

Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XXIV. Five New Species from Hokkaido, Northern Japan

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Abstract A new series in subsect. *Borealicola* Kitam. and five new species of the genus *Cirsium* (Asteraceae) are described from Hokkaido, northern Japan. Ser. *Glandulosae* is described based on *C. boreale* Kitam. in subsect. *Borealicola* of sect. *Onotrophe* (Cass.) DC. *Cirsium pectinellum* A.Gray var. *alpinum* Koidz. is accepted as a distinct species and is here named *C. yezoalpinum* H.Koidz. ex Kadota & Umezawa. *Cirsium yezoalpinum* is distributed in the alpine zone of Taisetsu-san and Shiretoko Mountains, central and eastern Hokkaido. *Cirsium charkeviczii* Barkalov, newly recognized, comes from Nemuro Peninsula, easternmost Hokkaido. It differs from *C. pectinellum* A.Gray by having subterranean stolons and glandular bodies. *Cirsium teshioense* Kadota described from northern Hokkaido is distinguished from *C. kamschaticum* Ledeb. ex DC. by having coriaceous, pinnatifid or deeply pinnatilobate cauline leaves and campanulate involucre, and from *C. pectinellum* by the absence of basal leaves at anthesis, coriaceous leaves and campanulate involucre. *Cirsium chikabumiense* described from northern Hokkaido is different from *C. charkeviczii* in the absence of subterranean stolons, lower cauline leaves with fewer pinnae and amplexicaul leaf bases. *Cirsium kenji-horieanum* Kadota described from northern Hokkaido is different from *C. boreale* Kitam. in having smaller capitula, narrowly cylindrical to cylindrical involucre, thicker and soft (fleshy) leaves and deeply pinnatilobate, lower, cauline leaves. *Cirsium austrohidakaense* described from southern Hokkaido is different from *C. kamschaticum* Ledeb. ex DC. in showing gynodioecy, soft cauline leaves, linear glandular bodies, 8-seriate involucreal phyllaries, longer and flexuous outer involucreal phyllaries and longer peduncles.

Key words: *Cirsium austrohidakaense*, *Cirsium charkeviczii*, *Cirsium chikabumiense*, *Cirsium kenji-horieanum*, *Cirsium teshioense*, *Cirsium yezoalpinum*, Hokkaido, Japan, new species.

Introduction

This is part of a revision of Japanese *Cirsium* (Asteraceae) (Kadota, 1989–2012; Kadota and Nagase, 1988). In this paper a new series of subsect. *Borealicola* Kitam., a new species of subsect. *Nutantia* (Kitam.) Kadota and four new species of subsect. *Borealicola* (Kitam.) Kadota are described from sect. *Onotrophe* (Cass.) DC. in the genus *Cirsium*.

In the classification of the genus *Cirsium* the

degree of leaf division is frequently employed as an important diagnostic character. Among Hokkaido *Cirsium*, species thistles with pinnatisect or deeply pinnatilobate leaves were ascribed to *C. pectinellum* A.Gray (e.g., Hara, 1952; Kitamura, 1937, 1957, 1981; Ohwi, 1953; Kadota, 1995). However, based on the difference of habitats and morphological traits (especially involucreal characters) it has clarified that several species are included in "*C. pectinellum*". They are *C. charkeviczii*, *C. chikabumiense*, *C. kenji-*

horieanum and *C. teshioense*, which are treated in this paper. The former three species are ultra-basicosaxicolous and the latter is a dweller of high moors.

In the alpine zone of Taisetsu [Daisetsu] and Shiretoko Mountains a small-sized thistle has been known to grow. This thistle was considered to be an alpine form of *C. pectinellum* and called *C. pectinellum* var. *alpinum* Koidz. ex Kitam. [= *C. pectinellum* subsp. *alpinum*] (e.g., Hara, 1952, Kitamura, 1937, 1957, 1981; Ohwi, 1953; Kadota, 1995; Umezawa, 2009). However, based on the presence of gynodioecy and the difference in the number of involucrel phyllaries, this small thistle should be treated as a distinct species.

Cirsium austrohidakaense has simply serrate and not pinnatilobate cauline leaves, thereby differing from the other species stated above. This new species is well characterized by having 8-seriate, long-flexuous involucrel phyllaries. This species was found at the southern foot of Hidaka Mountains in 2005 by Mr. S. Umezawa. According to the later field examinations it is clarified that this is widely distributed in the Hidaka (chiefly on the Pacific Ocean side) and Yubari Mountains.

Taxonomic treatment

Subsect. **Nutantia** (Kitam.) Kadota in K. Iwats. & al., Fl. Jap. **IIIb**: 128 (1995) — subsect. *Borealicola* Kitam. ser. *Nutantia* Kitam. in Acta Phytotax. Geobot. **3**: 7 (1934).

Type: *Cirsium pectinellum* A.Gray.

Subsect. *Borealicola* Kitam.: Barkalov in Kharkev., Pl. Vasc. Orient. Extr. Soviet. **IV**: 305 (1992), p.p.

1. *Cirsium yezoalpinum* H.Koidz. ex Kadota & Umezawa, **sp. nov.**

Cirsium yezoalpinum is different from *C. kamtschaticum* Ledeb. ex DC. in being gynodioecious habit, the presence of basal leaves at anthesis and 11–12-seriate involucrel phyllaries and also from *C. pectinellum* A.Gray by the gynodioecy and the number of involucrel phylla-

ries.

Cirsium pectinellum A.Gray var. *alpinum* Koidz. ex Kitam. in Mem. Coll. Sci. Kyoto Imp. Univ. ser. B, **13** [Comp. Jap. 1]: 45 (1937) & in Ohwi, Fl. Jap. ed. Engl.: 905 (1965) — H. Hara, Enum. Sperm. Jap. **II**: 181 (1952) — Ohwi, Fl. Jap.: 1208 (1953) — *Cirsium kamtschaticum* Ledeb. ex DC. subsp. *pectinellum* (A.Gray) Kitam. var. *alpinum* (Koidz. ex Kitam.) Kitam. in Mem. Coll. Sci. Univ. Kyoto ser. B, **24** (1): 44 (1957) — T. Shimizu, New Alp. Fl. Jap. **I**: 18, pl. 4–13 (1982).

Type: JAPAN. Hokkaido, 'Ishikari, Mt. Nutakkamshe' [= Kamikawa Subpref., Mt. Nutapkauspe, Mts. Taisetsuzan], 29 Jul. 1916, G. Koidzumi s.n. (TI!).

Cirsium alpinum auct. non All., Fl. Pedem. **1**: 153 (1785).

Cirsium yezofrigidum H.Koidz., in sched. (TNS 664808).

A gynodioecious, perennial, 0.2–0.9 m tall. Rootstock stout, oblique, 1–2 cm in diameter, with cord-like roots. Stem suberect, simple to 1–2(–3) times branched from the lower part, leafy, green, narrowly winged, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part. Basal leaves usually persistent at anthesis; blades elliptic, 8–12 cm long, 4–6 cm wide, deeply to medially pinnatilobate, 5–7-jugate, petiolate; petioles 4.5–8 cm long, winged, with sharp spines up to 1 cm long along the margin of the wings. Lower cauline leaves yellowish green on the adaxial side, glaucous on the abaxial side, soft, petiolate; blades elliptic to narrowly ovate in outline, 12–18 cm long, 6–12 cm broad, larger than the basal, sparingly pubescent with brownish multicellular hairs on both sides, deeply pinnatilobate, 6–9-jugate; lobes narrowly ovate, 2.5–4 cm long, 1–1.5 cm broad, with spines 1–3 mm long; petioles 3–5 cm long, winged, decurrent to the stem, amplexicaul, auriculate; wings up to 0.5 cm wide. Upper cauline leaves elliptic to narrowly ovate, coarsely serrate to medially pinnatilobate with 4–6 jugae, shortly petiolate or sessile, amplexicaul, auriculate. Flowers in July to September.

Capitula solitary or 2–3(–5) in a loose raceme, nodding, with peduncles 4–17 cm long, densely arachnoid and pubescent with multicellular brownish hairs; subtending leaves ca. 5, narrowly ovate, 10–14 mm long, with weak spines ca. 0.5 mm long. Involucres bowl-shaped to broadly campanulate, 20–26 mm long, 18–25 mm (*in vivo*) and 2–5 cm (*in sicco*) in diameter, densely arachnoid. Phyllaries 11–12-seriate, gently recurved, flexuous at apices; glandular bodies absent; innermost phyllaries linear, 17–18 mm long; outer phyllaries narrowly ovate, 12–13 mm long, slightly shorter than the inner ones, herbaceous, caudate at apex, terminated with fine spines 3–5 mm long. Corollae pale pink in bisexual florets, deep pink in female florets, 18–20 mm long; lobes 4–6 mm long; throats 5–7 mm long; tubes 8–9 mm long, longer than the throats. Achenes brownish gray tinged pale purple, 4.5–5 mm long, ribbed, striate; pappus grayish, 15–18 mm long.

Chromosome number: $2n = 2x = 34$ (Nishikawa, 1992).

Japanese name: Ezo-no-miyama-azami (G. Koidzumi, in sched., TI), Miyama-sawa-azami (Kitamura, 1937), Takane-hire-azami (H. Koidzumi, in sched., TNS).

Icones: T. Shimizu, New Alp. Fl. Jap. I: pl. 4, 3 (1982), as *C. kamtschaticum* subsp. *pectinellum* var. *alpinum*, female plant — Umezawa, Alp. Flow. Hokkaido: 26, middle right (Taisetsu Mountains, Mt. Aka-dake), 27, bottom right (Shiretoko Mountains, Mt. Chienbetsu-dake, female plant) (2009), both as *C. pectinellum* var. *alpinum*.

Distribution: Taisetsu and Shiretoko Mountains, Hokkaido. Endemic. In alpine meadows.

Specimens examined: JAPAN. Hokkaido. **Kamikawa Subpref.**, Kamikawa-gun, Kamikawa-cho, Mts. Taisetsusan, Aug. 1928, S. Akiyama 884 (SAPS); Mts. Taisetsusan, Aug. 1929, S. Akiyama 985 (SAPS); Mts. Taisetsusan, no date, G. Koidzumi s.n. (KYO); Mt. Taisetsusan, Dai-funkakô, 27 July 1916, H. Koidzumi 69667, 69669 (TNS 664807, 664809); Utsukushigahara, 21 Aug. 1926, G. Koidzumi s.n. (KYO); Eboshi-

dake, 14 Aug. 1926, Y. Okada s.n. (TNS 305061); Dai-funkakô, 13 Aug. 1927, S. Ito & al. (SAPS). Kumonotaira, 1 Aug. 1946, M. Tatewaki & E. Ohtake 35169 (SAPS); Kumonotaira, 31 July 1946, M. Tatewaki & E. Ohtake 35110 (SAPS). Goshikigahara, 14 Aug. 1952, T. Misumi s.n. (SAPS). Takanegahara, July 1931, G. Yamada 11889 (SAPS); Takanegahara, 14 Aug. 1952, T. Misumi s.n. (SAPS). Yanbetappu — Mt. Matsuura-dake, 27 Aug. 1953, T. Misumi s.n. (SAPS). Mt. Niseikaushupe, 9 Aug. 1947, M. Tatewaki 35335 (SAPS –). Hokkai-zawa, 1 Aug. 1948, M. Tatewaki 35848 (SAPS). Mt. Koidzumi-dake, 28 July 1926, S. Ito & S. Imai (SAPS). Akadake-tozanguchi — Komakusa-daira, alt. 1540–1840 m, 4 Aug. 1988, H. Takahashi 9025 (SAPS). Chûbetsu-numa pond, 30 July 2008, K. Iwasaki 1347 (SAPS –). Mt. Hiraga-take (Mt. Hira-yama), 30 July 1917, H. Koidzumi 69668 (TNS 664808); Mt. Hiraga-take, 30 July 1917, H. Koidzumi s.n. (SAPS); Mt. Taira, 2 Sept. 1958, M. Arai s.n. (SAPS); Mt. Hiraga-take, 1 Aug. 1948, M. Tatewaki 35896 (SAPS); Mt. Hira-yama, 7 Aug. 1958, S. Kawano 2203–2204 (SAPS); Mt. Hira-yama, 6 Aug. 1985, Y. Kadota & K. Midorikawa 12786, 12927 (TNS 9026641, 9026642, 9026649); Mt. Hira-yama — Mt. Niseikaushuppe-yama, 6 Aug. 1985, Y. Kadota & K. Midorikawa 12940 (TNS 9026647). Sorachi-gun, Kami-Furano-cho, Mt. Furano-dake, 1 July 1917, H. Koidzumi 69670 (TNS 664810). **Ohôtsuku Subpref.**, Shari-gun, Shari-cho, Shiretoko Range, Mt. Chinishibetsu-dake, alpine meadow, 4 Aug. 1984, K. Sato & T. Nishikawa 845208, 845217 (SAPS 10174, 10189); Mt. Shiretoko-dake, South ridge, alt. 850 m, 18 July 1952, J. Samejima & al. s.n. (SAPS 6442); Mt. Shiretoko-dake, South ridge, alt. 900–1050 m, 19 July 1952, J. Samejima & al. s.n. (SAPS –); Mt. Shiretoko-dake, South ridge, alt. 1080 m, 20 July 1952, J. Samejima & al. s.n. (SAPS 6441); Mt. Iwo-dake, 26 July 1928, C. Hara s.n. (SAPS 6443). **Nemuro Subpref.**, Menashi-gun, Rausu-cho, Shiretoko Range, Yunosawa — Mt. Rausu-dake, alt. 1100 m, 9 Sept. 1984, K. Takita 2190 (KYO); Mt. Rausu-

dake, at the shoulder, 19 July 1951, T. Misumi & al. 41010 (SAPS 6433); Rausu, 14 Aug. 1959, K. Hirata s.n. (SAPS 6444); Mt. Rausu-dake — Peak 1460m, Aug. 1960, Y. Ikeda s.n. (SAPS 6445); Mt. Rausu-dake, Rausu-daira, alt. 1360–1280m, 13 Aug. 1971, K. Sato & T. Tsuji 715454 (SAPS 10352); Mt. Rausu-dake, Rausu-daira, alt. 1350m, 28 Aug. 1984, Y. Kadota 849011–849016 (TNS 9026625–9026629); along the Unakibetsu-gawa river to Shiretoko-numa pond, 44°13.76' 145°19.58', alt. 250–900m, 6 Aug. 2005, H. Takahashi & al. 32286 (SAPS 6436); Mt. Higashi-dake — Mt. Chienbetsu-dake, 16 July 1979, K. Sato & J. Samejima 795167 (SAPS 10163); Mt. Sashirui-dake, 17 Aug. 1979, K. Sato & J. Samejima 795477 (SAPS 10154); Mt. Sashirui-dake, 18 July 1951, T. Misumi & al. 41001, 41002 (SAPS 6432, 6434).

Note: As shown in the synonymy *C. yezoalpinum* has been long considered as a subspecies or a variety of *C. pectinellum* because *C. yezoalpinum* has deeply pinnatifid basal and lower cauline leaves and a few nodding capitula. However, this entity should be treated to be a distinct species based on the presence of the gynodioecious habit and the 11–12-seriate involucrel phyllaries.

In Taisetsu [Daisetsu] and Shiretoko Mountains *C. yezoalpinum* was frequently found sympatrically with *C. kamtschaticum*. But, the former is distinguished from the latter by the number of involucrel phyllaries (11–12 vs. 6–7), the occurrence of basal leaves at anthesis (present vs. absent), the division of middle cauline leaves (deeply lobate with 6–9 jugae vs. coarsely serrate or shallowly lobate with 3–4 jugae) and the surface of internodes (pubescent and spiny vs. glabrous) as well as the chromosome number ($2n=34$ vs. $2n=68$). In spite of such sympatric occurrence any hybrid derivatives between *C. yezoalpinum* and *C. kamtschaticum* were not found in Taisetsu and Shiretoko Mountains probably due to the difference in the ploidy level.

In Hidaka and Yubari Mountains *C. kamtschaticum* exclusively grows in meadows and herbages of the alpine zone while another thistle, *C. austrohidakaense* (see below), occurs in the lowland of the mountain areas.

2. ***Cirsium charkeviczii*** Barkalov in Kharkev., Pl. Vasc. Orient. Extr. Soviet. VI: 307 (1992).

[Fig. 1]

Type: KURILES. 'Ins. Kunashir, in viciniis pagi Yuzhno-Kurilsk, in prato variiherboso humido, copiose' 25 August 1985, V. Yu. Barkalov s.n. (VLA–holotype, n.v.).

Cirsium pectinellum A.Gray var. *fallax* Nakai in Bot. Mag. (Tokyo) 46: 628 (1932), ut var. '*fallace*', non *C. fallax* Fisch. & C.A.Mey. (1838), *C. ×fallax* Franch. (1857). Type: JAPAN. Hokkaido, Nemuro Subpref., Nosappu-misaki cape, in herbage, 12 August 1931, H. Hara C1579 (TI; Fig. 2). The specimens 'Hara C1596 (TI)' from the Nosappu-misaki cape, Nemuro Peninsula should be ascribed to *C. ito-kojianum* Kadota. As indicated above, the two *Cirsium* species, *C. charkeviczii* and *C. ito-kojianum* are distributed in Nemuro Peninsula, eastern Hokkaido.

A hermaphrodite, stoloniferous perennial, 0.6–1.2m tall. Rootstock slender, suberect to oblique, 0.5–1cm in diameter, with cord-like roots. Stem suberect, simple or 1–2 times branched in the upper part, leafy, greenish, narrowly winged, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part; wings 0.5–1mm wide, with spines 1–5mm long. Basal leaves withering or sometimes persistent at anthesis. Lower cauline leaves green on the adaxial side, glaucous on the abaxial side, subcoriaceous, petiolate; blades ovate to narrowly ovate in outline, 10–23cm long, 5–10cm broad, glabrous on both sides, pinnatifid, 10–16-jugate; lobes linear to narrowly lanceolate, 3–5cm long, 0.3–0.6cm broad, with weak spines 1–3mm long; petioles 3–21cm long, winged, decurrent to the stem, amplexicaul, vaginate. Upper cauline

Fig. 1. Habit of *Cirsium charkeviczii* Barkalov (JAPAN. Hokkaido. Nemuro Subpref., Nemuro-shi, Tōsamuporo, in a high moor, 1 Sept. 2011). Top right corner inset shows oblique capitulum. Bottom left corner inset shows subterranean stolons (arrowheads). Courtesy of Mr. S. Miya.





Fig. 2. Type of *Cirsium pectinellum* A.Gray var. *fallax* Nakai (JAPAN. Hokkaido. Nemuro Subpref., Nosappu-misaki cape, 12 August 1931, H. Hara C1579, TI, holotype). Right. Inflorescence.

leaves narrowly ovate, pinnatifid to pinnatilobate with 3–7 jugae, sessile, vaginate. Flowers in August to September. Capitula solitary or 2–3 in a loose raceme, nodding, with peduncles (0.3–) 1.5–10.5 cm long, densely arachnoid and pubescent with multicellular brownish hairs; subtending leaves ca. 5, narrowly ovate, 5–8 mm long, with weak spines ca. 0.5 mm long. Involucres campanulate, 13–14 mm long, 8–12 mm (*in vivo*) and 1.5–2.5 cm (*in sicco*) in diameter, glabrous or sparingly arachnoid. Phyllaries 8–9-seriate, ascending at an acute angle; glandular bodies lanceolate, whitish (*in vivo*) and black (*in sicco*), degenerative and eglutinous; innermost phyllaries narrowly lanceolate, 9–12 mm long; outer phyllaries narrowly ovate, 4–5 mm long, shorter

than the inner ones, herbaceous, acuminate at apex, terminated with weak spines ca. 1 mm long. Corollae pale pink, 11–14 mm long; lobes 4–5 mm long; throats 3 mm long; tubes 4–6 mm long, longer than the throats. Achenes brownish gray tinged pale purple, 4 mm long, ribbed, striate; pappus grayish, 11–13 mm long.

Japanese name: Ezo-mamiya-azami (Nakai, 1932).

Chromosome number: Unknown.

Distribution: Nemuro Peninsula, Hokkaido. Kunashiri Island, the Kuriles. Endemic. In high moors near the seashore.

Specimens examined: JAPAN. Hokkaido, **Nemuro Subpref.**, Nemuro-shi, Kanebô pasture, in moors, 8 Aug. 1940, M. Tatewaki 31876

Fig. 3. Type of *Cirsium teshioense* Kadota (JAPAN. Hokkaido, Soya Subpref., Esashi-gun, Naka-Tonbetsu-cho, Mt. Shirikoma-dake, Kikusui-gawa, 6 July 2007, Shun Umezawa 07070605, TNS 772854, holotype).



Typus

FLORA OF HOKKAIDO

Cirsium tesuioense Kadota, sp. nov.
テシオアザミ (新種)

Det. _____

Loc. 中頓別町 菊水川

Date. 2011. 6 Alt. _____ m

Coll. Shun Umezawa 07070605

772854



Fig. 4. Habit of *Cirsium teshioense* Kadota (JAPAN. Hokkaido, Soya Subpref., Esashi-gun, Naka-Tonbetsu-cho, Kikusui-gawa, 16 July 2012, courtesy of Dr. K. Horie).

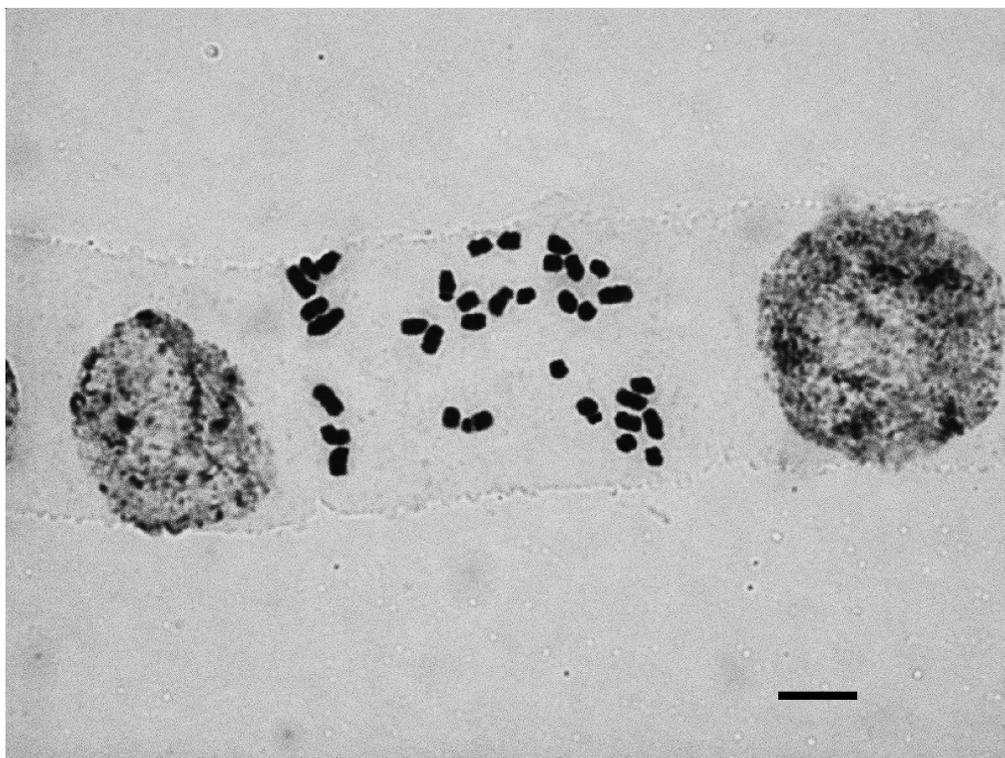


Fig. 5. Somatic chromosomes of *Cirsium teshioense* Kadota (JAPAN. Hokkaido. Soya Subpref., Esashi-gun, Naka-Tonbetsu-cho, Kikusui-gawa). Scale = 5 μ m.

(SAPS); in the vicinity of Nosappu-misaki cape, 15 July 1971, S. Mimoro & S. Tsugaru 715 (TNS 339258); in the suburbs of Nemuro-shi, 28 Aug. 1987, J. Haginiwa JH 10987, 10989–10994, 30536–30537 (TNS 960987, 960989–960994, 980536–980537); Futaoki – Toyosato, around a radio wave tower, in wet grassland, 25 Aug. 2007, H. Takahashi & H. Sato 33937 (SAPS, KYO); Tôsamuporo, in a high moor, alt. 35 m, 28 July 2010, S. Umezawa s.n. (TNS 1139212); Tôsamuporo, in a high moor, 4 Aug. 2010, S. Umezawa s.n. (TNS 1136269–1136270); Tôsamuporo, in a high moor, alt. 40 m, 1 Sept. 2011, Y. Kadota 118531–118545 (TNS 1155403–1155418). **The Kuriles.** Kunashiri (Kunashir) Island, Furukamappu, in swampy places, 26 July 1923, M. Tatewaki 3386' (SAPS); Furukamappu, 21 July 1930, Y. Matsumura s.n. (KYO); Furukamappu, 19 Aug. 1931, J. Ohwi 905 (KYO); Niki-shiro, in boggy places, 29 July 1923, M.

Tatewaki 3548 (SAPS); Ruyabetsu, Wotaepake, 5 Sept. 1894, C. Endo s.n. (SAPS); no precise locality, 1935, no collector's name (KYO).

Note: *Cirsium charkeviczii* is similar to *C. pectinellum* in the habitat preference (in high moors) and deeply pinnatisect leaves, however, the former is clearly different from the latter by having subterranean stolons and glandular bodies on all the phyllaries.

In Nemuro Peninsula, eastern Hokkaido, Japan, *C. charkeviczii* grows in high moors while *C. koji-itoanum* occurs in maritime herb stands.

Subsect. **Borealicola** Kitam. in Acta Phytotax. Geobot. **3**: 7 (1934) & in Mem. Coll. Sci. Kyoto Imp. Univ. ser. B, **13** [Comp. Jap. 1]: 41 (1937) — Kadota in K. Iwats. & al., Fl. Jap. **IIIb**: 139 (1995).

Type: *Cirsium kamtschaticum* Ledeb. ex DC.
Ser. **Borealicola**.

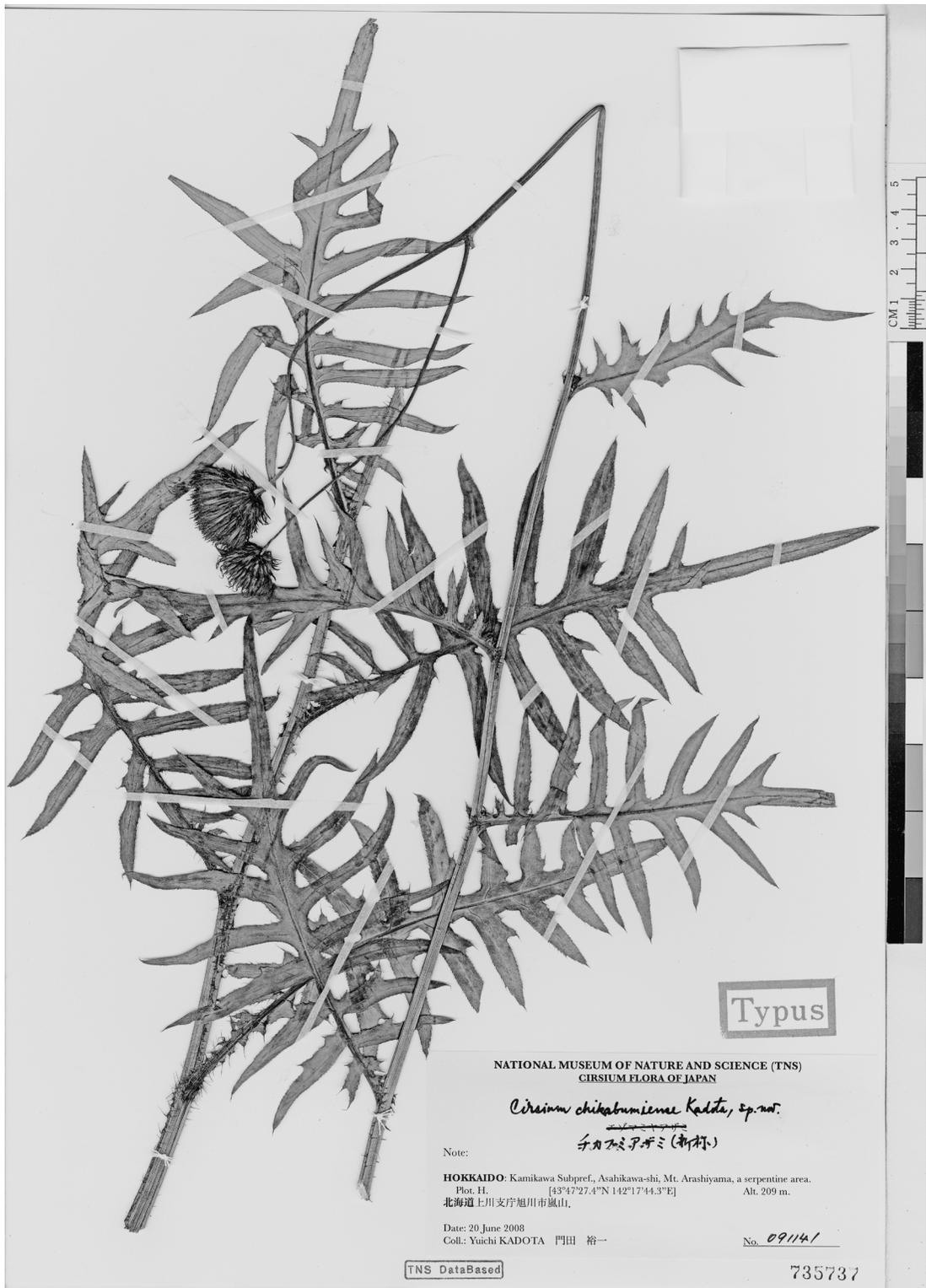


Fig. 6. Type of *Cirsium chikabumiense* Kadota (JAPAN. Hokkaido. Kamikawa Subpref., Asahikawa-shi, Mt. Chikabumi-yama [Mt. Arashi-yama], alt. 209 m, 20 June 2008, Y. Kadota 091141, TNS 735737, holotype).

3. *Cirsium teshioense* Kadota, sp. nov.

[Figs. 3–5]

Cirsium teshioense is distinguished from *C. kamtschaticum* Ledeb. ex DC. by having coriaceous, pinnatifid or deeply pinnatilobate cauline leaves and campanulate involucre, and from *C. pectinellum* A. Gray by the absence of basal leaves at anthesis, coriaceous leaves and campanulate involucre.

Type: JAPAN. Hokkaido, Soya Subpref., Esashi-gun, Naka-Tonbetsu-cho, Mt. Shirikomada-ke, Kikusui-gawa, 6 July 2007, Shun Umezawa 07070605 (TNS 772854–holotype; Fig. 3).

A hermaphrodite, perennial, 0.5–1 m tall. Rootstock stout, horizontal to oblique, 2–3 cm in diameter, with cord-like roots. Stem suberect, simple or 1–3 times branched in the upper part, leafy, winged, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part; wings 1–3 mm wide, with spines 2–4 mm long. Basal leaves withering at anthesis. Lower cauline leaves dark green on the adaxial side, glaucous on the abaxial side, coriaceous, petiolate; blades ovate in outline, 11–15 cm long, 6–12 cm broad, glabrous on both sides, pinnatifid or deeply pinnatilobate, 6–9-jugate; lobes narrowly ovate, 3.5–6 cm long, 0.5–1.5 cm broad, with weak spines 1–2 mm long; petioles 2–4 cm long, winged, decurrent to the stem, amplexicaul, auriculate. Upper cauline leaves pinnatifid to coarsely serrate or subentire, sessile, amplexicaul. Flowers in June to July. Capitula 1–2(–4) in a loose raceme, nodding, with peduncles 2.5–12 cm long; subtending leaves ca. 5, narrowly ovate, ca. 5 mm long, with weak spines ca. 0.5 mm long. Involucre campanulate, 16–18 mm long, 2–3.5 cm (in sicco) in diameter, arachnoid. Phyllaries 6-seriate, gently recurved and frequently flexuous at apices; glandular bodies linear, blackish and degenerative, eglutinous; innermost phyllaries narrowly lanceolate, 15–18 mm long; outer phyllaries narrowly ovate, 7–8 mm long, slightly shorter than the inner ones, herbaceous, caudate at apex, terminated with weak spines 1–2 mm long. Corollae deep pink,

12–18 mm long; lobes 4–5 mm long; throats 3–5 mm long; tubes 5–8 mm long, longer than the throats. Achenes reddish to purplish brown, 3.5 mm long, ribbed, striate; pappus gray tinged pale reddish brown, 11–12 mm long.

Chromosome number: $2n = 2x = 34$ (Fig. 5).

Japanese name: Teshio-azami (nom. nov.).

Distribution: Horokanai-cho, Shibetsu-shi, Toikanbetsu-cho, Naka-Tonbetsu-cho, Hokkaido, Japan. Endemic. On rocky, grassy slope in serpentine areas.

Additional specimens examined: JAPAN. Hokkaido. **Kamikawa Subpref.**, Fukagawa-shi, Mt. Shiratori-yama (Mt. Bōzu-yama), 2 Aug. 1956, S. Okamoto 1494 (KYO). Shibetsu-shi, On'nebetsu, Ibun dam, in a serpentine area, alt. 240 m, 26 June 1988, K. Horie s.n. (TNS 770992–770997). Uryu-gun, Horokanai-cho, Soeushinai, in a serpentine area, 3 July 1989, Y. Kadota 899101–899113 (TNS 9027452–9027464). **Soya Subpref.**, Teshio-gun, Horonobe-cho, Toikanbetsu, Nuporomapporo-sawa, in humid place of serpentine area, 3 Aug. 1953, S. Kitamura s.n. (KYO); at the vicinity of Nuporomapporo-sawa, on sandy soil along the stream, alt. 100–300 m, 14 Aug. 1963, H. Koyama 1686 (TNS 172095).

Ser. *Glandulosae* Kadota, ser. nov.

Type: *Cirsium borealis* Kitam.

Ser. *Glandulosae* is distinguished from ser. *Borealicola* by having glandular bodies on all involucreal phyllaries.

4. *Cirsium chikabumiense* Kadota, sp. nov.

[Figs. 6–7]

Cirsium chikabumiense is different from *C. charkeviczii* Barkalov by the absence of subterranean stolons, lower cauline leaves with fewer pinnae and amplexicaul leaf bases, from *C. pectinellum* by having 8–9-seriate involucreal phyllaries, shorter outer phyllaries and whitish glandular bodies on all phyllaries, and from *C. boreale* Kitam. by pinnatifid cauline leaves.

Type: JAPAN. Hokkaido. Kamikawa Subpref., Asahikawa-shi, Mt. Chikabumi-yama (Mt. Arashi-yama), alt. 209 m, 20 June 2008, Yuichi

Kadota 091141 (TNS 735737–holotype; Fig. 6).

A hermaphrodite, perennial, 0.7–1.4 m tall or taller. Rootstock stout, horizontal, 1–3 cm in diameter, with cord-like roots. Stem suberect, simple or 1–2(–4) times branched in the upper part or sometimes more than 10 times branched from the middle part, leafy, deep purple, winged, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part; wings 0.5–1 mm wide, with spines 1–3 mm long. Basal leaves withering at anthesis. Lower cauline leaves green on the adaxial side, glaucous on the abaxial side, herbaceous, petiolate; blades ovate to narrowly ovate in outline, 18–30 cm long, 12–20 cm broad, glabrous on both sides, pinnatifid, 8–10-jugate; lobes lanceolate to narrowly ovate, 5–14 cm long, 0.5–1.5 cm broad, with weak spines 1–2 mm long; petioles 2–11 cm long, winged, decurrent to the stem, amplexicaul, auriculate. Upper cauline leaves narrowly ovate, medially pinnatilobate with 2–3 jugae, sessile, amplexicaul. Flowers in June to July. Capitula 1–2 in a loose raceme, nodding, with peduncles 2–12.5 cm long, densely arachnoid and pubescent with multicellular brownish hairs; subtending leaves 5–7, narrowly ovate, 3–12 mm long, with weak spines ca. 0.5 mm long. Involucres campanulate, 18–22 mm long, 12–16 mm (*in vivo*) and 2–3 cm (*in sicco*) in diameter, glabrous or sparingly arachnoid. Phyllaries 8–9-seriate, ascending to gently recurved and sometimes flexuous at apices; glandular bodies lanceolate to linear, whitish (*in vivo*) and black (*in sicco*), degenerative and eglutinous; innermost phyllaries linear, 15–18 mm long; outer phyllaries narrowly ovate, 6–9 mm long, shorter than the inner ones, herbaceous, acuminate at apex, terminated with weak spines 0.5–1 mm long. Corollae deep pink, 14–15 mm long; lobes 4 mm long; throats 4 mm long; tubes 5–6 mm long, slightly longer than the throats. Achenes purplish brown, 3.5–4 mm long, ribbed, faintly striate; pappus grayish, 12–13 mm

long.

Chromosome number: Unknown.

Japanese name: Chikabumi-azami (nom. nov.).

Distribution: Asahikawa-shi, Takasu-cho, Horokanai-cho, northern Hokkaido, Japan. Endemic. Predominantly along the margin of summer-green woods in serpentine areas and rarely on moors (Ibun-tôge pass, Takasu-cho).

Specimens examined: JAPAN. Hokkaido. **Kamikawa Subpref.**, Asahikawa-shi, Kaguragaoka, 27 June 1917, H. Koidzumi 75835 (TNS 178397); Kaguragaoka, no date, H. Iwamoto s.n. (TNS 44414); Mt. Chikabumi-yama, at the edge of deciduous woods, in basic zone, alt. 200 m, 28 July 1983, K. Takita 1579 (KYO); Mt. Arashi-yama, in a serpentine area, 14 July 2007, K. Horie s.n. (TNS 770991); Mt. Arashi-yama, in a serpentine area, along *Quercus dentata* woods, 27 June 2007, Y. Kadota 071701–071702 (TNS 770977–770979); Mt. Arashi-yama, alt. 230 m, 10 Aug. 2011, Y. Kadota 118111–118112 (TNS 1151257–1151258); Kamui-Kotan, alt. 158 m, 20 June 2008, Y. Kadota 091135–091136 (TNS 735728–735729); Kamui-Kotan, 18 June 2009, S. Umezawa 1–2 (TNS 740259–740266). Kamikawa-gun, Takasu-cho, just below the Ibun-tôge pass, in a small moor, 30 July 2007, Y. Kadota 073351–073352 (TNS 771074–771079). Uryugun, Horokanai-cho, 26 July 1960, T. Takahashi 1771 (TNS 175119).

Note: The specific epithet derives the name of the type locality, Mt. Chikabumi-yama, which is an alternative name of Mt. Arashi-yama.

Cirsium chikabumiense is an ultrabasicosaxicolous plant. In Mt. Chikabumi-yama this species occurred in ultrabasic areas while *C. boreale* grew in non-basic areas.

5. ***Cirsium kenji-horieanum*** Kadota, sp. nov.
[Figs. 8–10]

Cirsium kenji-horieanum is different from *C. boreale* Kitam. by having smaller capitula, nar-

Fig. 7. Habit of *Cirsium chikabumiense* Kadota (JAPAN. Hokkaido. Asahikawa, Mt. Chikabumi-yama [Mt. Arashi-yama]). Whole plant. On 20 June 2008. Capitulum. On 27 June 2012. Whitish glandular bodies are seen on the abaxial side of the involucre phyllaries.





Fig. 8. Type of *Cirsium kenji-horieanum* Kadota (JAPAN. Hokkaido. Kamikawa Subpref., Asahikawa-shi, Etanbetsu, Mt. Maru-yama, 8 August 2011, Y. Kadota 1118005, TNS 1151341, holotype).

rowly cylindrical to cylindrical involucre, thicker and soft (fleshy) leaves and deeply pinnatilobate, lower, cauline leaves.

Type: JAPAN. Hokkaido. Kamikawa Subpref., Asahikawa-shi, Etanbetsu, Mt. Maru-yama, alt. 531 m, 8 Aug. 2011, Yuichi Kadota 1118005 (TNS 1151341–1151342–holotype; Fig. 8); Mt. Maru-yama, alt. 531 m, 8 August 2011, Yuichi Kadota 1118001–1118004, 1118006–1118012 (TNS 1151332–1151340, 1151343–1151351–isotypes).

A hermaphrodite, perennial, 1.5–2.5 m tall. Rootstock stout, horizontal, 2–5 cm in diameter, with cord-like roots. Stem suberect, 4–5 times branched from the middle part, leafy, grayish green, not winged, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part. Basal leaves withering at anthesis. Lower cauline leaves yellowish green on the adaxial side, glaucous on the abaxial side, thick and soft, rather fleshy, petiolate; blades ovate or sometimes narrowly ovate in outline, 17–30 cm long, 8–31 cm broad, sparingly or densely arachnoid on both sides, pinnatilobate, 3–6-jugate; lobes narrowly ovate, 3–12 cm long, 1.5–4 cm broad, with spines 1–2 mm long; petioles 5–7.5 cm long, winged, decurrent to the stem, amplexicaul, auriculate; wings up to 2 cm wide. Upper cauline leaves narrowly ovate, coarsely serrate with 2–3 jugae or subentire, shortly petiolate or sessile, amplexicaul, auriculate. Flowers in July to August. Capitula 4–5 in a loose raceme, nodding, with peduncles 2.5–10 cm long, densely arachnoid and pubescent with multicellular brownish hairs; subtending leaves ca. 5, narrowly ovate, 2–5 mm long, with weak spines ca. 0.5 mm long. Involucres narrowly cylindrical to cylindrical, 17–18 mm long, 8–9 mm (*in vivo*) and 1.5–2.5(–3) cm (*in sicco*) in diameter, glabrous. Phyllaries 9–10-seriate, adpressed; glandular bodies lanceolate to oblanceolate, whitish (*in vivo*) and black (*in sicco*), degenerative and eglutinous; innermost phyllaries narrowly lanceolate, 11–14 mm long; outer phyllaries narrowly ovate, 3–4 mm long, clearly shorter than the inner ones, herbaceous, acuminate at apex,

terminated with weak spines ca. 1 mm long. Corollae pale pink, 15–16 mm long; lobes 4–5 mm long; throats 5 mm long; tubes 6 mm long, slightly longer than the throats. Achenes brownish gray tinged pale purple, 4 mm long, ribbed, striate; pappus grayish, 13–15 mm long.

Chromosome number: $2n = 4x = 68$ (Fig. 10).

Distribution: Northern Hokkaido, Japan. Endemic. On serpentine, grassy slopes.

Japanese name: Asahikawa-azami (nom. nov.).

Specimens examined: JAPAN. Hokkaido.

Kamikawa Subpref., Uryu-gun, Horokanai-cho, Uenbetsu, alt. 180 m, 14 Aug. 2004, S. Umezawa 04081401 (TNS 747598–747600, 747636); Horokanai-cho, Mt. Santô-zan, 24 July 2012, S. Umezawa s.n. (TNS 1139242–1139243); Horokanai-cho, Soeushinai, alt. 199 m, 8 Aug. 2011, Y. Kadota 1118031–1118036 (TNS 1151652–1151366). Shibetsu-shi, On'nebetsu-cho, Inuushibetsu, alt. 222 m, 8 Aug. 2011, Y. Kadota 1118021–1118026 (TNS 1151238–1151244). Kamikawa-gun, Wassam-cho, Fukuhara, Peoppe-gawa, on a serpentine, rocky slope, 14 July 1971, Ko. Ito s.n. (SAPS). Fukagawa-shi, Takadomari, alt. 200 m, 30 July 2007, Y. Kadota 73325–73326 (TNS 771065–771067); Takadomari, 24 July 2011, S. Umezawa s.n. (TNS 1139251–1139252).

Note: *Cirsium kenji-horieanum* is apparently similar to *C. boreale* in having well-branched stem, cauline leaves more or less arachnoid on both surfaces and glandular bodies on all the involucreal phyllaries. However, the former is discriminated from the latter by having smaller heads, narrowly cylindrical to cylindrical involucre and more deeply divided cauline leaves with wider wings.

Cirsium chikabumiense is also an ultrabasic-saxicolous plant. *Cirsium kenji-horieanum* occurred in ultrabasic areas while *C. boreale* grew in non-basic areas throughout the distribution range of *C. kenji-horieanum*.

6. *Cirsium austrohidakaense* Kadota, sp. nov.

[Figs. 11–12]

Cirsium austrohidakaense is different from *C. kamtschaticum* Ledeb. ex DC. by having the

gynodioecious habit, soft cauline leaves, linear glandular bodies, 8-seriate involucrel phyllaries, longer and flexuous outer involucrel phyllaries and longer peduncles.

Type: JAPAN. Hokkaido. Hidaka Subpref., Samani-gun, Samani-cho, Shiomidai, Mt. Kan'non-yama, under sparse summer-green woods, alt. 79m, 10 July 2011, Y. Kadota 1117042 (TNS 1142976–holotype, hermaphrodite; Fig. 11).

A gynodioecious, perennial, 1.2–2.5 m tall. Rootstock stout, horizontal, 2–5 cm in diameter, with cord-like roots. Stem declining, 3–9 or more times branched from the middle part, leafy, green, winged or not winged, sparingly arachnoid and covered with short brownish hairs in the upper half; branches elongated at an acute angle. Basal leaves withered at anthesis. Lower cauline leaves yellowish green on the adaxial side, glaucous on the abaxial side, soft, petiolate; blades elliptic to ovate in outline, 23–30 cm long, 13–16 cm broad, shallowly to medially pinnatilobate, 2–6-jugate, usually arachnoid on the abaxial sides; lobes, if pinnatilobate, narrowly ovate, 4–10 cm long, 1.5–4 cm broad, with spines 1–3 mm long; petioles 4 cm long, winged, decurrent to the stem, amplexicaul, auriculate; wings up to 0.4 cm wide. Blades of middle cauline leaves ovate to narrowly ovate or narrowly obovate, 16–36 cm long, 8–22 cm wide, serrate, shortly petiolate to sessile, decurrent to the stem, amplexicaul, auriculate. Upper cauline leaves narrowly ovate, serrate, sessile, amplexicaul, auriculate. Flowers in June to July, or to August to September in higher elevations. Capitula (1–)2–5 in a loose raceme, nodding, with peduncles 13–25 cm long, densely arachnoid and pubescent with multicellular brownish hairs; subtending leaves 1–2, lanceolate, 10–20 mm long, with weak spines ca. 0.5 mm long. Involucres bowl-shaped, 20–25 mm long, 16–25 mm (*in vivo*) and 3–6 cm (*in sicco*) in diameter, sparingly

arachnoid. Phyllaries 8-seriate, flexuous; glandular bodies linear, whitish (*in vivo*) and black (*in sicco*), degenerative, eglutinous; innermost phyllaries linear, 21–23 mm long; outer phyllaries narrowly ovate, 16–25 mm long, as long as the inner ones, herbaceous, caudate at apex, terminated with sharp spines 2–3 mm long. Corollae pale pink to whitish pink, 17–20 mm long; lobes 4–6 mm long; throats 5–7 mm long; tubes 6–8 mm long, longer than or as long as the throats; styles pink in hermaphrodite florets, deep pink in female florets. Achenes brownish gray tinged pale purple, 4–4.5 mm long, ribbed, striate; pappus grayish, 13–15 mm long.

Japanese name: Kamui-azami (nom. nov.).

Chromosome number: $2n = 4x = 68$ (Nishikawa, pers. comm.).

Additional specimens examined: JAPAN. Hokkaido. **Kamikawa Subpref.**, Yūfutsu-gun, Shimukappu-mura, Shimo-Tomamu, Ikutoratōge pass, alt. ca. 700 m, 5 July 2011, Y. Kadota 1117027–1117028 (TNS 1142935–1142939); Shimukappu-mura, Akaiwa-Seigan-kyō gorge, alt. 290 m, 4 July 2011, Y. Kadota 1117022–1117024 (TNS 1142893–1142895, 1142899–1142907); Shimukappu-mura, Sōshubetsu, alt. 360 m, 5 July 2011, K. Kadota 1117025 (TNS 1142930–1142931). Mukawa-cho, Shiomi, 15 July 2001, K. Oita 01-6625 (SAPS); Mukawa-cho, Hobetsu Toyoidzumi, 27 June 2009, H. Igarashi s.n. (TNS 739721–739722); Mukawa-cho, Hobetsu Tomiuchi, 27 June 2009, H. Igarashi s.n. (TNS 739723); Mukawa-cho, Hobetsu Tomiuchi, alt. 90 m, 26 June 2010, S. Umezawa b (TNS 1107375–1107376); Mt. Bōzu-yama, Ōkuzure, 13 July 2004, Y. Kanagami & al. 04-9159, 04-9170 (SAPS); Mukawa-cho, Hobetsu Fukuyama, Mt. Bōzu-yama, alt. 600 m, 26 June 2010, S. Umezawa a, e (TNS 1107361–1107365, 1107371–1107374); Mt. Bōzu-yama, alt. 425 m, 26 June 2010, S. Umezawa b (TNS 1107366–1107370); Mt. Bōzu-yama, alt. 170 m, 4 July

Fig. 9. Habit of *Cirsium kenji-horieanum* Kadota (JAPAN. Hokkaido. Kamikawa Subpref., Asahikawa-shi, Etanbetsu, Mt. Maru-yama, 8 August 2011). Left corner inset shows capitulum. Whitish glandular bodies are seen on the abaxial side of the involucrel phyllaries.



2011, Y. Kadota 1117013–1117016 (TNS 1142884–1142892). Sorachi-gun, Minami-Furano-cho, Kanayama, E foot of Mt. Yubari-dake, alt. 334 m, 5 July 2011, Y. Kadota 1117032–1117035 (TNS 1142908–1142920).

Sorachi Subpref., Yubari-shi, Mt. Yuparo, 8 Aug. 1912, H. Yanagisawa s.n. (SAPS); Mt. Yupari, 27 July 1957, S. Nosaka 31689 (SAPS); Ô-yubari, 14 July 1986, A. Hinoma & K. Sakai 640 (SAPS); Mt. Yubari-dake, Hiyamizu Course, alt. 800–1150 m, 12 Aug. 1982, H. Takahashi 2978 (SAPS); Mt. Yubari-dake, Bunkiten — E side of Mt. Mae-dake, alt. 1250–1350 m, 28 July 1987, H. Takahashi & al. 7386, 7411, 7415, 7443 (SAPS). **Hidaka Subpref.**, Saru-gun, Biratori-cho, Honmachi, Yoshitsune park, 27 June 2009, H. Igarashi s.n. (TNS 739719–739720); Biratori-

cho, Yoshitsune park, alt. 150 m, 4 July 2011, Y. Kadota 1117011–1117012 (TNS 1142921–1142922); Biratori-cho, Honmachi, alt. 70 m, 26 June 2010, S. Umezawa c (TNS 1107351–1107360) Biratori-cho, Asahi, alt. ca. 190 m, 1 July 2011, H. Igarashi s.n. (TNS 1139214–1139215); Biratori-cho, Nioi, alt. ca. 70 m, 1 July 2011, H. Igarashi s.n. (TNS 1139216–1139217); Hidaka-cho, Monbetsu Midori-cho, 30 June 2009, H. Igarashi s.n. (TNS 739716); Hidaka-cho, Monbetsu Tomikawa, Biraga, alt. 20 m, 26 June 2010, S. Umezawa f1–f2 (TNS 1107474–1107481); Hidaka-cho, Miwa, alt. ca. 100 m, 1 July 2011, H. Igarashi s.n. (TNS 1139213); Hidaka-cho, Chisaka, along the river Pan-kenûshi-gawa, alt. ca. 550 m, 5 July 2011, Y. Kadota 1117036–1117037 (TNS 1142806–

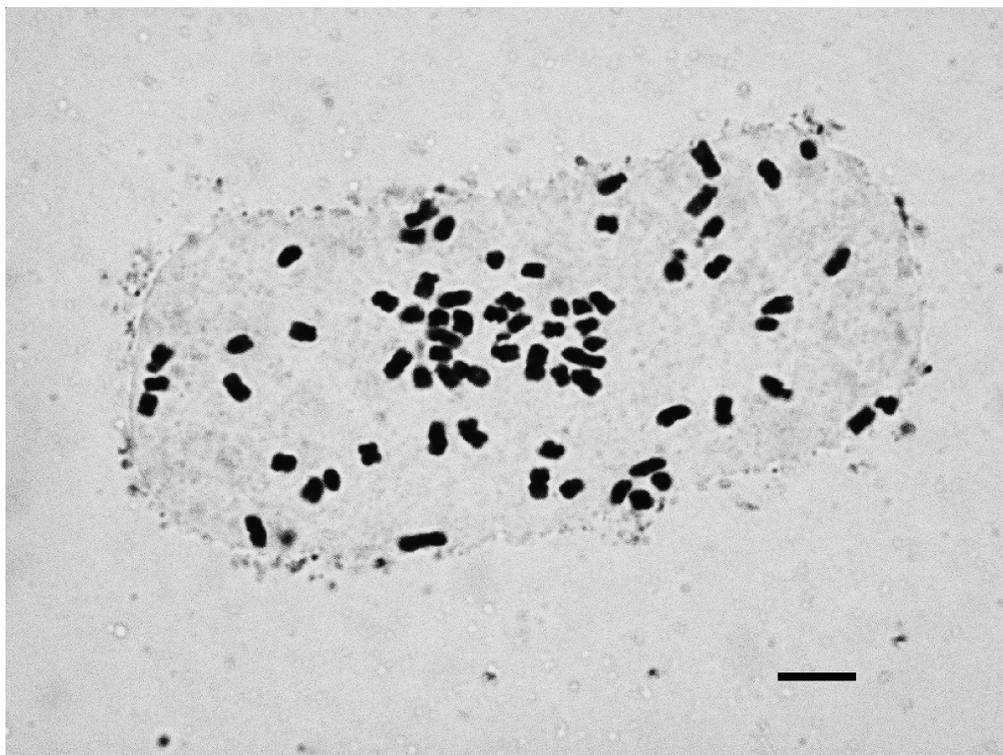
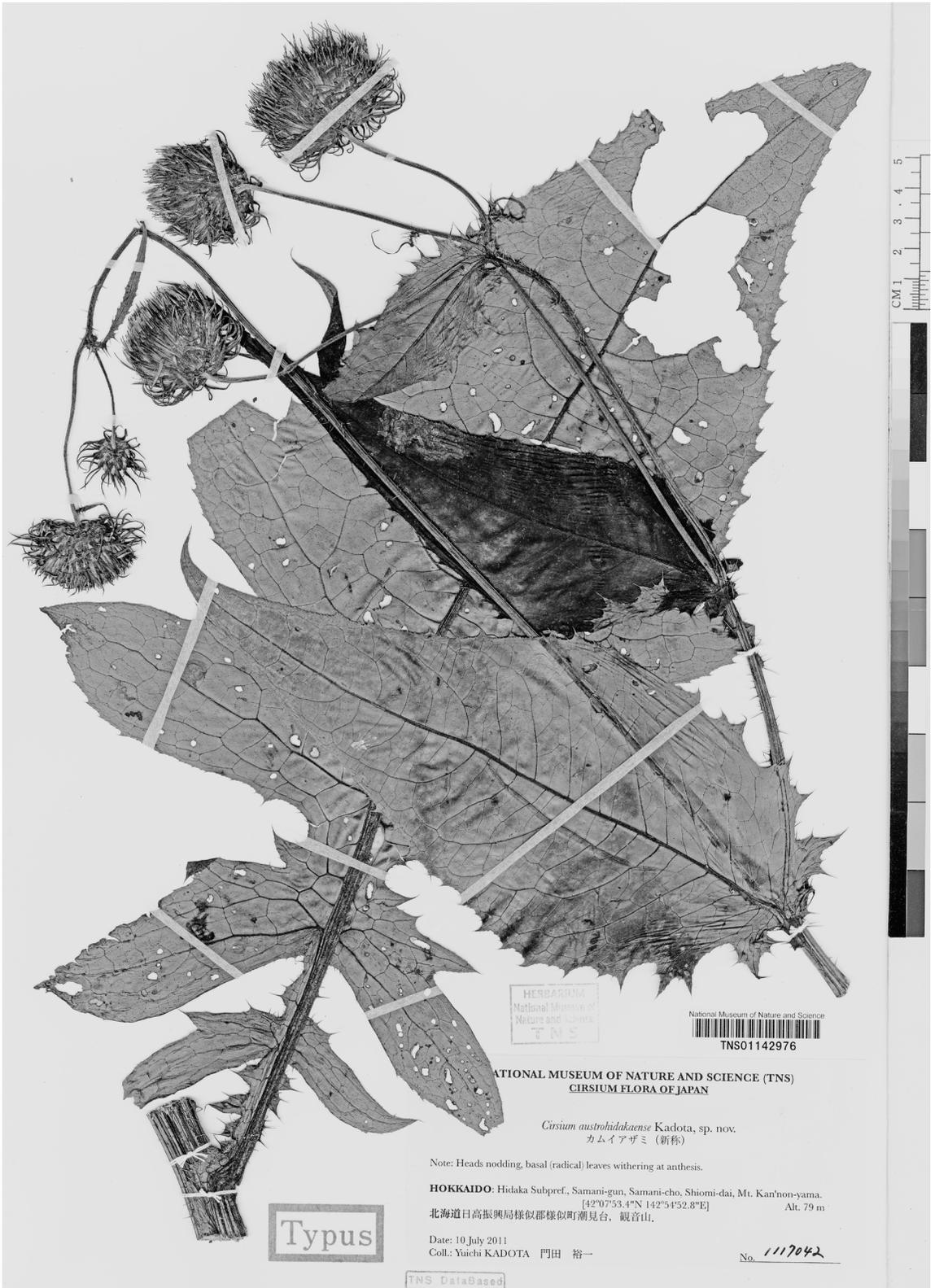


Fig. 10. Somatic chromosomes of *Cirsium kenji-horieanum* Kadota (JAPAN. Hokkaido. Kamikawa Subpref., Asahikawa-shi, Etanbetsu, Mt. Maru-yama). Scale = 5 μ m.

Fig. 11. Type of *Cirsium austrohidakaense* Kadota (JAPAN. Hokkaido. Hidaka Subpref., Samani-gun, Samani-cho, Shiomidai, Mt. Kan'non-yama, 10 July 2011, Y. Kadota 1117042, TNS 1142976, holotype).



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CIRSIUM FLORA OF JAPAN

Cirsium austrohidakaense Kadota, sp. nov.
カムイアザミ (新種)

Note: Heads nodding, basal (radical) leaves withering at anthesis.

HOKKAIDO: Hidaka Subpref., Samani-gun, Samani-cho, Shiomi-dai, Mt. Kan'non-yama.
[42°07'53.4"N 142°54'52.8"E] Alt. 79 m
北海道日高振興局様似郡様似町潮見台, 観音山.

Date: 10 July 2011
Coll.: Yuichi KADOTA 門田 裕一

No. 1117042

Typus

TNS DataBased

1142808, 1142815–1142817). Niikappu-gun, Niikappu-cho, Hangankan forest park, alt. 73 m, 10 July 2011, Y. Kadota 1117097–1117099 (TNS 1142818–1142822). Hidaka-gun, Shin-Hidaka-cho, Shizunai Toyohata, Mt. Perari-yama, 29 June 2005, S. Umezawa 05062916–05062919 (TNS 753584–753587, 753642, 768264); Mt. Perari-yama, alt. 24 m, 9 July 2011, Y. Kadota 1117071–1117073 (TNS 1142846–1142854); Shin-Hidaka-cho, Shizunai Toyohata, 28 June 2009, H. Igarashi s.n. (TNS 739711–739712); Shin-Hidaka-cho, Mitsuishi Hongiri, alt. 30–50 m, 29 June 2005, S. Umezawa 05-01–05-05 (TNS 749686–749696); Shin-Hidaka-cho, Mitsuishi Toyooka, 29 June 2005, S. Umezawa 050629911–050629912 (TNS 753569–753570, 768322–768323); Shin-Hidaka-cho, Shizunai Misono, 6 July 1995, H. Takahashi 18200 (SAPS); Shin-Hidaka-cho, Shizunai Misono, 29 June 2005, S. Umezawa 05062921 (TNS 768321); Shin-Hidaka-cho, Mitsuishi Nishihata, 28 June 2009, H. Igarashi s.n. (TNS 739711); Shin-Hidaka-cho, Mitsuishi, Mt. Hôrai-san, 28 June 2009, H. Igarashi s.n. (TNS 739713–739715); Shin-Hidaka-cho, Mitsuishi Kerimai, 9 July 2010, H. Igarashi s.n. (TNS 1108764). Urakawa-gun, Urakawa-cho, 24 June 1987, J. Haginiwa JH 10972–10973, 30516 (TNS 960972–960973, 980516); Urakawa-cho, Ogibushi, 9 July 2010, H. Igarashi s.n. (TNS 1108765); Urakawa-cho, Ogibushi, alt. 30 m, 9 July 2011, Y. Kadota 1117074–1117076 (TNS 1142823–1142832). Samani-gun, Samani-cho, 9 July 1973, J. Haginiwa JH 010984 (TNS 960984); Samani-cho, Shintomi, 29 June 2005, S. Umezawa 05062901 (TNS 753574–753576); Samani-cho, Shintomi, 9 July 2010, H. Igarashi s.n. (TNS 1108760); Samani-cho, Nishi-Samani, alt. 36 m, 9 July 2011, Y. Kadota 1117091–1117095 [hermaphrodite], 1117096 [female] (TNS 1142855–1142870); Samani-cho, Shiomidai, 9 July 2010, H. Igarashi s.n. (TNS 1108761–1108762); Samani-cho, Shiomidai, Mt. Kan'on-

yama, alt. 79 m, 10 July 2011, Y. Kadota 1117041, 1117043–1117052 [hermaphrodite], 1117053–1117054 [female] (TNS 1142946–1142966, 1142978–1142984). Horoidzumi-gun, Erimo-cho, Erimo-misaki cape, 8 Aug. 1985, Y. Kadota & K. Midorikawa 12972 (TNS 9026605); Erimo-cho, Erimo-misaki cape, 29 Aug. 1985, J. Haginiwa JH 4526–4527, 10954 (TNS 954526–954527, 960954); Erimo-cho, Erimo-misaki cape, alt. ca. 50 m, 11 Aug. 2005, Y. Kadota s.n. (TNS 751495, 751790–751793, 751797). **Tokachi Subpref.**, Hiroo-gun, Hiroo-cho, Funbe-no-taki fall, 25 June 1987, J. Haginiwa JH 10964 (TNS 960964).

Note: *Cirsium austrohidakaense* has been long confused with *C. kamschaticum* in the Hidaka and Yubari Mountains, central Hokkaido. *Cirsium austrohidakaense* differs clearly from *C. kamschaticum* especially in the long-flexuous middle and outer involucrel phyllaries and whitish, linear glandular bodies on all the phyllaries in the former species.

In Hidaka and Yubari Mountains the habitats of *C. austrohidakaense* and *C. kamschaticum* were vertically segregated, i.e., the former in the basal to montane zones and the latter in the alpine zone. *Cirsium austrohidakaense* was occasionally found in the alpine zone of the northernmost part of Hidaka Mountains. However, sympatric occurrence of the two species was not observed in Hidaka and Yubari Mountains.

Acknowledgments

I am deeply indebted to Messrs. S. Umezawa and H. Igarashi for their gifts of *Cirsium* specimens; Dr. K. Horie for his guidance to the locality and assistance for the field study of *C. chikabumiense* and *C. kenji-horieanum*; Mr. S. Miya for his assistance to the field study of *C. charkevicii* in Nemuro Peninsula. I wish to give my sincere thanks to Prof. Dr. T. Nishikawa for counting the chromosome numbers of *Cirsium*

Fig. 12. *Cirsium austrohidakaense* Kadota. A. Habit. B. Hermaphrodite capitulum. C. Female capitulum. JAPAN. Hokkaido. Hidaka Subpref., Samani-gun, Samani-cho, Shiomidai, Mt. Kan'on-yama, 10 July 2011.



astrohidakaense described in this paper. Thanks also go to the Curators of the Herbaria (KYO, SAPS and TI) and to an anonymous reviewer for checking the text.

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