; He & Song, 2007; Yoon & Sun, 2010; Yoon et al., 2011a, 2011b), there is, today, still a great number of moss taxa awaiting discovery in the Korean Peninsula. Additionally, difficulty also exists in the study and understanding of the reported diversity of Korean moss flora because it is often not possible to find access to voucher specimens cited in past publications, and there are incomplete specimens of the moss taxa reported that are preserved in the herbaria in Korea.

Facing with these difficulty, we report here 7 species of mosses newly found in Korea. Although these mosses are widespread taxa and have long been known from adjacent countries, their presence have been overlooked in South Korea. The voucher specimens of these mosses are deposited at the herbarium of Chonbuk National University (JNU). The study effort is an outcome of a plan to produce a new illustrated moss flora of South Korea in the near future.

Of the seven newly recorded moss species, the occurrence of *Sasaokaea aomoriensis* (Par.) Kanda is most interesting from the point of view of the phytogeography of Korean flora. This species shows an oceanic pattern of plant distribution in coastal Asia from Japan to Taiwan, including the Korean Peninsula.
**Bryum handelii** Broth. [Bryaceae]


The Bryaceae are one of the largest families on mosses, consisting of about 1000 species which are classified into 16–18 genera (Ochyra et al., 2008). The family consist nine genera in Korean Peninsula: *Anomobryum* Schimp. (2 species), *Brachymenium* Schwägr. (3 species), *Bryum* Hedw. (12 species), *Epipterygium* Lindb. (1 species), *Leptobryum* (Schimp.) Wilson (1 species), *Plagiobryum* Lindb. (1 species), *Pohlia* Hedw. (15 species), *Rhodobryum* (Schimp.) Limpr. (3 species), *Rosulabryum* J. R. Spence (1 species) (see Park and Choi, 2007). Here we report the first record of *B. handelii* in Korea although the same species has been previously reported from Japan, mainland China, Taiwan and Himalayas. *Bryum handelii* differs from other species of the genus in having a large plant size of about 30–40 mm tall (Noguchi, 1988) and appressed and concave leaves with narrowly rhombic to linear-rhomboidal leaf cells, round to obtuse leaf apices, bluntly denticulate leaf margins and a percurrent to slightly excurrent costa (Li et al., 2007).

**Eurhynchium arbuscula** Broth. [Brachytheciaceae]

Specimen studied: Jeju Prov. (Island), Seogeomeum-oreum, 33°27′555″N, 126°43′552″E, 352 m a.s.l.; on humus rocks, 21 Jun. 2011, leg. Y.-J. Yoon 7737 (JNU).

*Eurhynchium arbuscula* is reported here new to the Korean Peninsula. It is the largest plant species of the genus in Korean Peninsula. It is distinguished by its large and proliferous plant body with arcuate, pinnately branched stems and reniform to semi-orbicular stem leaves (Noguchi, 1991). The species is best characterized by its dendroid habit and its broadly decurrent leaf bases. In the past it has been treated as a species of *Kindbergia* (Ochyra, 1982) or *Stokesiella* (Robinson, 1967). We follow the traditional system of classification proposed by Noguchi (1991) and Hu et al. (2008) in placing the species in the genus *Eurhynchium*.

**Fissidens pallidinervis** Mitt. [Fissidentaceae]

Specimen studied: Ulleung Prov., MT. Seongin, 37°29′140″N, 130°52′559″E, 432 m a.s.l.; on rocks, 20 Oct. 2010, leg. Y.-J. Yoon 6485 (JNU).

The Fissidentaceae is a family of acrocarpous and haplolepideous mosses. The family is often treated as monogenetic, consisting of the genus *Fissidens* Hedw., which consist of 450 species worldwide (Pursell, 2007). Sixteen taxa have previously been reported from Korean Peninsula (Park and Choi, 2007). We report here the first record of *F. pallidinervis* from Korean Peninsula.

*Fissidens pallidinervis* can be distinguished from other species in the genus by its pluripapillose laminal cells, broadly acute, obtuse to round leaf apex, and the limbidium restricted to the vaginant laminae of perichaetial and 1 or 2 pairs of subtending leaves (Pursell, 2007). It differs from the widespread Asia species with similar, obtuse leaf apex, *F. gardneri* Mitt., in having the two vaginant laminae of nearly equal size (see Pursell 2007 for more discussion).
**Gymnostomum recurvirostrum** Hedw. [Pottiaceae]

Specimen studied: Gangwon Prov., Dong stream, 37°18′021″N, 128°36′836″E, 268 m a.s.l.; on shaded humus rocks, 29 Aug. 2011, leg. Y.-J. Yoon 7908 (JNU).

The Pottiaceae are one of the largest moss family distributed in temperate regions of the world (Li et al., 2001). There are a total of 18 genera and 38 species in this family known from South Korea (Park and Choi, 2007). Thus, it is not surprising to find *Gymnostomum recurvirostrum* from South Korea.

The first reference for this species in Korean Peninsula was made from Anbyeonmyeon in North Korea (Osada, 1958). It is here reported from South Korea from limestone area at Dong stream (limestone area) near the North Korean border. *Gymnostomum recurvirostrum*, also known by its synonym, *Hymenostylium recurvirostrum* (Hedw.) Dix., can be distinguished from other species in the genus *Gymnostomum* by its linear-lanceolate to oblong-lanceolate leaves not sheathing at base, acute to acuminate leaf apices, and each laminal cell decorated with several small papillae. The stem surface cells of this species are papillose (Noguchi 1988).

**Pylaisiadelpha tenuirostris** (Bruch & Schimp. ex Sull.) W.R. Buck [Pylaisiadelphaceae]

Specimen studied: Poch-On-Gun Co., 8th US Army Installation. Camp Casey, Mike Unit, over the ridge from the town of Kumdong-ri, 37°56′15″N, 127°06′45″E, 220 m a.s.l.; on bark of Korean pine tree trunk along lower slope of mixed hardwood forest, 6 Aug. 1997, leg. J.R. Shevock 16156 (UC, det. as *Clastobryella kusatsuensis*). Although *P. tenuirostris* is a pantropical taxon reaching north to NE China, Japan and Siberia of Russia in Asia, it has not been properly recognized in recent publications and often treated as a synonym of *P. yokohamae* (Broth.) W.R. Buck. The distinction between the two species is clarified by Tan & Jia (1999) and Jia and He (2006). *P. yokohamae* has long been reported to be a common trunk epiphyte in Korea, while *P. tenuirostris* is hereby reported as a new species record.

**Pylaisiadelpha tenuirostris** is best distinguished by its falcate-secund leaves with long acuminate apex. The few differentiated quadrate and non-inflated alar cells and the overall plant habit often lead people to misidentify it as a species of *Hypnum*. For a good illustration of *P. yokohamae*, see Noguchi (1994, Fig. 483 as *Brotherella yokohamae*), and for *P. tenuirostris*, see Buck (1998, Plate 150, Fig. 9–13) and Jia and He (2006). The illustration of *P. yokohamae* in Wu et al. (2005, Plate 606) is *P. tenuirostris*.

**Sasaokaea aomoriensis** (Par.) Kanda [Amblystegiaceae]

Specimen studied: Jeju Prov. (Island), Sumeunmulbaengdwi, 33°21′948″N, 126°27′412″E, 1029 m a.s.l.; on humus, 26 Aug. 2010, leg. Y.-J. Yoon 5761-1 (JNU).

The genus *Sasaokaea* Broth. is a new moss record for Korean Peninsula. It was treated as a synonym of *Drepanocladus* by Noguchi (1991). Koponen and Lai (1978) considered *Sasaokaea* to be closer to *Cratoneuron* and *Cratoneuropsis* than *Drepanocladus* based on the presence of paraphyllia (see Hu et al., 2008). The genus became a monotypic genus after Kanda (1976) reduced *S. japonica* Broth. to a synonym of *S. aomoriensis* (Par.) Kanda.
Sasaokaea aomoriensis differs from other representatives of the family in having abundant filiform, often bifurcate, paraphyllia on the stem, and scarcely decurrent leaves with inconspicuously differentiated alar cells. This species grows reportedly on wet soil at fen margin, beside paddy fields and irrigation pond at lowlands, often in submerged condition. The sporophytes are unknown in Japan (Noguchi, 1991). We found S. aomoriensis also on wet soil in wetland on Mt. Halla on Jeju Island. Sasaokaea aomoriensis is an Asiatic endemic restricted in distribution to the coastal areas and island chains from Japan to Taiwan, including the Korean Peninsula.

Tortula muralis Hedw. [Pottiaceae]


The cosmopolitan genus Tortula Hedw. is a morphologically diverse group in the family Pottiaceae. Before the present report, Tortula muralis had been collected from Mt. Geumgang and Mt. Baekdu in North Korea (Hwang, 1991). The species is widely reported from China, Japan, Russia, Europe, Africa and North America (Li et al., 2001). It is most commonly found growing on concrete walls in city and town areas, but can also be seen growing on tree bark, stones and sandstone cliffs. It can be distinguished from other species in the genus by its well-developed peristome with spirally twisted teeth and leaves with the excurrent costa protruding from the round to emarginated apex into a long, hyaline hair-point. Sporophytes of Tortula muralis commonly mature in the spring and are red-brown at maturity (Kosnar and Kolar, 2009).

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Literature cited


