

## *Arabidopsis umezawana* (Brassicaceae), a New Species from Mt. Rishirizan, Rishiri Island, Hokkaido, Northern Japan

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(Received on February 27, 2007)

A new species, *Arabidopsis umezawana* Kadota, is here described from Rishiri Island, Hokkaido, northern Japan. *Arabidopsis umezawana* is distinguished from *A. kamchatica* subsp. *kamchatica* by having plantlets at axils and inflorescences, uneven, adaxial surface of cauline leaves, suborbicular seeds with wings ca. 0.3 mm wide, non-nerved valves and the absence of radical leaves at anthesis; from *A. halleri* subsp. *gemmifera* by having annual or biennial habit, suborbicular, winged seeds and the absence of radical leaves at anthesis. This new species is restricted to the alpine zone of Mt. Rishirizan and grows under *Betula ermanii* – *Alnus maximowiczii* scrub and in alpine meadow. A new combination, *Arabidopsis gemmifera*, is also proposed.

**Key words:** *Arabidopsis gemmifera*, *Arabidopsis umezawana*, Japan, new species, Rishiri Island.

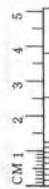
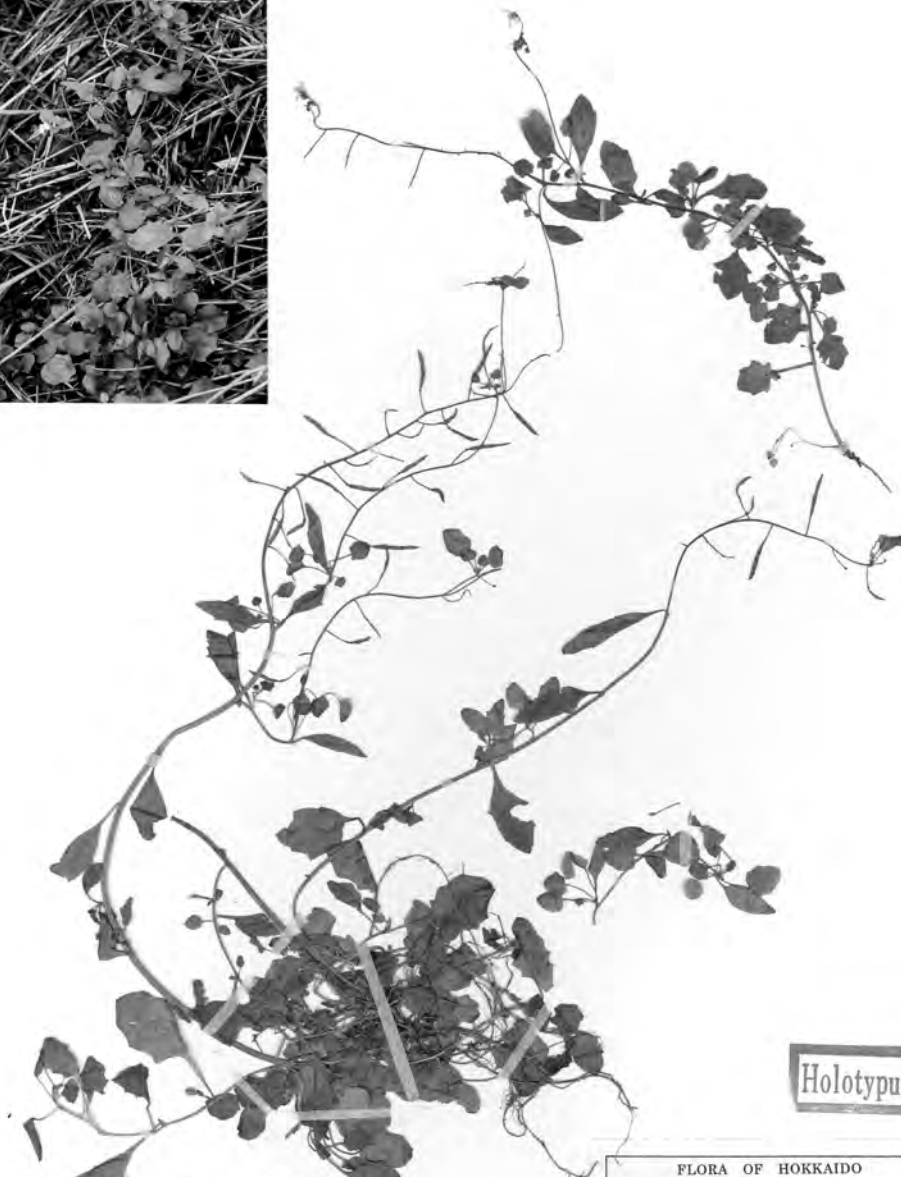
In December of 2005 some specimens and a photograph of *Arabidopsis* plants from Mt. Rishirizan, Rishiri Island, Hokkaido, northern Japan, were sent to me for identification from Mr. Shun Umezawa, Sapporo, Hokkaido, Japan. These plants were estimated to be annual or biennial because plant bodies were so weak and their subterranean organs were rather meager. They were devoid of radical leaves at anthesis. Seeds of these plants were suborbicular in outline and distally provided of rather broad wings ca. 0.3 mm wide. The plants from Mt. Rishirizan were significantly different from the two species hitherto known from Hokkaido: *A. kamchatica* (DC.) K. Shimizu & Kudoh subsp. *kamchatica* (Shimizu et al. 2005) and *A. halleri* L. subsp. *gemmifera* (Matsum.) O’Kane & Al-Shebaz. Additionally the plants in question did not correspond

to any known species. Accordingly it was concluded that the plants belonged to an undescribed species. Here this species will be described as *Arabidopsis umezawana* after the name of the collector.

***Arabidopsis umezawana*** Kadota, sp. nov. [Figs. 1–2]

Differt ab *Arabidopsis kamchatica* subsp. *kamchatica*, habitui gemmifero ad axillas et inflorescentias, foliis supra inaequalibus, seminibus suborbicularibus et late alatis, stylis tenuis et longioribus, siliquis brevioribus, valvis non nervatis, absentia folio radicali; ab *A. halleri* subsp. *gemmifera*, habitui annuo vel biennis, foliis supra inaequalibus, seminibus suborbicularibus et late alatis, absentia folio radicali.

**Type:** JAPAN: Hokkaido, Sôya Subpref., Rishiri-gun, Rishiri-cho, Rishiri Island, Mt.



**Holotypus**

THE NATIONAL MUSEUM OF NATURE AND SCIENCE (MUSEUMS)  
FLORA OF JAPAN

*Arabidopsis umezawana* Kadota, sp. nov.  
リシリハタザオ (新種)

Note: Flowers white, stems decumbent.

**HOKKAIDO:** Sôya Subpref., Rishiri-gun, Rishirifuji-machi, Rishiri Island, Mt. Rishirizan, the East Ridge. Alt. ca. 1000 m.  
北海道宗谷支庁利尻郡利尻島, 利尻富士町, 利尻山東麓.  
Date: 7 July 2004  
Coll.: Shun UMEZAWA

FLORA OF HOKKAIDO	
<i>Arabidopsis umezawana</i> Kadota	
Det.	
Loc.	利尻島 利尻山 東麓
Date.	7.7
Alt.	ca. 1000 m
Coll.	Shun Umezawa 04070701

Fig. 1. Type specimen of *Arabidopsis umezawana* Kadota (JAPAN: Hokkaido, Sôya Subpref., Rishiri-gun, Rishiri-cho, Rishiri Island, Mt. Rishirizan, the East Ridge, alt. ca. 1000 m, 7 July 2004, S. Umezawa 04070701, TNS 747639, holotype).



Fig. 2. Habit of *Arabidopsis umezawana* Kadota (Mt. Rishirizan, Nishi-Ôsora-sawa Gorge, alt. 1065 m, 4 July 2007, courtesy of Mr. S. Umezawa).

Rishirizan, the East Ridge, alt. ca. 1000 m, 7 July 2004, S. Umezawa 04070701 (TNS 747639–holotype, Fig. 1; TNS 747640–isotype).

A slender, stoloniferous, viviparous, annual or biennial herb, 20–40 cm long. Stems 1–3, decumbent, simple or 1–3 times branched, almost glabrous or sparingly hirsute with simple hairs, viviparous at axils and inflorescences; if branched, branches elongated, divaricate. Radical leaves absent at anthesis. Lower cauline leaves ovato-elliptic to broadly ovate, 1.5–3 cm long, 10–17 mm wide, coarsely and shallowly 1–3-toothed, uneven on the adaxial side, sparingly pubescent with a mixture of simple hairs and forked hairs on both sides, or glabrous on the adaxial side, rounded at apex, cuneate at base, petiolate; petioles 3–10 mm long, almost glabrous. Upper cauline leaves narrowly elliptic to lanceolate, 1.5–2 cm long, 4–12 mm wide, subentire, almost glabrous on both sides, petiolate; petioles 5–10 mm long, glabrous. Leaves of the plantlets suborbicular, 3–6 mm in diameter at anthesis, glabrous on the adaxial side, subdensely pubescent with a mixture of simple hairs and forked hairs on the abaxial side, petiolate; petioles 3–10 mm long, pubescent with a mixture of simple hairs and forked hairs. Flowers in July, numerous in a loose raceme. Petals white, narrowly obovate, 5 mm long, 2 mm wide. Sepals obovato-oblong, 2 mm long, 0.9 mm wide, glabrous. Nectaries ca. 0.5 mm in diameter. Filaments 3 mm long, flattened; anthers oblong, 0.5 mm long. Siliques linear, 12–15 mm long, ca. 1 mm wide, slightly constricted, not nerved, glabrous; styles thin, ca. 1 mm long; fruiting pedicels 5–7 mm long, patent. Seeds suborbicular, flattened, ca. 1 mm diameter, dark brown, distally winged; wings 0.3 mm wide; cotyledons accumbent.

Japanese name: Rishiri-hatazao (nom. nov.).

Distribution and habitat: Endemic to Mt.

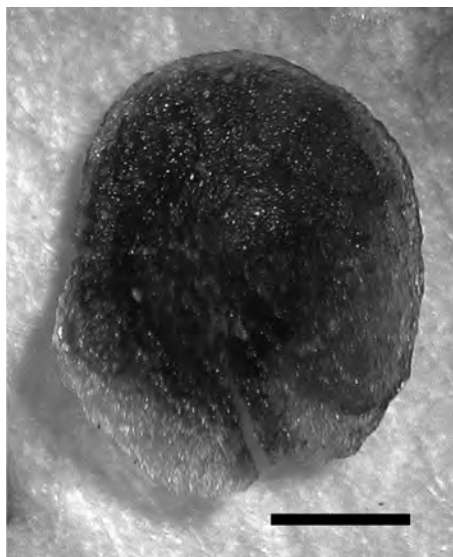


Fig. 3. Seed of *Arabidopsis umezawana* Kadota (from the holotype specimen). Scale indicates 0.2 mm.

Rishizan, Rishiri Island, Hokkaido, Japan. Growing under *Betula ermanii*–*Alnus maximowiczii* scrub and meadow in the alpine zone of the mountain (alt. 800–1120 m; Fig. 2).

*Arabidopsis umezawana* is distinguished from *A. kamchatica* subsp. *kamchatica* by having plantlets in the leaf axils and inflorescences, uneven adaxial surface of cauline leaves, suborbicular seeds with wings ca. 0.3 mm wide, non-nerved valves and the absence of radical leaves at anthesis. Seeds are relatively widely winged at base in *Arabidopsis umezawana* (Fig. 3), on the contrary, seeds are winged at apex and the wings are narrower (ca. 0.1 mm wide) in *A. kamchatica* subsp. *kamchatica*.

*Arabidopsis umezawana* is discriminated from *A. halleri* subsp. *gemmifera* (*Arabis gemmifera*) by having annual or biennial habit, suborbicular, winged seeds and the absence of radical leaves at anthesis.

According to Mr. S. Umezawa (pers. comm.) *A. umezawana* grew sometimes with

*Sasa kurilensis* under *Betula ermanii* – *Alnus maximowiczii* scrub at low altitudes. In the *Pinus pumila* zone *A. umezawana* occurred among *Alnus maximowiczii* – *Salix reinii* shrubbery with *Calamagrostis purpurea* subsp. *langsдорffii*, *Artemisia montana*, *Anaphalis margaritacea*, *Maianthemum dilatatum*. This *Arabidopsis* species was never observed under *Pinus pumila* scrubs. At high altitudes *A. umezawana* was found in alpine meadows on rocky slopes together with *Salix reinii*, *Spiraea betulifolia*, *Aconogonon weyrichii*, *Coelopleurum rupestre*, *Cirsium kamtschaticum*, *Filipendula camtschatica*, and so on.

#### Taxonomic status of *Arabidopsis halleri* subsp. *gemmifera*

Within the species *Arabidopsis halleri* L. plants from East Asia have been recognized as an East Asian subspecies, subsp. *gemmifera*, by O’Kane and Al-Shehbaz (1997, 2001, 2002). However, they are significantly different from those of European subsp. *halleri* by having gemmifery and more slender stems as well as the diagnostic characters described by O’Kane and Al-Shehbaz. Large populations of subsp. *gemmifera* are often found in the Japanese Mountains. The frequent occurrence of the large populations in this taxon might be caused due to the gemmifery. The gemmiferous habit is considered to make an important role in the propagation of this taxon. It is consequently appropriate that *Arabidopsis halleri* subsp. *gemmifera* is regarded as a distinct species in the genus *Arabidopsis*. Hence a new combination is proposed here.

***Arabidopsis gemmifera* (Matsum.) Kadota, comb. nov.** – *Cardamine gemmifera* Matsum. in Bot. Mag. Tokyo **13**: 49 (1899) – *Arabis gemmifera* (Matsum.) Makino [in Bot. Mag. Tokyo **24**: 224 (1910), comb. nud.] ex Ohwi, Fl. Jap. 581 (1953) – *Cardaminopsis gemmifera* (Matsum.)

Berkut. in Novosti Syst. Vyssh. Rast. **15**: 154 (1977) – *Arabidopsis halleri* L. subsp. *gemmifera* (Matsum.) O’Kane & Al-Shehbaz in Novon **7**: 325 (1997).

*Arabis halleri* L. var. *senanensis* Franch. & Sav., Enum. Pl. Jap. **II**: 279 (1897) – *Arabis senanensis* (Franch. & Sav.) Makino in Bot. Mag. Tokyo **24**: 224 (1910).

*Arabis gemmifera* (Matsum.) Makino ex Ohwi var. *alpicola* H. Hara in J. Jpn. Bot. **12**: 901 (1936) – *Arabis gemmifera* (Matsum.) Makino f. *alpicola* (H. Hara) Ohwi in Bull. Natn. Sci. Mus., Tokyo (33): 73 (1953).

*Arabis coronata* Nakai in Bot. Mag. Tokyo **28**: 302 (1914).

*Arabis maximowiczii* N. Busch in Bot. Mater. Gerb. Glavn. Bot. Sada **3**: 13 (1922) – *Cadaminopsis maximowiczii* (N. Busch) O. E. Schultz, Nat. Pflanzenfam. ed. 2, **17B**: 541 (1936).

*Cardamine greatrexii* Miyabe & Kudo in Trans. Sapporo Nat. Hist. Soc. **6**: 169 (1910) – *Arabis greatrexii* (Miyabe & Kudo) Miyabe & Tatew. in Trans. Sapporo Nat. Hist. Soc. **13**: 379 (1934).

Japanese name: Hakusan-hatazao, Tsuru-tagarashi.

Distribution: Hokkaido (southwestern part), Honshu, Shikoku (Mt. Tsurugisan, Tokushima Pref., limestone area), Kyushu (Mt. Shiraiwayama, Miyazaki Pref., limestone area), Russia (Okhotsk, Kamchatska, Ussuri, south Sakhalin; Berkutenko 1988, fig. 35), Korea (the whole region; Lee 1996), China (Heilongjiang, Jilin and Liaoning; Lan 1987, Zhou et al. 2001, Fu and Hong 2003) and Taiwan (high mountains of the northern part; Ying 1996).

I wish to show my sincere thanks to Mr. S. Umezawa, Sapporo, Hokkaido, Japan for his kind gifts of the specimens and the photograph; to Dr. M. Sato, Rishiri Town Museum, Rishiri Island, Hokkaido, Japan for useful information on *Arabidopsis* in Rishiri

## Island.

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門田裕一：利尻山産シロイヌナズナ属（アブラナ科）の1新種，リシリハタザオ

利尻島の利尻山からアブラナ科シロイヌナズナ属の1新種，リシリハタザオ *Arabidopsis umezawana* Kadota を記載した。リシリハタザオはミヤマハタザオ *A. kamchatica* (DC.) K. Shimizu & Kudoh subsp. *kamchatica* からは、①葉腋や花序に小植物体（新苗）をつけること、②茎葉の上面に凹凸を有すること、③種子がほぼ円形で基部により幅の広い翼をもつこと、④花柱がより細くかつ長いこと、⑤果実に脈が認められないこと、⑥根生葉は花期に生存しないことで区別され、ハクサンハタザオからは、①一年生あるいは二年生であること、②種子がほぼ円形で基部により幅の広い翼をもつこと、③根生葉は花期に生存しないことで区別される。種形容語（種小名）は発見者の梅澤 俊氏への献名である。リシリハタザオは利尻

山高山帯下部のダケカンバーミヤマハンノキ低木林の林床や高山帯上部のミネヤナギ、マルバシモツケ、ウラジロタデ、エゾヤマゼンゴ、チシマアザミなどからなる草原に生える。

ハクサンハタザオは最近になってハタザオ属 *Arabis* からシロイヌナズナ属 *Arabidopsis* に移され、かつ *A. halleri* L. の極東アジア産の亜種、*Arabidopsis halleri* L. subsp. *gemmifera* (Matsum.) O’Kane & Al-Shehbaz (1997) と扱われている。しかし、ハクサンハタザオは繊細な茎をもち、主に花後に花序や葉腋に小植物体をつけるという、ヨーロッパの *A. halleri* には見られない特徴をもっている。したがって、この属の独立種とみなし、*Arabidopsis gemmifera* (Matsum.) Kadota の新組み合わせを提唱した。（国立科学博物館植物研究部）