

Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XXV. Identity of *Cirsium nipponicum* (Maxim.) Makino and Two New Species from Tohoku District, Northern Japan

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Abstract *Cirsium nipponicum* (Maxim.) Makino [basionym: *Cnicus nipponicus* Maxim.] has erect capitula. However, this character has been misunderstood in the Japanese Flora, i.e., the thistles with nodding capitula distributed in northern and central Honshu, Japan have been erroneously ascribed to *C. nipponicum*. Therefore *Cirsium nipponicum* is re-described here. The thistle with nodding capitula is here named *C. makinoi* Kadota after Dr. Tomitaro Makino who recorded this species for the first time. In association with this change of the species concept, a new subsection, *Rubicola*, is described based on *C. makinoi* and subsect. *Nipponocirsium* Kitam. is amended. *Cirsium yuki-uenoanum* Kadota described from Marumori-machi, Miyagi Pref. is characterized by having gynodioecy, erect capitula, narrowly campanulate involucre, 10–11-seriate involucral phyllaries and herbaceous cauline leaves. *Cirsium hagurosanense* Kadota described from Tsuruoka-shi, Yamagata Pref. is characterized by its gynodioecy, erect capitula, 8–9-seriate involucral phyllaries and the chromosome number $2n=4x=68$.

Key words: *Cirsium hagurosanense*, *Cirsium makinoi*, *Cirsium muraii*, *Cirsium nipponicum*, *Cirsium sendaicum*, *Cirsium yuki-uenoanum*, Honshu, Japan, new name, new species.

Introduction

This is part of a revision of Japanese *Cirsium* (Asteraceae) (Kadota and Nagase, 1988; Kadota, 1989–2012; Kadota and Miura, 2013).

The thistle called ‘Nanbu-azami’ in Japanese is widely distributed in northern and central Honshu, Japan and is well known to botanical students. This thistle is characterized by nodding capitula, the absence of basal leaves at anthesis and 8–9-involucral phyllaries (e.g., Kitamura, 1937, 1957, 1981; Kadota, 1995a; see below) and has been assigned to ‘*Cirsium nipponicum* (Maxim.) Makino’ [basionym: *Cnicus nipponicus* Maxim.]. However, Maximowicz (1874) described *C. nipponicum* with

erect capitula. Head direction (erect vs. nodding) is considered one of the main diagnostic characters within *Cirsium* (Nakai, 1932; Kitamura, 1937, 1957, 1982; Kadota, 1995a). Therefore ‘Nanbu-azami’ is different from *Cirsium nipponicum*, and ‘Nanbu-azami’ should be described as a new species. This new species is described here as *Cirsium makinoi*, and the circumscription of *C. nipponicum* is amended. In connection with the change of the species concept a new subsection, subsect. *Rubicola* Kadota, is described and subsect. *Nipponocirsium* Kitam. is re-described. Two new species belonging to subsect. *Nipponocirsium* are described in this paper.

Subsect. **Rubicola** Kadota, **subject. nov.**

Hermaphrodite or sometimes gynodioecious perennial herbs. Rootstock conglomerate, horizontal to oblique. Basal leaves withered at anthesis. Cauline leaves several, arranged at regular intervals. Capitula nodding; involucre campanulate to cylindrical; glandular bodies present at least on inner involucral phyllaries; subtending leaves few, linear to lanceolate. Chromosome number $2n=4x=68$ (tetraploid).

TYPE: *Cirsium makinoi* Kadota (see below).

Subsect. *Nipponocirsium* Kitam. in Acta Phytotax. Geobot. **3**: 4 (1934), p.p. majore.

The species belonging to subsect. *Rubicola* are very common in Honshu and Shikoku, northern to western Japan and grow abundantly on hills and low mountains. Therefore there is a wide range of morphological variation in each species of this subsection and hence the species are notorious for their difficult taxonomy.

1. ***Cirsium makinoi* Kadota, nom. nov.**

TYPE: JAPAN. Honshu. 'Rikuchû, near Miyamori' [Shimohei-gun, Miyamori-mura, currently Tôno-shi, Miyamori-cho], Aug. 1905, T. Makino (TI-holotype).

Cirsium nipponicum (Maxim.) auct. non Maxim.: Makino in Bot. Mag. (Tokyo) **19**: 155 & (299) (1905), excl. specim. Nakahara-Matsum. & Koidz. in Bot. Mag. (Tokyo) **24**: 162 (1910); Matsum., Index Pl. Jap. 2(2): 641 (1912), p.p.–Nakai in Bot. Mag. (Tokyo) **26**: 367 (1912), p.p.–Kitam. in Acta Phytotax. Geobot. **3**: 4, 5 (1934); in Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B, **13** [Comp. Jap. **1**]: 107, pl. 4, fig. 1, pl. 6, fig. 2 (1937), p.p.; in Kitam. & al., Col. Illust. Herb. Jap I: 38, pl. 11-77 (1957); in Ohwi, Fl. Jap. ed. Engl.: 910 (1965); in Satake & al., Wild Fl. Jap. **III**: 219, pl. 199-1, 2 (1982)–H. Hara, Enum. Sperm. Jap. **2**: 180 (1952)–Ohwi, Fl. Jap.: 1217 (1953)–Kadota in K. Iwats. & al., Fl. Jap. **IIIb**: 141 (1995). The Nakahara specimen ('Rikuchû: Mt. Iwate', 1 Aug. 1903, G. Nakahara, TI!) cited by Makino as *C. nipponicum* should be ascribed to *C. amplexifolium* Kitam. Nakai (1929) annotated the same specimen as *C. sendaicum* Nakai var. *amplexifolium* Nakai (in sched., TI).

Cirsium sendaicum Nakai var. *amplexicaule* Nakai in Bot. Mag. (Tokyo) **46**: 628 (1932)–*Cirsium nipponicum* (Maxim.) Makino var. *amplexicaule* (Nakai) Kitam. in Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B, **13** [Comp. Jap. **1**]: 109 (1937), in Ohwi, Fl. Jap. ed. Engl.: 910 (1965)–H. Hara, Enum. Sperm. Jap. **2**: 180 (1952)–Ohwi, Fl. Jap.: 1217 (1953). Type: JAPAN. Honshu. 'Prov. Rikuchû, in montis Iwatesan, G. Nakahara s.n. (TI!)'. Japanese name: Dakiba-hime-azami (Nakai, 1932).

Cirsium nipponicum (Maxim.) Makino var. *lanuginosum* Nakai in Bot. Mag. (Tokyo) **46**: 621 (1932)–*Cirsium nipponicum* (Maxim.) Makino var. *nipponicum* f. *lanuginosum* (Nakai) Kitam. in Mem. Coll. Sci. Kyoto Imp. Univ. Ser. B, **13** [Comp. Jap. **1**]: 108 (1937)–H. Hara, Enum. Sperm. Jap. **II**: 180 (1952)–Ohwi, Fl. Jap.: 1217 (1953). Type: JAPAN. Honshu. 'Prov. Iwashiro, Aidzu, T. Nakai s.n. (TI!)'. Japanese name: Urage-hime-azami (Nakai, 1932).

Gynodioecious, perennial herb, 0.6–2 m tall. Rootstock stout, horizontal; rhizomes well-developed. Stem declining to suberect, stout, well branched in the upper part, leafy, more or less arachnoid and covered with short brown hairs in the upper part or glabrous. Basal leaves withered at anthesis. Lower cauline leaves deep green to yellowish green on the adaxial side, shortly petiolate or amplexicaul (var. *amplexicaule*); blades lanceolate or elliptic to ovate in outline, 15–50 cm long, 6–25 cm wide, sparingly covered with brown short hairs or almost glabrous on both sides, or sometimes sparingly arachnoid on the abaxial side (var. *lanuginosum*), serrate to shallowly to medially or deeply pinnatilobate; lobes, if pinnatilobate, 3–7-jugate, narrowly ovate, 2.5–13 cm long, 0.5–4 cm wide, with spines 1–5 mm long. Flowering August to October. Capitula nodding, several in a loose or compact corymb; peduncle (0.5–)3–10 cm long; subtending leaves 1–2, linear to narrowly lanceolate, 1–2 cm long, with weak spines ca. 1 mm long. Involucre campanulate to cylindrical, purple or green, 14–20 mm long, 10–18 mm (*in vivo*) or 15–30 mm (*in sicco*) in diameter, more or less arachnoid.

Phyllaries 8–9-seriate, herbaceous, recurved; glandular bodies linear to lanceolate, on the midrib of the middle and/or the inner phyllaries, slightly glutinous; outer phyllaries ovate with acuminate apices, ca. 10 mm long, shorter than the inner ones, terminated with weak spines ca. 1 mm long. Corolla pale violet, 15–21 mm long; lobes 3–5 mm long; throat (3–)5–6(–7) mm long; tube 6–8(–9) mm long, longer than the throat. Achenes grayish brown tinged purple, ca. 3.5 mm long; pappus sordid, 12–15 mm long.

Chromosome number: $n=34$ (Aishima, 1934; as '*C. nipponicum*'), $2n=68$ (Masukawa *et al.*, 1990; Kadota, 1995a; both as '*C. nipponicum*').

Distribution: Honshu, Tohoku District (including the easternmost part of Aomori Pref.), Kanto District (Tochigi and Gunma Prefs.) and Chubu District (Niigata and northern part of Nagano Prefs.), predominantly on the Japan Sea side. Endemic. Growing along the margin of cool-temperate woods and in herb stands of the montane zone (sometimes to the alpine zone).

Japanese name: Nanbu-azami (Miyabe), Hime-azami (Iinuma).

Icons: Kitamura *et al.*, Col. Illust. Herb. Pl. Jap. I: pl. 11, fig. 77 (1957; as *C. nipponicum* var. *nipponicum*)–Kitamura in Satake *et al.*, Wild Flow. Jap. I: pl. 199, fig. 1–2 (1981; as *C. nipponicum* var. *nipponicum*)–Azegami, Wild Flow. Jap. Mountainside: 554, uppermost photo, fig. 1 (2013).

Etymology: The specific epithet '*makinoi*' is dedicated to Dr. Tomitaro Makino who scientifically recorded this species for the first time.

Representative specimens examined: **Aomori Pref.**, San'nohe-gun, Nanbu-cho, Ômukai, Hase, 40°23'37"N 141°17'43"E, alt. ca. 250 m, 26 Oct. 2011, J. Kunikyô 1005 (TNS 01165753–TNS 01165754). **Akita Pref.**, Akita-gun, Yamase-mura, 25 Aug. 1935, M. Matsuda s.n. (TNS 50824). Oga-shi, Oga Peninsula, Sôroku, alt. 40 m, 27 Aug. 1987, H. Koyama 7883 (TNS 553932). Ômagari-shi, Nakayama, 17 Nov. 1997, Y. Horii s.n. (TNS 652424; chromosome voucher $2n=68$). Senboku-gun, Tazawako-machi, Yachi-no-sawa, 24 Sept. 1994, Y. Horii 1418 (TNS 643017); Tazawako-machi, Dakigaeri, 17 Oct. 1994, Y. Horii

1419 (TNS 01135248); Tazawako-machi, Mt. Kojiro-mori, alt. 900 m, 5 Sept. 1999, Y. Horii 1980 (TNS 692336); Kakunodate-machi, Horiuchi-sawa, 19 Oct. 1995, Y. Horii 1417 (TNS 643018); Ôta-machi, Mt. Kabuto-yama, 23 Sept. 1995, Y. Horii 1422 (TNS 643012); Ôta-machi, Maki-keikoku gorge, 23 Aug. 1994, Y. Horii 1414 (TNS 633020b); Senhata-machi, Mt. Mahiru-dake, alt. 970 m, 13 Sept. 1998, Y. Horii 1903–1913 (TNS 672517–672527). **Iwate Pref.**, Takizawa-shi, Mt. Iwate-san, Sept. 1900, H. Sakurai s.n. (TNS 12197). Ôshû-shi, Mt. Yakeishi-dake, 14 Aug. 1934, H. Iwabuchi [H. Koidzumi 97074] (TNS 178450). Morioka-shi, Asagishi, 24 Sept. 1967, M. Kikuchi s.n. (TNS 176531). Hanamaki, 17 Oct. 1935, H. Muroi s.n. (TNS 285774–285776). Iwate-gun, Shidzukuishi-cho, below the Sengoku-tôge pass, 3 Sept. 1989, J. Haginiwa JH010965, JH030524 (TNS 960965, 980524); Tamayama-mura, 1 Oct. 1990, J. Haginiwa JH030523 (TNS 980523). **Miyagi Pref.**, Tamatsuri-gun, Nishi-Ôsaki-mura [Ôsaki-shi], 11 Oct. 1937, Y. Chiba s.n. [H. Yamamoto 4145] (TNS 188747). Sendai-shi, Taihaku-ku, Taihaku-no-mori, Mt. Taihaku-san, Taihaku-san Nature Sanctuary, alt. ca. 70 m, 27 Oct. 1999, Y. Ueno 38276 (TNS 691999). Sendai-shi, Sakunami, 7 Oct. 2005, K. Koidzumi 1–3 (TNS 753611–753613). Miyagi-gun, Iwagiri-mura, Iriyama, 4 Oct. 1931, 'K. N.' 40 (TNS 837676). Shiroishi-shi, Zawo Mountains, Mt. Fubô-san, Shinrei-rindô, alt. ca. 840 m, 170 cm in height, 18 Oct. 1999, Y. Ueno 38270 (TNS 691911); Zawo, alt. 1070 m, 26 Sept. 1998, Y. Kadota 985152–985153 (TNS 671474, 671479). Shibata-gun, Kawasaki-cho, Mt. Nakitsura-yama, alt. ca. 340 m, 120 cm in height, 18 Oct. 1999, Y. Ueno 38271 (TNS 691912). Katta-gun, Zawo-cho, Mt. Katta-dake, along a trail under *Abies mariesii*—*Sasa kurilensis* woods, alt. ca. 1640 m, 21 Oct. 1999, Y. Ueno 38273 (TNS 691913); Shichikashuku-machi, Chôja-jinja shrine, alt. 620 m, Y. Kadota s.n. (TNS 651375–651376). Kakuda-shi, Mt. Tokura-yama, 16 Nov. 1997, S. Kato s.n. (TNS 652405; chromosome voucher $2n=68$). Igu-gun, Marumori-machi, Kokura, 2.15 m in height, 24 Sept. 2010, Y. Ueno 46659 (TNS

- 01025451); Marumori-machi, Waseda, alt. ca. 380m, 12 Oct. 1998, Y. Ueno 38293 (TNS 692005–692008). **Yamagata Pref.**, Nishi-Murayama-gun, Nishikawa-machi, Mt. Gassan, alt. 1100m, 7 Oct. 1971, H. Koyama 4048 (TNS 304133). Higashi-Tagawa-gun, Asahi-mura, along the river Asahi-gawa, alt. 560m, 2 Oct. 1997, Y. Kadota 975001–975016 (TNS 651250–651270); Asahi-mura, Shimanagawa, along the river Hayata-gawa, 13 Nov. 1997, S. Kato s.n. (TNS 652410; chromosome voucher 2n=68). Akumi-gun, Yahata-cho, Mt. Chôkai-san, alt. 1000m, 5 Oct. 1979, Y. Kadota s.n. (TNS 9016653–9016655). Kita-Murayama-gun, Tôgô-mura, Numasawa, 20 Sept. 1945, S. Okuyama 5825 (TNS 291201). Tendô-shi, Jagaramogara, 2 Nov. 1997, S. Kato s.n. (TNS 651833); Jagaramogara, alt. 640m, 20 Sept. 2005, Y. Kadota 066304 (TNS 758641–758642). Yamagata-shi, Kan'no-o, 2 Nov. 1997, S. Kato s.n. (TNS 651828–651830); Mt. Zawo-zan, 2 Aug. 1965, K. Doi s.n. (TNS 181212); Zawo-onsen hot spring, alt. 880m, 20 Aug. 1962, H. Koyama 1378 (TNS 238316). Kaminoyama-shi, Mt. Ha-yama, Ôbora-rindo forest road, 6 Oct. 2001, T. Suzuki s.n. (TNS 710017). Higashi-Murayama-gun, Mt. Higashikuromori-yama, alt. 700m, 8 Oct. 1971, H. Koyama 4053 (TNS 304111); Mt. Gassan, Ubasawa-goya, alt. 1100m, 7 Oct. 1971, H. Koyama 4048–4049 (TNS 304130–304133); Mt. Ha-yama, 7 Oct. 1945, S. Okuyama 6041 (TNS 291200). Mogami-gun, Okura-mura, Mt. Gassan, Karasugawa, alt. 850m, 17 Sept. 1983, Y. Kadota s.n. (TNS 9015190–9015192). Tsuruoka-shi, Atsumi-cho, 16 Oct. 1939, T. Uchikawa s.n. (TNS 108687); Mt. Atsumi-dake, 16 Oct. 1939, T. Uchikawa s.n. (TNS 108686); Kamo, 19 Oct. 1997, S. Kato s.n. (TNS 650200). Nishi-Okitama-gun, Oguni-machi, the Iide Mountain Range, Mt. Kajikawa-mine, Gorô-shimidzu spring, alt. 1380m, 6 Sept. 1995, Y. Kadota s.n. (TNS 676353–676366). **Fukushima Pref.**, Yama-gun, Bandai-machi, Bandai-san Gold Line, 13 Oct. 2012, H. Yanagita 24747, 24749, 24754 (TNS 01174950–TNS 01174951, TNS 01174963–TNS 01174964); Inawashiro-machi, Okinajima, 18 Oct. 1948, Y. Ikegami 11692 (TNS 80351). Fukushima-shi, Tsuchiyu, June 1901, G. Nakahara s.n. (TNS 23904); Fukushima-shi, Iizaka-cho, Nakano, 14 Oct. 2012, H. Yanagita 24784 (TNS 01174952). Date-gun, Ryôzen-cho, Mt. Ryôzen, alt. 800m, 13 Sept. 1970, H. Koyama & F. Maeda 4029–4031 (TNS 304078, 304080, 304083, 378885). Tamura-gun, Funabiki-machi, Mt. Utsushiga-take, alt. 750m, 16 Nov. 1998, Y. Saisu 6–7, 9–10 (TNS 678320, 678361–678363). Aidzu-Wakamatsu-shi, Mt. Iimori-yama, alt. 300m, 12 Sept. 1970, H. Koyama & F. Maeda 4090 (TNS 313959). Iwaki-gun, Hirakubo-mura [Iwaki-shi], Nakajio, 2 Dec. 1936, J. Nozaki s.n. (TNS 56395–56396). Ônuma-gun, Numazawa-mura, Mifuke, 24 Oct. 1935, T. Saito s.n. (TNS 51604); Kaneyama-machi, Numazawa-ko lake, 18 Oct. 1973, F. Maekawa 87780 (TNS 837669–837671, 837677–837679). Nishi-Shirakawa-gun, Koseki-mura, Mt. Sekiyama, 16 Sept. 1931, N. Imai s.n. (TNS 35685); Nishigô-mura, Mt. Akadzura-yama, alt. 1000m, 15 Sept. 1970, H. Koyama & F. Maeda 4047 (TNS 304116, 378858). Minami-Aidzu-gun, Minami-Aidzu-machi, Tajima, 8 Sept. 1932, D. Hoshi s.n. (TNS 37967); Minami-Aidzu-machi, Mt. Tashiro-yama, 9 Aug. 1959, S. Okuyama 19000 (TNS 282450); Hinoemata-mura, 11 Sept. 1932, D. Hoshi s.n. (TNS 37972); Hinoumata-mura, Numayama-tôge pass, alt. 1720m, 5 Sept. 2002, Y. Kadota 202317–202321 (TNS 718644–718656). **Niigata Pref.**, Mishima-gun, Yoita-machi, 23 Sept. 1956, Y. Kusumi s.n. (TNS 127558–127559). Niigata-shi, 27 Sept. 1938, Y. Ikegami s.n. (TNS 64714–64715). Ojiya-shi, Ojiya, 19 Oct. 1963, F. Konta 3186 (TNS 01111326). Agano-shi, Mt. Godzu-san, 21 Sept. 1957, K. Noda s.n. (TNS 271128). Shibata-shi, Akaiwa, Uchinokura, alt. 150m, 7 Nov. 1962, F. Konta 1166 (TNS 01111316); Sugadani, Kamiarasawa, alt. ca. 200m, 6 Oct. 1963, F. Konta 2840 (TNS 01111324). Kita-Kanbara-gun, Sugaya, Ishikawa, alt. 180m, 21 Oct. 1962, F. Konta 990 (TNS 01111317). Higashi-Kanbara-gun, Tsugawamachi, Mt. Kirin-yama, 7 Oct. 1950, T. Nakai & N. Maruyama s.n. (TNS 83839–83840). Minami-Kanbara-gun, Tagami-machi, Ôsawa, 31 Aug.

1989, Y. Kadota s.n. (TNS 9026344–9026348). Nishi-Kanbara-gun, Yahiko-mura, 9 Oct. 1956, K. Noda s.n. (TNS 306308); Muramatsu-machi, Jikô-ji temple, alt. 160m, 31 Aug. 1989, Y. Kadota s.n. (TNS 9026349–9026350); Kariwa-gun, Naigô-mura, Bessan, Y. Ikegami s.n. (TNS 44412). Uonuma-shi, Yunotani, Mt. Arasawa-dake, Maegura, alt. 1536m, 1 Sept. 2012, H. Yanagita 24559 (TNS 01174954). Naka-Uonuma-gun, Kawanishi-machi, Murojima, alt. 280m, 26 Oct. 1969, Y. Ikegami 95943 (TNS 280832). Minami-Uonuma-gun, Yuzawa-machi, Mt. Naeba-san, 19 Aug. 1953, Y. Satake & S. Ito s.n. (TNS 273394); Tsuchitaru, 28 Sept. 1974, Y. Jotani s.n. (TNS 826518); Yabukami-mura, Mitake, 15 Oct. 1966, C. Okawa s.n. (TNS 461210); Mikuni-tôge pass, 10 Sept. 1967, Y. Jotani 32898 (TNS 837536). Minami-Uonuma-shi, Mt. Echigo-Komaga-take, 4–6 Oct. 1949, J. Ohwi s.n. (TNS 238594). Myôkô-shi, Myôkô-kôgen heights–Shin-Akakra, 31 Oct. 1948, J. Yoshikawa 31 (TNS 80686); Mt. Myôkô-san, alt. ca. 1250m, 1 Sept. 2011, M. Higuchi s.n. (TNS 01028982–01028983). Itoigawa-shi, Ichiburi, 11 Oct. 1936, Z. Tashiro s.n. (TNS 54376); Tengu-no-niwa–Renge-onsen hot spring, alt. 1550m, 15 Sept. 1989, Y. Kadota 82007–82011 (TNS 9023226–9023231); Mt. Kanbara-yama, Shira-ike pond, alt. 1100m, 16 Sept. 1989, Y. Kadota 9023253–9023258). **Gunma Pref.**, Tone-gun, Minakami-machi, Shimizu-tôge pass, 6 Aug. 1938, M. Togashi s.n. (TNS 304552); Yubiso–Deai, 19 Oct. 1942, K. Hisauti s.n. (TNS 660801, 703505); Mikuni-tôge pass, 25 Aug. 1967, K. Kogure s.n. (TNS 191630); Mikuni-tôge pass, 14 Sept. 1981, Y. Kadota s.n. (TNS 9016651–9016652); Katashina-mura, Marunuma, 8 Aug. 1967, Y. Jotani s.n. (TNS 826312). Agatsuma-gun, Tsumagoi-mura, Ishidzu, 5 Sept. 1969, K. Masuda 3777 (TNS 383678); Aduma-kôzan mine, 18 Aug. 1971, K. Masuda 3707 (TNS 383679). Kuni-mura, Mt. Shirasuna-yama, 26 Aug. 1981, Y. Kadota s.n. (TNS 9016654–9016659, 9016665). **Tochigi Pref.**, Kanuma-shi, Mt. Yokone-yama, at the entrance of Ido-shitsugen moor, alt. 1280m, 22 Aug. 2006, K. Fukuda 1314 (TNS 758449).

Haga-gun, 18 Sept. 1938, H. Sekimoto s.n. (TNS 64721). Kawachi-gun, Shiroyama-mura [Utsunomiya-shi], Mt. Kogashi-yama, 9 Oct. 1949, H. Sekimoto 3 (TNS 80772). **Nagano Pref.**, Iiyama-shi, Kosuge, alt. 1100m, 11 Sept. 1977, S. Ito 2177 (TNS 01171016). Shimo-Takai-gun, Yamanoouchi-machi, Shiga-kôgen heights, Ishi-no-yu, alt. 1600m, 26 July 1990, K. Imai s.n. (TNS 643406–643408); Nozawa-mura, 10 Oct. 1931, H. Koidzumi 35124–35125 (TNS 934778–934779); Kinasa-mura, Mt. Ichiya-san, alt. 700m, 3 Sept. 1978, S. Ito 2216 (TNS 01135249). Nagano-shi, Mt. Togakushi-yama, Aug. 1898, H. Sakurai s.n. (TNS 12193). Ueda-shi, Sugadaira, 5 Aug. 1957, C. Ôkawa s.n. (TNS 393087). Kita-Adzumi-gun, Hakuba-mura, Ochikura–Kami-notanbo, 21 Aug. 1936, K. Hisauti 1754 (TNS 55015); Shiromajiri–Futamata, 15–16 Aug. 1951, J. Ohwi s.n. (TNS 88103–88104); Happô-one ridge, non-serpentine area, alt. 1650m, 6 Sept. 1993, Y. Kadota 20009–20011 (TNS 0111311–0111315). Ômachi-shi, Kashimayari, Kurosawa-kôgen heights, 18 Sept. 1991, K. Deguchi 7715 (TNS 597640–597641).

Note: As stated above Maximovicz (1874) considered this thistle to have erect capitula. Nakai (1912) followed Maximowicz and circumscribed this species. However, Nakai's '*C. nipponicum*' is a mixture of *C. nipponicum* itself (e.g., Mt. Iide-san, 13 Aug. 1879, no collector's name, TI; Mt. Iide-san, 12 Aug. 1907, G. Nakahara s.n., TI), *C. alpicolum* Nakai (e.g., Mt. Hakkoda-san, Aug. 1912, T. Nakai s.n., TI) and *C. domonii* Kadota (Sakata, 10 Aug. [no year], S. Ishidzuka 132, TI). This may be due to Nakai describing capitulum orientation through examination of herbarium specimens only.

Next, Kitamura referred to *C. nipponicum* in his seminal paper on Japanese *Cirsium* (1934). When Kitamura (1934) described a new subsection, subsect. *Nipponocirsium*, he selected *C. nipponicum* as the type species and described "Capitulis.... nutantia vel cernua" as one of diagnostic characters. In fact among the species which he cited as the members of subsect. *Nipponocirsium* ser. *Sylvicola* Kitam. [= ser. *Nip-*

ponocirsium] most have nodding capitula, such as *C. incomptum* (Franch. & Sav.) Nakai, *C. hanamakiense* Kitam. and *C. yoshinoi* Nakai. The exception is *C. muraii* Kitam., with erect capitula. Kitamura's concept was adopted in *Coloured Illustrations of Herbaceous Plants of Japan Vol. I* (1953). Perhaps as a result of this more populist publication, his concept has been widely accepted in Japan. Therefore Kitamura (1934) is regarded to be the starting point of the misunderstanding surrounding *Cirsium nipponicum* (Maxim.) Makino.

Cirsium makinoi* Kadota var. *shiroumense* (Kadota) Kadota, **comb. nov.*

Cirsium nipponicum (Maxim.) Makino var. *shiroumense* Kadota in Bull. Natn. Sci. Mus., Tokyo, Series B, **21**: 25, figs. 10, 12 (1995).

TYPE: JAPAN. Honshu. Niigata, Itoigawashi, the Hida Mountain Range, Tengu-no-niwa, N. of Mt. Korenge-san, alt. ca. 2000 m, 29 Aug. 1992, Y. Kadota 19491 (TNS–holotype).

Additional specimens examined: JAPAN. Honshu. Nagano Pref., Kita-Adzumi-gun, Hakubamura, Shiroumayari-onsen hot spring, 13 Sept. 1988, H. Okuhara & K. Hiroshima 8 (TNS); Shiroumayari-onsen hot spring, alt. 1850 m, 8 Sept. 1988, K. Imai 10 (TNS).

Cirsium makinoi* Kadota var. *abukumense* (Kadota) Kadota, **stat. nov.*

Cirsium abukumense Kadota in Mem. Natn. Sci. Mus. Tokyo no. 29: 96, f. 1–2 (1996).

TYPE: JAPAN. Honshu. Fukushima, Date-gun, Ryozen-cho, Mt. Ryozen, 500 m 30 Sep. 1995, Y. Kadota 22089 (TNS–holotype).

Subsect. ***Nipponocirsium*** Kitam. in Acta Phytotax. Geobot. **3**: 4 (1934), p.p.

TYPE: *Cirsium nipponicum* (Maxim.) Makino.

Subsect. *Littoralicola* Kadota in Bull. Natn. Sci. Mus., Tokyo, Ser. B, **33**(1): 30 (2007). Type: *Cirsium umezawanum* Kadota.

2. ***Cirsium nipponicum* (Maxim.) Makino** in Bot. Mag. (Tokyo) **19**: 155 & (299) (1905),

excl. specim. Nakahara — *Cnicus nipponicus* Maxim. in Bull. Acad. Sci. St.-Petersb. **19**: 496 (1874), p.p. [Figs. 1–2]

LECTOTYPE (Kadota, 1993): JAPAN. 'In Nippon boreali prov. Nambu' [northern Honshu, Iwate Pref.], Tschonoski (LE!; isotypes–LE!; Fig. 1). The syntypes from 'Nippon media' should be ascribed to *C. amplexifolium* Kitam. (cf. Kadota, 1993).

Gynodioecious perennial, 0.6–2 m tall or taller. Rootstock stout, horizontal, ca. 5 cm in diameter, with cord-like roots. Stem erect, 3–8 times branched from the middle part, leafy, green, striate, not winged, glabrous; branches divaricate, elongated. Basal leaves withering at anthesis. Lower cauline leaves green on the adaxial side, glaucous on the abaxial side, coriaceous, sessile or short-petioled (up to 5 cm long); blades broadly ovate in outline, 24–35 cm long, 11–26 cm broad, glabrous on both sides or sparingly arachnoid on the abaxial side, serrate to deeply pinnatilobate to pinnatisect, if pinnatilobate, 5–8-jugate; lobes narrowly ovate, 5–12 cm long, 2–4 cm broad, with strong spines 3–5 mm long, not decurrent to the stem, not amplexicaul or semi-amplexicaul, not auriculate. Upper cauline leaves narrowly ovate, deeply to shallowly pinnatilobate with 4–6 jugae, sessile, not amplexicaul nor auriculate. Flowering August to October. Capitula erect to oblique, 2–3 in a loose raceme or solitary in the terminal inflorescence, with peduncles 5–9 cm long, arachnoid and pubescent with long, brownish hairs; subtending leaves ca. 5, narrowly lanceolate, 5–10 mm long, with spines ca. 1 mm long. Involucres campanulate, 19–21 mm long, 15–18 mm (*in vivo*) and 2.5–3.5 cm (*in sicco*) in diameter, sparingly arachnoid. Phyllaries 8–9-seriate, recurved to subpatent, or ascending at an acute angle (in the populations Shimokita Peninsula, Aomori Pref.); glandular bodies linear on the inner and middle phyllaries, degenerative but slightly glutinous; innermost phyllaries narrowly lanceolate, 19–21 mm long; outer phyllaries narrowly ovate, 5–10 mm long, shorter than or as long as the inner ones, coriaceous, acuminate at apex, terminated with strong spines ca. 2 mm



Fig. 1. Lectotype of *Cirsium nipponicum* (Maxim.) Makino ('Japonia, in Nippon boreali prov. Nambu' [Iwate Pref.], 1864, Tschonoski [Chônosuke Sugawa s.n.], LE). Left inset shows erect capitulum.



Fig. 2. *Cirsium nipponicum* (Maxim.) Makino (Mt. Hashikami-dake, Haruyama-sawa, Hashikami-machi, San'nohe-gun, Aomori Pref., Honshu, Japan, on 14 Sept. 2008). Left inset shows erect capitulum.

long. Corollae pale pink to pink (no difference in color between hermaphrodite plants and female plants), 18–20 mm long; lobes 4–5 mm long; throats 5–6 mm long; tubes 8–10 mm long, longer than the throats. Achenes brownish gray, 4–4.5 mm long, triangular, smooth; pappus silver white, 10–15 mm long.

Distribution: Honshu (Aomori [excluding Tsugaru area], Iwate and Miyagi [northernmost part only] Prefs., chiefly on the Pacific Ocean side).

Japanese name: Kitakami-azami (nov.).

Specimens examined: **JAPAN.** Honshu. **Aomori Pref.**, Shimokita-gun, Sai-mura, Arasawa, alt. 360 m, 13 Sept. 2005, Y. Kadota 055003–055007 (TNS 753034–753040, 753079, 753116–753119; chromosome voucher $2n=4x=68$); Ôma-machi, Okudo, 30 Aug. 1984, K. Hosoi s.n. (TNS 652119); Ôma-machi, Zaimoku, Tsubana-zaki cape, in maritime herbal stand, abundant, alt. 50 m, 14 Sept. 2005, Y. Kadota 055104–055106 (TNS 753121–753123); Kazamaura-mura, Shimburo, 2 Sept. 1974, J. Haginiwa JH004558–JH004559 (TNS 954558–954559); Higashidôri-mura, Odano-sawa, 4 Oct. 1971, K. Hosoi s.n. (TNS 652402); Higashidôri-mura, Shiranuka, alt. 10 m, around a moor, 19 Aug. 2003, M. Neichi s.n. (TNS 767891); Higashidôri-mura, Shiriya, alt. 40 m, in maritime herbal stand, 10 Aug. 2006, M. Neichi s.n. (TNS 767887–767890). Kamikita-gun, Yokohama-mura, Fukigoe–Arido, 23 Aug. 1956, J. Haginiwa JH004557 (TNS 954557); Noheji-machi, Kimyô, alt. 14 m, 6 Sept. 2007, Y. Kadota 074320 (TNS 770579); Rokkasho-mura, Tomari, 10 Sept. 1961, S. Suzuki s.n. (TNS 9026734); Rokkasho-mura, Mutsu Ogawara, 20 July 1963, K. Hosoi s.n. (TNS 652630); Rokkasho-mura, Kurauchi, 1 Aug. 1967, K. Hosoi s.n. (TNS 652425–652426); Rokkasho-mura, Ichiyanaginuma, 22 Sept. 1971, K. Hosoi s.n. (TNS 652105); Rokkasho-mura, Deto, Shinmachi, alt. 20 m, 6 Sept. 2007, Y. Kadota 074318 (TNS 770581); Rokkasho-mura, Takahoko-numa, alt. 3 m, 6 Sept.

2007, Y. Kadota 074319 (TNS 770580). Mutsushi, Mt. Usori-yama [= Mt. Osore-zan], 20 Sept. 1934, Z. Tashiro s.n. (TNS 45307–45308); Mt. Osore-zan, 9 Sept. 1959, S. Suzuki s.n. (TNS 9026735); Kawauchi, 6 Sept. 1967, K. Hosoi s.n. (TNS 652403); Usorigawa, alt. 450 m, 5 Oct. 2007, Y. Shima s.n. (TNS 770915–770616). San'nohe-gun, San'nohe-machi, Toyokawa, 27 Sept. 1988, K. Hosoi s.n. (TNS 651722–651724); Nagawa-machi, Toyokawa, Yamabata, 23 Sept. 1988, K. Hosoi s.n. (TNS 648521, 651721); Nanbucho, Hôkôji temple, alt. 250 m, 7 Sept. 2007, Y. Kadota 074363 (TNS 770561); Hashikami-machi, Haruyama-sawa, Mt. Hashikami-dake, alt. 581 m, 14 Sept. 2008, Y. Kadota s.n. (TNS). Misawa-shi, Sunamori, Hotokenuma, alt. 4 m, in a moor, 29 Sept. 2002, M. Neichi s.n. (TNS 767892). Higashi-Tsugaru-gun, Hiranai-machi, Kariba-sawa, Mt. Matsukura-yama, alt. 185 m, 25 Sept. 2007, M. Neichi s.n. (TNS 767898–767890); Sotogahama-machi, Kanita, Ôdai, 1 Oct. 1988, K. Hosoi s.n. (TNS 652097–652098, 653411); Hiranai-machi, Kariba-sawa, Okuga-sawa, around a moor, alt. 40 m, 25 Sept. 2007, M. Neichi s.n. (TNS 767897); Hiranai-machi, upper stream of Kuchihiro-gawa river, alt. 230 m, 25 Sept. 2007, M. Neichi s.n. (TNS 767893–767894, 767896). Hirakawa-shi, 7 Sept. 2010, S. Miya s.n. (TNS 01113357–01113359). Ninohe-shi, Fukuoka, Mt. Oritsume-dake, 7 Sept. 2010, S. Miya s.n. (TNS 01113356). Hachinohe-shi, Natsudate, Tokura, alt. 84 m, 12 Sept. 2008, Y. Kadota 085094 (TNS 777661); Matsudate, Karuizawa, 9 Sept. 2008, M. Neichi s.n. (776876–776880); Matsudate, Karuizawa, 16 Sept. 2008, M. Neichi s.n. (776863, 776866, 776871–776875). **Iwate Pref.**, Kuji-shi, Misaki, 21 Sept. 1952, K. Hosoi s.n. (TNS 652084–652085). Iwate-gun, Matsuo-mura, 2 Oct. 1957, K. Hosoi s.n. (TNS 651727). Kunohe-gun, Yamagata-mura, Takinosawa, alt. 500 m, 29 Aug. 1987, H. Koyama 7909–7911 (TNS 55393, 553943–553944); Yamagata-mura, Mt. Hiraniwa-dake, 22 Sept. 1999, T. Kawasaki

7308 (TNS 687111–687114); Hirono-cho, Taneichi, Nakano-kaigan beach, alt. 13 m, 15 Sept. 2009, Y. Kadota 094133–094136 (TNS 011057–10110461). Shimo-Hei-gun, Tanihata-mura, Shimanokoshi, 28 Sept. 1967, M. Kikuchi s.n. (TNS 176736); Tarô-machi, near Tarô station, cult. at Niigata, 11 Oct. 2003, A. Togashi s.n. (TNS 726601); Kawai-mura, Hiratsudo, 6 Oct. 1954, K. Hosoi s.n. (TNS 652088–652089); Iwaidzumi-cho, Shinden, alt. 500 m, 10 Sept. 2000, Y. Horii 1994 (TNS 758402). Morioka-shi, Mt. Himekami-san, 20 Oct. 1935, H. Muroi s.n. (TNS 558459–558465). Hienuki-gun, Ôhasama-machi, Mt. Hayachine-san, Dake, alt. 600 m, 30 Aug. 1990, Y. Kadota 909011–909020 (TNS 9024737–9024762). Tôno-shi, Kotomo-machi, Tsuchimuro, Tsuchimuro-tôge pass, alt. 300 m, 23 Sept. 1998, Y. Kadota 985072–985075 (TNS 673680, 674061–674064); Mt. Monomi-yama, alt. 750 m, 16 Sept. 2009, Y. Kadota 094164 (TNS 01101410). Kamaishi-shi, Mt. Senban-san, alt. 1022 m, 16 Sept. 2009, Y. Kadota 094138 (TNS 01101465–0110466); Mt. Senban-san, alt. 274 m, 16 Sept. 2009, Y. Kadota 094151–094156 (TNS 0110435–0110439, 01101480–01101485). Hanamaki-shi, Hanamaki-onsen hot spring, 7 Sept. 2010, S. Miya s.n. (TNS 01113354–01113355). Mizusawa-shi, Kuroishi, alt. 440 m, 21 Sept. 1998, Y. Kadota 985031 (TNS 674108). Kesen-gun, Sumita-machi, Taneyama, alt. 720 m, 22 Sept. 1998, Y. Kadota 985035–985036 (TNS 671472–671473). **Yamagata Pref.**, Mogami-gun, Mogami-machi, Kurosawa, Han'ya–Hanatate-tôge pass, alt. 360 m, 29 Sept. 2006, S. Kato s.n. (TNS 736414–736418); Hanatate-tôge pass, alt. 440 m, 26 Sept. 2006, S. Kato s.n. (TNS 736418–736424). **Miyagi Pref.**, Ôsaki-shi, Matsuyama, Shimoibano, alt. ca. 16 m, 25 Oct. 2011, T. Nemoto 30134 (TNS 01151234–TNS 01151235).

Note: The Japanese name comes from the Kitakami Mountain Range where this thistle commonly grows.

3. ***Cirsium sendaicum*** Nakai in Bot. Mag. (Tokyo) **44**: 536 (1930), p. p., excl. syn. — *Cirsium nipponicum* (Maxim.) Makino var. *sendai-*

cum (Nakai) Kitam. in Mem. Coll. Sci. Kyoto Imp. Univ., Series B, **13** [Comp. Jap. **1**]: 108 (1937), in Ohwi, Fl. Jap. ed. Engl.: 910 (1965) – H. Hara, Enum. Sperm. Jap. **2**: 180 (1952) – Ohwi, Fl. Jap.: 1217 (1953). [Fig. 3]

TYPE: JAPAN. Honshu. Prov. Rikuzen], Matsushima [Miyagi Pref., Miyagi-gun, Matsushima-machi], Kariganenomori, 20 Nov. 1929, T. Nakai s.n. (TI–holotype; Fig. 4). The paratype specimen from Mt. Iwate-san, Prov. Rikuchû [Iwate Pref.] should be ascribed to *C. amplexifolium* Kitam.

Cirsium matsushimense Kitam., Cirs. Nov. Or.-Asiat. **16** (1931). Type: JAPAN. Honshu. Prov. Rikuzen], Matsushima [Miyagi Pref., Miyagi-gun, Matsushima-machi], Kariganenomori, 4 Oct. 1930, S. Kitamura s.n. (KYO–holotype!; TNS–photo. of the holotype!). The type locality is the same as that for *C. sendaicum* Nakai.

Gynodioecious perennial, 1–2.8 m tall or taller. Rootstock rather stout, horizontal, ca. 5 cm in diameter, with cord-like roots. Stem erect, usually 6–10 times branched from the middle part, leafy, green, striate, not winged, glabrous; branches divaricate, elongate. Basal leaves withering at anthesis. Lower cauline leaves green on the adaxial side, glaucous on the abaxial side, coriaceous, sessile or with petioles up to 3 cm long, not decurrent to the stem, semi-amplexicaul, not auriculate; blades broadly ovate to broadly elliptic in outline, 23–34 cm long, 13–23 cm broad, glabrous on both sides, deeply pinnatilobate or rarely serrate, if pinnatilobate, 4–5-jugate; lobes narrowly ovate, 6–11 cm long, 1–3 cm broad, with strong spines 3–5 mm long. Middle and upper cauline leaves narrowly ovate to narrowly elliptic, deeply pinnatilobate or rarely serrate, sessile, not amplexicaul nor auriculate. Flowering September to October. Capitula 2–3 in a loose corymb at the terminal inflorescence, erect, with thick peduncles 3–7 cm long, densely arachnoid; subtending leaves ca. 5, ca. 5 mm long, with spines ca. 1 mm long. Involucres campanulate, 18–20 mm long, 12–15 mm (*in vivo*) and 2–3 cm (*in sicco*) in diameter, sparingly arachnoid. Phyllaries 8–9-seriate, strongly recurved to patent; glandular bodies lan-



Fig. 3. *Cirsium sendaicum* Nakai (Mt. Senban-san, Kamaishi-shi, Iwate Pref., Honshu, Japan, on 16 Sept. 2009). Bottom middle inset shows erect capitulum. Right inset shows white-flowered, erect capitulum.

ceolate, on the inner and middle phyllaries, slightly glutinous; innermost phyllaries narrowly lanceolate, 18–20 mm long; outer phyllaries narrowly lanceolate, 5–15 mm long, shorter than the inner ones, coriaceous, acuminate at apex, terminated with strong spines 1–2 mm long. Corollae pale pink to pink (both in hermaphrodite plants and in female plants), 15–20 mm long; lobes 3–5 mm long; throats 5–6 mm long; tubes 6–9 mm long, longer than or sometimes as long as the throats. Achenes ivory white, purplish-striate, 4 mm long, triangular, smooth; pappus sordid white, 12–14 mm long.

Distribution: Honshu (Iwate and Miyagi Prefs., on the Pacific Ocean side). Endemic. Growing along the margin of warm-temperate woods and neighboring grasslands in maritime hills and low mountains.

Japanese name: Matsushima-azami (Kitamura, 1931), Nanbu-azami (Nakai, 1930).

Specimens examined: **JAPAN.** Honshu. **Iwate Pref.**, Kunohe-gun [currently Kuji-shi], Misaki, 21 Sept. 1952, K. Hosoi s.n. (TNS). Kamaishi-shi, Kami-Arakawa, alt. 200 m, 8 Oct. 2000, Y. Horii 2031 (TNS 704786); Kamaishi-shi, Arakane, alt. 200 m, 8 Oct. 2000, Y. Horii 2033 (TNS 704788); Kamaishi-shi, Mt. Goyô-zan, Goyô-rindo forest road, 3 Oct. 2006, H. Suzuki s.n. (TNS 758419); Ôfunato-shi, Kashi, alt. 400 m, 7 Oct. 2000, Y. Horii 2028–2030, 2032 (TNS 704783–704785, 704787); Ôfunato-shi, Sanriku-cho, Yoshihama, Mt. Ôkubo-yama, alt. 618 m, 17 Sept. 2009, Y. Kadota 094171–094176 (TNS 01101442–01101455). Higashi-Iwai-gun, Hiraidzumi-machi, Mt. Tabashine-yama, 17 Sept. 1967, M. Kikuchi s.n. (TNS 176172); Higashiyama-cho, Koshiro, alt. 160 m, 29 Oct. 2000, Y. Horii 2027 (TNS 704814). Esashi-gun, Kuroishi-mura [currently Ôshû-shi, Mizusawa-ku], 15 Aug. 1935, C. Suzuki (H. Koidzumi 96874) (TNS 934762). Miyako-shi, Shigemo, alt. 50 m, 10 Sept. 2000, Y. Horii 1990–1991 (TNS 732335, 758391). **Miyagi Pref.**, Ojika-gun, Onagawa-cho, Urajuku, 21 Oct. 1967, M. Kikuchi s.n. (TNS 177090); Natori-shi, Takadate Kawakami, alt. ca. 60 m, 19 Sept. 2010, Y. Kadota 104121–104122 (TNS 01113360–

01113363); Takadate Kawakami, alt. ca. 80 m, 17 Oct. 2010, S. Miya s.n. (TNS 01110855); Takadate Kawakami, Nishiyakushi, alt. ca. 80 m, 4 Oct. 2011, Y. Kadota 111017 (TNS 01155567–TNS 01155569). Sendai, Sahoyama, Y. Asahina & K. Hisauti 12 (TI). Miyagi-gun, Matsushima-machi, alt. 20 m, 29 Sept. 1989, K. Masukawa 1203–1208 (TNS 01111520); Matsushima-machi, Kariganeno-mori, alt. 20 m, 18 Sept. 2006, Y. Ueno 45319–45328 (TNS 759717–789726; chromosome voucher $2n=4x=68$, examined by Dr. T. Nishikawa, 2008). Higashi-Matsushima-shi, Miyatojima Island, 27 Sept. 1932, Naohara s.n. (TNS 837675). Shibata-gun, Shibata-machi, Funabusama, 14 Oct. 2006, T. Sugiyama 2177–2178 (TNS 01165759–TNS 01165759); Kawasaki-machi, 21 Oct. 2011, J. Kunikyô 14 (TNS 01165765). Katta-gun, Shichigashuku-machi, Watase-fuketsu, 4 Sept. 1977, S. Yoshida s.n. (TNS 375015).

f. *albiflorum* Kadota, f. nov.

Florets creamy white.

TYPE: **JAPAN.** Honshu. Iwate Pref., Ôfunato-shi, Sanriku-cho, Yoshihama, Mt. Ôkubo-yama, alt. 618 m, 17 Sept. 2009, Y. Kadota 094177 (TNS 01101440–01101441; Fig. 3, right corner inset).

Japanese name: Shirobana-matsushima-azami (nov.).

4. ***Cirsium muraii*** Kitam. in Acta Phytotax. Geobot. 3: 5 (1934) – *Cirsium amplexifolium* (Nakai) Kitam. var. *muraii* (Kitam.) Kitam. in Mem. Coll. Sci. Kyoto Imp. Univ., Series. B, 13 [Comp. Jap. 1]: 123, pl. III, fig. 1; pl. X, fig. 4 (1937), in Ohwi, Fl. Jap. ed. Engl.: 911 (1965) – H. Hara, Enum. Sperm. Jap. 2: 168 (1952) – Ohwi, Fl. Jap.: 1220 (1953).

[Fig. 4]

TYPE: **JAPAN.** Honshu. Rikuzen, Insul. Kinkwazan [Miyagi Pref., Ishinomaki-shi, Kinkazan Island], cult. at Aomori, 4 Sept. 1933, S. Murai s.n. (KYO–holotype!).

Hermaphrodite perennial, 0.6–1.4 m tall. Rootstock stout, horizontal, ca. 5 cm in diameter, with cord-like roots. Stem erect, 5–6 times branched from the middle part, leafy, grayish green, not



Fig. 4. *Cirsium muraii* Kitam. (Kinkazan Island, Ishinomaki-shi, Miyagi Pref., Honshu, Japan, on 2 Sept. 2003). Left inset shows erect capitulum. Courtesy of Mr. Y. Ueno.

winged, glabrous; branches divaricate, elongated. Basal leaves withering at anthesis. Lower cauline leaves grayish green on the adaxial side, glaucous on the abaxial side, coriaceous, sessile, amplexicaul, not auriculate, deccurent to the stem; blades narrowly ovate to broadly ovate in outline, 13–32 cm long, 4–11 cm broad, glabrous on both sides, deeply pinnatilobate, 5–12-jugate; lobes narrowly ovate, 1.5–6 cm long, 0.5–3 cm broad, with strong spines 5 mm long. Upper cauline leaves narrowly ovate, shallowly pinnatilobate with 3–9 jugae, sessile, amplexicaul, not auriculate. Flowering August to October. Capitula erect, 2–3 in a loose raceme or solitary in the terminal inflorescence, with peduncles 2–4 cm long, glabrous; subtending leaves ca. 5, lanceolate, 5–15 mm long, with spines ca. 1 mm long. Involucres campanulate to cylindrical, 15–20 mm long, 12–15 mm (*in vivo*) and 2–3 cm (*in sicco*) in diameter, glabrous. Phyllaries 8–9-seriate, recurved to ascending at an acute angle; glandular bodies narrowly oblanceolate to linear on the inner and middle phyllaries, degenerative but slightly glutinous; innermost phyllaries narrowly lanceolate, 15–20 mm long; outer phyllaries narrowly ovate, ca. 5 mm long, clearly shorter than the inner ones, coriaceous, acuminate at apex, terminated with strong spines ca. 1 mm long. Corollae pale pink to pink, 16–21 mm long; lobes 4–5 mm long; throats 5–6 mm long; tubes 7–9 mm long, longer than the throats. Achenes ivory white, 4–4.5 mm long, triangular, smooth; pappus silver white, 9–16 mm long.

Chromosome number: $2n=4x=68$ (examined by Dr. T. Nishikawa, 2006).

Distribution: Honshu (Miyagi Pref., Kinkazan Island and Onagawa-cho, on the Pacific Ocean side). Endemic. On grassy slopes and along the margin of warm-temperate woods in the maritime mountains.

Japanese name: Kinka-azami (Kitamura, 1934).

Specimens examined: JAPAN. Honshu. **Miyagi Pref.**, Ishinomaki-shi, Kinkazan Island, 19 Aug. 1958, J. Haginiwa JH010980 (TNS 960980); Kinkazan Island, 10 Aug. 1965, K. Kogure s.n. (TNS 162296); Kinkazan Island, 22 Oct. 1967,

M. Kikuchi s.n. (TNS 177144); Kinkazan Island, cult. at Tsukuba Botanical Garden, National Museum of Nature & Science, 4 Oct. 1988, Y. Ueno s.n. (TNS 9019061–9019062); Kinkazan Island [38°17'50"N 141°33'30"E], in a *Miscanthus sinensis* grassland, alt. 230 m, 22 Sept. 2006, Y. Ueno 45337–45346 (TNS 759706–759716). Ojika-gun, Ôhara-mura [currently Ishinomaki-shi, Tanigawa-hama], Mt. Tanigawa-yama, 15 Nov. 1949, K. Hosoi s.n. (TNS 652093); Onagawa-cho, Takashiro-hama, Mt. Dairokuten-zan, along the road 'Cobalt Line', alt. 250 m, 1.2 m in height, 19 Aug. 2006, Y. Ueno 45258 (TNS 769831).

5. *Cirsium yuki-uenoanum* Kadota, **sp. nov.**

[Figs. 5–6]

Cirsium yuki-uenoanum Kadota is distinguished from *C. sendaicum* Nakai by having herbaceous leaves with distinct auricles, narrowly campanulate involucres and 10–11-seriate involucreal phyllaries; from *C. amplexifolium* by being gynodioecious, and having, narrowly campanulate involucres and 10–11-seriate involucreal phyllaries.

TYPE: JAPAN. Honshu. Miyagi Pref., Igu-gun, Marumori-machi, Kawadashima, Mt. Jirô-Tarô-yama, alt. 437 m, 19 Sept. 2010, Y. Kadota 104134 (TNS 01113385–holotype, Fig. 5; TNS 01113384, 01113386–isotypes).

Gynodioecious perennial, 1–2.5 m tall or taller. Rootstock rather slender, horizontal, ca. 1 cm in diameter, with cord-like roots. Stem erect or inclined because of the own weight of heads, usually 9–16 times branched from the middle part, leafy, green, striate, not winged, glabrous; branches divaricate, elongate. Basal leaves withering at anthesis. Lower cauline leaves green on the adaxial side, glaucous on the abaxial side, herbaceous, sessile, amplexicaul and auriculate, not deccurent to the stem; blades ovate to elliptic in outline, 24–35 cm long, 11–18 cm broad, glabrous on both sides, deeply pinnatilobate to pinnatisect, 5–8-jugate; lobes narrowly ovate, 4–9 cm long, 2–3 cm broad, with strong spines 2–3 mm long. Middle and upper cauline leaves narrowly ovate, serrate, sessile, amplexicaul and auricu-



Fig. 5. Type of *Cirsium yuki-uenoanum* Kadota (Mt. Jirô-Tarô-yama, Kawadashima, Marumori-machi, Igu-gun, Miyagi Pref., Y. Kadota 104134, TNS 01113385, holotype).



Fig. 6. *Cirsium yuki-uenoanum* Kadota (Mt. Jirô-Tarô-yama, Kawadashima, Marumori-machi, Igu-gun, Miyagi Pref., on 19 Sept. 2010). Upper middle inset shows hermaphrodite, erect capitulum. Right inset shows female, erect capitulum.

late. Flowering September to October. Capitula erect, 2–3 in a loose corymb at the terminal inflorescence, with slender peduncles 4–7 cm long, glabrous; subtending leaves ca. 5, with a prominent subtending leaf 1.5–4 cm long, with spines ca. 1 mm long. Involucres narrowly campanulate, 18–20 mm long, 8–12 mm (*in vivo*) and 1.5–2.5 cm (*in sicco*) in diameter, almost glabrous. Phyllaries 10–11-seriate, strongly recurved; glandular bodies vestigial, completely degenerative, eglutinous; innermost phyllaries narrowly lanceolate, 18–20 mm long; outer phyllaries narrowly lanceolate, ca. 1 cm long, slightly shorter than the inner ones, coriaceous, acuminate at apex, terminated with strong spines ca. 2 mm long. Corollae pale pink (in hermaphrodite plants) and pink (in female plants), 15–18 mm long; lobes 4–5 mm long; throats 4–5 mm long; tubes 7–8 mm long, longer than the throats. Achenes slightly purplish gray, 4.5 mm long, triangular, smooth; pappus sordid white, 10–13 mm

long.

Chromosome number: Unknown.

Distribution: Honshu (southernmost part of Miyagi Pref., on the Pacific Ocean side). Endemic. Growing along the margin of warm-temperate woods.

Japanese name: Marumori-azami (nov.).

Specimens examined: **JAPAN**. Honshu. **Miyagi Pref.**, Kakuda-shi, Inaoki, alt. 40 m, 6 Oct. 1986, T. Mori 2312 (TNS 9016672); Fujita, Miyazawa, alt. ca. 80 m, 27 Sept. 1985, T. Mori 1635 (TNS 9016676). Igu-gun, Marumori-machi, Kawadashima, Mt. Jirô-Tarô-yama, alt. 437 m, 19 Sept. 2010, Y. Kadota 104131–104138 (TNS 01113376–01113394); Mt. Jirô-Tarô-yama, alt. 437 m, 19 Sept. 2010, Y. Ueno 48000 (TNS 0111670); Marumori-machi, Kakeiri, alt. ca. 320 m, 1.50 m in height, branches 16, 24 Sept. 2010, Y. Ueno 46660/1 (TNS 01025452, TUS); Marumori-machi, Kakeiri, alt. ca. 320 m, 1.70 m in height, branches 16, 24 Sept. 2010, Y. Ueno 46660/2 (TNS 01025453, Herb.

Sendai Wild Plants Garden); Marumori-machi, Magaki, Mt. Tsuboke-yama, alt. 333 m, 2 Oct. 2011, Y. Kadota 11011–111013 (TNS 01155549–TNS 01155552).

Note: The specific epithet is dedicated to Mr. Yûki Ueno who was the first finder of this new thistle.

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

[Figs. 7–9]

Cirsium hagurossanense Kadota is discriminated from *C. domonii* Kadota by being gynodioecious, having 8–9-seriate involucreal phyllaries and the presence of glandular bodies; from *C. amplexifolium* Kitam. by the absence of prominently long subtending leaves at the base of involucre, non-auriculate leaf bases and the chromosome number $2n=68$.

TYPE: JAPAN. Honshu. Yamagata Pref., Tsuruoka-shi, Soegawa, Mt. Soegawa-yama, alt. ca. 180 m, 10 Sept. 2013, Y. Kadota 1325004 (TNS 01186889–holotype; Fig. 7).

Gynodioecious perennial, 1–2.2 m tall or taller. Rootstock rather stout, horizontal, ca. 3 cm in diameter, with cord-like roots. Stem erect to inclined due to own weight, usually 6–15 times branched from the middle part, leafy, green, striate, not winged, glabrous; branches divaricate, elongated. Basal leaves withering at anthesis. Lower cauline leaves green to yellowish green on the adaxial side, glaucous on the abaxial side, herbaceous in shady places and coriaceous in sunny places, with petioles 3–6 cm long, not decurrent to the stem, semi-amplexicaul, not auriculate; blades ovate to oblong in outline, 25–33 cm long, 11–20 cm broad, glabrous on both sides, deeply pinnatilobate to coarsely dentate, if pinnatilobate, 1–5-jugate; lobes narrowly ovate, 4.5–11 cm long, 1–5 cm broad, with spines 1–3 mm long. Middle and upper cauline leaves narrowly ovate to narrowly elliptic, short-petioled, not amplexicaul nor auriculate. Flowering September to November. Capitula erect to oblique, 2–3 in a loose corymb at the terminal inflorescence, with slender peduncles 7–11.5 cm long, glabrous; subtending leaves ca. 5, ca 5 mm long, with spines ca. 1 mm

long. Involucres campanulate to cylindrical, 13–17 mm long, 10–12 mm (*in vivo*) and 1.7–2.5 cm (*in sicco*) in diameter, almost glabrous. Phyllaries 8–9-seriate, gently recurved to patent; glandular bodies lanceolate, on the inner and middle phyllaries, slightly glutinous; innermost phyllaries narrowly lanceolate, 13–17 mm long; outer phyllaries narrowly lanceolate, 5–10 mm long, clearly shorter than the inner ones, coriaceous, acuminate at apex, terminated with strong spines 1–2 mm long. Corollae pale pink (both in hermaphrodite plants and in female plants), 16–20 mm long; lobes 4–5 mm long; throats 4–5 mm long; tubes 6–10 mm long, longer than the throats. Achenes brownish gray, purplish-striate, 4 mm long, triangular, smooth; pappus sordid white, 9–15 mm long.

Chromosome number: $2n=4x=68$ (Fig. 9).

Distribution: Honshu (Tsuruoka-shi, Yamagata Pref., on the Japan Sea side). Endemic. Growing usually along the margin of warm-temperate woods.

Japanese name: Hagurossan-azami (nov.).

Specimens examined: **JAPAN.** Honshu. **Yamagata Pref.**, Tsuruoka-shi, Soegawa, Mt. Soegawa-yama, alt. ca. 100 m, 6 Nov. 2010, S. Kato s.n. (TNS 01113242–01113244; chromosome voucher $2n=4x=68$); Mt. Soegawa-yama, alt. ca. 180 m, 10 Sept. 2013, Y. Kadota 1325001–1325004 (TNS 01186889–TNS 01186897). Soegawa, in the upper part of Yuno-sawa onsen hot spring, alt. ca. 50 m, 21 Sept. 2013, S. Kato s.n. (TNS 01191706–TNS 01191711); Sanze, Mt. Hachimori-yama, 7 Sept. 2013, S. Kato s.n. (TNS 01185898–TNS 01185901). Higashi-Tagawa-gun, Shônai-machi, Karikawa, Utsuno-rindô forest road, alt. ca. 100 m, 23 Sept. 2013, S. Kato s.n. (TNS 01191697–TNS 01191705).

Etymology: The localities of this new thistle are situated at the foot of Mt. Haguro-san, which is a holy place in Shinto, the traditional Japanese religion. The specific epithet comes from the name of the mountain.

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Fig. 7. Type of *Cirsium hagurossanense* Kadota (Mt. Soegawa-yama, Soegawa, Tsuruoka-shi, Yamagata Pref., alt. ca. 180m, 10 Sept. 2013, Y. Kadota 1325004, TNS01186889, holotype).



Fig. 8. *Cirsium haguosanense* Kadota (Mt. Soegawa-yama, Soegawa, Tsuruoka-shi, Yamagata Pref., on 10 Sept. 2013). Bottom left inset shows female floret (left) and hermaphrodite floret (right). Middle inset shows hermaphrodite, erect capitulum.

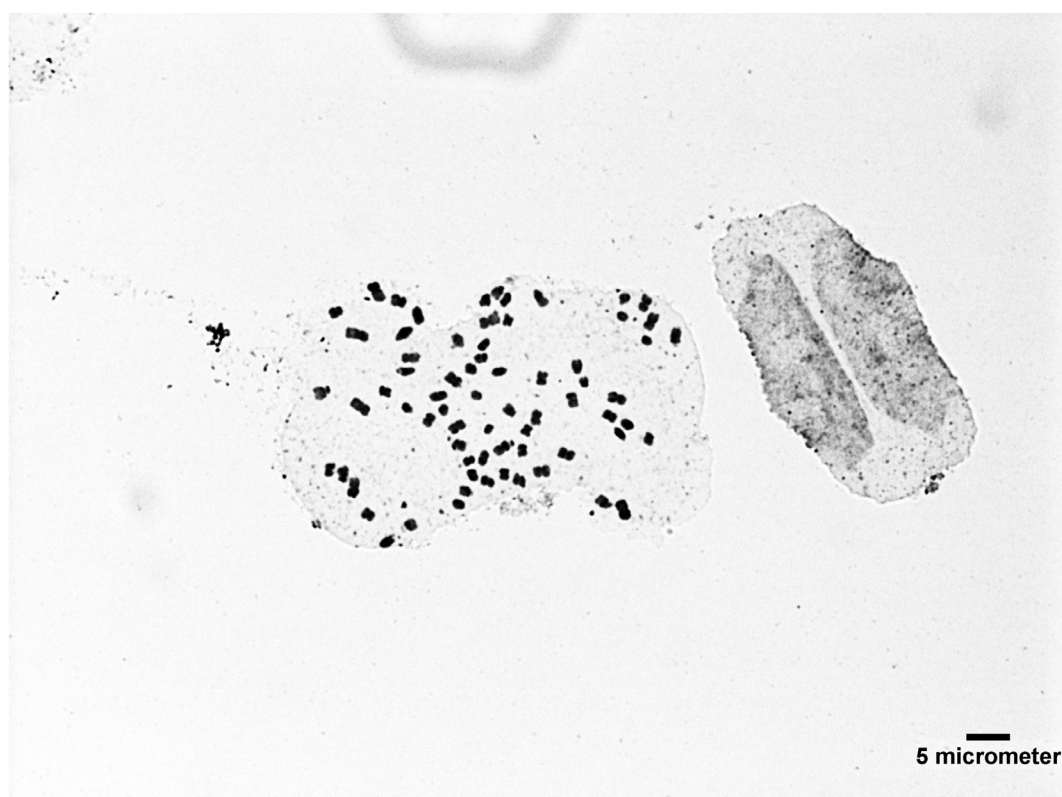


Fig. 9. Somatic chromosomes of *Cirsium haguosanense* Kadota (voucher: Y. Kadota 1325001, Mt. Soegawayama, Soegawa, Tsuruoka-shi, Yamagata Pref.).

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