Unrecorded liverwort species from Korean flora II

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While preparing a floristic study of Korean hepatics, we discovered four unrecorded species collected from Mt. Geumo, Donggang river, Mt. Deokhang, and Mt. Naebyeon in Korea. Plagiochila shangaica Steph., Porella stephaniana (C. Massal.) S. Hatt., Porella chinensis (Steph.) S. Hatt., Solenostoma horikawanum (Amakawa) Váňa, Hentschel & J. Heinrichs are reported for the first time in Korea here.

Keywords: hepatics, Marchantiophyta, new species for Korea

INTRODUCTION

The first collector of hepatics on the Korean Peninsula was U. Faurie. In collaboration with E. Taquet, he collected some hepatics and mosses while amassing a large collection of vascular plants. The collections were studied by Stephani (1909-1912; 1912-1917; 1924 (1917-1924)). Since then, the Korean Hepaticae have been studied mainly by Japanese botanists, such as Nakai (1918), Horikawa (1932; 1934; 1955), Hattori (1943; 1947; 1952; 1956; 1978), Hattori et al. (1962a; 1962b), Ando (1955; 1960), Amakawa (1960), and Inoue (1958a; 1958b; 1959a; 1959b; 1962).

The first Korean botanist who studied the hepatics of Korea, was Hong (1960a; 1960b; 1960c; 1997; 2003). Choe conducted exhaustive bryofloristic research in southern Korea. He reported 201 Korean hepatic taxa in 66 genera (Choe, 1980). Recently Song and Yamada examined the hepatic flora of Jeju, Mt. Gaya, Mt. Jiri (2006; 2009a; 2009b) and Bakalin et al. (2009) described a new species (Tritomaria koreana) from Mt. Jiri.

During a floristic study of Korean hepatics, we discovered four unrecorded species collected from Korea. In this study, we provide a description and habitat details of the newly collected specimens from Korea.

MATERIALS AND METHODS

The field excursions were carried out in July 2008 (Jeollabuk-do: Mt. Naebyeon), October 2009 (Gangwon-do: Mt. Deokhang), February 2010 (Jeollanam-do: Mt. Geumo) and August 2010 (Gangwon-do: Donggang River) (Fig. 1).

Nomenclature of liverworts follows Konstantinova et al. (2009). All the voucher specimens are kept in the herbarium of Chonbuk National University (JNU) and National Institute of Biological Resources (NIBR).

RESULTS

During a floristic study of Korean hepatics, we determined four species turned to be new for the Korean bryophyte flora. The description and details of each species is provided here.

1. Plagiochila shangaica Steph., Sp. Hepat. 6: 216, 1921. (Fig. 2)

Korean Name: Hae-an-nal-gae-i-kki (해안날개이끼)
Plants 30.0-70.0 × 2.5-3.5 mm, prostrate to ascending, yellowish green to brownish green. Stems dichotomously branched, brownish green to reddish green, cross section ca. 0.25-0.30 × 0.20-0.25 mm, cortex cells smaller, thick-walled in 2-3 layers, 12.5-17.5 × 10.0-12.5 μm, inner cells larger, thin-walled, colorless, 15.0-17.5 × 12.5-25.0 μm, trigones concave. Rhizoids scarce. Leaves contiguously to imbricate, horizontally spreading, obliquely inserted, obliquely ovate to oblong, dorsal insertion line straight, recurved, ventral insertion line arched, shortly decurrent, 1.7-2.0 × 0.7-1.3 mm, margin entire, apex broadly rounded. Cells in the median leaf polygonal, 25.0-30.0 × 20.0-25.0 μm, trigones triangular, marginal cells subquadrate 20.0-25.0 × 17.5-22.5 μm, trigones concave, basal cells 25.0-40.0 × 20.0-32.5 μm, walls intermediate thickenings, trigones convex; cuticle smooth. Oil bodies (2-)4-5(-6) per cells, ovate to elliptical, grape-cluster, ca. 9.0-15.0 × 6.0-9.0 μm. Underleaves mostly vestigial, sometimes linear, 0.20-0.25 × 0.10-0.12 mm.

**Habitats.** On shaded rocks near the small stream in broad-leaved evergreen forest mixed with deciduous trees.

**Distribution.** Korea, China, Japan (So, 2001).


*Plagiochila shangaica* is characterized by (1) stem dichotomously branched, (2) leaves oblong to ovate and (3) leaves margin entire (So, 2001). In the Korean flora, this species is easily distinguished from the other *Plagiochila* species by its entire margin.

New Korean name is given as ‘Hae-an-nal-gae-i-kki’, is based on the habitat (seacoast) of locality. The ‘Hae-an’ means seacoast in Korea.

2. *Porella stephaniana* (C. Massal.) S. Hatt., J. Hattori Bot. Lab. 5: 81, 1951. (Fig. 3)


Korean Name: Dong-gang-se-jul-i-kki (동강세줄이끼)
Plants 30.0-80.0 × 3.2-3.8 mm, prostrate to ascending, green to dark green. Stems irregularly branched, brownish green to reddish green, cross section ca. 0.25-0.30 × 0.40-0.50 m, cortex cells smaller, thick-walled in 1-3 layers, 10.0-15.0 × 5.0-7.5 μm, inner cells larger, thin-walled, colorless, 15.0-30.0 × 12.5-20.0 μm, trigones concave. Rhizoids scarce. Leaves imbricate, falcately spreading; lobe obliquely inserted, line insertion arched, not decurrent, concave, obliquely ovate to broadly ovate, 1.5-2.5 × 1.2-1.5 mm, margin slightly crispate, incurved with 2-5 dentate near base, apex acute; lobule transversely inserted, not decurrent, narrowly ligulate, parallel with the stem, 0.8-1.2 × 0.4-0.5 mm, margin irregularly dentate, apex acute to obtuse. Cells in the median leaf polygonal, 25.0-37.5 × 20.0-25.0 μm, marginal cells subquadrate 10.0-15.0 × 12.5-17.5 μm, trigones concave, basal cells 37.5-50.0 × 22.5-30.0 μm, trigones concave; cuticle smooth. Oil bodies 10-15 per cells, elliptical to spherical, slightly granulate, ca. 5.0-7.0 × 4.0-6.0 μm. Underleaves imbricate, transversely inserted, line insertion arched, short decurrent, oblong to narrowly ligulate, 0.9-1.2 × 0.4-0.5 mm, margin irregularly dentate, apex obtuse to truncate.

Habitats. On shaded limestone near the stream in broad-leaved deciduous forest.


Specimens examined. Donggang River, Yeongwol-eup, Yeongwol-gun, Gangwon-do, N 37°16′35.9″E 128°32′05.8″, Alt. 222 m, 17 Aug. 2010 leg. & det. S.S. Choi 7937 (JNU; NIBR).

Porella stephaniana is a calcicolous species. This species is characterized by (1) lobe stoutly dentate toward base of the ventral margin, (2) lobule dentate nearly throughout margin and (3) median cells 30.0-35.0 × 25.0 μm, marginal cells 20.0 × 15.0 μm, walls thin (Hattori, 1978).

New Korean name is given as ‘Dong-gang-se-jul-i-kki’, is based on the name of locality.

3. Porella chinensis (Steph.) S. Hatt., J. Hattori Bot. Lab. 30: 131, 1967. (Fig. 4)


Korean Name: Deok-hang-se-jul-i-kki (덕항세줄이끼)

Plants 30.0-80.0 × 2.0-3.5 mm, prostrate to ascending, green to brownish green. Stems frequently densely bipinnate, brownish green to reddish green, cross section ca. 0.20-0.25 × 0.25-0.35 m, cortex cells smaller, thick-walled in 2-3 layers, 12.5-20.0 × 10.0-12.5 μm, inner cells larger, thin-walled, colorless, 20.0-30.0 × 17.5-25.0 μm,
trigones concave. Rhizoids scarce, fasciculate at base of underleaves, pale reddish brown. Leaves imbricate; lobe obliquely inserted, line insertion arched, not decurrent, concave, obliquely ovate to broadly ovate, 1.6-2.3 × 1.0-1.4 mm, margin slightly crispate, slightly incurved, mostly entire to rarely toothed, apex obtuse to rounded; lobule transversely inserted, line insertion curving down from the level of the base of keel to 0.5-1.0 the stem wide, long decurrent, narrowly ligulate, parallel with the stem, 0.5-0.7 × 0.2-0.3 mm, lateral margins narrowly recurved, irregularly dentate, apex acute to obtuse. Cells in the median leaf polygonal, 30.0-37.5 × 25.0-30.0 μm, trigones concave, marginal cells subquadrate 20.0-25.0 × 15.0-20.0 μm, trigones concave, basal cells 30.0-37.5 × 25.0-30.0 μm, trigones concave; cuticle smooth. Oil bodies 10-20 per cells, elliptical to spherical, homogeneous, smooth, ca. 5.0-6.0 × 2.0-3.0 μm. Underleaves contiguous, transversely inserted, line insertion curving up the stem 1.0-1.5 the stem wide, arched, long decurrent, repand-crispate, ovate to ligulate, 0.5-0.8 × 0.4-0.9 mm, margin irregularly dentate, apex obtuse to acute-rounded.

**Habitats.** On shaded rocks or bark of tree in broad-leaved deciduous forest.

**Distribution.** Korea, China, Russia (Hattori, 1967; Konstantinova et al., 2009).

**Specimens examined.** Mt. Deokhang, Anui-ri, Singimyeon, Samcheok-si, Gangwon-do, N 37°19′24.2″E129°00′17.6″, Alt. 664 m, 14 Oct. 2009 leg. & det. S.S. Choi 7006 (JNU; NIBR).  

*Porella chinensis* is characterized by (1) lobe almost entire margin (2) lobule and underleaves long decurrent and (3) stems frequently densely pinnately-branchded (Hattori, 1967). In the Korean flora, this species is easily distinguished from *P. grandiloba* by its long decurrent lobule and underleaves.

New Korean name is given as ‘Deok-hang-se-jul-i-kki’, is based on the name of locality.

4. *Solenostoma horikawanum* (Amakawa) Váňa, Hentschel & J. Heinrichs, Cryptog. Bryol. 31: 137, 2010. (Fig. 5)


Korean Name: Nun-mang-ul-i-kki (눈망울이끼)

Plants 8.0-12.0 × 2.5-3.0 mm, prostrate to ascending, yellowish green to green. Stems sparsely branched, yellowish green dorsal part, purple ventral part, cross section ca. 0.25-0.35 × 0.30-0.35 mm, cortex cells smaller, slightly thick-walled in 1 layers, 20.0-25.0 × 15.0-25.0 μm, inner cells larger, thin-walled, colorless, 25.0-50.0 × 20.0-37.5
μm, trigones concave. Rhizoids numerous, purple. Leaves contiguously to imbricate, obliquely inserted, obliquely ovate to oblong, slightly concave, 1.1-1.5 × 1.2-1.5 mm, margin entire, apex rounded to truncate. Cells in the median leaf polygonal, 30.0-42.5 × 25.0-37.5 μm, trigones concave to triangular, marginal cells 20.0-25.0 × 17.5-25.0 μm, walls thin, trigones concave, basal cells 50.0-62.5 × 30.0-37.5 μm; cuticle smooth to slightly striolate. Oil bodies 2-4 per cells, elliptical to spherical, glanulate, biconcentric, ca. 15.0-20.0 × 5.0-7.5 μm. Underleaves absent.

**Habitats.** On exposed wet rocks near the stream in broad-leaved deciduous forest.

**Distribution.** Korea, China, Japan (Amakawa, 1960).

**Specimens examined.** Mt. Naebyeon, Seokpo-ri, Jinseomyeon, Buan-gun, Jeollabuk-do, N35°36′42.6″E126°34′55.5″, Alt. 39 m, 3 Jul. 2008 leg. & det. S.S. Choi 3-18 (JNU; NIBR).


*Solenostoma* is similar to *Plectocolea infusca* in having ovate to oblong leaves and similar habitat, but differs in having rhizoids purple versus colorless to slightly purple and oil-bodies 2-4 per cells, biconcentric, narrowly oblong versus 4-8 per cells, not biconcentric, oblong to spherical (Amakawa, 1960).

New Korean name is given as ‘Nun-mang-ul-i-kki’, is based on the character of biconcentric oil-bodies in leaves. The ‘Nun’ means eye in Korea.

**ACKNOWLEDGEMENTS**

We are grateful to J.K. Ahn, I.C. Hwang, Y.J. Yoon and N.R. Yun (JNU), for partnerships during the field work and help in various aspects. The work was supported by the grant “The Survey of Korean Indigenous Species” from the National Institute of Biological Resources of Ministry of Environment in Korea.

**REFERENCES**


Submitted: June 19, 2012, Accepted: August 24, 2012