

Two Species of Lophoziaceae, New to Japan

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After the publication of my previous paper on Lophoziaceae (Kitagawa 1965), a small collection of Hepaticae from the alpine region of middle Japan was sent to me by Dr. H. Shimizu for identification. In the collection, I found two species of Lophoziaceae which were not treated in that paper. By my careful examination, they were proved to be identical with *Barbilophozia floerkei* and *Lophozia obtusa*, both of which had never been recorded from Japan. The result of examination will be given in the following pages.

I wish to express my hearty thanks to Dr. H. Shimizu for his sending me the valuable specimens. Deep gratitude is also due to Dr. H. Persson for his kindness in supplying me with European material for comparison.

Barbilophozia floerkei (Web. et Mohr) Loeske (Fig. I)

Verh. Bot. Ver. Brandenburg 49: 37 (1907). — *Jungermannia floerkei* Web. et Mohr, Bot. Taschenb. 410 (1807). — *Lophozia floerkei* (Web. et Mohr) Schiffn. in Engler et Prantl, Nat. Pfl.-Fam. 1(3): 85 (1893). — *Orthocaulis floerkei* (Web. et Mohr) Buch, Mem. Soc. F. Fl. Fenn. 8: 294 (1932).

Plants medium-sized, yellowish brown to greenish brown, scattered or in loose patches; shoots procumbent with ascending tips, up to 2.5 cm long, 1.5~2 mm wide, sparsely branching. Stems subterete, 0.2~0.3 mm wide, 15~18 cells high, hardly differentiated dorsiventrally, cortical cells in 2 layers 12~18 μ , somewhat thick-walled, deep brown, medullary cells 22~35 μ , thin-walled, pale brown. Rhizoids rather numerous, colorless. Leaves contiguous to weakly imbricate, dorsally secund, widely to horizontally spreading, obliquely inserted, shortly decurrent dorsally, broadly ovate to rounded quadrate, 0.75~1.0 mm long, 0.9~1.1 mm wide, 3-lobed (occasionally 2- or

4-lobed), usually with a few cilia at postical bases; sinus descending $1/5 \sim 1/4$ the leaf length, acute to obtuse, often gibbous; lobes nearly equal, subacute to apiculate. Underleaves large, deeply 2-lobed, $0.55 \sim 0.60$ mm long, $0.25 \sim 0.30$ mm wide at subbase, lobes ending in long cilia, with a few marginal cilia. Cells of the leaf apex $15 \sim 20 \mu$, of the middle $17 \sim 24 \mu$, of the base $18 \sim 24 \times 25 \sim 38 \mu$, of the basal cilia nearly isodiametric, $15 \sim 20 \mu$; cells of cilia of underleaves also nearly isodiametric, $18 \sim 25 \mu$; walls thin, pale brown or hyaline; trigones acute, not bulging; cuticle smooth. Gemmae wanting (in our plants).

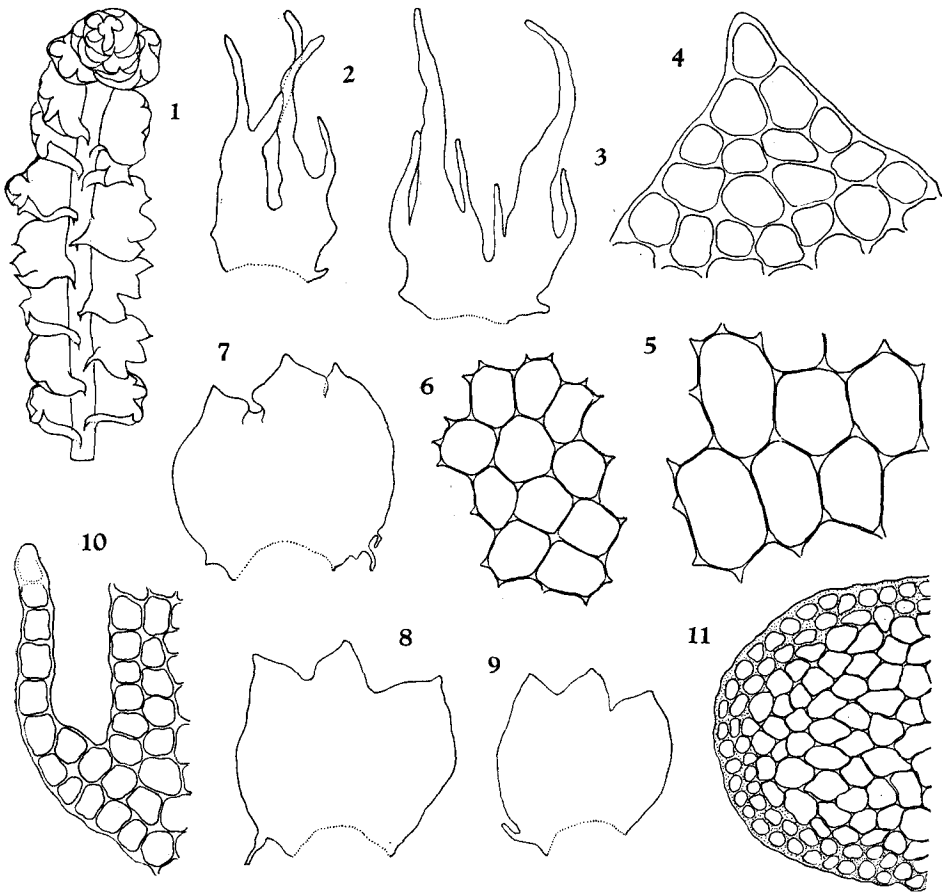


Fig. 1. *Barbilophozia floerkei* (Web. et Mohr) Loeske. 1. Part of shoot, $\times 12$. 2-3. Underleaves, $\times 65$. 4. Cells of leaf apex, $\times 360$. 5. Cells of leaf base, $\times 360$. 6. Cells of leaf middle, $\times 360$. 7-9. Leaves, $\times 25$. 10. Basal cilium of leaf, $\times 250$. 11. Cross section of stem, $\times 120$. (Drawn from H. Shimizu 979).

Habitat. On humus in the alpine regions of Honshu.

Specimens examined. HONSHU. Pref. Toyama: Mt. Tateyama, *H. Shimizu* 363. Goshikigahara, *H. S.* 517; Mt. Mitsumata-rence, *H. S.* 979.

Range. Distributed in Europe, North America and disjunctively Peru (after Grolle 1960). In Japan, known only from the localities given above.

Barbilophozia floerkei is a new record for the flora of Japan. The species has been recorded from several localities of Asia and the Antarctic region. However, it was proved by Grolle (1960) that the records had been based on erroneous identification and then the range was rather narrowly restricted in Europe and North America including the Aleutians, and discontinuously in Peru. Although the record from Siberia was denied by Grolle, the occurrence in Japan is not strange, because it is known from Aleutian Islands. Indeed, Grolle (1960) said, "Angaben für *B. floerkei* erwiesen sich zwar alle als irrtümlich, es wäre aber nicht überraschend, wenn *B. floerkei* im pazifischen NO-Asien noch entdeckt würde."

The diagnostic features for this species can be found in the symmetrically 3-lobed leaves with a few marginal cilia at their postical bases as well as in the deeply bilobed large underleaves with long-ciliate margins. There is a certain resemblance between *B. floerkei* and *B. hatcheri* which has also large underleaves and often 3-lobed leaves. However, *B. hatcheri* is different from *B. floerkei* in the narrower leaves with more sharply pointed lobes. Furthermore, the nearly isodiametric cells of the marginal cilia of leaves serve as a good character to distinguish *B. floerkei* from *B. hatcheri* in which they are obviously elongate (three to five times as long as wide). Likewise, the cilia of underleaves are composed of nearly isodiametric cells in *B. floerkei*, while they are of elongate cells in *B. hatcheri*; this distinguishing feature was proved by Grolle (1960).

I have examined some European plants for a comparison with Japanese ones. The Japanese collections are different from the typical ones of Europe in the respect that the plants are smaller and the basal cilia of leaves are sometimes reduced or absent. J. W. and R. D. Fitzgerald (1962) fully discussed on the variation of European plants of *B. floerkei*. According to their study, the above differences are seen even among the European collections. The Japanese plants seem to represent a depauperate form of this variable species.

Phylogenetically, this species is situated at an intermediate position between subgen. *Barbilophozia* and *Orthocaulis*. The presence of the basal cilia of leaves and the occasional occurrence of 4-lobed leaves suggest a close affinity to *Barbilophozia*. However, I would here assign *B. floerkei* to *Orthocaulis* as treated by Buch (1932), Schuster (1951), Müller (1954), etc., because the species exhibits characteristic features of *Orthocaulis* such as the leaves are predominantly trilobed and the shoots are rather ascending at their tips. Now, Japanese members of subgen. *Orthocaulis* become two species, *B. attenuata** and *B. floerkei*. They can be separated by the following key.

Key to the Japanese Species of *Orthocaulis*

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|---|---|-----------------------|
| { | Leaves without basal cilia; underleaves small (rudimentary), unlobed; erect filiform shoots present..... | <i>B. attenuata</i> * |
| { | Leaves with basal marginal cilia; underleaves large and deeply 2-lobed; erect filiform shoots wanting | <i>B. floerkei</i> |

Lophozia obtusa (Lindb.) Evans (Fig. II)

Proc. Wash. Acad. Sci. 2 : 303 (1900). — *Jungermannia obtusa* Lindb. Musci Scand. 7 (1879). — *Leiocolea obtusa* (Lindb.) Buch, Mem. Soc. F. Fl. Fenn. 8 : 288 (1932). — *Obtusifolium obtusum* (Lindb.) S. Arnell, Illust. Moss Fl. Fennosc. 1 : 133 (1956).

Plants medium-sized, rather flaccid, dark green, in loose patches; shoots procumbent, up to 2.5 cm long, 1.5~2.0mm wide, sparsely branching. Stems flattened, 0.30~0.38mm wide, 8~10 cells high, formed of thin-walled cells throughout, cortical cells in 1~2 layers 15~20 μ , medullary cells 25~38 μ . Rhizoids rather numerous, colorless. Leaves contiguous, obliquely to horizontally spreading, obliquely inserted, rounded quadrate, wider than long, 0.6~1.2 mm wide, 0.5~1.0mm long, simply 2-lobed; sinus descending 1/4~1/3 the leaf length, obtuse to acute, more or less gibbous; lobes somewhat unequal (the ventral lobe larger than the dorsal one), rounded to obtuse. Underleaves normally lacking. Cells of the leaf apex 12~22 μ , of the middle 18~25 μ , of the base 18~25 \times 25~38 μ ; walls thin, hyaline; trigones minute but distinct;

* In my previous paper, I used *B. gracilis* for this species. According to Grolle (1961), *Jungermannia gracilis*, the basionym of this species, is a *nomen nudum*, and instead *B. attenuata* (Mart.) Loeske becomes the correct name for this species.

cuticle smooth.

Habitat. On humus in the alpine region of Honshu.

Specimen examined. HONSHU. Pref. Toyama: Mt. Warimo-dake, *H. Shimizu 1246*.

Range. Europe, North America and Japan (known only from the above locality).

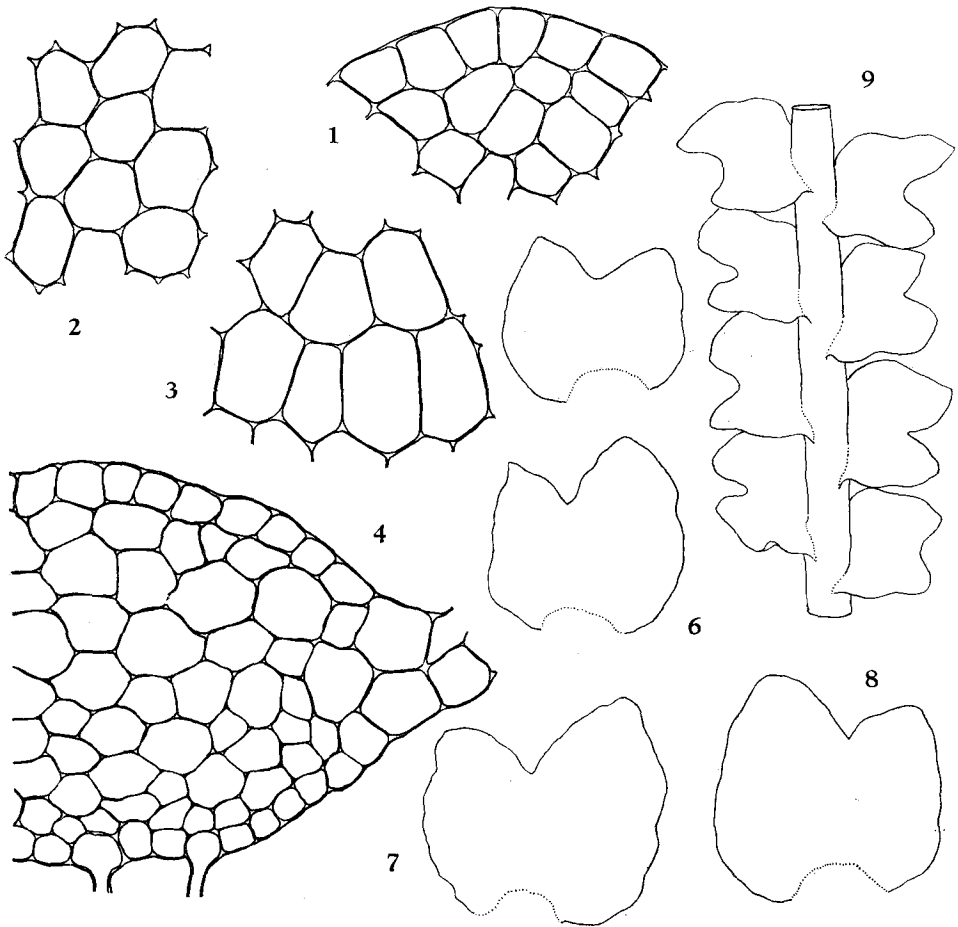


Fig. II. *Lophozia obtusa* (Lindb.) Evans. 1. Cells of leaf apex, $\times 360$. 2. Cells of leaf middle, $\times 360$. 3. Cells of leaf base, $\times 360$. 4. Cross section of stem, $\times 120$. 5~8. Leaves, $\times 25$. 9. Part of shoot, $\times 12$. (Drawn from *H. Shimizu 1246*).

This species has been known from Europe and North America. Now, its range extends to Japan, where the plants were taken only once at an alpine station of the above locality. Although the Japanese plants were sterile, a close examination of them convinced me that the material was identical with *L. obtusa*. The distinguishing characters of this species are the rather large

size of plants, the dark green color and rather flaccid texture of plants, and the wide leaves with rounded lobes. Among Japanese species of *Lophozia*, *L. excisa* shares with *L. obtusa* such characters as fleshy texture, the flattened stems, and the fairly large leaf-cells whose walls are very thin and whose trigones are minute. *Lophozia excisa* is readily discriminated from *L. obtusa* by the far smaller size of plants, as well as by the narrower leaves which have often subacute lobes and less horizontal insertion. If the plant bears an inflorescence, the paroicous one would make *L. excisa* easily separated from *L. obtusa* which is dioicous.

The systematic position of *L. obtusa* has been repeatedly discussed by several authors. In my estimation, this species seems to be situated just midway between subgen. *Lophozia* and *Massula* and not so closely allied to *Leiocolea*, though Buch (1932) placed it in *Leiocolea* basing the similarity of stem anatomy. As demonstrated by Schuster (1951), there is no definite difference between *Massula* and *Leiocolea* in the structure of stems. I would here place *L. obtusa* in *Massula* for such gross characteristics as the dark green color and the flaccid texture of plants and the procumbent growth habit; these features seem to be correlated with such minor ones as the flattened fleshy stems, the thin-walled leaf cells and the numerous minute oil-bodies (ca. 30 per cell and only 2~3 μ , after Müller, 1939). In these characters, however, not so sharp are the differences between *L. obtusa* and *L. excisa* which was placed in subgen. *Lophozia* in my previous paper.

Another Japanese species belonging to *Massula* is *L. incisa* which can be immediately separated from *L. obtusa* by the following key.

Key to the Japanese Species of *Massula*

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| Leaves canaliculate, with lobes spinose-dentate; cells large, 30~50 μ at leaf middle | <i>L. incisa</i> |
| Leaves flat, with lobes entire; cells small, 18~25 μ at leaf middle | <i>L. obtusa</i> |

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