

## Six unrecorded species from the family Lejeuneaceae (Marchantiophyta) in Korea

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## 작은귀이끼과(Lejeuneaceae)의 한반도 미기록 태류식물

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**ABSTRACT:** While preparing a floristic study of Korean hepatics, we discovered the six unrecorded species of Lejeuneaceae from Mt. Seolak, Mt. Gaya, Geojedo, Wando and Gageodo. *Archilejeunea kiushiana*, *Drepanolejeunea angustifolia*, *Lejeunea aquatica*, *Lejeunea otiana*, *Leucolejeunea japonica*, and *Spruceanthus semirepandus*, are reported here. *A. kiushiana* was characterized by unlobed underleaves, homogeneous oil-bodies, and four to six perianth-keels. *D. angustifolia* is similar to *D. ternatensis*, but it differs in the dorsal margin of the leaf-lobe, which is entire or denticulate, spines never present, and leaf cells smooth or with minute dorsal bulging. *L. aquatica* is similar to *L. japonica* in that it has a wider and similar shape (wider than long) of its underleaves and has homogeneous oil-bodies. The former, however, has minute leaf-lobules (5–15 cells), 1/10 to 1/5 the length of the leaf-lobe, versus leaf-lobules 1/4 to 1/3 the length of the leaf-lobe. *L. otiana* is similar to *L. kodamae* in that it has a large and acute first tooth of the leaf-lobule but differs in having plain leaf-lobules obliquely quadrate and an indistinct second tooth. *Drepanolejeunea* (Spruce) Schiffn. is widely distributed in tropical and subtropical regions (Mizutani, 1961). *L. japonica* is characterized by entire underleaves; one large, coarsely segmented oil-body per leaf cell; and a large second tooth of the leaf lobule, two to six cells long, and two to three cells wide at the base. *S. semirepandus* is widely distributed in tropical and subtropical regions in Asia. This species is characterized by small homogeneous and numerous oil-bodies, up to 10 smooth perianth-keels, and leaf-lobe acute at the apex.

**Keywords:** Lejeuneaceae, Liverwort, Marchantiophyta, unrecorded hepatics

**적 요:** 작은귀이끼과(Lejeuneaceae)에서 우리나라 미기록 태류식물 6 종을 발견하였다. 거제도에서 생육하는 응달이끼(*Archilejeunea kiushiana*), 가야산에 생육하는 칼잎이끼 (*Drepanolejeunea angustifolia*)와 동굴작은귀이끼(*Lejeunea otiana*), 완도 상황봉 계곡에 생육하는 계곡작은귀이끼(*Lejeunea aquatica*), 설악산 초청봉 부근에 생육하는 산토끼이끼 (*Leucolejeunea japonica*) 그리고 가거도에 생육하는 섬이끼(*Spruceanthus semirepandus*)를 국내 미기록 태류식물로 보고한다.

**주요어:** 태류식물, 미기록, 작은귀이끼과

Lejeuneaceae is the largest family of liverworts, with ca. 1000 species in 90 currently accepted genera worldwide (Gradstein et al., 2003). There are 32 known species in 9 genera

in Korea (Hong, 2003; Yamada & Choe, 1997; Park & Choi, 2007). The important features of Lejeuneaceae include incubous leaves that are bilobed into the ordinary dorsal lobe and a much smaller, modified ventral lobe (lobule); rhizoid-

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initial region restricted to the base of the underleaf; one pair of female bracts; perianth constricted, forming a beak at the apex; and archegonium one per gynoeceum (Mizutani, 1961; Zhu & So, 2001; Gradstein et al., 2003). While preparing a floristic study of Korean hepatics, we discovered the six unrecorded species of Lejeuneaceae at Mt. Seolak, Mt. Gaya, Geojedo, Wando, and Gageodo. *Archilejeunea kiushiana* (Horik.) Verd., *Drepanolejeunea angustifolia* (Mitt.) Grolle, *Lejeunea aquatica* Horik., *Lejeunea otiana* S. Hatt., *Leucolejeunea japonica* (Horik.) Verd., and *Spruceanthus semirepandus* (Nees) Verd. are reported here.

## Descriptions

1. *Archilejeunea kiushiana* (Horik.) Verd., Ann. Bryol. suppl. 4. 46, 1934. (Fig. 1)

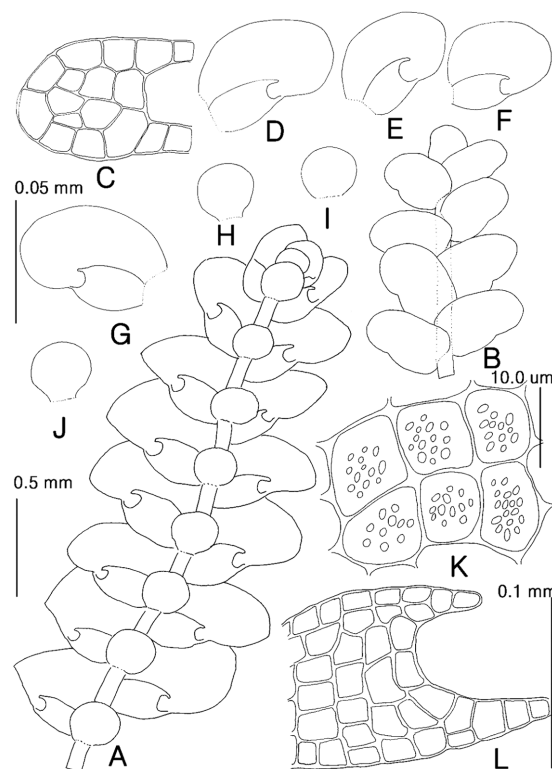
*Lopholejeunea kiushiana* Horik., Jour. Sci. Hiroshima Univ. ser. b, div. 2, 1. 129, 1932.

**Korean Name:** Eung-dal-i-kki (응달이끼)

**Plants** 5.0–10.0 × 0.4–0.9 mm, prostrate, brownish green to dark green. **Stems** irregularly branched, brownish green, cross section ca. 0.04 × 0.05 mm, cortex cells larger, thin-walled in 9–11 cells, 12.5–17.5 × 10.0–15.0 μm; inner cells smaller, thin-walled in 5–9 cells, 7.5–12.5 × 7.5–12.5 μm, concave trigones. **Rhizoids** scarce, fasciculate at base of underleaves, pale brown.

**Leaves** contiguous to imbricate, widely spreading; keel 0.4–0.5 of lobe length, slightly arched, smooth; lobe slightly flat, obliquely ovate to oblong, 0.40–0.50 × 0.30–0.35 mm, margin entire with round at apex; lobule ovate, 0.15–0.20 × 0.10–0.15 mm, 0.5 of lobe length, truncate at apex, first tooth 2–3 cells long, 2 cells wide at base, hyaline papilla large, situated on inner surface at base of first tooth; cells in the midleaf polygonal, 12.5–17.5 × 10.0–12.5 μm with triangular trigones; in apex subquadrate 7.5–12.5 × 7.5–12.5 μm with concave trigones; in base 17.5–25.0 × 12.5–17.5 μm with concave trigones. **Oil bodies** 10–20 per cells, small, ovate to elliptical, smooth, ca. 3.0 × 1.5 μm. **Underleaves** distant, orbicular, 0.15–0.30 × 0.15–0.30 mm, margin entire. [**Sexual condition** autoicous. **Androecia** terminal on short lateral branch; male bracts in 2–5 pairs, much inflated, 1/3–1/2 the length of leaves. **Gynoeceia** inflorescence terminal on lateral branch with 0–1 subfloral innovation; bracts ligulate, as large as leaf-lobe, margin entire. **Perianth** pyriform, 0.85–1.00 × 10.60–0.65 mm, with 4–6 keels with slightly crenate (Mizutani, 1961).].

**Habitats:** On dry rocks covered thin soil near the small valley in deciduous *Quercus* forest.



**Fig. 1.** *Archilejeunea kiushiana* (Horik.) Verd. A. plant (ventral); B. plant (dorsal); C. cross section of stem; D-G. leaves; H-I. underleaves; K. oil-bodies in midleaf; L. lobule. Scale bars: 0.5 mm for A-B, D-J; 0.05 mm for C; 0.1 mm for L; 10 μm for K.

**Distribution:** Korea, China, Japan (Mizutani, 1961).

**Specimens examined:** Oryong valley, Oryong-ri, Geoje-si, Gyeongsangnam-do, Korea N 34°53'18.9"E 128°30'28.6", Alt. 45 m, 16 Mar. 2011 S.-S. Choi 110009 (JNU; NIBR).

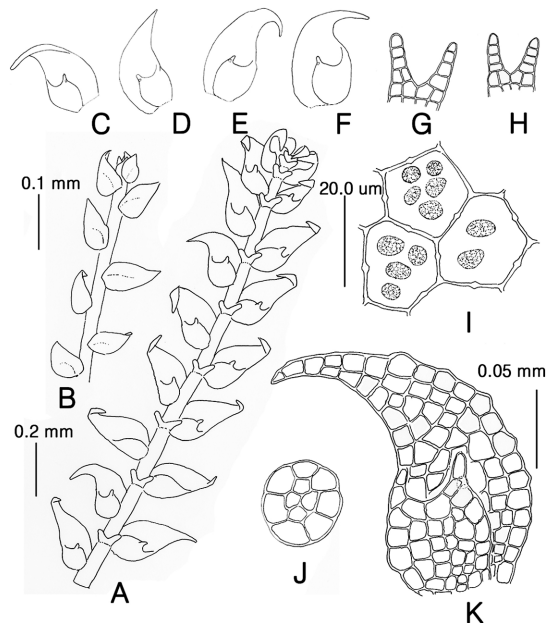
*Archilejeunea* (Spruce) Schiffn. is characterized by unlobed underleaves, homogeneous oil-bodies, hyaline papilla occurring on the inner surface, four to six smooth perianth-keels, and cells of the outer layer with large nodulose thickening. This species is similar to *A. planiuscula* (Mitt.) Steph., but differs in that the lobules have a length:width ratio of 1.0–1.5 versus more than 2.0 in the latter.

New Korean name is given as 'Eung-dal-i-kki', is based on the growth habit on shaded rocks.

2. *Drepanolejeunea angustifolia* (Mitt.) Grolle, J. Jpn. Bot. 40. 206, 1965. (Fig. 2)

*Lejeunea angustifolia* Mitt., J. Proc. Linn. Soc., Bot. 5. 116, 1861 (1860).

**Korean Name:** Kal-ip-i-kki (칼잎이끼)



**Fig. 2.** *Drepanolejeunea angustifolia* (Mitt.) Grolle A. plant (ventral); B. plant (dorsal); C-F, K. leaves; G-H. underleaves; I. oil-bodies in midleaf; J. cross section of stem. Scale bars: 0.2 mm for A-B; 0.1 mm for C-F; 0.05 mm G-H, J, K; 20  $\mu$ m for I.

**Plants** 4.0–10.0  $\times$  0.3–0.4 mm, prostrate, yellowish green. **Stems** irregularly branched, yellowish green, cross section ca. 0.06  $\times$  0.05 mm, cortex cells thick-walled in 7 cells, 15.0–20.0  $\times$  12.5–15.0  $\mu$ m; inner cells smaller, thick-walled in 3–4 cells, 7.5–12.5  $\times$  7.5–12.5  $\mu$ m. **Rhizoids** sparse, colorless. **Leaves** distant, obliquely spreading; keel 0.5 of lobe length, arched, smooth or slightly crenulate; lobe slightly convex, falcate, narrowly ovate to lanceolate 0.25–0.30  $\times$  0.10–0.15 mm, margin entire to denticulate with incurved, acuminate at apex; lobule ovate, strongly inflated, 0.10–0.12  $\times$  0.08–0.10 mm, 1/3–1/2 of lobe length, margin incurved, first tooth unicellular, incurved, second tooth reduced, hyaline papilla on the proximal base of first tooth; cells in the midleaf polygonal, 20.0–25.0  $\times$  12.5–17.5  $\mu$ m with concave trigones, thick-walled, intermediate thickening; near apex subquadrate 12.5–17.5  $\times$  12.5–17.5  $\mu$ m. **Oil bodies** 2–5 per cells, granulate, spherical to elliptical, 5.0–12.5  $\times$  5.0  $\mu$ m, ocelli 1–2 at base of lobe. **Underleaves** distant, obtuse, deeply bilobed, sinus lunate, lobes 3–4 cells long, 1–2 wide at base. [**Sexual condition** dioicous. **Androecia** on very short branches, bracts in 2–3 pairs, bract lobule almost as large as the bract lobe, bracteole absent. **Gynoecia** on short or long branches with one subfloral innovation. **Perianth** obovate, ca. 0.6  $\times$  0.3 mm, with 5 smooth keels (Zhu & So, 2001).].

**Habitats:** Humid soil on steep slope in mountain coniferous

forest with *Abies Koreana* E.H. Wilson, and wet cliffs along stream in broad-leaved forest with admixture of conifers

**Distribution:** Korea, Bhutan, Cambodia, China, India, Indonesia, Japan, New Caledonia, Papua New Guinea, Philippines, Sri Lanka, Thailand and Vietnam (Zhu & So, 2001).

**Specimens examined:** Mt. Gaya, Gaya-ri, Gaya-eup, Haman-gun, Gyeongsangnam-do, Korea N 35°49'4.8"E 128°07'27.5", Alt. 1313 m, 28 Apr. 2009 S.-S. Choi 4371 (JNU; NIBR).

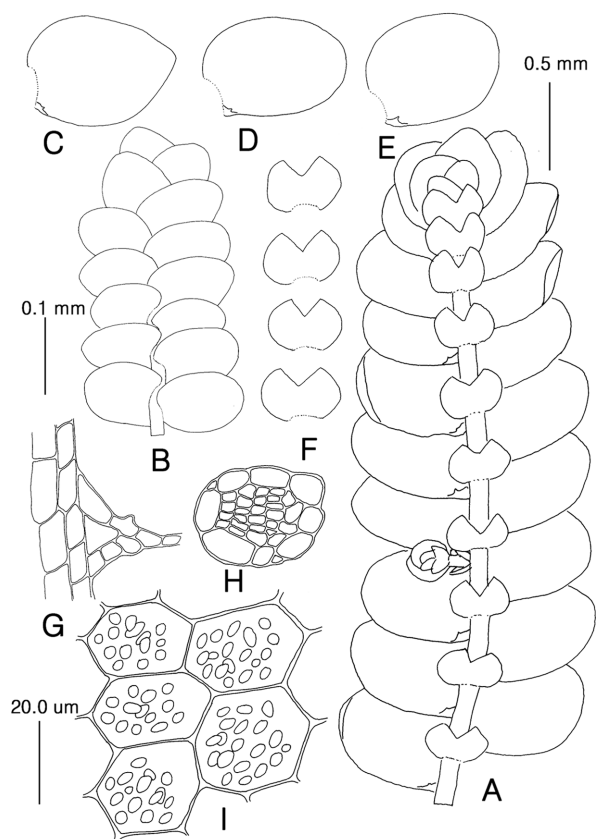
*Drepanolejeunea* (Spruce) Schiffn., a mainly tropical and subtropical genus, is largely epiphyllous in habitat. This genus is characterized by bifid underleaves, stem cross-section consisting of seven (up to nine) cortical cells and three (to four) inner cells, constricted apex of leaf lobule with one to two marginal teeth, presence of ocelli in the leaf lobe (at the base of the leaf lobe), and hyaline papilla on the proximal side of the first tooth of the leaf lobule. *Drepanolejeunea* is closely related to *Leptolejeunea*. The latter, however, differs in having an area of small rhizoid initials differentiated from six much larger surrounding cells in the underleaf base, very large leaf cells with large trigones with one to three intermediate thickenings, and straight apical teeth on the leaf lobule (Zhu & So, 2001). *D. angustifolia* is similar to *D. ternatensis* (Gott.) Steph. but differs in having a dorsal margin of the leaf-lobe entire or denticulate, spines never present versus dorsal margin of the leaf-lobe with one to three spines, and leaf cells smooth or with minute dorsal bulging versus leaf cells conical (Mizutani, 1961).

New Korean name is given as 'Kal-ip-i-kki', is based on the shape of leaves.

3. *Lejeunea aquatica* Horik., Sci. Rep. Tohoku Imp. Univ. ser. 4, 5. 643, 1930. (Fig. 3)

**Korean Name:** Gye-gok-Jak-eun-gwi-i-kki (계곡작은귀이끼)

**Plants** 10.0–30.0  $\times$  1.5–1.7 mm, prostrate, green to brownish green. **Stems** irregularly branched, brownish green, cross section ca. 0.13  $\times$  0.15 mm, cortex cells larger, thin-walled in 8–10 cells, 37.5–50.0  $\times$  20.0–25.0  $\mu$ m; inner cells smaller, thin-walled in 25–32 cells, 12.5–20.0  $\times$  12.5–20.0  $\mu$ m, concave trigones. **Rhizoids** scarce, fasciculate at base of underleaves, colorless. **Leaves** contiguous to imbricate, obliquely spreading; keel 0.10–0.15 of lobe length, straight, smooth; lobe slightly convex, obliquely ovate to oblong, 0.7–0.8  $\times$  0.5–0.7 mm, margin entire



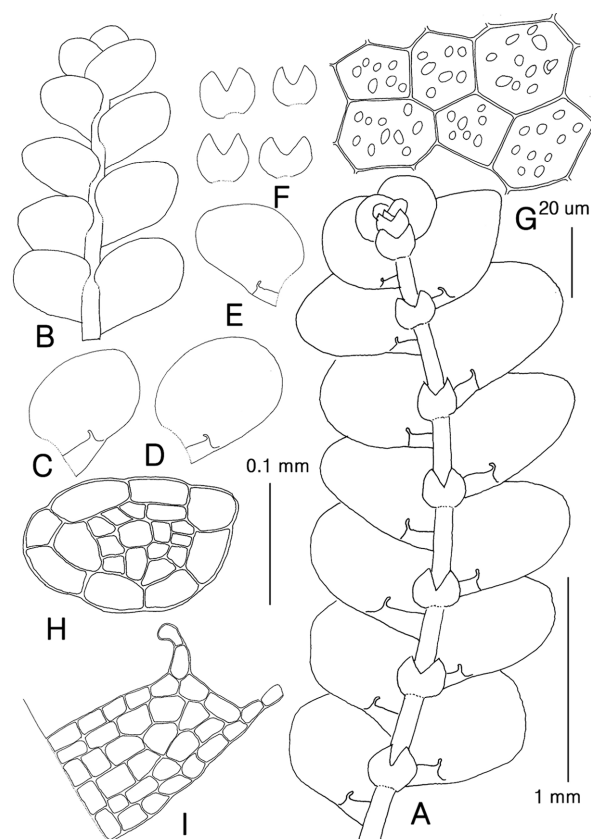
**Fig. 3.** *Lejeunea aquatica* Horik. A. plant (ventral); B. plant (dorsal); C-E. leaves; F. underleaves; G. lobule; H. cross section of stem; I. oil-bodies in midleaf. Scale bars: 0.5 mm for A-F; 0.1 mm for B, C, D, E, F, G, H; 20.0  $\mu$ m for I.

with round to obtuse at apex, somewhat incurved; lobule small, ca. 10 cells, subtriangular,  $0.10\text{--}0.15 \times 0.05\text{--}0.08$  mm,  $0.1\text{--}0.2$  of lobe length, first tooth obtuse, second tooth obsolete; cells in the midleaf polygonal,  $25.0\text{--}37.5 \times 20.0\text{--}25.0$   $\mu$ m with concave trigones; in apex subquadrate  $12.5\text{--}17.5 \times 12.5\text{--}17.5$   $\mu$ m with concave trigones; in base  $37.5\text{--}50.0 \times 20.0\text{--}25.0$   $\mu$ m with concave trigones. **Oil bodies** 20–30 per cells, ovate to elliptical, smooth,  $7.5\text{--}5.0 \times 2.5$   $\mu$ m. **Underleaves** distant, orbicular,  $0.50\text{--}0.60 \times 0.35\text{--}0.45$  mm, margin entire, bilobed for about half of length, lobes acute, sinus acute to obtuse. [**Androecia** on short lateral branch; male bracts in 2–5 pairs, strongly inflated, imbricate; male bracteole obsolete (Mizutani, 1961).].

**Habitats:** On wet rock or submerged rocks in valley with *Chiloscyphus polyanthos* (L.) Corda, *Plagiochila ovalifolia* Mitt., *Jubula hutchinciae* ssp. *javanica* (Steph.) Verd., *Radula tokiensis* Steph.

**Distribution:** Korea, China, Japan (Mizutani, 1961).

**Specimens examined:** Sanghwangbong, Gunoe-myeon,



**Fig. 4.** *Lejeunea otiana* S.Hatt. A. plant (ventral); B. plant (dorsal); C-E. leaves; F. underleaves; G. oil-bodies in midleaf; H. cross section of stem; I. lobule. Scale bars: 1.0 mm for A-F; 0.1 mm for C, D, E, F, G, H; 20  $\mu$ m for I.

Wando-gun, Jeollanam-do, Korea N  $34^{\circ}20'55.0''$  E  $126^{\circ}40'20.2''$ , Alt. 190 m, 21 Sep. 2009 S.-S. Choi 7009 (JNU; NIBR).

*Lejeunea aquatica* is similar to *L. japonica* Mitt. in having wider but similarly shaped (wider than long) underleaves and homogeneous oil-bodies, but differs in having leaf-lobules minute (5–15 cells),  $1/10\text{--}1/5$  long leaf-lobes versus leaf-lobules  $1/4\text{--}1/3$  the length of the leaf-lobe, and the cross-section of the stem having 10–12 cortical cells and about 25 inner cells, versus approximately 7 cortical cells and 12 inner cells (Mizutani, 1961).

New Korean name is given as ‘Gye-gok-Jak-eun-gwi-i-kki’, is based on the growth habit near the valley.

4. *Lejeunea otiana* S. Hatt., Bot. Mag. Tokyo. 65. 15, 1952. (Fig. 4)

**Korean Name:** Dong-gul-jak-eun-gwi-i-kki (동굴작은귀이끼)

**Plants** small,  $5.0\text{--}10.0 \times 1.0\text{--}1.2$  mm, prostrate, yellowish

green to brownish green. **Stems** irregularly branched, brownish green, cross section ca.  $0.10 \times 0.13$  mm, cortex cells larger, thin-walled in 7–8 cells,  $37.5\text{--}50.0 \times 20.0\text{--}25.0$   $\mu\text{m}$ ; inner cells smaller, thin-walled in 10–14 cells,  $12.5\text{--}20.0 \times 12.5\text{--}20.0$   $\mu\text{m}$ , concave trigones. **Rhizoids** scarce, fasciculate at base of underleaves, colorless. **Leaves** contiguous to imbricate, widely spreading; keel 0.3–0.4 of lobe length, straight to slightly arched, smooth; lobe convex, ovate to oblong,  $0.5\text{--}0.6 \times 0.4\text{--}0.5$  mm, margin entire with round to obtuse at apex; lobule obliquely quadrate, slightly inflated,  $0.10\text{--}0.20 \times 0.06\text{--}0.10$  mm, 0.2–0.3 of lobe length, first tooth 1 cell long, 2 cells wide at base, second tooth obsolete, hyaline papilla long on tip of first tooth; cells in the midleaf polygonal,  $25.0\text{--}50.0 \times 20.0\text{--}30.0$   $\mu\text{m}$  with concave trigones; in apex subquadrate  $20.0\text{--}25.0 \times 10.0\text{--}15.0$   $\mu\text{m}$  with concave trigones; in base  $37.5\text{--}50.0 \times 25.0\text{--}30.0$   $\mu\text{m}$  with concave trigones. **Oil bodies** 8–15 per cells, small, ovate to elliptical, smooth, ca.  $3.0\text{--}5.0 \times 2.5$   $\mu\text{m}$ . **Underleaves** distant, orbicular,  $0.25\text{--}0.30 \times 0.30\text{--}0.32$  mm, margin entire, bilobed for about half of length, lobes acute, sinus acute to obtuse. [**Sexual condition** autoicous. **Androecia** terminal on short lateral branch; male bracts in 2–4 paris, 1/2 the length of leaves. **Gynoecia** inflorescence terminal on elongate branch with one subfloral innovation; bracts oblong, slightly smaller than leaf-lobe. **Perianth** pyriform,  $0.60\text{--}0.70 \times 0.40\text{--}0.45$  mm, with dorsal keel none or very weak, lateral and ventral keels sharp but smooth (Mizutani, 1961).].

**Habitats:** On wet rocks covered thin soil in small cave near the road.

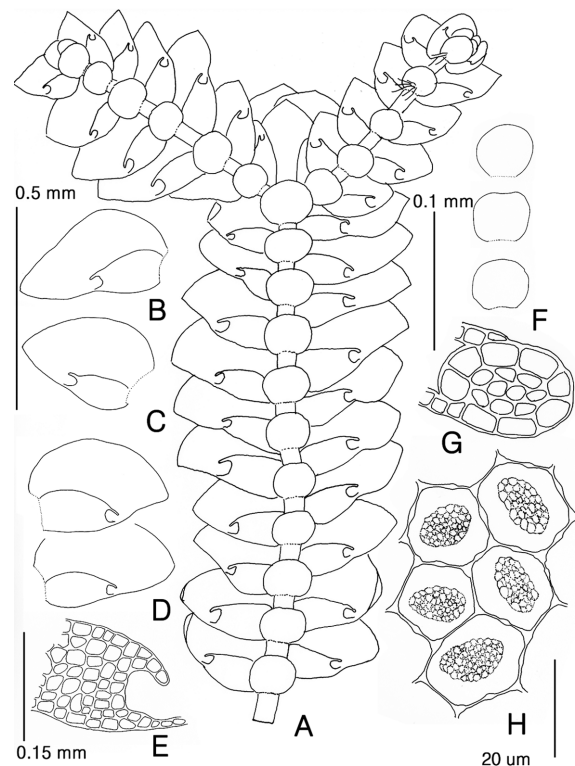
**Distribution:** Korea, Japan (Mizutani, 1961).

**Specimens examined:** Mt. Gaya, Gaya-ri, Gaya-eup, Haman-gun, Gyeongsangnam-do, Korea N  $35^{\circ}47'09.7''$ E  $128^{\circ}06'36.2''$ , Alt. 425 m, 28 Apr. 2009 S.-S. Choi 3512 (JNU; NIBR).

*Lejeunea otiana* is similar to *L. kodamae* Ikegami & Inoue in having a large and acute first tooth of the leaf-lobule but differs in having leaf-lobules obliquely quadrate, plain versus ovate, saccate, and inflated; second tooth indistinct versus distinct; and hyaline papilla on the tip of the first tooth versus on the proximal base of the first tooth (Mizutani, 1961).

New Korean name is given as ‘Dong-gul-Jak-eun-gwi-i-kki’, is based on the growth habit near the small cave.

5. *Leucolejeunea japonica* (Horik.) Verd., Ann. Bryol. Suppl. 4, 69, 1934. (Fig. 5)



**Fig. 5.** *Leucolejeunea japonica* (Horik.) Verd. A. plant (ventral); B-D. leaves; E. lobule; F. underleaves; G. cross section of stem; H. oil-bodies in midleaf. Scale bars: 0.5  $\beta$ /E for A-F; 0.1 mm for G; 0.15 mm for E; 20  $\mu\text{m}$  for H.

*Archilejeunea japonica* Horik., Jour. Sci. Hiroshima Univ. ser. b, div. 2, 1, 84, 1932

**Korean Name:** San-to-kki-i-kki (산토끼이끼)

**Plants**  $5.0\text{--}10.0 \times 0.5\text{--}0.7$  mm, prostrate, yellowish green. **Stems** irregularly branched, yellowish green, cross section ca.  $0.08 \times 0.10$  mm, cortex cells larger, thick-walled in 8 cells,  $20.0\text{--}25.0 \times 12.5\text{--}17.5$   $\mu\text{m}$ ; inner cells smaller, thick-walled in 9 cells,  $10.0\text{--}12.5 \times 10.0\text{--}12.5$   $\mu\text{m}$ , convex trigones. **Rhizoids** fasciculate at base of underleaves, colorless. **Leaves** imbricate, obliquely spreading; keel 0.45–0.55 of lobe length, straight to slightly arched, smooth; lobe slightly convex, obliquely ovate,  $0.30\text{--}0.50 \times 0.30\text{--}0.32$  mm, margin entire with round to obtuse or acute at apex, incurved; lobule inflated, obliquely ovate,  $0.22\text{--}0.25 \times 0.14\text{--}0.15$  mm, 0.5–0.6 of lobe length, first tooth indistinct or small projecting cell, second tooth 4–5 cells long, 1–3 cells wide at base, curved keel; cells in the midleaf  $17.5\text{--}20.0 \times 12.5\text{--}15.0$   $\mu\text{m}$  with triangular trigones; in apex subquadrate  $12.5\text{--}17.5 \times 10.0\text{--}12.5$   $\mu\text{m}$  with triangular trigones; in base  $20.0\text{--}25.0 \times 12.5\text{--}17.5$   $\mu\text{m}$  with triangular trigones. **Oil bodies** 1 per cells, large, elliptical, compound,  $10.0\text{--}15.0 \times 7.5\text{--}$

10.0  $\mu\text{m}$ . **Underleaves** distant, orbicular, 0.15–0.20  $\times$  0.15–0.20 mm, margin entire. [**Sexual condition** autoicous. **Androecia** male bracts in 1–3 paris, imbricate, smaller than leaves. **Gynoecia** inflorescence on more or less elongate branch, usually with one subfloral innovation. **Perianth** obovate, somewhat inflated, ca. 0.8  $\times$  0.6 mm, with 4 keels with smooth (Mizutani, 1961).].

**Habitats:** On rock covered thin soil in stony slopes near the top of mountain in coniferous forest with *Ptilidium pulcherrimum* (G. Weber) Vainio, *Sphenolobus saxicola* (Sshreb.) Steph.

**Distribution:** Korea, Japan (Mizutani, 1961).

**Specimens examined:** Mt. Seolak, Seorak-dong, Sokcho-si, Gangwon-do, Korea N 38°06'35.7"E 128°25'33.7", Alt. 1449 m, 21 Sep. 2009 S.-S. Choi 5142 (JNU; NIBR).

*Leucolejeunea* A. Evans is widely distributed in tropical and subtropical regions (Mizutani, 1961). This genus is characterized by entire underleaves; one to three large, coarsely segmented oil-bodies per leaf cell; first tooth of the leaf-lobule smaller or scarcely developed; distal marginal hyaline papilla of leaf lobule; and absence of vittae. This genus is closely related to *Cheilolejeunea*, but differs in having undivided underleaves that are bracteoles versus bilobed (Mizutani, 1961; Zhu & So, 2001). *L. japonica* is similar to *L. xanthocarpa* (Lehm. & Lindenb.) Evans, but differs in having second tooth of the leaf lobule, large, two to six cells long, two to three cells wide at the base versus usually consisting of a single projecting cell; and leaf-lobes involute only at the apex versus strongly convex (Mizutani, 1961).

New Korean name is given as 'San-to-kki-i-kki', is based on the shape of plants.

6. *Spruceanthus semirepandus* (Nees) Verd., Ann. Bryol. Suppl. 4. 153, 1934. (Fig. 6)

*Jungermannia semirepanda* Nees, Hepat. Javan. 39, 1830.

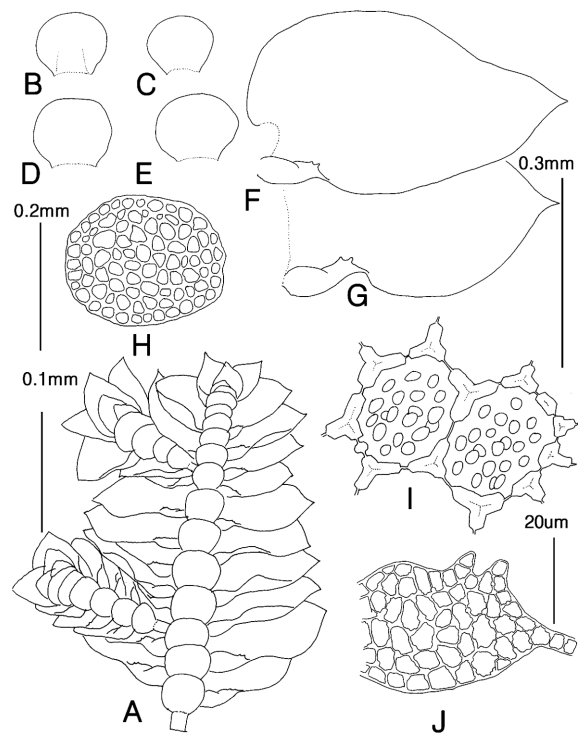
*Ptychanthus semirepandus* (Nees) Ness, Naturg. Eur. Leberm. 3. 212, 1838.

*Lejeunea semirepanda* (Nees) Mitt. Jour. Proc. Linn. Soc. Bot. 5. 111, 1861

**Korean Name:** Seom-i-kki (섬이끼)

**Plants** 15.0–70.0  $\times$  2.0–3.0 mm, prostrate, brownish green.

**Stems** irregularly branched, brownish green, cross section ca.



**Fig. 6.** *Spruceanthus semirepandus* (Nees) Verd. A. plant (ventral); B-E. underleaves; F-G. leaves; H. cross section of stem; I. oil-bodies in midleaf; J. lobule. Scale bars: 1.0 mm for A; 0.3 mm for B-G; 0.2 mm for H, J; 20  $\mu\text{m}$  for I.

0.20  $\times$  0.15 mm, cortex cells thick-walled in 30–35 cells, 10.0–12.5  $\times$  10.0–12.5  $\mu\text{m}$ ; inner cells larger, thick-walled in 9–10 cells, 12.5–20.0  $\times$  12.5–17.5  $\mu\text{m}$ , convex trigones. **Rhizoids** fasciculate at base of underleaves, pale brown. **Leaves** densely imbricate, widely spreading; keel 0.30–0.35 of lobe length, arched, smooth; lobe slightly convex, obliquely ovate, 1.5–1.7  $\times$  1.0–1.1 mm, margin entire with acute to apiculate at apex; lobule inflated, obliquely truncate at apex, 0.40–0.50  $\times$  0.20–0.25 mm, 1/4–1/3 of lobe length, margin 1–3 teeth, teeth triangular with obtuse, hyaline papilla on the inner surface at base of first tooth; cells in the midleaf 25.0–35.0  $\times$  20.0–25.0  $\mu\text{m}$  with intermediate thickenings and large trigones; in apex subquadrate 12.5–17.5  $\times$  12.5–17.5  $\mu\text{m}$  with convex trigones; in base 37.5–50.0  $\times$  20.0–25.0  $\mu\text{m}$  with intermediate thickenings and large trigones. **Oil bodies** 30–40 per cells, smooth, spherical to elliptical, ca. 3.0  $\times$  2.5  $\mu\text{m}$ . **Underleaves** imbricate, orbicular, 0.6–0.7  $\times$  0.7–0.8 mm, margin entire. [**Sexual condition** autoicous. **Androecia** male bracts in 5–8 paris, 1/3–1/2 the length of leaves, inflated and almost equally bilobed. **Gynoecia** on terminal on the main branch, usually with 1–2 subfloral innovation. **Perianth** obovate, inflated 2.0–2.4  $\times$  1.0–1.2 mm, with 5–10 smooth keels (Mizutani, 1961).].

**Habitats:** On bark of tree on top of mountain in broad-leaved evergreen forest with admixture of conifers.

**Distribution:** Korea, China, India, Indonesia, Japan, New Caledonia, Papua New Guinea, Philippines (Mizutani, 1961).

**Specimens examined:** Doksil-san, Gageodo-ri, Heuksan-myeon, Sinan-gun, Jeollanam-do, Korea, N 34°04'32.8"E 125°06'31.2", Alt. 1820 m, 2 Mar. 2010 *S.-S. Choi 7188* (JNU; NIBR).

*Spruceanthus* Verd. is widely distributed in tropical and subtropical regions in Asia. This genus is characterized by homogeneous, small and numerous oil-bodies; up to 10 smooth perianth-keels; leaves, underleaves, female bracts, and bracteoles typically dentate; and perianth terminal on the main branch typical with two undulations. This genus is closely related to *Archilejeunea* in oil-body type, but differs in having five to six perianth-keels; cortical cells of the stem in 15 longitudinal rows; and leaves, underleaves, female bracts, and bracteoles typically whole at the margin (Mizutani, 1961). *S. semirepandus* is similar to *A. polymorpha* (Sande Lac.) B. Thiers. but differs in having leaf-lobe acute at the apex, margin never undulate versus rounded at the apex, and margin mostly undulate (Mizutani, 1961).

New Korean name is given as 'Seom-i-kki', because material was collected in island.

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