

## *Solidago horieana* (Asteraceae), a New Species from Hokkaido, Northern Japan

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A new species of *Solidago* (Asteraceae), *S. horieana* Kadota, is described from Hokkaido, northern Japan. *Solidago horieana* is different from *S. yokusaiana* Makino in having larger capitula, fewer, remote cauline leaves densely strigose with curved hairs on the adaxial side, acuminate involucrel phyllaries and subtending leaves and longer outer involucrel phyllaries. *Solidago horieana* occurs along mountain streams of lower elevation in the serpentine area of northern Hokkaido. This new species is both a rheophyte and serpentinophyte.

**Key words:** New species, rheophyte, serpentinophyte, *Solidago horieana*, *Solidago yokusaiana*.

In July 2007 I made field explorations in northern Hokkaido, Japan, under the guidance of Dr. Kenji Horie. At that time I observed plants belonging to genus *Solidago* (Asteraceae; Fig. 1). The plants grew among serpentine rocks along the River Osarunai, one of the upper tributaries of the River Uryûgawa (Fig. 1D). Within the genus *Solidago* *S. yokusaiana* Makino is known as a rheophyte (Hara 1952, Kitamura et al. 1957, Hatusima 1971, Kitamura 1981, Ohwi (Kitagawa) 1992, Koyama 1995). The plants also occurred along the river and have lanceolate cauline leaves. Hence the plants are regarded as rheophytes. *Solidago yokusaiana* is distributed in Honshu, Shikoku, Kyushu and the Ryukyus (the Okinawa island) and is not reported from Hokkaido, northern Japan (Hara 1952, Kitamura et al. 1957, Hatusima 1971, Masamune 1974, Kitamura 1981, Ohwi (Kitagawa) 1992, Koyama 1995). The plants

seemed to be significantly different from *S. yokusaiana* by having larger heads and fewer, scattered cauline leaves based on the observations of the habitat.

Later the plants were compared with specimens of *S. yokusaiana* preserved at the Herbarium, Department of Botany, National Museum of Nature and Science (TNS, former National Science Museum, Tokyo). As a result it was clear that the plants in question are distinguished from *S. yokusaiana* by the pubescence of basal and cauline leaves, the shape of involucrel phyllaries and subtending leaves and the length of outer involucrel phyllaries (Fig. 2) as well as the head size and the number and arrangement of cauline leaves. The plants are therefore described here as a new species, *S. horieana*, after the discoverer Dr. K. Horie. He noticed the occurrence of the plant about twenty years ago (Horie pers. comm.).



Fig. 1. *Solidago horieana* Kadota at the type locality (Horokanai-cho, Sorachi Subpref., Hokkaido, Japan). A. Habit at flowering time (on 7 July 1991, courtesy of Dr. K. Horie). B. Capitula and achenes. C. Habit at fruiting time. D. Habitat. Photographs B–D were taken on 30 July 2007.

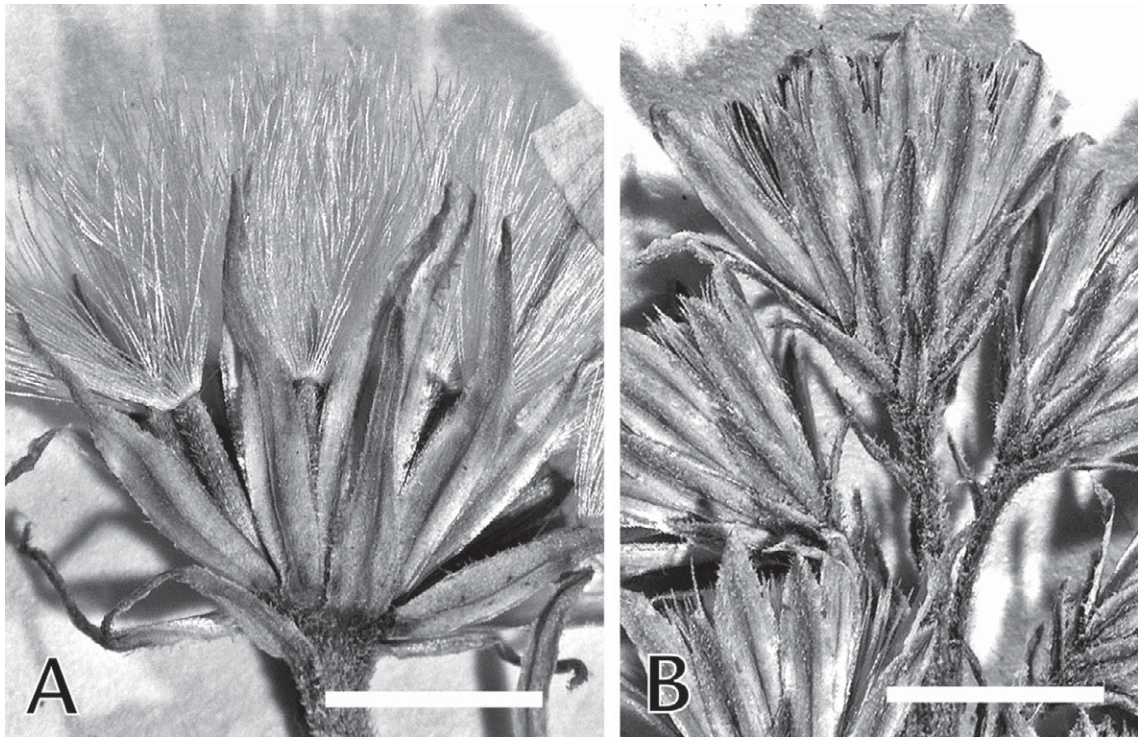


Fig. 2. Comparison between *Solidago horieana* Kadota and *S. yokusaiana* Makino in the shape of involucre phyllaries and subtending leaves. A. *S. horieana* (holotype). B. *S. yokusaiana* (JAPAN: Honshu; Yamagata Pref., Nishi-Okitama-gun, Oguni-machi, under the Tamagawabashi bridge, 12 Sept. 1946, S. Okuyama 7038, TNS 105040). Bar indicates 3 mm.

***Solidago horieana* Kadota, sp. nov.**

[Figs. 1, 2A, 3]

Haec species *Solidagini yokusaianae* affinis est, sed a qua capitulis magnis, foliis caulibus paucis remotis superne dense strigosis, phyllariis involucre et foliis subtentis acuminatis, phyllariis involucre exterioribus longioribus facile distinguitur.

**TYPE:** JAPAN: HOKKAIDO: Sorachi Subpref., Uryû-gun, Horokanai-cho, Osarunai, along the valley of Osarunai-gawa, a tributary of the River Uryû-gawa, a serpentine area, 44°00'27"N 142°06'34", alt. 140 m, 7 July 1991, K. Horie s.n. (TNS 769414 –holotype, Fig. 3; KYO, SAPT, TI, TNS-isotype).

A rheophytic, herbaceous perennial, 50–60 cm in height. Rhizome well developed, stout despite the plant size, up to 5 cm long. Stem declining at flowering time to erect to suberect at fruiting time, striate, sparingly

strigose with curved hairs in the upper part, branched also in the upper part; internodes 2–7 cm long in the middle of the stem; branches less elongated, shorter than cauline leaves. Basal leaves sometimes persistent at anthesis; blades lanceolate or sometimes elliptic, 3–12 cm long, 5–20 mm wide, pinnately veined, minutely serrate with acuminate teeth to entire, acuminate at apex, attenuate at base, densely strigose with curved hairs on the adaxial side, glabrous on the abaxial side, long petiolate; petioles 3–12 cm long, narrowly winged, ciliate with curved hairs along the wings. Cauline leaves 5–14, smaller than the basal leaves, remote, similarly pubescent to the basal leaves. Flowers in July. Capitula ca. 2 cm in diameter, in a loose monochasium; subtending leaves 5–7, 1–5 mm long, adpressed, scaly, acuminate at apex. Involucre narrowly cylindrical, ca. 3 mm in diameter, ca. 8 mm

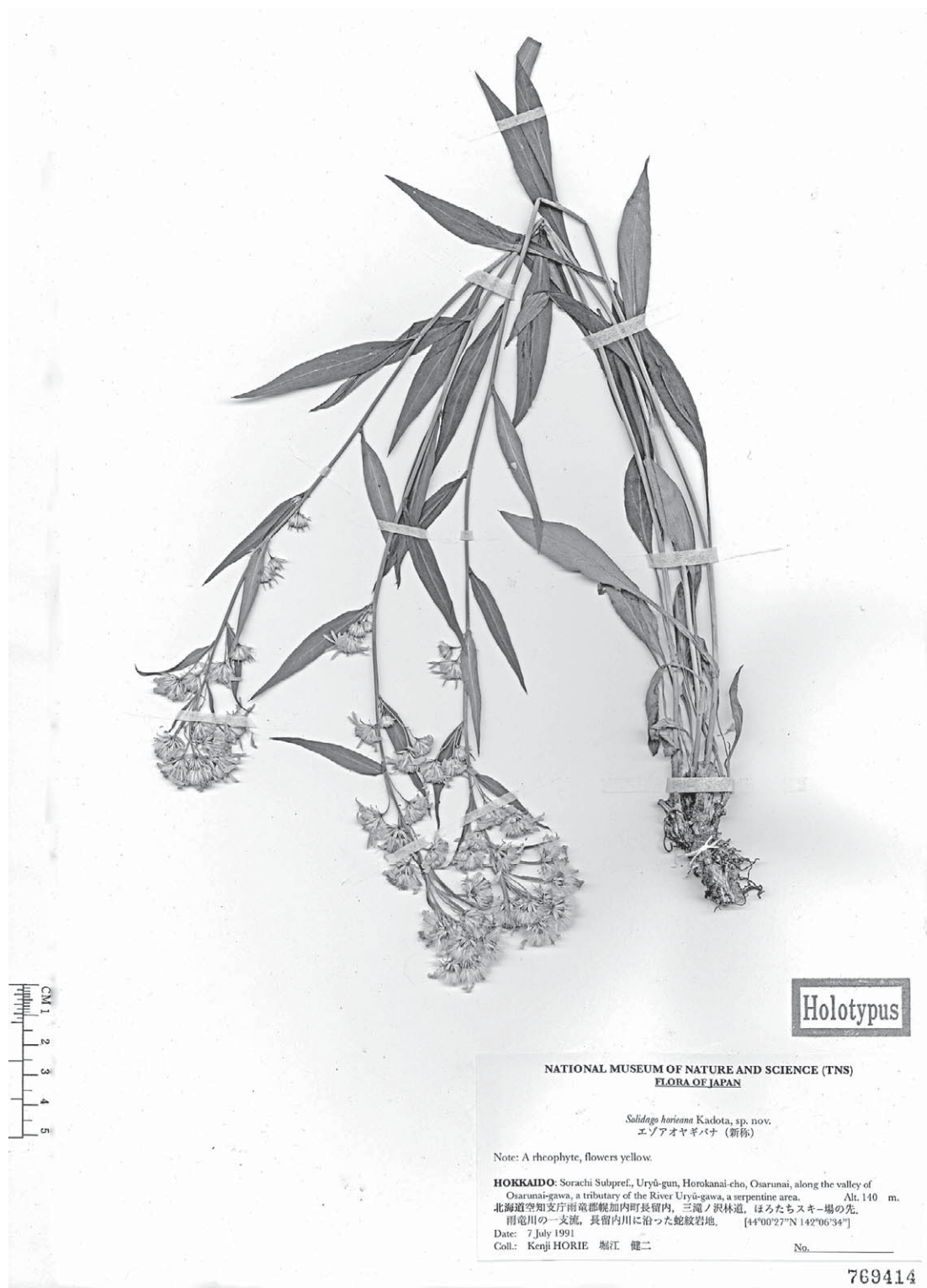


Fig. 3. Type specimen of *Solidago horieana* Kadota (JAPAN: HOKKAIDO: Sorachi Subpref., Uryû-gun, Horokanai-cho, Osarunai, along the valley of Osarunai-gawa, a tributary of the River Uryû-gawa, a serpentine area, 44°00'27"N 142°06'34", alt. 140 m, 7 July 1991, K. Horie s.n. (TNS 769414).

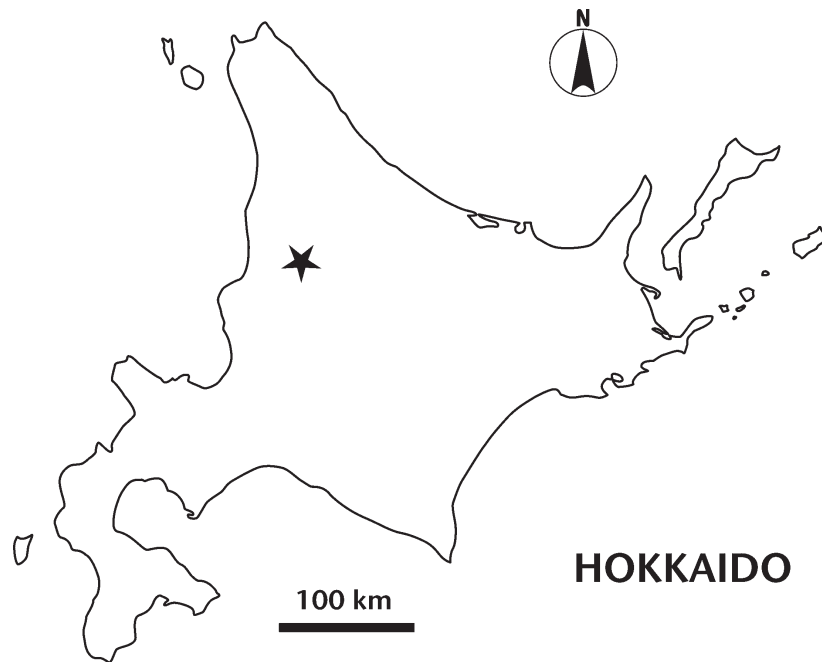


Fig. 4. Distribution of *Solidago horieana* Kadota.

long (*in vivo*); phyllaries 3-seriate, erect, adpressed, imbricate, 1-veined; inner phyllaries 6–7.5 mm long, narrowly lanceolate, acuminate at apex; outer phyllaries narrowly lanceolato-elliptic, 5–6 mm long, acuminate at apex. Ray florets yellow, pistillate; blades lanceolato-elliptic, 7 mm long, 2 mm wide; tubes 4 mm long; pappus capillary, 4–6 mm long, sordid. Disc florets dark orange, hermaphrodite; lobes 1 mm long; throats 2 mm long; tubes 2 mm long; pappus capillary, 4–6 mm long, sordid. Achenes cylindrical, ca. 3 mm long, striate, dark straw-colored, densely hirsute with ascending hairs.

Japanese name: Sorachi-Aoyagi-bana (nov.).

新和名：ソラチアオヤギバナ

Distribution: Northern Hokkaido, Japan (Fig. 4). Endemic to Japan. Currently *Solidago horieana* is reported from only a single locality. However, there is a possibility that this new species is found other localities because the northern part of Hokkaido is still inaccessible now and not thoroughly

botanized yet (cf. Kadota 2000, 2007a, 2007b, 2007c).

Additional specimens examined: JAPAN: HOKKAIDO: Sorachi Subpref., Uryû-gun, Horokanai-cho, Osarunai, along the valley of Osarunai-gawa, a tributary of the River Uryû-gawa, a serpentine area, 44°00′27″N 142°06′34″, alt. 140 m, 7 July 1991, 30 July 2007, fl. & fr., Y. Kadota 073311–073315 (TNS 769406–769409).

*Solidago horieana* is clearly distinguished from *S. yokusaiana* by having larger capitula (ca. 2 cm in diameter vs. 1–1.5 cm in diameter), fewer, remote cauline leaves, the pubescence of leaves (densely strigose above vs. glabrous above), apices of involucrel phyllaries and subtending leaves (acuminate vs. acute) and longer outer involucrel phyllaries (5–6 mm vs. 1–1.5 mm).

At the habitat the following plants associated; *Achillea ptarmica* subsp. *macrocephala*, *Artemisia montana*, *Viola verecunda*, *Trifolium repens*, *T. pratense*, *Filipendula camtschatica*, *Astilbe odontophylla* (*A. thunbergii* var. *congesta*), *Salix integra*, *Rumex acetosa*, *Phragmites australis*, etc.

Another taxon of *Solidago*, *S. virgaurea* L. subsp. *asiatica* (Nakai ex H. Hara) Kitam. ex H. Hara, occurs in the Uryû serpentine area. However, *S. virgaurea* subsp. *asiatica* was not found along streamside.

I would like to show my sincere thanks to Dr. Kenji Horie for his guidance to the locality of *Solidago horieana* and presenting herbarium specimens and the photographs of this species.

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#### 門田裕一：北海道産アキノキリンソウ属（キク科）の1新種，ソラチアオヤギバナ

北海道空知支庁幌加内町からアキノキリンソウ属（キク科）の1新種，ソラチアオヤギバナ *Solidago horieana* Kadota を記載した。種形容語（種小名）は発見者の堀江健二博士への献名である。

ソラチアオヤギバナはアオヤギバナと同じく溪流植物の一つで，アオヤギバナとは，①花がより大きく，②茎葉が少数個で茎に疎らにつき，③葉の向軸面に屈毛が密生し，④総苞片や苞葉の先端が尾状鋭先端となり，⑤総苞外片がより長い点で区別できる。根生葉は花期にも生存する傾向があ

る。

ソラチアオヤギバナは雨竜川上流の長留内川沿岸に生える蛇紋岩植物でもあり，付近にはエゾノコギリソウ，オオヨモギ（ヤマヨモギ），ツボスミレ，シロツメクサ，ムラサキツメクサ，オニシモツケ，トリアシショウマ，イヌコリヤナギ，スイバ，ヨシなどが生育していた。道北地方では，溪流沿いに生える蛇紋岩植物としてソラチアオヤギバナの他にホソバエゾノコギリソウやセイヤブシが知られている。

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