Systematic Studies of Asian *Saussurea* (Asteraceae) II.
Two New Species from Aomori Prefecture, Northern Japan

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Two new species of *Saussurea* (Asteraceae) are described from Aomori Pref., northern Japan. *S. hosoiana* Kadota (sect. *Rosulascentes*) is described from Rokkasho-mura, Shimokita zone. *S. hosoiana* is akin to *S. diamantiaca* Nakai, however, the former differs in having a leafy, winged stem, several corymbs or spike-like racemes with short peduncles, thick, coriaceous, glossy, broadly ovate, leaf blades glabrous beneath. *S. hosoiana* grows under a sparse *Pinus densiflora* groove located near the Pacific Ocean. *S. neichiana* Kadota is described from Hachinohe, Sanpachi zone. *S. neichiana* is similar to *S. sugimurae* Honda, however, the former is distinguished from the latter by having 8-seriate, ascending at an acute angle to adpressed involucral phyllaries, narrowly ovate, acute outer involucral phyllaries, well developed, sometimes coarsely toothed stem wing and thick and coriaceous leaf blades. *S. neichiana* occurs in maritime, windy grassland facing also the Pacific Ocean.

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**Key words:** Aomori, new species, *Saussurea hosoiana*, *Saussurea neichiana*, the Pacific Ocean.

This article is part of a revisional work of Asian *Saussurea* (Asteraceae) (Kadota 1987, 2004, 2007).

In 2006 and 2007 I had an opportunity to examine a huge collection of *Saussurea* (Asteraceae) from Aomori Prefecture, northern Honshu, Japan. These specimens were kindly sent to me by Messrs. K. Hosoi, M. Neichi, Y. Shima, Y. Kudo and I. Sato. The collection was mostly composed of two *Saussurea* species; *S. muramatsui* Kitam. and *S. sugimurae* Honda. However, a few specimens from the Monomi-zaki Cape facing the Pacific Ocean, Rokkasho-mura, Shimokita-gun, Aomori Pref., are equivalent to neither *S. muramatsui* nor *S. sugimurae*. It was consequently necessary to make field examinations in order to clarify the identity of the plants from the Monomi-zaki Cape.

In September of 2007 I conducted a field research around the Monomi-zaki Cape under the guidance of Mr. K. Hosoi and Ms. M. Jin. The plants in question were found under a sparse *Pinus densiflora* groove. To my great surprise the plants bore persistent radical leaves during the flowering time (Fig. 1, the largest leaf on the left hand; Fig. 2). The plant is additionally characterized by having a firm body and thick, coriaceous, glossy leaf blades. The nature of the leaves recall those of *S. chionophylla* Takeda, an endemic of ultrabasic rock areas of Mt. Yūbari-dake and Mt. Chiroro-dake, Hokkaido, Japan. *Saussurea chionophylla* has glabrous receptacles, however, the receptacles of the Monomi-zaki Cape plants are...
Fig. 1. Holotype of *Saussurea hosoiana* Kadota (JAPAN: Honshu, Aomori Pref., Kamikita-gun, Rokkasho-mura, Tomari, the Monomi-zaki Cape, alt. 20 m, 6 September 2007, Y. Kadota 074314, TNS 770861).
setaceous. In the genus *Saussurea* subgenus *Saussurea* the presence of radical leaves at anthesis and setae indicates that this plant belongs to sect. *Rosulascentes* (Kitam.) Lipsch. (Nakai 1909, 1915, Kitamura 1935, 1937, Lipschitz 1979, Shih and Jing 1999) and that this plant has no relationships with either *S. muramatsui* or *S. sugimurae* (sect *Saussurea* ser. *Tohiren*). The plant therefore belongs to an undescribed species within sect. *Rosulascentes*. Here I describe the species as *S. hosoiana* after Mr. K. Hosoi, who gave me an opportunity to study the species in detail.

In the course of the field examination in 2007 peculiar plants were found at Kofunato, Hachinohe-shi. As a consequence of later analysis it is confirmed that the plants from Hachinohe belong to another undescribed species. I describe this species *S. neichiana* after Mr. M. Neichi, who has contributed to the understanding of the flora of Aomori Prefecture, northern Japan.

**Taxonomic treatment**


*Saussurea hosoiana* Kadota, sp. nov.

[FIGS. 1, 2]

Differt a *Saussurea diamantiaca* caule foliaceo alato ramoso, folio radicali crasso coriaceo nitido late ovato subter glabro, phyllariis exterioribus involucrorum anguste ovatis, pedunculis brevioribus (0–)1–3 mm longis, capitibus pluribus.

**TYPE:** JAPAN: Honshu, Aomori Pref., Kamikita-gun, Rokkasho-mura, Tomari, the Monomi-zaki Cape, alt. 20 m, 6 September 2007, Y. Kadota 074314 (TNS 770861–holotype, Figs. 1, 2), Kadota 074311–074313 (TNS 770859–770860, 770862–isotype).

A medium-sized, firm, herbaceous perennial, 30–40 cm tall. Rhizome oblique to erect, ca. 1.5 cm in diameter, with string-like roots. Stem erect, leafy, striate, winged, sparingly sparingly pubescent with short, brownish, multicellular hairs in the upper part, 3–7 times branched; wings up to 4 mm wide. Basal leaves persistent at anthesis. Basal and lower cauline leaves thick, coriaceous, glossy, broadly ovate, 11–18 cm long, 10–16 cm wide, shallowly dentate, sparingly pubescent with short, brownish, multicellular hairs in the upper part, 3–7 times branched; wings up to 4 mm wide. Basal leaves persistent at anthesis. Basal and lower cauline leaves thick, coriaceous, glossy, broadly ovate, 11–18 cm long, 10–16 cm wide, shallowly dentate, sparingly pubescent with short, brownish, multicellular hairs on the adaxial side, similarly pubescent along veins on the abaxial side, deeply cordate at base, obtuse with acute tip at apex; petioles 9–14 cm long, sparingly pubescent with short, brownish, multicellular hairs, winged. Middle and upper cauline leaves elliptic to ovate, 4–5 cm long, 1.5–4 cm wide, shallowly serrate, truncate to cuneate at base, acuminate at apex, similarly pubescent to the lower cauline leaves, shortly petiolate, amplexicaul; petioles winged. Flowers in August to September, with 2–5 capitula, arranged in a compact corymb or a spike-like raceme; peduncles (0–)1–3 mm long, divaricate, sparingly arachnoid. Involucres campanulate to cylindrical, 10–18 mm in diameter, 13–16 mm long, arachnoid; phyllaries 8-seriate; outer phyllaries ovate, 4–6 mm long,
Fig. 2. Habit and involucre of *Saussurea hosoiana* Kadota (JAPAN: Honshu, Aomori Pref., Kamikita-gun, Rokkashe-mura, Tomari, the Monomi-zaki Cape, 6 September 2007, the same individual of the holotype specimen).
acuminate, recurved; inner phyllaries lanceolate, 10–13 mm long, acute; setae 6 mm long; subtending leaves 3–4, lanceolate-triangular, 5–15 mm. Corollae purplish violet, 12–13 mm long; lobes 3–4 mm long; throats 2.5–3 mm long; tubes 6 mm long; anthers 6 mm long, deep bluish purplish. Pappi 2-whorled, grayish white; outer 3 mm long, simple; inner 9–10 mm long, plumose. Achenes 6 mm long, glabrous, straw-colored, light brownish purple-lined and/or spotted, striate.

Japanese name: Mutsu-tōhiren (nov.).

Distribution: the Monomi-zaki Cape, Rokkasho-mura, Aomori Pref., Honshu, Japan (Fig. 3, star). Endemic to Japan.


As above-mentioned *S. hosoiana* belongs to sect. *Rosulascentes* (Kitam.) Lipsch. Among the constituent species of this section *S. diamantiaca* is closer to *S. hosoiana* than other species. *Saussurea hosoiana* is different from *S. diamantiaca* in habit (leafy vs. scapose to subscapose), texture, shape and pubescence of radical leaf blade (thick, coriaceous, glossy, broadly ovate and glabrous beneath vs. thin, chartaceous, non-glossy, ovate to narrowly ovate and densely arachnoid beneath) and the number of heads (several vs. 2–3 or solitary) (Nakai 1909, 1915, Kitamura 1937, W. T. Lee 1996a, 1996b, Y. N. Lee 1996, Lipschitz 1979).

Fig. 4. Holotype of *Saussurea neichiana* Kadota (JAPAN: Honshu, Aomori Pref., Hachinohe-shi, Kofunato, alt. 10 m, 7 September 2007, Y. Kadota 074351, TNS 770659). Left corner inset shows serrate wing of stem.
S. seoulensis Nakai, S. tomentosa Kom. [= S. alpicola Kitam.] and S. uchiyamae Nakai. Saussurea hosoiana, however, does not have the scapose habit. The assignment of S. hosoiana to sect. Rosulascentes is therefore still questionable.

Saussurea hosoiana occurs under a sparse Pinus densiflora grove established on a bluff facing the Pacific Ocean. This pine grove was ca. 5 m in height and was devoid of shrub layer. For this reason the habitat of S. hosoiana may be greatly affected by strong wind from the sea. The environmental condition of this habitat may be equivalent to that of maritime grassland. The hardy plant body of this species (particularly stem and leaves) is considered to be a result of adaptation to this severe environmental condition. On the contrary the continental species of sect. Rosulascentes occur in the mountains at the elevation of higher than 1000 m and bear chartaceous leaves similarly to S. muramatsui and S. sugimurae.


Sect. Lagurostemon (Cass.) DC., Prodr. VI: 532 (1837).


Saussurea neichiana Kadota, sp. nov. [Figs. 4, 5]

Differt a Saussurea sugimurae phyllariis 8-seriatis, phyllariis exterioribus involucro-rum brevioribus acutis anguste ovatis, alis latoribus grosse serratis, foliis crassioribus.

**TYPE** JAPAN: Honshu, Aomori Pref., Hachinohe-shi, Kofunato, alt. 10 m, 7 September 2007, Y. Kadota 074351 (TNS 770659–holotype, Fig. 4), Kadota 074352–074354 (TNS 770660–770662–isotype).

A medium-sized, herbaceous perennial, 40–80 cm tall. Rhizome oblique, ca. 1.0 cm in diameter, with string-like roots. Stem erect, striate, strongly winged, sparsely arachnoid in the upper part, 1–6 times branched; wings up to 8 mm wide, occasionally serrate. Basal leaves withering at anthesis. Lower cauline leaves coriaceous, narrowly ovate to ovate, 9–12 cm long, 7–9 cm wide, coarsely dentate, sparsely pubescent with short, brownish, multicellular hairs on the adaxial side, glabrous on the abaxial side, cuneate at base, acute at apex; petioles 7–11 cm long, sparsely pubescent with short, brownish, multicellular hairs. Middle and upper cauline leaves narrowly ovate, 2.5–8 cm long, 1–5 cm wide, serrate, truncate to cuneate at base, acuminate at apex, similarly pubescent to the lower cauline leaves, shortly petiolate, amplexicaul; petioles broadly winged. Flowers in September, with 2–5 capitula, arranged in a compact corymb; peduncles 0.5–2 cm long in the terminal corymb, ascending at an acute-angle, sparsely arachnoid. Involucres campanulate, 12–18 mm in diameter, 15–17 mm long, arachnoid; phyllaries 8-seriate; outer phyllaries narrowly ovate, 5–12 mm long, acuminate; inner phyllaries narrowly elliptic, 14–17 mm long, acute; setae 6 mm long; subtending leaves 3–4, narrowly ovato-lanceolate, 1–1.5 cm. Corollae purplish violet, 12–13 mm long; lobes 5 mm long; throats 2 mm long; tubes 6–7 mm long; anthers 6 mm long, deep bluish purplish. Pappi 2-whorled, grayish white; outer 3–5 mm long; inner 9–11 mm long. Achenes ca. 6 mm long, glabrous, straw-colored, purple-lined and purple-spotted, striate.
Fig. 5. Habit and involucre of *Saussurea neichiana* Kadota. Left. JAPAN: Honshu, Aomori Pref., Hachinohe-shi, Kofunato-taira, on 19 Aug. 2000 (courtesy of Mr. M. Neichi). Right. Hachinohe-shi, Kofunato, on 7 Sept. 2007.
Japanese name: Hachinohe-tôhiren (nov.).
新和名：ハチノヘトウヒレン

Distribution: Kofunato, Hachinohe-shi, Aomori Pref., Honshu, Japan (Fig. 3, triangle). Endemic to Japan.

Additional specimens examined: JAPAN: Aomori Pref., Hachinohe-shi, Same-machi, Akakô, alias Tanesashi Kaigan, 16 May 2008, with the former year’s scapes, M. Neichi s.n. (TNS 772782–772783); Hachinohe-shi, Same-machi, Ôkuki, 16 May 2008, with the former year’s scapes, M. Neichi s.n. (TNS 772784); Hachinohe-shi, Kanehama, 16 May 2008, with the former year’s scapes, M. Neichi s.n. (TNS 772785).

**Saussurea neichiana** is discriminated from *S. sugimurae* by having 1) 8-seriate involucral phyllaries (Fig. 4), 2) shorter, acute, narrowly ovate outer involucral phyllaries (Fig. 5), 3) thicker, coriaceous leaves, and 4) wider, sometimes coarsely serrate stem wing.

**Saussurea sugimurae** has been considered to have 8-seriate involucral phyllaries (e.g., Kitamura 1937, 1981). However, based on the re-examination of the type specimen, it is confirmed that *S. sugimurae* has 6-seriate involucral phyllaries.

**Saussurea neichiana** is different from *S. sugimurae* in having narrowly ovate leaf blades. However, populations of *S. sugimurae* from Aomori Prefecture tend to have narrowly ovate leaf blades. Accordingly, *S. neichiana* is not distinguished from *S. sugimurae* in the shape of leaf blades.

**Saussurea neichiana** was found growing exclusively in grasslands facing the Pacific Ocean. On the contrary *S. sugimurae* grows under summer-green woods in the mountains of the inland regions, Aomori and Iwate Prefectures, northern Honshu, Japan.

**Saussurea muramatsui** and *S. sugimurae* have been frequently confused or placed in the same taxon (e.g., Ohwi 1953, 1972, Ono et al. 1989, Ohwi (Kitagawa) 1992, Koyama 1995, Yonekura and Kajita 2003–2008). However, *S. muramatsui* is distinguished from *S. sugimurae* by the pubescence of involucres (densely arachnoid vs. scarcely arachnoid), the direction of involucral phyllaries (patent vs. ascending) and the shape of leaf blades (ovate vs. saggitate). *Saussurea muramatsui* is distributed in Yamagata, Akita, Aomori (Tsugaru zone and the northern part of the Shimokita Peninsula) Prefectures (chiefly on the Japan Sea side). *Saussurea sugimurae* occurs in Iwate and Aomori (Sanpachi zone) Prefectures (on the Pacific Ocean side).

**Literatures cited**


森（三八地方）と岩手県に分布し、分布域は太平洋側に偏る。

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