

## Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XV. Four New Species from Western Japan

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**Abstract** A new subsection and four new species of the genus *Cirsium* in Japan are reported here. *Cirsium masami-saitoanum* Kadota is described from southern Kyushu and characterized by cylindrical involucre and recurved involucre phyllaries. *Cirsium pseudosuffultum* Kadota described from the Shikoku Mountains has been confused with *C. suffultum* (Maxim.) Matsum. from Kyushu and the former is distinguished from by having linear glandular bodies (vittae) as well as cylindrical involucre and recurved involucre phyllaries. *Cirsium ohminense* Kadota is described from the Kii Mountains and is characterized by having well branched stem, cylindrical involucre, recurved involucre phyllaries and lanceolate glandular bodies. A new subsection of sect. *Onotrophe* (Cass.) DC., subsect. *Suffulta*, is proposed for the four species above stated. The subsect. *Suffulta* also includes *C. chikushiense* Koidz. and *C. yakushimense* Masam. *Cirsium lucens* Kitam. var. *opacum* Kitam. is recognized as a distinct species, *C. opacum* (Kitam.) Kadota within the subsect. *Megaphylla* of sect. *Onotrophe*.

**Key words:** Honshu, Kyushu, new species, Shikoku, subsect. *Suffulta*, subsect. nov.

### Introduction

A part of the revisional work on the Japanese *Cirsium* (Asteraceae) I have reported some results based on both field and herbarium examinations (Kadota, 1989–2006; Kadota and Nagase, 1988). Here I will report four new species from western Japan.

*Cirsium suffultum* (Maxim.) Matsum. was believed to be distributed throughout Kyushu (e. g., Hara, 1952; Ohwi, 1953, 1965, 1984; Ohwi (Kitagawa), 1983; Kitamura, 1957, 1981; Masamune, 1974; Sugimoto, 1978; Kadota, 1989, 1995). In October of 2003 Messers. T. Minamitani, M. Saito and K. Kurogi introduced me to the localities of an unknown thistle. The thistle is significantly different from *C. suffultum* in having slender involucre with recurved phyllaries. This thistle will be described here as a new species, *C. masami-saitoanum*. From this time I started to revise taxonomically the *C. suffultum* group.

*Cirsium suffultum* was regarded to be distrib-

uted also in Shikoku (e. g., Hara, 1952; Ohwi, 1953, 1965, 1984; Ohwi (Kitagawa), 1983; Kitamura, 1957, 1981; Masamune, 1974; Sugimoto, 1978; Kadota, 1989, 1995). However, based on my examinations, the thistle from Shikoku is different from true *C. suffultum* from Kyushu and will be described here as *C. pseudosuffultum*. Similarly the thistle from the Ômine Mountains, central Honshu, will be described as *C. ohminense*. Additionally the other two species, *C. chikushiense* Koidz. (southern part of Kagoshima Prefecture) and *C. yakushimense* Masam. (Yakushima Island) are akin to the four species above stated. It is appropriate that these totally six species should be treated to belong to a new subsection of sect. *Onotrophe* (Cass.) DC.

Subsect. *Megaphylla* (Kitam.) Kitam. emend. Kadota (1995, 2006) of sect. *Onotrophe* is characterized by the absence of basal leaves at anthesis and nodding, larger capitula. *Cirsium yezoense* (Maxim.) Makino, a representative of this subsection, is distributed in Hokkaido and Honshu (chiefly on the Japan Sea side; Fukui

Prefecture and eastward). '*Cirsium lucens* Kitam. var. *opacum* Kitam.' is known to be distributed in Shiga Prefecture neighboring to Fukui Prefecture (Kitamura, 1963, 1981). However, it is clarified that '*C. lucens* var. *opacum*' is distinguished from *C. lucens* var. *lucens* on species level (Kadota, 1998a). It is accordingly appropriate that '*C. lucens* var. *opacum*' should be treated as a distinct species and belongs to the subsect. *Megalophylla* of sect. *Onotrophe*.

### Taxonomic treatment

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

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

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

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

Subsect. **Suffulta** Kadota, subsect. nov.

Subsect. *Nipponocirsium* Kitam. in Acta Phytotax. Geobot. 3: 4 (1934); in Mem. Coll. Sci. Kyoto Imper. Univ. ser. B, 13: 106 [Compos. Jap. 1: 106] (1937), p. p.

Subsect. *Megalophylla* auct. non (Kitam.): Kadota, Fl. Jap. IIIb: 125 (1995), p. p.

Herba perennis, hermaphrodita vel gynodioecia, foliis basalibus emarcidis sub anthesin, eis caulinis infernis conglomeratis in parte inferno caulis, capitulis nutantis vel raro obliquis, involucri crateriformibus vel campanulatis vel cylindricis, foliis subtentis prulibus foliaceis, numero chromosomatibus  $2n=4x=68$ .

Type: *Cirsium suffultum* (Maxim.) Matsum.

Hermaphrodite or gynodioecious, perennial herbs. Basal leaves withering at anthesis. Lower cauline leaves crowded together in the lower part of stem. Capitula bowl-shaped to campanulate or cylindrical, nodding or rarely oblique (in the case of *C. ohiminense*; see below); subtending leaves several, foliaceous. Chromosome number  $2n=4x=68$ .

### Key to the species of subsect. *Suffulta*

- 1A. Involucres not provided with glandular bodies (non-glutinous); plant hermaphrodite or gynodioecious
  - 2B. Involucre phyllaries 6-seriate, coriaceous
    - 3C. Involucres bowl-shaped to broadly campanulate or cylindrical, long-pedunculate; plant gynodioecious
      - 4D. Involucres bowl-shaped to broadly campanulate; outer and middle phyllaries ascending. . . . . *C. suffultum*
      - 4D. Involucres cylindrical; outer and middle phyllaries recurved . . . . . *C. masami-saitoanum*
    - 3C. Involucres narrowly cylindrical, subsessile; hermaphrodite plant . . . . . *C. yakushimense*
  - 2B. Involucre phyllaries 8–9-seriate, herbaceous; gynodioecious plant. . . . . *C. chikushiense*
- 1A. Involucres provided with glandular bodies (glutinous); plant always hermaphrodite
  - 2E. Tubes of florets clearly longer than the throats; stem simple, if branched, branches not elongated; glandular bodies frequently degenerated . . . . . *C. pseudosuffultum*
  - 2E. Tubes of florets slightly longer than the throats; stem well branched; branches elongated; glandular bodies well developed . . . . . *C. ohiminense*

### 1. *Cirsium masami-saitoanum* Kadota, sp. nov. [Figs. 1–4]

Differt ab *Cirsio suffulto* involucri anguste cylindricibus, phyllariis involucrorum 9–10-seriatis in plantas hermaphroditas et phyllariis involucrorum mediis et extribus recurvatis; a *C. chikushiense* foliis subtentis paucibus et parvioribus, phyllariis involucrorum mediis et extribus recurvatis et acheniis amplioribus.

TYPE: JAPAN: Kyushu; Miyazaki Pref., Miyazaki-gun, Tano-cho, Mt. Wanitsukayama, alt. 250 m, hermaphrodite, 28 Oct. 2003, Y.



Fig. 1. Habit of a hermaphrodite plant of *Cirsium masami-saitoanum* Kadota (Mt. Wanitsukayama, Miyazaki Pref., Kyushu). Right corner inset shows a capitulum.





Fig. 2. Holotype specimen of *Cirsium pseudosuffultum* Kadota (Mt. Wanitsukayama, Tano-cho, Miyazaki-gun, Miyazaki Pref., Kyushu, 28 Oct. 2003, Y. Kadota 034806, TNS 727861).



Fig. 3. Habit of a female plant of *Cirsium masami-saitoanum* Kadota (Mt. Wanitsukayama, Miyazaki Pref., Kyushu). Left corner inset shows a capitulum with semi-opened stigmata.





Fig. 4. Paratype specimen (female plant) of *Cirsium masami-saitoanum* Kadota (Mt. Wanitsukayama, Tano-cho, Miyazaki-gun, Miyazaki Pref., Kyushu, 28 Oct. 2003, Y. Kadota 034812, TNS 727847).

Kadota 034806 (TNS 727860-727862-holotype!). Miyazaki Pref., Miyazaki-gun, Tano-cho, Mt. Wanitsukayama, alt. 250 m, female, 28 Oct. 2003, Y. Kadota 034812 (TNS 727845-727847-paratype!)

A gynodioecious, perennial, herbaceous plant, 0.7–2.2 m tall. Rootstock stout, horizontal, up to 3 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, well branched from the lower part, sparingly arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull green above, coriaceous to subcoriaceous, sometimes subcarnose, elliptic to narrowly elliptic in outline, deeply to medially pinnatilobate or rarely simple and coarsely serrate, 20–40 cm long, 7–22 cm wide, provided with spines 1–6 mm long, almost glabrous on both sides; petioles 3–5 cm long, glabrous, slightly auriculate, not decurrent; lobes 4–9-jugate, ovate, 2–9 cm long, ascending. Upper cauline leaves similar to the lower in shape but smaller. Flowers in September to November. Capitula 2–5 in a compact corymb or aggregated, nodding; peduncels (0–)1.5–3.0 cm long, densely arachnoid; subtending leaves 3–5, narrowly lanceolate to narrowly ovate-lanceolate, foliaceous, 0.7–2.5 cm long, provided with sharp spine 1–2 mm long. Involucres cylindrical, non-glutinous, 16–21 mm long, 8–14 mm (in hermaphrodite plant; *in vivo*) and 6–7 mm (in female plant; *in vivo*), and 1.5–3 cm (*in sicco*) in diameter, densely arachnoid. Phyllaries 9–10-seriate (in hermaphrodite plant) or 6–7-seriate (in female plant), herbaceous, terminated with sharp spines 1 mm long; glandular bodies absent; inner phyllaries linear-lanceolate, ca. 14 mm long, erect; outer ones broadly ovate with caudate tips ca. 6 mm long, strongly to gently recurved. Corollae violet to pale violet (in hermaphrodite plant) or deep pink (in female flower), 13–20 mm long; lobes 3–4 mm long; throats 5–6 mm long; tubes 6–9 mm long, about two times longer than the throats. Achenes grayish brown, ca. 4 mm long, ribbed; pappi sordid, 10–15 mm long.

Chromosome number:  $2n=4x=68$  (present paper).

Japanese name: Hyûga-azami (nov.).

Distribution and habitat: Kyushu (the Wanitsuka Mountains; Miyazaki and Kagoshima Prefs.). Growing along evergreen woodlands.

Specimens examined: JAPAN: KYUSHU; **Miyazaki** Pref., Miyazaki-gun, Tano-cho, Mt. Wanitsukayama, alt. 250 m, 28 Oct. 2003, Y. Kadota 034802–034806 (TNS 727854–727867), 034810–034812 (TNS 727845–727853); Mt. Wanitsukayama, alt. 300 m, 24 Oct. 2004, Y. Kadota 046001–046011 (TNS 744118–744139), 046015–046020 (TNS 744111–744117); Mt. Wanitsukayama, alt. 725 m, Y. Kadota 056132–056136 (TNS 753512–753518). Kita-Morogata-gun, Yamanokuchi-cho, Tomiyoshi, alt. 160 m, 24 Oct. 2004, Y. Kadota 046045–046049 (TNS 744107–744110); Yamanokuchi-cho, Gotanda, alt. 230 m, 24 Oct. 2004, Y. Kadota 046030–046044 (TNS 744060–744087). Miyakonojo-shi, Yasuhisa-cho, alt. c. 350 m, 26 Sept. 1999, K. Maruno 9924–9930 (TNS 689476, 689521–689522, 689477–689480); Kamiguma, alt. 400 m, 28 Oct. 2003, Y. Kadota 034707–034714 (TNS 727867–727884). Minami-Naka-gun, Kitago-cho, Sowada, alt. 85 m, 28 Oct. 2003, Y. Kadota 034701–034703 (TNS 727830, 727841–727844). Nichinan-shi, Sakatani, alt. ca. 160 m, 28 Oct. 2003, Y. Kadota 034070 (TNS 727780–727781). Kushima-shi, Ôyatori, alt. 140 m, 28 Oct. 2003, Y. Kadota 034951 (TNS 727795–727796).

**Kagoshima** Pref., So'o-shi, Sueyoshi-cho, Hanafusa-kyo, Ikoi-no-mori, 17 Nov. 2003, M. Saito s. n. (TNS 754273).

The specific epithet '*masami-saitoanum*' is dedicated to Mr. Masami Saitô, who have contributed to the study of the flora of Miyazaki Prefecture, Kyushu, Japan.

*Cirsium masami-saitoanum* is discriminated from *C. suffultum* (Maxim.) Matsum. by having cylindrical involucres, 9–10-seriate involucreal phyllaries in female plants and recurved medial and outer onvolucreal phyllaries, and from *C. chikushiense* Koidz. by having fewer subtending leaves, recurved medial and outer onvolucreal phyllaries and larger achenes.

Gynodioecy in the Japanese *Cirsium* was stud-

ied for the first time by Kawakubo (1994, 1995). He observed the degree of degeneration of 'synangia' (integrated anthers) and the presence or absence of pollen grains as markers of male sterility with herbarium specimens kept at KYO. As a result he reported that the male sterility (gynodioecy) was confirmed in more than 40 percent of the Japanese species. He additionally stated that the difference between hermaphrodite and female plants was observed in the size of heads except for the degeneration of anthers and the absence of pollen grains; female plants had heads smaller than those of hermaphrodites.

With respect to the differences between hermaphrodite and female plants I made field observations on natural populations of *C. masamisaitoanum* and the related species in Kyushu during 2003–2005. It was consequently revealed that there were some additional differences between both kinds of plants; in female plants, 1) heads were more in number, 2) florets were deeper, 3) stem was well branched and the branches were elongated, 4) styles of florets turned out to be slightly open. The items 1), 2) and 4) might have close relationships with pollination syndrome. It thought to be important to understand how the unclosed styles do function for pollination because the genus *Cirsium* is characterized by having unopened styles together with the genera *Carduus* and *Breca* (e. g., Kitamura, 1957, 1981).

## 2. *Cirsium pseudosuffultum* Kadota, sp. nov.

[Figs. 5–6]

*Cirsium sufflutum* auct. non (Maxim.) Matsu.: H. Hara, Enum. Sperm. Jap. **II**: 184 (1952), p. p. – Kitam. in Kitam. & al., Col. Illust. Herb. Pl. Jap. **I**: 35 (1957); in Satake & al., Wild Flow. Jap. Herb. Pl. **III**: 219 (1981), p. p. excld. pl. 200, 1–2 – Ohwi, Fl. Jap. 1219 (1953), p. p.; Fl. Jap. rev. ed. 1383 (1965), p. p.; Fl. Jap. Engl. ed. 911 (1984) – Ohwi (Kitag.), Fl. Jap. 1534 (1984) – Kadota in K. Iwats. & al., Fl. Jap. **IIIb**: 125 (1995), p. p.

Haec species affine *Cirsio suffulto*, sed involucri cylindricis, phyllariis involucrorum 9–10-seriatis mediis et extrioribus recurvatis vel paten-

tibus, vittis linealibus vel anguste lanceolatis et flosculis omnibus hermaphroditibus differt.

TYPE: JAPAN: SHIKOKU; Kochi Pref., Takaoka-gun, Tsuno-cho [formerly Higashi-Tsuno-mura], Tengu Highland, Tengu Forest Park, calcareous area, alt. 1055 m, Y. Kadota 045031 (TNS 744298, 744300–744301-holotype!). Kochi Pref., Takaoka-gun, Yusuhara-cho, Okura-dani, alt. 590 m, 11 Oct. 2004, Y. Kadota 045067 (TNS 744284-paratype!). Tokushima Pref., Miyoshi-gun, Higashi-Iyayama-son, Ochiai Pass 33°55'N 133°57'E, alt. ca. 1550 m, 1 Aug. 1994, M. Ogawa 4877 (TKPM BSP35338-paratype!). Tokushima Pref., Naga-gun, Kizawason, Takashiroyama, "Tsurugisan Super Rindo", alt. ca. 1450 m, 16 Sept. 2001, S. Kinoshita 9782 (TNS 731444–731445-paratype!)

A hermaphrodite, perennial, herbaceous plant, 0.4–1.4(–2.0) m tall. Rootstock stout, horizontal, up to 2 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, 2–3 times branched in the upper part, sparingly arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull green above, sometimes variegate, coriaceous to subcoriaceous, elliptic in outline, deeply to medially pinnatifid, 20–40 cm long, 9–16 cm wide, provided with strong spines 3–7 mm long, glabrous on both sides, shortly petiolate, slightly auriculate, not decurrent; lobes 6–8-jugate, ovate, 2–9 cm long. Upper cauline leaves similar to the lower in shape but smaller. Flowers in August to October. Capitula several in a corymb or aggregated, nodding; peduncels (0–)2–15 cm long, densely arachnoid; subtending leaves 3–5, narrowly lanceolate to narrowly ovate-lanceolate, foliaceous, 2–5 cm long, provided with sharp spine 1–2 mm long. Involucres cylindrical, slightly glutinous or non-glutinous, 16–23 mm long, 8–12 mm (*in vivo*) and 2–4 cm (*in sicco*) in diameter, scarcely arachnoid. Phyllaries 9–10-seriate, herbaceous, terminated with sharp spines 1–3 mm long; glandular bodies linear to narrowly lanceolate on middle and inner ones; inner phyllaries linear-lanceolate, ca. 15 mm long, erect; outer ones broadly ovate with caudate tips ca. 6 mm long, recurved or patent. Corollae violet to



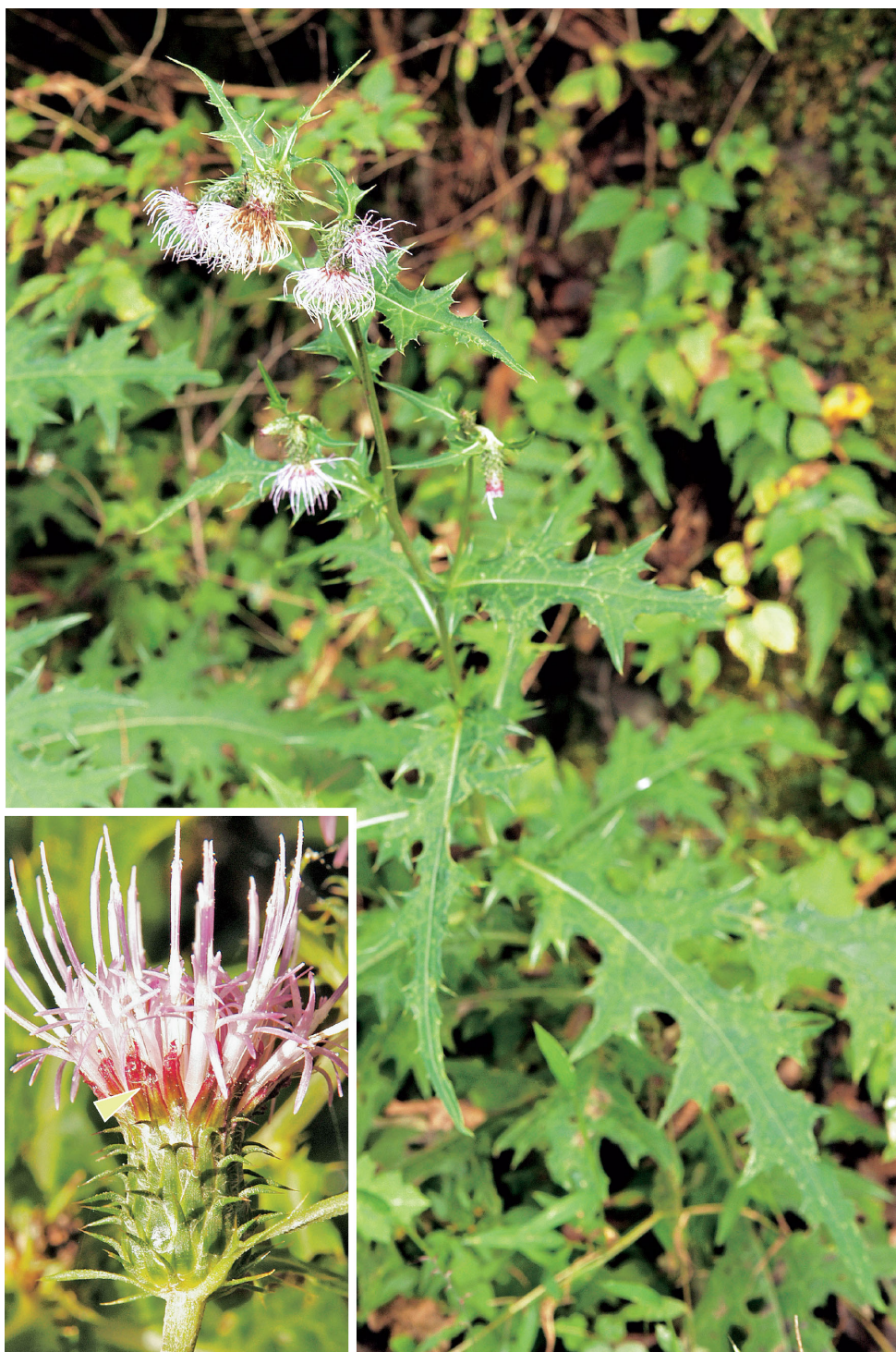


Fig. 5. Habit of *Cirsium pseudosuffultum* Kadota (Tengu-no-Mori, Shikoku Karst, Kochi Pref., Shikoku). Left corner inset shows a capitulum. Arrow shows a glandular body.



Fig. 6. Holotype specimen of *Cirsium pseudosuffultum* Kadota (Tengu-no-Mori, Shikoku Karst, Tsuno-cho, Takaoka-gun, Kochi Pref., Shikoku, 11 Oct. 2004, Y. Kadota 045031, TNS 744300).



pale violet, 18–20 mm long; lobes 4 mm long; throats 5–6 mm long; tubes 9–10 mm long, about two times longer than the throats. Achenes grayish brown, ca. 5 mm long, ribbed; pappi sordid, (13–)18–21 mm long.

Chromosome number:  $2n=4x=68$  (present paper).

Japanese name: Nise-tsukushi-azami (nov.).

Distribution and habitat: Shikoku (the Shikoku Range; Mt. Tsurugisan and its vicinity, the Shikoku Karst and Mt. Onigajōsan; Fig. 0). Growing along the margin of summer-green woodlands and grassland, usually on calcareous soils: alt. 400–1700 m.

*Cirsium pseudosuffultum* is so-called ‘*C. suffultum* in Shikoku’ and is distinguished from *C. suffultum* by having cylindrical involucre, 9–10-seriate, recurved or patent involucre phyllaries, linear to narrow lanceolate glandular bodies (vittae) on the inner and/or middle involucre phyllaries and hermaphrodite florets.

The presence of this species in Mt. Onigajōsan (Ehime Pref.) was confirmed by Mr. S. Miya, however, there are no voucher specimens.

Specimens examined: **JAPAN: SHIKOKU; Tokushima** Pref., Miyoshi-gun, Higashi-Iyayama-son, Ochiai Pass 33°55′N 133°56′E, alt. 1600–1680 m, in *Fagus crenata* woodland, 31 Aug. 1999, M. Ogawa & Y. Ibaragi 8256 (TKPM BSP48490, 4 sheets), 8257 (TKPM BSP48491, 7 sheets), 8258 (TKPM BSP48492, 3 sheets), 8259 (TKPM BSP48493, 5 sheets). Naga-gun, Kizawa-son, Mt. Takashiroyama, “Tsurugisan Super Rindo”, alt. ca. 1450 m, 28 Aug. 2001, S. Kinoshita 9777 (TNS 731437–731438), 9778 (TNS 731432–731435); Mt. Takashiroyama, “Tsurugisan Super Rindo”, alt. ca. 1450 m, 2 Sept. 2001, S. Kinoshita 9787 (TNS 731439–731441); Mt. Takashiroyama, “Tsurugisan Super Rindo”, alt. ca. 1450 m, 16 Sept. 2001, S. Kinoshita 9780 (TNS 731436), 9783 (TNS 731449–731451), 9784 (TNS 731452–731457), 9790 (TNS 731446–731448); Kizawa-son, Kamagaya, alt. ca. 600 m, 2 Sept. S. Kinoshita 9792 (TNS 731442–731443).

**Kochi** Pref. Takaoka-gun, Yusuhara-cho,

Shimagawa, Ryuogu, 29 Oct. 1978, K. Horiuchi 78-281 (TKPM-BSP101617); Yusuhara-cho, Kami-nishinokawa, alt. 460 m, 24 Oct. 1993, Y. Kadota 939015-939018 (TNS 9027228–9027231); Yusuhara-cho, Kanzaiko, 33°23′N 132°57′E, 21 Sept. 2003, H. Hosokawa & al. 60536 (MKB 35730, 66993); Yusuhara-cho, Okura-dani, alt. 590 m, 11 Oct. 2004, Y. Kadota 045060–045068 (TNS 744273–744285); Yusuhara-cho, Nanodani, 33°27′N 132°54′E, 12 Sept. 2004, 1.2 m in height, flowers pink, S. Kobayashi FOK-68642 (MKB 91199, 91200); Yusuhara-cho, Yokokai, alt. 850 m, 11 Oct. 2004, Y. Kadota 045084–045086 (TNS 744245–744250). Tsuno-cho (formerly Higashi-Tsunomura), Tengu Highland, 26 Sept. 1961, T. Yamawaki M61-111 (MKB 14971–14972); Tengu Highland, Tengu-so, 29 Oct. 1978, K. Horiuchi 78-272 (TKPM-BSP101609); Tengu Highland, Tengu-no-mori, 16 Sept. 1990, S. Okumiya 6695 (MKB 14988); Tengu-no-mori, 33°28′N 133°00′E, 16 Oct. 2004, alt. 1400 m, limestone area, flowers pink, S. Kuramoto & al. FOK-69589–69590 (MKB 95194, 95221); Tengu Highland, Tengu Forest Park, calcareous area, alt. 1055 m, Y. Kadota 045021–045030, 045032–045038 (TNS 744291–744315); Tengu Highland, Jiyoshi Pass, Mine-no-dan, alt. 900 m, 24 Oct. 1993, Y. Kadota 939033–939038 (TNS 9027205–9027214); Mine-no-dan, alt. 875 m, 11 Oct. 2004, Y. Kadota 045087 (TNS 744241–741244); Tengu Highland, Mt. Marutakiyama, alt. 1320 m, 24 Oct. 1993, Y. Kadota 939005–939014 (TNS 9027996–9028005); Mt. Irazuyama, alt. 870–910 m, 12 Oct. 2004, Y. Kadota 045070–045083 (TNS 744251–744272); Shikoku Karst, alt. 1415 m, 12 Oct. 2004, Y. Kadota 045090–045093 (TNS 744235–744238). Agawa-gun, Ino-cho (formerly Agawa-mura), Myojinyama, Naka (Nakatsuyama), 3 Nov. 1978, K. Horiuchi 78-313 (TKPM-BSP101613). Tosa-gun, Honkawa-mura, Tebako-goe, alt. 1720 m, 23 Oct. 1993, Y. Kadota 939019–939031 (TNS 9027955–9027970); Honkawa-mura, Mt. Tsutsujōsan, alt. 1640 m, 23 Oct. 1993, Y. Kadota 939001–939004 (TNS 9027278–9027282).



**Ehime** Pref. Higashi-Uwa-gun, Nomura-cho, Ônogahara, 8 Sept. 1975, Y. Koukami M75-188 (MKB 14976). Kami-Ukena-gun, Yanadanimura, Shikoku Karst, 11 Oct. 2003, S. Miya 03-07-03-11 (TNS 724467-724471); Yanadanimura, Nishitani, alt. 825 m, 12 Oct. 2004, Y. Kadota 045094-045096 (NS 744232-744234).

### 3. *Cirsium ohminense* Kadota, sp. nov.

[Figs. 7-8]

Differt ab *Cirsio suffluto* caule multo ramoso, vittis lanceolatis et tubis flosculorum faucibus plus minusve longioribus.

TYPE: JAPAN: HONSHU; Nara Pref., Yoshino-gun, Kami-Kitayama-mura, Wasamata Ski Slope, alt. 1090 m, 30 Sept. 2003, Y. Kadota 033501 (TNS 727675-727677-holotype!).

A hermaphrodite, perennial, herbaceous plant, 0.7-1.8 m tall. Rootstock stout, horizontal, up to 2 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, well branched from the lower part, sparingly arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull green above, coriaceous, frequently variegate, broadly elliptic in outline, deeply pinnatifid, 22-40 cm long, 15-22 cm wide, provided with strong spines 3-12 mm long, pubescent with brownish multicellular short hairs on the adaxial side, arachnoid on the abaxial side, sessile, slightly auriculate, not decurrent; lobes 6-9-jugate, narrowly ovate, 3-12 cm long, subpatent. Upper cauline leaves similar to the lower in shape but smaller. Flowers in September to October. Capitula 3-5, aggregated or in a compact corymb, nodding; peduncles 0.2-6.5 cm long, densely arachnoid; subtending leaves several, linear to narrowly ovate-lanceolate, foliaceous, 1-8 cm long, provided with sharp spines up to 10 mm long. Involucres cylindrical, glutinous, 20-24 mm long, 8-12 mm (*in vivo*), and 2-3 cm (*in sicco*) in diameter, arachnoid. Phyllaries 9-10-seriate, herbaceous, terminated with sharp spines 1-3 mm long; glandular bodies lanceolate on the middle and inner phyllaries; inner phyllaries linear-lanceolate, ca. 19 mm long, erect; outer ones ovate with caudate tips ca. 6 mm long, strongly

recurved. Corollae violet to pale violet, 18-22 mm long; lobes 4-5 mm long; throats 6-7 mm long; tubes 8-9 mm long, slightly longer than the throats. Achenes grayish brown, 4-5 mm long, non-ribbed; pappi sordid, 12-15 mm long.

Chromosome number:  $2n=4x=68$  (present paper).

Japanese name: Ômine-azami (nov.).

Distribution and habitat: Honshu, Kii Mountains (the Ômine Range and Ôdaigahara Mountains; Nara Pref.). Growing along the margin of summer-green woodlands; alt. 1000-1400 m.

Specimens examined: **JAPAN: HONSHU; Nara Pref.**, Yoshino-gun, Kami-Kitayama-mura, Wasamata Ski Slope, alt. 1090 m, 30 Sept. 2003, Y. Kadota 033502 (TNS); Kami-Kitayama-mura, Ôdai-ga-hara Driveway, alt. 1100 m, 30 Sept. 2003, Y. Kadota 033801, 033805-033806 (TNS); Kami-Kitayama-mura, Ôdai-ga-hara Driveway, alt. 1390 m, 30 Sept. 2003, Y. Kadota 033501-033507 (TNS 727724-727738).

*Cirsium ohminense* is distinguished from *C. sufflutum* by having well branched stem with elongated branches, lanceolate glandular glandular bodies on the middle and inner involucre phyllaries and floret tubes slightly longer than the throats and from *C. nipponicum* var. *yoshinoi* (Nakai) Kitam. ex Kitam. & Murata by having larger, more lower cauline leaves and subtending leaves and lanceolate glandular bodies on the middle and inner involucre phyllaries.

Subsect. **Megalophylla** (Kitam.) Kitam. in Mem. Coll. Sci. Kyoto Imper. Univ. ser. B, **13**: 51 [Compos. Jap. **1**: 51] (1937), emend. Kadota, Fl. Jap. **IIIb**: 125 (1995), p. p. excl. *C. lucens* var. *lucens*.

Sect. *Megalophylla* Kitam. in Acta Phytotax. Geobot. **3**: 2 (1934), p. p.

subsect. *Megalophylla* (Kitam.) Kitam. ser. *Yezoensia* Kitam. in Acta Phytotax. Geobot. **3**: 2 (1934); in Mem. Coll. Sci. Kyoto Imper. Univ. ser. B, **13**: 51 [Compos. Jap. **1**: 51] (1937).

Lectotype (Kadota, 2006): *Cirsium yezoense* (Maxim.) Makino.



Fig. 7. Habit of *Cirsium ohminense* Kadota (Wasamata Ski Area, Kami-Kitayama-mura, Yoshino-gun, Nara Pref., Honshu). Left corner inset shows a capitulum. Arrows show glandular bodies.





Fig. 8. Holotype specimen of *Cirsiium ohminense* Kadota (Wasamata Ski Area, Kami-Kitayama-mura, Yoshino-gun, Nara Pref., Honshu, 30 Sept. 2003, Y. Kadota 033501, TNS 727676).



4. ***Cirsium opacum*** (Kitam.) Kadota, stat. nov. – *Cirsium lucens* Kitam. var. *opacum* Kitam. in Acta Phytotax. Geobot. **19**: 179 (1963); in Satake & al., Wild. Flow. Jap. Herb. Pl. **III**: 215 (1981).

TYPE: JAPAN: “Hondo, Prov. Ohmi: Taira, Katsurakawa, Katatacho” [HONSHU; Shiga Pref., Ôtsu-shi, Katsurakawa, Taira], 5 Nov. 1961, S. Kitamura & G. Murata 2131 (KYO-holotype!; TNS 186716-isotype!).

[Kadota, 1988a; Fig. 2]

A hermaphrodite, perennial, herbaceous plant, 0.7–2.0 m tall. Rootstock stout, horizontal, up to 3 cm in diameter, with cord-like thin roots. Stem sulcate, suberect, well branched from the middle part, arachnoid. Basal leaves withering at anthesis. Lower cauline leaves dull yellowish green above, somewhat carnose, broadly elliptic in outline, deeply to medially pinnatilobate, 30–50 cm long, 14–26 cm wide, provided with strong spines 2–7 mm long, pubescent with brownish, multicellular, short hairs on the adaxial side, arachnoid on the abaxial side, sessile or 3–6 cm long, clearly auriculate, not decurrent; lobes 4–7-jugate, narrowly ovate, 2–12 cm long, ascending. Upper cauline leaves similar to the lower in shape but smaller, sessile. Flowers in September to November. Capitula several in a loose corymb, nodding; peduncles 3–18 cm long, densely arachnoid; subtending leaves several, linear to narrowly ovate-lanceolate, foliaceous, 1–5 cm long, provided with sharp spines 1–5 mm long. Involucre bowl-shaped to campanulate, no-glutinous, 22–25 mm long, 1.5–2 cm (*in vivo*), and 3.5–4.5 cm (*in sicco*) in diameter, arachnoid. Phyllaries 8–9-seriate, herbaceous, terminated with weak spines ca. 1 mm long; glandular bodies absent; inner phyllaries linear-lanceolate, ca. 20 mm long, erect; outer ones ovate with acuminate tips, ca. 5 mm long, one-fourth of the inner ones, ascending. Corollae violet to pale violet, 21–22 mm long; lobes 3–5 mm long; throats 7–8 mm long; tubes 9–10 mm long, slightly longer than the throats. Achenes white-yellowish brown, ca. 4.5 mm long, minutely striate; pappi sordid, 14–19 mm long.

Specimens examined: JAPAN: HONSHU; Shiga Pref., Ôtsu-shi, Katsurakawa, Kidoguchi-cho, alt. 400 m, 22 Sept. 1976, S. Mimoro & al. 12696 (TNS 371159); Ôtsu-shi, Katsurakawa, Nakamura-cho, alt. 300 m, 2 Nov. 1973, M. Tanimoto s. n. (Plantae Japonicae exsiccatae no. 1185; TNS 324500); Ôtsu-shi, Katsurakawa, Nakamura-cho, Egadani, alt. 360 m, 14 Oct. 1995, Y. Kadota 959001–959004 (TNS 930717–930730); Ôtsu-shi, Katsurakawa, Nakamura-cho, Egadani, alt. 320 m, 17 Oct. 1996, Y. Kadota 969001–969004 (TNS 642192–642200).

Chromosome number: unknown.

Japanese name: Katsurakawa-azami (Kitamura, 1963).

Distribution and habitat: Honshu (along the upper streams of the River Adogawa; Shiga Pref.). Growing along the margin of summer-green woodlands: alt. 300–400 m. Endemic.

*Cirsium lucens* Kitam. is different from *C. opacum* in having yellowish white flowers and outer involucreal phyllaries with ascending caudate tips up to 10 mm long (Kadota, 1998a). The locality of *C. lucens* (Kuma-mura, Kumamoto Pref., Kyushu) is distant from that of *C. opacum* by more than 600 km in beeline distance. It is therefore appropriate that the two entities are different on specific level.

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