

Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XX. *Cirsium shimae*, a New Species from Tsugaru Area, Aomori Prefecture, Northern Japan

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Abstract *Cirsium shimae* Kadota is described from Aomori Pref., Honshu, northern Japan, and is distinguished from *C. hachimantaiense* Kadota by soft and thinner leaves, short and weak spines, longer floret lobes and longer pappi; from *C. borealinipponense* Kitam. by blood-red or reddish purple flowers, 7–8-seriate involucre phyllaries, soft and thinner leaves, short and weak spines, longer florets; from *C. chokaiense* Kitam. 7–8-seriate involucre phyllaries, floret tubes equal to throats in length, soft and thinner leaves, and short and weak spines. *Cirsium shimae* is distributed in the Shirakami Mountains, northern Honshu, and grows on rocky, grassy slope and along the margin of summer-green woods in the montane zone. The distribution range of *C. shimae* is located in the northernmost part of the range of sect. *Onotrophe* (Cass.) DC. subsect. *Nipponensia* Kadota (the *Cirsium borealinipponense* group).

Key words: Aomori Prefecture, *Cirsium borealinipponense*, *Cirsium chokaiense*, *Cirsium hachimantaiense*, *Cirsium shimae*, Japan, new species, Shirakami Mountains, Tsugaru Area.

Introduction

This is part of a revisional work on Japanese *Cirsium* (Asteraceae) (Kadota, 1989–2009; Kadota and Nagase, 1988).

Subsect. *Nipponensia* Kadota of sect. *Onotrophe* (Cass.) DC. (= the *Cirsium borealinipponense* group; Kadota, 2004b) is characterized by having 1) basal leaves persistent at anthesis, 2) large nodding or hanging capitula, 3) remarkably glutinous involucre with well developed glandular bodies, and 4) the chromosome number of $2n=2x=34$, and is an endemic plant group of Honshu, Japan (Kadota, 2004b). The *Cirsium borealinipponense* group is distributed on the Japan Sea side of Honshu and has diversified in the peripheral areas and/or in the ultrabasic areas (Kadota, 2004b).

In Aomori Prefecture, which corresponds to the northernmost portion of the *Cirsium borealinipponense* group's distribution range, *C. borealinipponense* Kitam. [= *C. nipponense*

(Nakai) Koidz.] was reported (Kadota, 1986; Takatani *et al.*, 1991; Hosoi, 1994). However, these reports were done without specimen comparisons of materials from the range of true *C. borealinipponense*.

In 2008 Mr. Yûzô Shima, Tsugaru-shi, Aomori Pref., made conclusive field works in the Shirakami Mountains according to my request and sent to me several herbarium specimens and photographs of the *Cirsium* plants in concern. As a consequence of my observations of the materials and the photographs it has been turned out that the *Cirsium* plants are significantly different from *C. borealinipponense* proper in gross morphology. In June 2009 I executed field studies of the *Cirsium* plants in the Shirakami Mountains under his guidance and verified that the plants belong to an undescribed species in the *Cirsium borealinipponense* group. The aim of this paper is to describe this undescribed species as a new species, *Cirsium shimae* Kadota.

Taxonomic treatment

Genus *Cirsium* Mill., Gard. Dict. Abringd. ed. 4, 1 (1754), emend. Scop., Fl. Carn. 355 (1760).

Sect. **Onotrophe** (Cass.) DC., Prodr. 6: 644 (1837).

Genus *Onotrophe* Cass. in Dict. Sci. Nat. 36: 145 (1825).

Ser. *Onotrophe* (Cass.) Maxim. in Bull. Acad. Sci. St.-Petersb. 19: 502 (1874).

Subsect. **Nipponensia** Kadota in Bull. Natl. Sci. Mus., Tokyo 30: 118 (2004).

TYPE: *Cirsium borealinipponense* Kitam.

Ser. *Schantarensia* auct. non Kitam.: Kadota in K. Iwats. *et al.*, Fl. Jpn. 3a: 129 (1995), pro subsect. *Schantarensia* (Kitam.) Kadota.

Cirsium shimae Kadota, sp. nov. [Figs. 1–2]

Cirsium nipponense auct. non (Nakai) Koidz.: Kadota, Conserv. Res. Rep. Beech Forest Shirakami Mts. 44, 52, 86 (1986)—Takatani *et al.*, Nature Study Akaishi Basin, Aomori Pref. 36 (1991)—*Cirsium borealinipponense* auct. non Kitam.: Hosoi, List Wild Vasc. Pl. Aomori Pref. 58 (1994)—Aomori Pref. Mus., Handb. Nature Shirakami Mts. 22, photo III. 6 (1995).

Differt ab *Cirsio hachimantaienso* lobiis flosculorum longioribus, pappiis longioribus; ab *C. borealinipponense* floribus atosanguineis vel rubro-purpureis, phyllariis involucrolum 7–8-seriatis; ab *C. chokaienso* phyllariis involucrolum 7–8-seriatis, tubiis flosculorum aequantibus illas faucibus; ab illis speciebus tribus foliis mollibus tenuioribus, spiniis brevioribus invalidis, lobiis foliorum acutangularis.

TYPE: JAPAN: HONSHU; Aomori Pref., Nishi-Tsugaru-gun, Fukaura-machi, Oirase, the Shirakami Mountains, Oirase-gawa Gorge, [40°33'29.6"N 140°04'47.1"E], alt. 282 m, 28 June 2009, Y. Kadota 093204, TNS 737526–737528, holotype; Fig. 1).

A robust but tender, hermaphrodite, herbaceous perennial, 0.8–1.8 m tall or taller. Root-stock firm, vertical, up to 50 cm long, 2 cm in diameter, scatteredly branched. Stem declining, terete, sulcate, branched from the upper part, leafy, arachnoid and covered with short brownish

hairs throughout the surface. Basal leaves persistent at anthesis, rosulate, deep green on the adaxial side, membranous, soft and thinner, petiolate; blades ovate to obovate in outline, 28–50 cm long, 11–26 cm broad, sparingly arachnoid on both sides, or pubescent with long brownish hairs along midribs on the adaxial side and sparingly arachnoid on the abaxial side, shallowly to medially pinnatilobate, 4–6-jugate; lobes narrowly ovate, 9–17 cm long, 3–7 cm broad, ascending at an acute angle, with weak spines 1–3 mm long; petioles 10–12 cm long, winged. Lower and middle cauline leaves similarly pinnatilobate to the basal, shortly petioled; upper cauline leaves sessile and amplexicaul, clearly auriculate at base. Flowers in June to July. Capitula 2–4 in a loose raceme or solitary, nodding to hanging down from the axis, with peduncles 1–4 cm long, densely arachnoid; subtending leaves 2–5, lanceolate to ovate and foliaceous, 1–7 cm long, with weak spines 1–4 mm long. Involucres campanulate to bowl-shaped, 22–28 mm long, (16–)23–33 mm wide (*in vivo*) and 3–4 cm (*in sicco*) in diameter, sparingly arachnoid. Phyllaries 7–8-seriate, erect to slightly recurved; glandular bodies narrowly ovato-lanceolate, exceedingly glutinous; outer phyllaries ovate with acuminate tips, 10–12 mm long, clearly shorter than the inner ones, herbaceous, terminated with weak spines less than 1 mm long. Corollae blood-red or reddish purple, 22–25 mm long; lobes ca. 4 mm long; throats 10–11 mm long; tubes 8–9 mm long, nearly equal to or slightly shorter than the throats. Achenes ivory white, ca. 4.5 mm long, ribbed; pappus sordid, 17–22 mm long.

Chromosome number: $2n=2x=34$ (present paper).

Japanese name: Tsugaru-oni-azami (nom. nov.).

Distribution: The northernmost part of Honshu (the Shirakami Mountains, on the border between Aomori and Akita Prefs.; Figs. 3 and 4, large shaded disc). Endemic to Japan.

Additional specimens examined: JAPAN: HONSHU; **Aomori Pref.**, Nishi-Tsugaru-gun, Fukaura-machi, Oirase-gawa Gorge, 18 June



Fig. 2. Habit of *Cirsium shimae* Kadota (JAPAN: HONSHU; Aomori Pref., Nishi-Tsugaru-gun, Fukaura-machi, Oirase-gawa Gorge, 28 June 2009). A. Habit. B. Nodding capitulum. C. Floret.

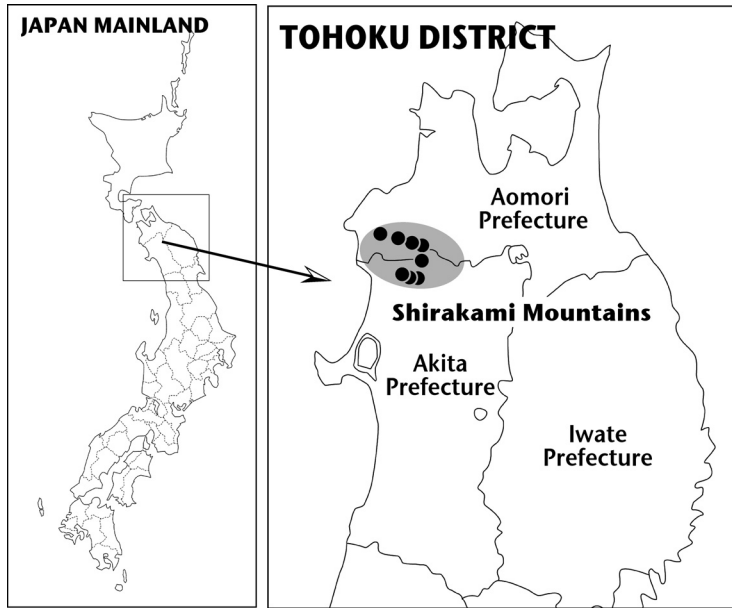


Fig. 3. Distribution of *Cirsium shimae* Kadota.

2008, Y. Shima s.n. (TNS 773870); Fukaura-machi, Oirase-gawa Gorge, 6 August 2008, Y. Shima s.n. (TNS 775305–775307); Fukaura-machi, Sasanai-gawa Gorge, 18 June 2008, Y. Shima s.n. (TNS 773871); Fukaura-machi, Oirase, Oirase-gawa Gorge, [40°33′29.6″N 140°04′47.1″E], alt. 282 m, 28 June 2009, Y. Kadota 093205–093211 (TNS 737529–737556); Fukaura-machi, Iwasaki, Sasanai-gawa Gorge, [40°33′13.9″N 140°02′09.1″E], alt. 258 m, 28 June 2009, Y. Kadota 093212 (TNS 737519–737524). Ajigasawa-machi, Hitotsu-mori, Akaishi-gawa Gorge, near the Akaishi Dam, [40°32′09.7″N 140°06′42.9″E], alt. 303 m, 28 June 2009, Y. Kadota 093201–093203 (TNS 737557–737572). Nishimeya-mura, Sunakose, Yunosawa-gawa Gorge, [40°29′02.5″N 140°16′36.0″E], alt. 340 m, 28 June 2009, Y. Kadota 093213–093217 (TNS 737573–737586). **Akita Pref.**, Yamamoto-gun, Fujisato-machi, along Prefectural Road Nishimeya-Futatsui Line, 6 July 2008, Y. Shima A, B (TNS 775308–775319); Fujisato-machi, Fukikoto, Tsurubeotoshi-tôge Pass, [40°26′12.0″N 140°19′24.8″E], alt. 576 m, 29 June 2009, Y. Kadota

093230–093232 (TNS 737494–737737497); Fujisato-machi, Fujikoto, Daira, [40°24′07.8″N 140°18′12.9″E], alt. 270 m, 29 June 2009, Y. Kadota 093218–093229 (TNS 737498–737737518).

Etymology: The specific epithet “*shimae*” is dedicated to Mr. Y. Shima, who has contributed to the understandings of this new thistle species as well as the Flora of Aomori Prefecture, northern Honshu, Japan.

Cirsium shimae is distinguished from *C. borealinipponense* Kitam. by having blood-red or reddish purple corollae, 7–8-seriate involucrel phyllaries and longer florets (22–25 mm long vs. 16–22 mm long). *Cirsium borealinipponense* is distributed from the southern part of Akita Pref. to Ishikawa Pref. (Fig. 4, small open circle).

Cirsium hachimantaiense Kadota is similar to *C. shimae* in flower color, however, the former is different from the latter in having longer floret lobes (2–3 mm long vs. 4 mm long) and longer pappi (10–15 mm long vs. 17–22 mm long). *Cirsium hachimantaiense* is an endemic of Mts. Hachimantai, the Owu Mountain Range, on the border between Akita and Iwate Prefs. (Fig. 4,

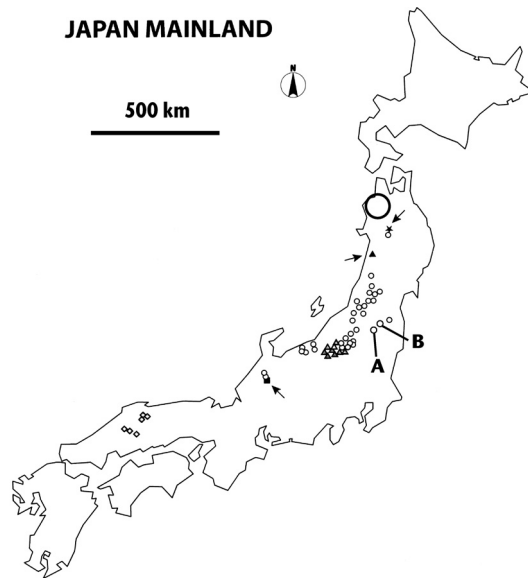


Fig. 4. Distribution of the *Cirsium borealinipponense* group (subsect. *Nipponensia* sect. *Onotrophe*). Large open circle. *C. shimae* Kadota. Star. *C. hachimantaiense* Kadota. Solid triangle. *C. chokaiense* Kitam. Disc. *C. borealinipponense* Kitam. Shaded triangle. *C. okamotoi* Kitam. Square. *C. occidentalinipponense* Kadota. Diamond. *C. maruyamanum* Kitam. Base map after Kadota (2004b). For *C. borealinipponense* two localities, Mt. Bandai-san (A) and Mt. Azuma-san (B), Fukushima Pref., are added.

solid star).

Cirsium chokaiense Kitam. resembles *C. shimae* also in flower color, but the former is clearly discriminated from the latter by having 6-seriate involucrel phyllaries. *Cirsium chokaiense* is endemic to Mt. Chôkai-san, on the border between Akita and Yamagata Prefs. (Fig. 4, solid triangle).

Cirsium shimae is remarkably characterized by having soft and thinner leaf blades with sharp-angled (ascending at an acute angle) lobes and this thistle is therefore definitely distinguished from the three species above-mentioned based on these attributes. *Cirsium shimae* is sometimes provided with plant body attaining 2 m in height and basal and lower cauline leaves 50 cm long and 26 cm wide, and this species is the biggest in the *Cirsium borealinipponense* group.

Cirsium shimae grows on rocky, grassy slopes (Fig. 2, A) in association with *Fallopia sachalinensis* (*Reynoutria sachalinensis*), *Weigela hortensis*, *Boehmeria silvestrii*, *Aruncus dioicus* var. *kamtschaticus*, *Clematis stans*, *Saxifraga fortunei*

var. *alpina*, *Coriaria japonica*, *Artemisia montana*, etc., and also along the margin of *Fagus crenata*-dominated woods.

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