

Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XXII. Four New Species from Honshu, Central Japan

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Abstract Four new species (*Cirsium funagataense*, *C. hasunumae*, *C. kasaianum* and *C. nasuense*) of subsect. *Reflexae* (the *Cirsium kagamontanum* group) are described from Honshu, Japan, within sect. *Onotrophe* of the genus *Cirsium*. *Cirsium funagataense* Kadota described from the northern part of Miyagi Pref. is characterized by having pinkish white flowers, soft, shallowly pinnatilobate or coarsely serrate cauline leaves and striate, light purplish gray achenes. *Cirsium hasunumae* Kadota described Fukushima Pref. is characterized by 11–12-seriate, adpressed or ascending involucrel phyllaries, obovate glandular bodies and thinner cauline leaves. *Cirsium kasaianum* Kadota described from the southern part of Miyagi Pref. is distinguished from *C. yuzawae* Kadota by soft, subentire to serrate cauline leaves with short, weak spines and shorter florets. *Cirsium nasuense* Kadota described from Tochigi Pref. is characterized by gynodioecy, 8–9-seriate, long, patent to recurved involucrel phyllaries, the absence of glandular bodies and smaller achenes.

Kew words: *Cirsium funagataense*, *Cirsium hasunumae*, *Cirsium kasaianum*, *Cirsium nasuense*, Japan, new species.

This is part of a revisional work on Japanese *Cirsium* (Asteraceae) (Kadota, 1989–2009; Kadota and Nagase, 1988). In this paper four new species of subsect. *Reflexae* (Kitam.) Kadota of sect. *Onotrophe* (Cass.) DC. (the *Cirsium kagamontanum* group) will be described.

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).

Subsect. **Reflexae** (Kitam.) Kadota, Fl. Jap. **IIIa**: 148 (1995).

Ser. *Reflexae* Kitam. in Acta Phytotax. Geobot. 3: 5 (1934), p. p.

Ser. *Imbricatae* Kitam. in Acta Phytotax. Geobot. 3: 5 (1934), p. p.

1. *Cirsium funagataense* Kadota, sp. nov.

[Figs. 1, 2]

Differt ab *Cirsio yuzawae*, phyllariis involucrelorum 8–9-seriatis, flores subroseoalbis, foliis caulinis inferiis et mediis mollibus non profunde pinnatilobatis vel grosse serratis, acheniis striatis laete purpureocineraceis.

TYPE: JAPAN. HONSHU: Miyagi Pref., Kurokawa-gun, Taiwa-cho, Yoshida, Mt. Kitaidzumi-ga-take, under *Fagus crenata* woods [38°25'43.6"N 140°42'20.6"E], alt. 804 m, 13 September 2009, Y. Kadota 093551 (TNS 741026–holotype; Fig. 1).

A hermaphrodite, perennial, herbaceous plant, 0.7–2.5 m tall or taller. Rootstock stout, horizontal, up to 6 cm in diameter, with cord-like roots. Stem declining to suberect, simple to well branched from the lower part when aged, leafy, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part. Basal



Fig. 1. Type of *Cirsium funagataense* Kadota (JAPAN: HONSHU. Miyagi Pref., Kurokawa-gun, Taiwa-cho, Yoshida, Mt. Kita-Idzumiga-take, alt. 804 m, 13 Sept. 2009, Y. Kadota 093551 (TNS 741026, holotype).



Fig. 2. Habit of *Cirsium funagataense* Kadota (JAPAN: HONSHU. Miyagi Pref., Kurokawa-gun, Taiwa-cho, Yoshida, Mt. Kita-Idzumiga-take, alt. 804 m, 13 Sept. 2009). Right corner inset shows nodding capitulum.

leaves withering at anthesis. Middle cauline leaves slightly yellowish green on the adaxial side, glaucous on the abaxial side, herbaceous, smooth and soft, not amplexicaul to semi-amplexicaul, not auriculate, shortly petioled; blades ovate to broadly ovate to elliptic, or obovate in outline, 24–42 cm long, 9–25 cm broad, almost glabrous on both sides, medially to shallowly pinnatilobate or coarsely serrate, 4–8-jugate; lobes triangular-ovate to narrowly ovate, 2.5–10 cm long, 1.5–3.5 cm broad, spreading, with spines 2–6 mm long; petioles, if present, 2–4 cm long. Middle and upper cauline leaves shallowly pinnatilobate to coarsely serrate, subsessile or short-petioled. Flowers in September. Capitula 1–2 in a loose raceme, nodding, with peduncles 2–8.5 cm long; subtending leaves ca. 5, lanceolate, 5–10 mm long, with weak spines ca. 0.5 mm long. Involucres cylindrical, 17–18 mm long, 8–10 mm (*in vivo*) and 2–3 cm (*in sicco*) in diameter, not arachnoid. Phyllaries 8–9-seriate, long patent to recurved; glandular bodies absent, eglutinous; innermost phyllaries narrowly obovate-lanceolate, 17–18 mm long; outer phyllaries ovate, 6–10 mm long, clearly shorter than the inner ones, herbaceous, caudate at apex, terminated with sharp spines 2–5 mm long. Corollae pinkish white, 16–17 mm long; lobes 4 mm long; throats 6 mm long; tubes 6–7 mm long, slightly longer than or as long as the throats. Achenes pale purplish gray, 4 mm long, ribbed, striate; pappus pale reddish brown, 12–14 mm long.

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

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

Distribution: Honshu (from Mt. Funagata-yama to Mt. Idzumi-ga-take, Miyagi Pref.; Fig. 9, square). Endemic to Japan.

Additional specimens examined: JAPAN. HONSHU: Miyagi Pref., Kami-gun, Kami-machi, Mt. Funagata-yama, along a forestry road, under *Fagus crenata* woods [38°30'02.0"N 140°41'26.8"E], alt. 468 m, 13 Sept. 2009, Y. Kadota 093562–093576 (TNS 741043–741067). Kurokawa-gun, Taiwa-cho, Yoshida, Mt. Kitaidzumi-ga-take, under *Fagus crenata* woods

[38°25'43.6"N 140°42'20.6"E], alt. 804 m, 13 Sept. 2009, Y. Kadota 093552–093560 (TNS 741001–741020). Sendai-shi, Idzumi-ku, Fukuoka, Mt. Idzumi-ga-take, under *Quercus crispula* and *Enkianthus campanulatus* woods [38°24'25.2"N 140°42'44.0"E], alt. 933 m, 13 Sept. 2009, Y. Kadota 093515–093516 (TNS 741036–741042).

Cirsium funagataense Kadota is discriminated from *C. yuzawae* by having pinkish white flowers, soft, shallowly pinnatilobate or coarsely serrate cauline leaves and striate, light purplish gray achenes.

Cirsium funagataense grows in and along the *Fagus crenata* woods and sometimes along the *Quercus crispula* — *Enkianthus campanulatus* woods.

2. *Cirsium hasunumae* Kadota, sp. nov.

[Figs. 3, 4]

Differt ab *Cirsio hanamakiense*, phyllariis involucrorum 11–12-seriatis adpressis vel leviter ascendentibus, vitiis obovatis, foliis caulinis tenuibus.

TYPE: JAPAN. HONSHU: Fukushima Pref., Iwase-gun, Ten'ei-mura, Yumoto, along the upstream of River Futamata-gawa [37°14'06"N 139°58'38"E], alt. 910 m, 8 September 2010, Y. Kadota 104105 (TNS 1112588–holotype; Fig. 3).

A hermaphrodite, perennial, herbaceous plant, 1–2.5 m tall or taller. Rootstock stout, horizontal, up to 5 cm in diameter, with cord-like roots. Stem declining, well branched in the upper part, leafy, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part. Basal leaves withering at anthesis. Lower cauline leaves deep green on the adaxial side, glaucous on the abaxial side, membranous, smooth and not scabrous, semi-amplexicaul, not auriculate, shortly petioled or subsessile; blades ovate to broadly ovate in outline, 27–45 cm, 15–25 cm broad, almost glabrous on both sides, deeply to medially pinnatilobate, 4–8-jugate; lobes narrowly ovate, 3–12 cm long, 1.5–3 cm broad, spreading, with spines 2–5 mm long; petioles, if present, 1–2 cm long. Middle and upper cauline

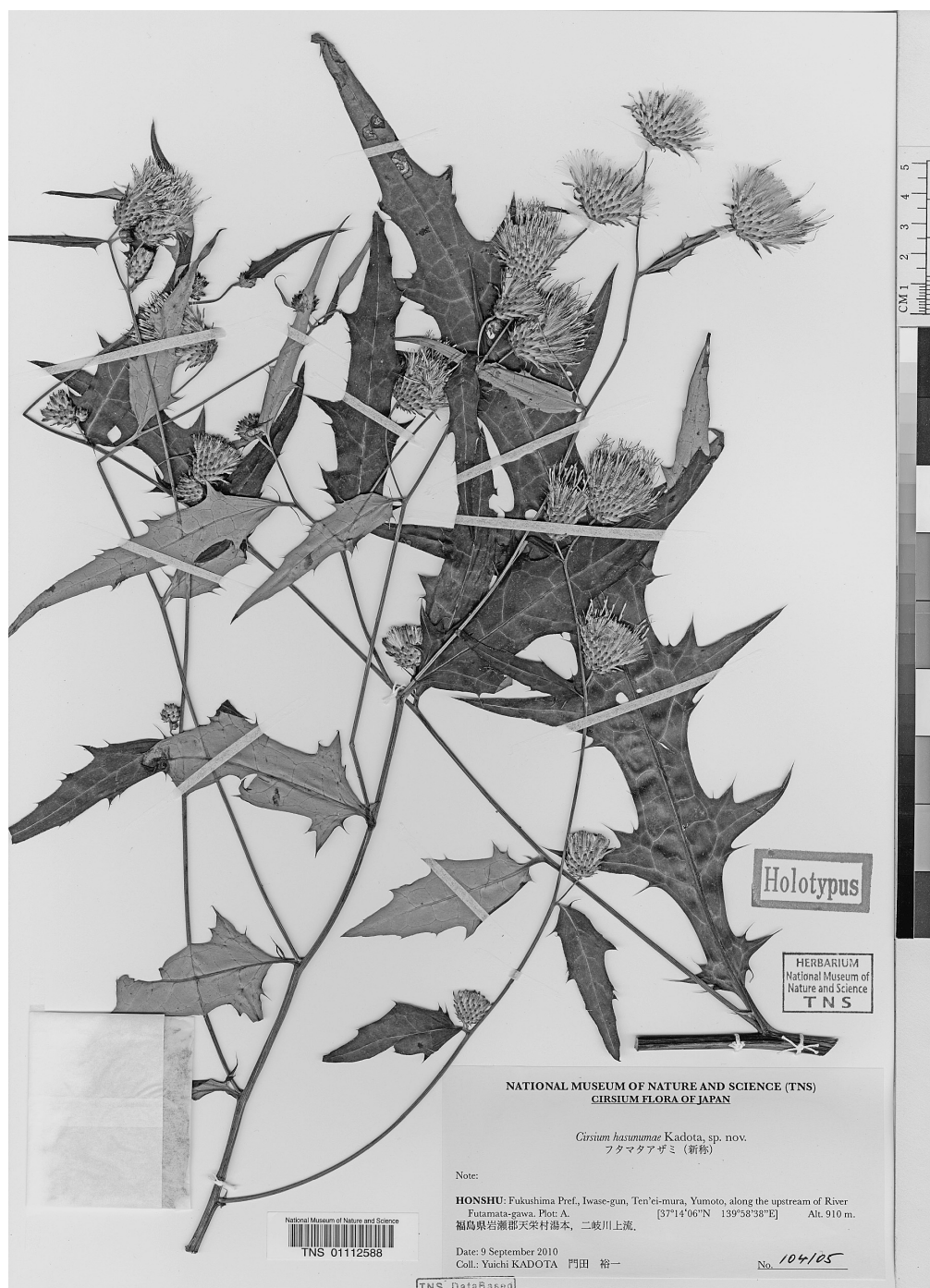


Fig. 3. Type of *Cirsium hasunumae* Kadota (JAPAN: HONSHU. Fukushima Pref., Iwase-gun, Ten'ei-mura, Yumoto, along the upstream of River Futamata-gawa [37°14'06"N 139°58'38"E], alt. 910 m, 9 Sept. 2010, Y. Kadota 104105 (TNS 1112588, holotype).



Fig. 4. Habit of *Cirsium hasunumae* Kadota (JAPAN: HONSHU, Fukushima Pref., Iwase-gun, Ten'ei-mura, along upstream of the River Futamata-gawa, alt. 910 m, 9 Sept. 2010). Right corner inset shows nodding capitulum.

leaves shallowly pinnatilobate, sessile or short-petioled. Flowers in August to October. Capitula 3–4 in a loose raceme, nodding, with slender peduncles 2–7 cm long; subtending leaves 3–5, lanceolate, 2–5 mm long, with weak spines ca. 0.5 mm long. Involucres narrowly cylindrical, 17–18 mm long, 6–8 mm (*in vivo*) and 2–2.5 cm (*in sicco*) in diameter, not arachnoid. Phyllaries 11–12-seriate, adpressed to ascending at an acute angle; glandular bodies obovate on inner and middle phyllaries, strongly glutinous, or sometimes degenerated and vestigial, or rarely absent, eglutinous; innermost phyllaries narrowly obovato-lanceolate, 18 mm long; middle phyllaries undulate and arachnoid with brownish hairs along the margin; outer phyllaries ovate, ca. 3 mm long, clearly shorter than the inner ones, herbaceous, terminated with weak spines 0.2–1.0 mm long. Corollae pale pink, 16–17 mm long; lobes 3–4 mm long; throats 6 mm long; tubes 6–7 mm long, slightly longer than the throats. Achenes light brownish gray, 3.5–4 mm long, obscurely ribbed; pappus sordid, 11–15 mm long.

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

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

Distribution: Honshu (Fukushima Pref.; Fig. 9, disc). Endemic to Japan.

Etymology: The specific epithet “*hasunumae*” is dedicated to Mr. Kenji Hasunuma, Aidzu-Wakamatsu, Fukushima Pref., who devoted himself to survey this new thistle in Fukushima Pref. and its adjacent areas, northern Honshu.

Additional specimens examined: JAPAN. HONSHU: Fukushima Pref., Fukushima-shi, Machiniwasaka, Takayu-onsen Hot Spa, alt. 750 m, 18 Sept. 2010, K. Hasunuma 30538 (TNS 1112010–1112011); Fukushima-shi, Mt. Issaikyô-yama, alt. 1200 m, 18 Sept. 2010, K. Hasunuma 30530 (TNS 1112006–1112009); Fukushima-shi, Mt. Minowa-yama, alt. 1160 m, 9 Sept. 2000, K. Hasunuma 21724 (TNS). Yamagun, Inawashiro-machi, the Adzuma Range, Yachidaira, alt. 1500 m, 4 Sept. 2004, K. Hasunuma 27501 (TNS); Inawashiro-machi, Mt. Kawageta-yama, alt. 900 m, 2 Sept. 2000, K.

Hasunuma 21732 (TNS). Adachi-gun, Ôtamamura, Mt. Mae-ga-take, alt. 900 m, 18 Sept. 2010, K. Hasunuma 21726 (TNS). Sukagawa-shi, Mt. Kasagamori-yama, alt. 660 m, 14 Oct. 1998, K. Hasunuma 20113 (TNS). Iwase-gun, Ten'eimura, Hôsaka-tôge Pass, alt. 760 m, 14 Oct. 1998, K. Hasunuma 20111 (TNS); Ten'eimura, Mt. Karasawa-yama, alt. 700 m, 3 Sept. 2003, K. Hasunuma 29417 (TNS); Ten'eimura, Futamata-gawa, alt. 885 m, 30 Aug. 1999, Y. Kadota 996008–996013 (TNS 692168–692186); Ten'eimura, Futamata-gawa forest road, alt. 890 m, 1 Oct. 2004, Y. Kadota 044163–044177 (TNS 744393–744397, 744441–744447, 744481–744491); Ten'eimura, Yumoto, along the upstream of River Futamata-gawa [37°14'06"N 139°58'38"E], alt. 910 m, 9 Sept. 2010, Y. Kadota 104101–104104, 104106–104107 (TNS 1112581–1112586, 1112589–1112594); Ten'eimura, Yumoto, along the upstream of River Futamata-gawa [37°13'57"N 139°58'14"E], alt. 950 m, 9 Sept. 2010, Y. Kadota 104108–104111 (TNS 1112595–1112602). Kawanuma-gun, Yanaidzu-machi, Mt. Hakase-yama, alt. 1100 m, 15 Oct. 2006, K. Hasunuma 29477 (TNS). Minami-Aidzu-gun, Shimogô-machi, Takashima, Shiroiri-sawa, alt. 550 m, 14 Oct. 1998, K. Hasunuma 20112 (TNS); Shimogô-machi, Mt. Kan'non-yama, alt. 1100 m, 28 Aug. 2008, K. Hasunuma 29816 (TNS); Shimogô-machi, Ôtôge Pass, alt. 1350 m, 19 Sept. 1999, K. Hasunuma 21407 (TNS); Shimogô-machi, Mt. Sudachi-yama, alt. 1500 m, 19 Sept. 1999, K. Hasunuma 21405 (TNS); Minami-Aidzu-machi, Mt. Ojika-yama, alt. 900 m, 26 Sept. 2009, K. Hasunuma 31186 (TNS); Minami-Aidzu-machi, San'nô-tôge Pass, alt. 820 m, 10 Oct. 1998, K. Hasunuma 20114 (TNS); Minami-Aidzu-machi, Mt. Arakai-san, alt. 800 m, 15 Sept. 1999, K. Hasunuma 21415 (TNS); Minami-Aidzu-machi, Mt. Arakai-san, alt. 860 m, 7 Oct. 1999, Y. Kadota 997095–997105 (TNS 689757–689809); Minami-Aidzu-machi, Nakayama Tunnel, alt. 1000 m, 22 Aug. 1999, K. Hasunuma 21408 (TNS); Minami-Aidzu-machi, Yasô, Mt. Maruyama, alt. 1000 m, 22 Aug. 1999, K. Ha-

sunuma 21409 (TNS).

Cirsium hasunumae is different from *C. hanamakiense* Kitam. by the direction and the number of involucrel phyllaries (11–12-seriate, adpressed or ascending vs. 8–9, recurved), the shape of glandular bodies (obovate vs. oblong) and the texture of cauline leaves (thinner and smooth vs. thicker and scabrid).

Cirsium hasunumae occurs along the margin and in woods dominated by *Fagus crenata*.

In *C. hasunumae* glandular bodies usually well developed on the midribs of the middle and inner phyllaries and involucre were strongly adhesive. However, the glandular bodies sometimes so degenerated and were vestigial that the involucre were not adhesive. Such a kind of variation in the development of glandular bodies were also observed in the western populations of *C. hanamakiense* (Kadota, unpublished) and in the lowland populations of *C. kagamontanum* Nakai (Kadota, 2004c).

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

[Figs. 5, 6]

Differt ab *Cirsio yuzawae*, foliis caulinis inferiis et mediis mollibus ellipticis vel obovato-ellipticis, breviter petiolatis alatis, flosculis brevioribus.

TYPE: JAPAN. HONSHU: Miyagi Pref., Natori-shi, Takadate Kawakami, [38°10'N 140°49'E], alt. ca. 80 m, 29 September 2009, H. Kasai 2196-1 (TNS 742341–holotype; Fig. 5).

A hermaphrodite, perennial, herbaceous plant, 0.7–1.5 m tall. Rootstock stout, horizontal, up to 2 cm in diameter, with cord-like roots. Stem suberect, 3–5 times branched in the upper part, leafy, sparingly arachnoid and covered with short brownish hairs chiefly in the upper part. Basal leaves withering at anthesis. Lower cauline leaves deep green on the adaxial side, glaucous on the abaxial side, membranous but soft, amplexicaul, auriculate, shortly petioled; blades narrowly elliptic to obovato-elliptic in outline, 10–33 cm long, 4–14 cm broad, almost glabrous on both sides, subentire to serrate or sometimes shallowly pinnatilobate, if pinnatilobate, 4–6-jugate; lobes

narrowly ovate, 2–5 cm long, 1–2 cm broad, spreading, with weak spines 1–3 mm long; petioles 1–9 cm long. Middle and upper cauline leaves serrate, subsessile or short-petioled. Flowers in September to October. Capitula 2–3 in a raceme or sometimes solitary, nodding, with peduncles (0–)0.5–5 cm long; subtending leaves 3–5, narrowly ovato-lanceolate to linear, 2–5 mm long, with weak spines ca. 0.5 mm long. Involucre narrowly cylindrical, 17–18 mm long, 6–8 mm (*in vivo*) and 1.5–2.5 cm (*in sicco*) in diameter, sparingly arachnoid. Phyllaries 10–11-seriate, ascending to subpatent; glandular bodies narrowly obovato-lanceolate to linear on inner and middle phyllaries, vestigial, or absent, eglutinous; innermost phyllaries narrowly obovato-lanceolate, ca. 15 mm long; outer phyllaries narrowly ovate to ovate with acuminate tips, 3–5 mm long, clearly shorter than the inner ones, herbaceous, terminated with weak spines ca. 0.5 mm long. Corollae pale pink, 15–16 mm long; lobes 4 mm long; throats 5–6 mm long; tubes 7 mm long, slightly longer than the throats. Achenes ivory-white, 3.5–4 mm long, obscurely ribbed; pappus sordid, 10–14 mm long.

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

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

Distribution: Honshu (Natori-shi and Marumori-machi, Miyagi Pref.; Fig. 9, triangle). Endemic to Japan.

Etymology: The specific epithet “*kasaianum*” is dedicated to Mr. Hideaki Kasai, Sendai, Miyagi Pref., who discovered this new thistle in Natori-shi, Miyagi Pref., northern Honshu.

Additional specimens examined: JAPAN. HONSHU: Miyagi Pref., Natori-shi, Takadate Kawakami, west of Mt. Ôdate-yama [38°10'82.4"N 140°49'65.3"E], alt. ca. 80 m, 19 Sept. 2010, Y. Kadota 105101–105110 (TNS 1112465–1112484). Igu-gun, Marumori-machi, Hippo, alt. ca. 400 m, 26 Sept. 2007, T. Mori 11734–11735 (TNS 76816–769819); Hippo, Ko-Hippo, Meoto-iwa [37°50'N 140°42'E], alt. 480 m, 19 Sept. 2010, Y. Kadota (TNS); Hippo, Ko-Hippo, at the entrance of Meoto-iwa

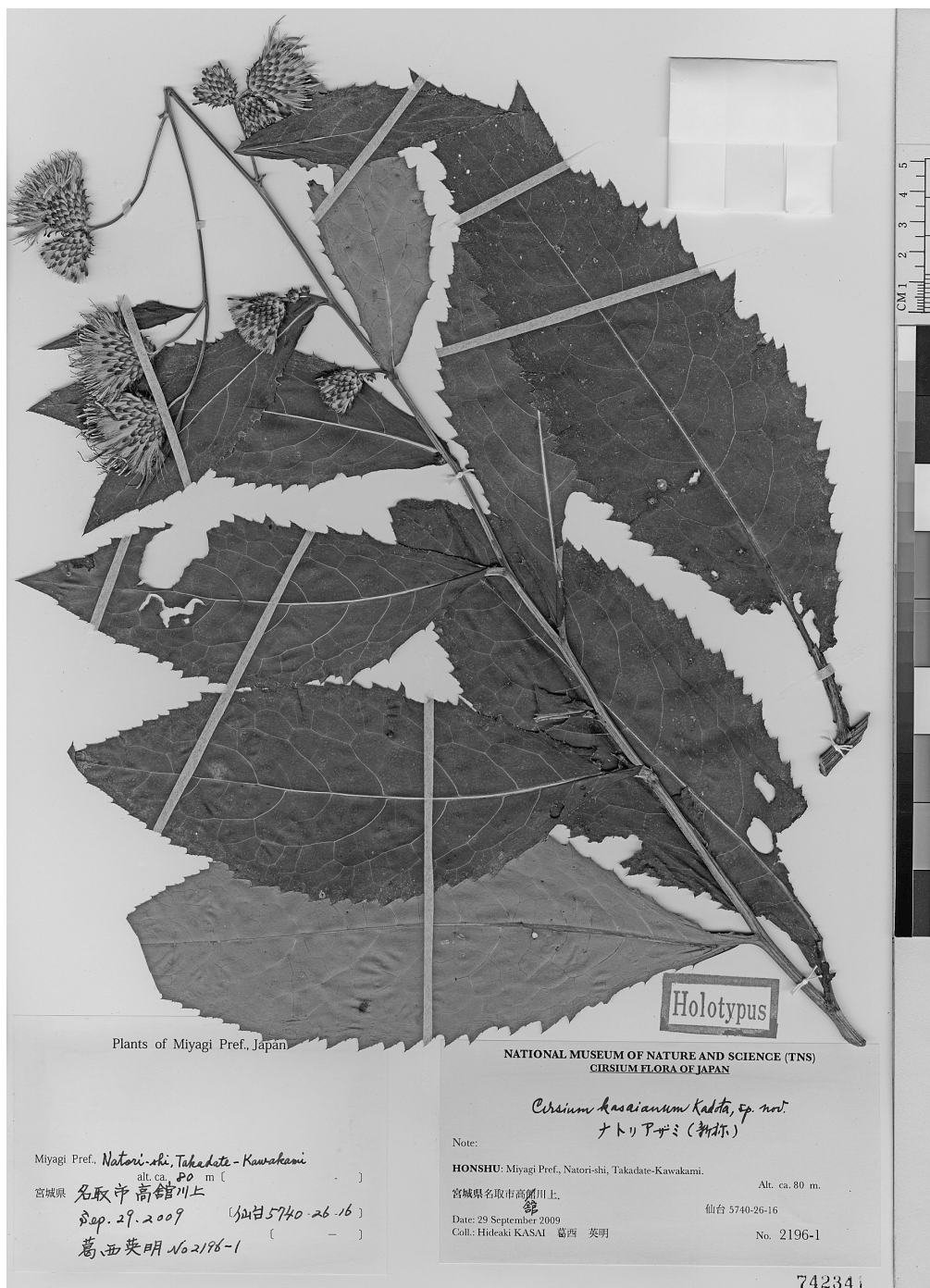


Fig. 5. Type of *Cirsium kasaianum* Kadota (JAPAN: HONSHU. Miyagi Pref., Natori-shi, Takadate Kawakami, alt. ca. 80 m, 19 Sept. 2009, H. Kasai 2196-1 (TNS 742341, holotype).

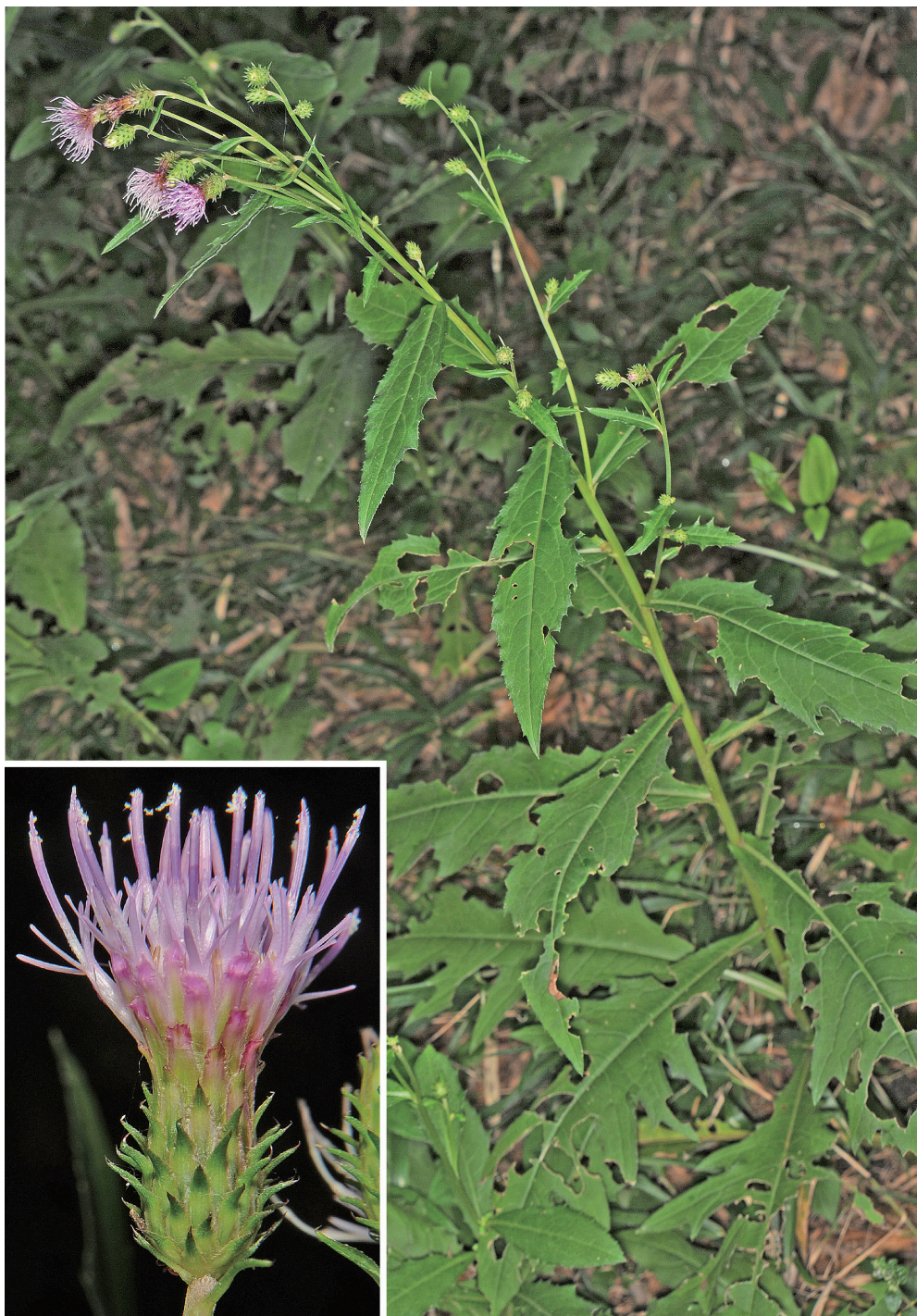


Fig. 6. Habit of *Cirsium kasaianum* Kadota (JAPAN: HONSHU. Miyagi Pref., Natori-shi, Takadate Kawakami, west of Mt. Ôdate-yama, alt. ca. 80 m, 19 Sept. 2010). Left corner inset shows nodding capitulum.

[37°50'N 140°42'E], alt. ca. 500 m, 6 Oct. 2010, T. Mori 1–4 (TNS).

Cirsium kasaianum is distinguished from *C. yuzawae* by soft, subentire to serrate cauline leaves with short, weak spines and shorter florets.

Cirsium kasaianum exceptionally occurs in the sites of lower elevation among the species of subsect. *Reflexae* (Kitam.) Kadota. At the type locality this thistle grew along the margin of *Cryptomeria japonica* plantation in association with *Zelkova serrata*, *Juglans mandshurica* var. *sieboldiana*, *Alangium platanifolium* var. *trilobatum*, *Rubus palmatus* var. *palmatus*, *Actinidia polygama*, *Desmodium oldhamii*, *Arachniodes standishii*, *Polystichum ovatopaleaceum* var. *coraiense*, *P. tripterum* etc.

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

[Figs. 7, 8]

Differt ab *Cirsio yuzawae*, habitu gynodioecio, phyllariis involucrorum 8–9-seriatis longe patentibus vel recurvatis, acheniis brevioribus.

TYPE: JAPAN. HONSHU: Tochigi Pref., Nasu-gun, Nasu-machi, Ôshima, the Nasu Mountains, near the Yosasa-bashi bridge [37°07'23.6"N 140°00'49.6"E], alt. 915 m, 24 September 2009, Y. Kadota 095111 (TNS 1101096–holotype, Fig. 7; hermaphrodite plant). Tochigi Pref., Nasu-Shiobara-shi, Yumoto Shiobara, near the Motoyu-onsen Hot Spa, alt. ca. 850 m, 24 September 2009, Y. Kadota 095131 (TNS 1101108–1101110–paratype; female plant).

A gynodioecious, perennial, herbaceous plant, 1–2.5 m tall or taller. Root stock stout, horizontal, up to 5 cm in diameter, with cord-like roots. Stem sulcate, declining to suberect, sparingly arachnoid, much branched from the middle part; branches not elongated. Basal leaves withering at anthesis. Middle cauline leaves deep green on the adaxial side, glaucous on the abaxial side, herbaceous, ovate to broadly ovate, or narrowly ovate to lanceolate in outline, 25–41 cm long, 12–21 cm wide, deeply to shallowly pinnatilobate to coarsely dentate; lobes, if pinnatilobate, 4–7-jugate, triangular-ovate, 5–11 cm long, 1.5–3 cm

wide, entire to pinnatilobate, provided with sharp spines 2–8 mm long, glabrous on the adaxial side, sparingly arachnoid on the abaxial side, petiolate, not amplexicaul, not decurrent; petioles 2–7 cm long. Flowers in September to October. Capitula nodding, 2–3 in a loose raceme or sometimes solitary; peduncles 1–6 cm long, arachnoid; subtending leaves ca. 5, linear to narrowly ovato-lanceolate, 3–10 mm long, provided with weak spines ca. 1 mm long. Involucres narrowly cylindrical to cylindrical, eglutinous, 15 mm long, 8–9 mm (*in vivo*) and 2–3 cm (*in sicco*) in diameter, sparingly arachnoid. Phyllaries 8–9-seriate, herbaceous, terminated with weak spines ca. 0.5 mm long; glandular bodies absent; innermost phyllaries narrowly obovato-lanceolate, ca. 15 mm long; outer phyllaries narrowly ovate with patent to recurved caudate tips, 5–6 mm long. Corollae pale violet, 17–18 mm long; lobes 4 mm long; throats 4–5 mm long; tubes 8–9 mm long, clearly longer than the throats in hermaphrodite plants (Fig. 8B), deep pink, 14–15 mm long; lobes 4 mm long; throats 5–6 mm long; tubes 5–6 mm long, slightly longer than or as long as the throats in female plants (Fig. 8C). Achenes brownish gray tinged with yellow, ca. 3 mm long, ribbed; pappus sordid, 13–15 mm long.

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

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

Distribution: C. Honshu (Tochigi Pref.; Fig. 9, star). Endemic to Japan.

Additional specimens examined: JAPAN. HONSHU; Tochigi Pref., Nasu-gun, Nasu-machi, the Nasu Mountains, the Yosasa-bashi bridge, alt. 830 m, 4 Oct. 1999, Y. Kadota 997004–997011, 997069–997082 (TNS 690177–690238); Nasu-machi, Ôshima, near the Yosasa-bashi bridge [37°07'23.6"N 140°00'49.6"E], alt. 915 m, 24 Sept. 2009, Y. Kadota 095112–095122 (TNS 1101081–1101093). Shiobara-machi [currently Nasu-Shiobara-shi], Motoyu, along the River Akagawa, alt. 780 m, 6 Oct. 1999, Y. Kadota 997058–997068 (TNS 689810–689825); Shiobara-machi [currently Nasu-Shiobara-shi], along the River Tanahata-gawa, alt.

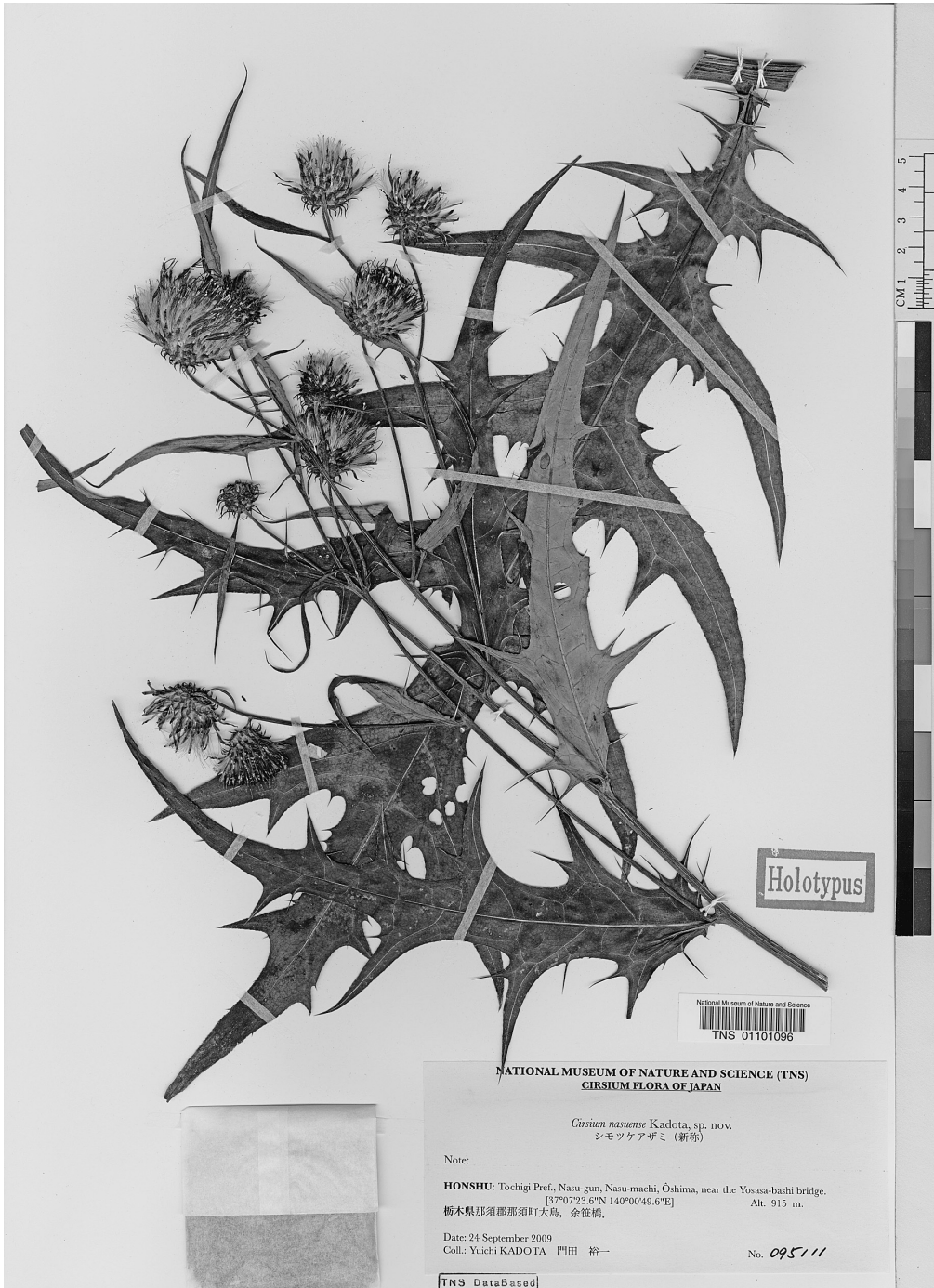


Fig. 7. Type of *Cirsium nasuense* Kadota (JAPAN: HONSHU. Tochigi Pref., Nasu-gun, Nasu-machi, Ôshima, just below the Yosasa-bashi bridge, alt. 915 m, 24 Sept. 2009, Y. Kadota 095111 (TNS 1101096).



Fig. 8. *Cirsium nasuense* Kadota. A. Habit. B. Hermaphrodite capitulum. C. Female capitulum. A–B. Nasu-machi, Tochigi Pref., Japan, 24 Sept. 2009. C. Shiobara, Nasu-Shiobara-shi, Tochigi Pref., Japan, 24 Sept. 2009.

TOHOKU DISTRICT

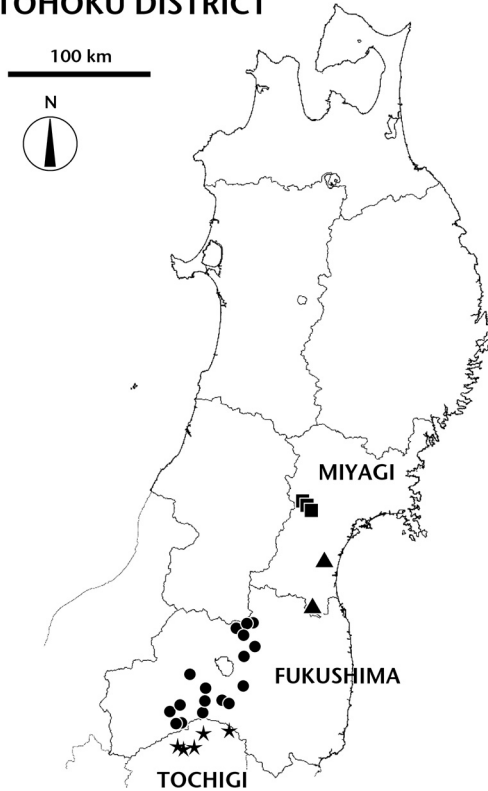


Fig. 9. Distribution of *Cirsium funagataense* (square), *C. hasunumae* (disc), *C. kasaianum* (triangle) and *C. nasuense* (star).

860 m, 6 Oct. 1999, Y. Kadota 997036–997055 (TNS 689862–689870, 690018–690028, 690113–690114); Nasu-Shiobara-shi, Yumoto Shiobara, near the Motoyu-onsen Hot Spa, alt. ca. 850 m, 24 September 2009, Y. Kadota 095131 (TNS 1101108–1101110); Nasu-Shiobara-shi, Yumoto Shiobara, near the Motoyu-onsen Hot Spa, alt. ca. 850 m, 24 September 2009, Y. Kadota 095132–095139 (TNS 1101097–1101113); Nasu-Shiobara-shi, Utsuno, Happô-ko Lake – Takesan-Hôkine-jinja Shrine, alt. 1000 m, 29 Sept. 2010, Y. Sugino 1 (TNS 1112015). Kuroiso-shi [currently Nasu-Shiobara-shi], Miyama, the Nasu Mountains, along the upstream of the River Naka-gawa, alt. 570 m, 5 Oct. 1999, Y. Kadota 997024–997035 (TNS 690239–690251).

Cirsium nasuense is distinguished from *C.*

yuzawae by having gynodioecy, 8–9-seriate, long patent to recurved involucrel phyllaries and small achenes.

Cirsium nasuense is distributed in the south of Tohigi–Fukushima Prefectural border. While *C. hasunumae* occurs in the north of the border. In this way the two species are clearly geographically segregated. However, there are several populations of *Cirsium* in Oze and Marunuma located in the northeastern part of Gunma Prefecture. The populations are morphologically similar to *C. hasunumae* and the area is close to the southern end of the distribution range of *C. hasunumae*. Further studies are necessary for the appropriate treatment of the populations in question.

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