

Taxonomic Studies of *Cirsium* (Asteraceae) in Japan XVII. Two New Species from Hokkaido and Honshu

Yuichi Kadota

Department of Botany, National Museum of Nature and Science,
4-1-1 Amakubo, Tsukuba, 305-0005 Japan
E-mail: kadota@kahaku.go.jp

Abstract *Cirsium ito-kojianum* is described from eastern Hokkaido and is distinguished from *C. kamtschaticum* by having well branched stem with divaricate, elongated branches, (8–)9–10-seriate involucrel phyllaries, longer florets, thicker peduncles and ribbed achenes; from *C. boreale* by well branched stem with divaricate, elongated branches, thicker peduncles, pinnatilobate, middle cauline leaves, vestigial glandular bodies and longer, outer involucrel phyllaries. *Cirsium yoshidae* is described from Mie Pref., Honshu and is clearly distinguished from *C. grandirosuliferum* by having stem branched below the middle of stem with elongated branches, 10–11-seriate involucrel phyllaries, several subtending leaves, longer florets 18–20 mm long, narrowly ovate and ascending to recurved involucrel phyllaries and oblanceolate to lanceolate but almost vestigial glandular bodies.

Key words: *Cirsium ito-kojianum*, *Cirsium yoshidae*, Hokkaido, Honshu, new species.

Introduction

In order to prepare a monograph on the Japanese *Cirsium* (Asteraceae) I have reported some results based on both field and herbarium examinations (Kadota, 1989–2007; Kadota and Nagase, 1988). Here I will report two new species from Hokkaido and Honshu, Japan.

Thistles characterized by large nodding heads and deeply pinnatilobate cauline leaves grow in the maritime grasslands facing the Pacific Ocean, Kushiro and Nemuro Subprefectures, Hokkaido. This thistle was regarded as *C. kamtschaticum* Ledeb. ex DC. (Kitamura, 1937; Kitamura *et al.*, 1957; Ko. Ito, 1987; Kadota, 1995) or *C. pectinellum* A. Gray (Umezawa, 2007). However, this thistle is different from both *Cirsium* species by having (8–)9–10-seriate involucrel phyllaries, several subtending leaves, thicker peduncles and larger florets. Especially heads are larger than both species and they are rather ‘suspending’ than ‘nodding’.

In late October of 2007 some living materials of *Cirsium* were sent from Dr. Kuniji Yoshida to

me. These materials were collected by him at Iseki, Tsu-shi, Mie Prefecture, central Honshu and he noticed the presence of this thistle there about 20 years ago (Yoshida, pers. comm.). This thistle resembled *C. grandirosuliferum* in having rosulate, basal leaves, numerous erect heads and narrowly cylindrical involucrel. However, this thistle is clearly different from *C. grandirosuliferum* by having ascending to recurved, middle and outer phyllaries and vestigial glandular bodies at first sight. Furthermore this thistle is restricted to Mie Prefecture, central Honshu, on the contrary *C. grandirosuliferum* is distributed in Gifu and Nagano Prefectures. The range of this thistle is far from that of *C. grandirosuliferum* by ca. 200 km. In November of 2007 I made a field study in Mie Prefecture and it was concluded that this thistle belongs to a distinct species, *Cirsium yoshidae*.

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. **Borealicola** Kitam. in Acta Phytotax. Geobot. **3**: 7 (1934).

1. **Cirsium ito-kojianum** Kadota, sp. nov.

[Figs. 1–2]

Cirsium kamtschaticum auct. non Ledeb. ex DC.: Kitam. in Mem. Coll. Sci. Kyoto Univ., ser. B [Compos. Jap. I] **13**: 42 (1937), pl. Nemuro; in Kitam. *et al.*, Col. Illust. Herb. Pl. Jap. **I**: 33 (1957), p. p. — Ko. Ito *et al.*, Check List High. Pl. Hokkaido **IV**: 158 (1987), p. p. — Kadota, Fl. Jap. **IIIb**: 139 (1995), p. p.

Cirsium pectinellum auct. non A. Gray: Umezawa, Wild Fl. Hokkaido 211, photo (2007).

Differt ab *Cirsio kamtschatico*, caule bene ramoso ramis divaricatis, phyllariis involucrium (8–)9–10-seriatis, flosculis longioribus, pedunculis crassioribus, acheniis costatis; ab *C. boreali*, caule bene ramoso ramis divaricatis, pedunculis crassioribus, foliis mediis caulinis pinnatilobatis, vittis vestigialibus non nisi super phyllariis involucrium intimis, phyllariis exterius involucrium longioribus.

TYPE: JAPAN: HOKKAIDO; Kushiro Subpref., Akkeshi-gun, Akkeshi-cho, Tokotan, 42°59'44"N 144°52'26"E, alt. 20 m, 2 August 2007, Y. Kadota 073454 (TNS 768100 — holotype; Fig. 2).

A hermaphrodite, perennial, herbaceous plant, 0.25–2 m tall. Rootstock stout, horizontal, up to 3 cm in diameter, with cord-like roots. Stem declining to erect, well branched from the middle part or sometimes simple, leafy, spiny-winged, arachnoid and covered with short brownish hairs in the upper part. Basal leaves usually withering at anthesis or persistent in windy locations near the seashore. Lower cauline leaves bright green on the adaxial side, thick and somewhat fleshy, auriculate and amplexicaul, decurrent, long petiolate; blades ovate to broadly ovate in outline,

10–52 cm, 7–26 cm broad, glabrous on the adaxial side and pubescent with long brownish hairs along midribs on the abaxial side, shallowly to medially pinnatilobate, 5–8-jugate; lobes narrowly ovate, 2.5–10 cm long, 0.7–5.5 cm broad, with weak spines 1–3 mm long; petioles 3.5–21 cm long, spiny-winged. Middle and upper cauline leaves shallowly pinnatilobate to coarsely dentate, sessile, auriculate and amplexicaul, decurrent. Flowers in July to September. Capitula 2–3 in a loose raceme or solitary, hanging down to nodding, with peduncles 2–3 cm long, 3–5 mm in diameter at apex; subtending leaves 2–5, linear to narrowly lanceolate, 1–2 cm long, with sharp spines 3–7 mm long. Involucres bowl-shaped to broadly campanulate, 20–25 mm long, 20–30 mm (*in vivo*) and 40–60 mm (*in sicco*) in diameter, sparingly to densely arachnoid. Phyllaries (8–)9–10-seriate, ascending to subpatent; glandular bodies vestigial only on the inner ones, narrowly lanceolate, eglutinous; outer phyllaries narrowly ovate with long acuminate tips, 10–15 mm long, slightly shorter than the inner ones, herbaceous, terminated with sharp spines ca. 2 mm long. Corollae deep pink, (13–)18–22 mm long; lobes 4–6 mm long; throats 4–6 mm long; tubes (5–)8–14 mm long, usually longer than the throats. Achenes purplish brown, 4–4.5 mm long, ribbed; pappus sordid, (10–)15–17 mm long.

Chromosome number: $2n=4x=68$.

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

Distribution: Hokkaido (the Nemuro Peninsula, Kushiro and Nemuro Subprefs., the maritime region facing the Pacific Ocean; Fig. 3).

Additional specimens examined: JAPAN: HOKKAIDO; Kushiro Subpref., Kushiro-shi, Tottori, 25 July 1960, T. Ozaki s.n. (TNS 152917). Kushiro-cho, Konbumori, 42°58'17"N 144°31'50"E, alt. 80 m, 2 August 2007, Y. Kadota 073491–073492 (TNS 768113–768116). Akkeshi-gun, Akkeshi-cho, Akkeshi, 14 July 1971, S. Minoru and S. Tsugaru s.n. (TNS 339716); Akkeshi-cho, Tokotan, 42°59'44"N 144°52'26"E, alt. 20 m, 2 August 2007, Y. Kadota 073451–073453, 073455–073458 (TNS



Fig. 1. Habit of *Cirsium ito-kojianum* Kadota (JAPAN: HOKKAIDO; Kushiro Subpref., Akkeshi-gun, Hamanaka-cho, Biwase, 43°02'59"N 145°05'01"E, alt. 10 m, 2 August 2007). Right corner inset shows a "suspending" capitulum.



Fig. 2. Type specimen of *Cirsiium ito-kojianum* Kadota (JAPAN: HOKKAIDO; Kushiro Subpref., Akkeshi-gun, Akkeshi-cho, Tokotan, 42°59'44"N 144°52'26"E, alt. 20 m, 2 August 2007, Y. Kadota 073454, TNS 768100, holotype).

768085–768099, 768102–768112); Akkeshi-cho, Namida-misaki Cape, 42°59'46"N 145°00'28"E, alt. 70 m, 2 August 2007, Y. Kadota 073461–073463 (TNS 768213–768215);

Hamanaka-cho, Biwase, 43°02'59"N 145°05'01"E, alt. 10 m, 2 August 2007, Y. Kadota 073481–073485 (TNS 768191–768197); Hamanaka-cho, Kiritappu, 43°04'21"N 145°07'47"E, alt. 10 m, 2

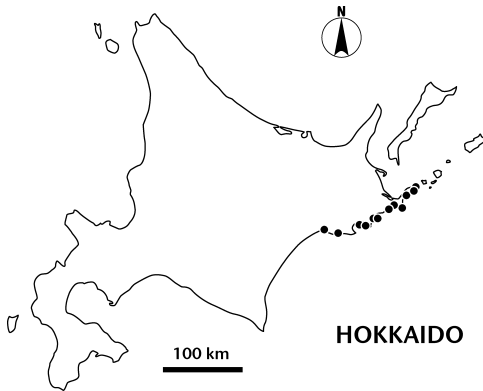


Fig. 3. Distribution of *Cirsium ito-kojianum* Kadota.

August 2007, Y. Kadota 073471–073473 (TNS 768200–768211). Nemuro Subpref., Nemuro-shi, Ochiishi to Ochiishi-misaki Cape, 11 August 1970, G. Murata 21152 (TNS 276977); Ochiishi, 12 July 1972, J. Haginiwa 4637 (TNS 954637); Ochiishi, 9 July 1975, J. Haginiwa 11072 (TNS 961072); Ochiishi, alt. 40 m, 7 September 1986, Y. Kadota 13849–13854 (TNS 9026644–9026639); Bettoga, alt. 40 m, 7 September 1986, Y. Kadota 13817, 13832 (TNS 9026602); Habomai, 14 August 2007, S. Umezawa 07081404 (TNS 767906–767909); Nosappu, 11 July 1972, J. Haginiwa 4629 (TNS 954629); Nosappu, 14 August 2007, S. Umezawa 07081401–07081403 (TNS 767910–767912); Goyōmai, 11 July 1972, J. Haginiwa 4627, 4628, 4635, 4636 (TNS 954627, 954628, 954635, 954636); On'nemoto to Goyōmai, 11 July 1972, J. Haginiwa 4634, 4638 (TNS 954634, 953638).

The specific epithet is dedicated to Professor Emeritus Dr. Koji Ito who found this thistle and noticed that this is different from *C. kamtschaticum* Ledeb. ex DC. for the first time (Nishikawa, pers. comm.).

Cirsium ito-kojianum is distinguished from *C. kamtschaticum* by having well branched stem with divaricate, elongated branches, (8–)9–10-seriate involucre phyllaries, longer florets, thicker peduncles and ribbed achenes; from *C. boreale* Kitam. by having also well branched stem with divaricate, elongated branches, thicker

peduncles, pinnatifid, middle cauline leaves, vestigial glandular bodies and longer, outer involucre phyllaries. Both *C. kamtschaticum* and *C. boreale* do not occur in the Nemuro Peninsula.

Cirsium ito-kojianum grows in maritime grasslands associated with *Thalictrum minus* var. *hypoleucum*, *Potentilla sprengeliana*, *Rosa rugosa*, *Rubus parvifolius*, *Sanguisorba tenuifolia*, *Lespedeza bicolor*, *Geranium yesoense*, *Angelica sachalinensis*, *Hypericum erectum*, *Bupleurum longiradiatum* var. *elatius*, *Galium verum* subsp. *asiaticum* var. *trachycarpum*, *Scabiosa japonica* var. *acutiloba*, *Adenophora triphylla* var. *japonica*, *Artemisia japonica* subsp. *littorica*, *Festuca ovina*, *F. rubra*, *Miscanthus sinensis* etc.

2. A new species from Honshu

Subsect. **Angustiinvolucrae** Kadota, Fl. Jap. **IIIb**: 135 (1995).

Cirsium yoshidae Kadota, sp. nov.

[Figs. 4–5, 6A]

Differt ab *Cirsio grandirosulifero*, caule bene ramoso ramis divaricatis, phyllariis involucre 10–11-seriatis, flosculis longioribus, foliis subtentorum pluribus, phyllariis exterinis involucre anguste ovatis vel lanceolatis, ascendentibus vel recurvatis, 3–4 mm longis, vittis oblanceolatis vel lanceolatis fere vestigialibus.

TYPE: JAPAN: HONSHU; Mie Pref., Taki-gun, Taki-cho, Ōka, Ekuni, 34°30'34"N 136°35'17"E, on the small slope along a road from Aramaki to Nishi-Ikegami near the JR Railway, alt. 20 m, 3 November 2007, Y. Kadota 078106 (TNS 768134 — holotype; Fig. 5).

A hermaphrodite, perennial, herbaceous plant, 0.4–2 m high. Root stock sturdy, horizontal to oblique, up to 1 cm in diameter, with firm, cord-like roots. Stem erect to inclining, sulcate, well branched below the middle part, arachnoid and covered with brownish hairs in the upper part; branches elongated. Basal leaves dull green, coriaceous, somewhat fleshy, persistent at anthesis and rosulate; blades narrowly obovato-lanceolate in outline, 14–40 cm long, 6–12 cm wide, glabrous to densely covered with short brownish hairs on the adaxial side, covered with short



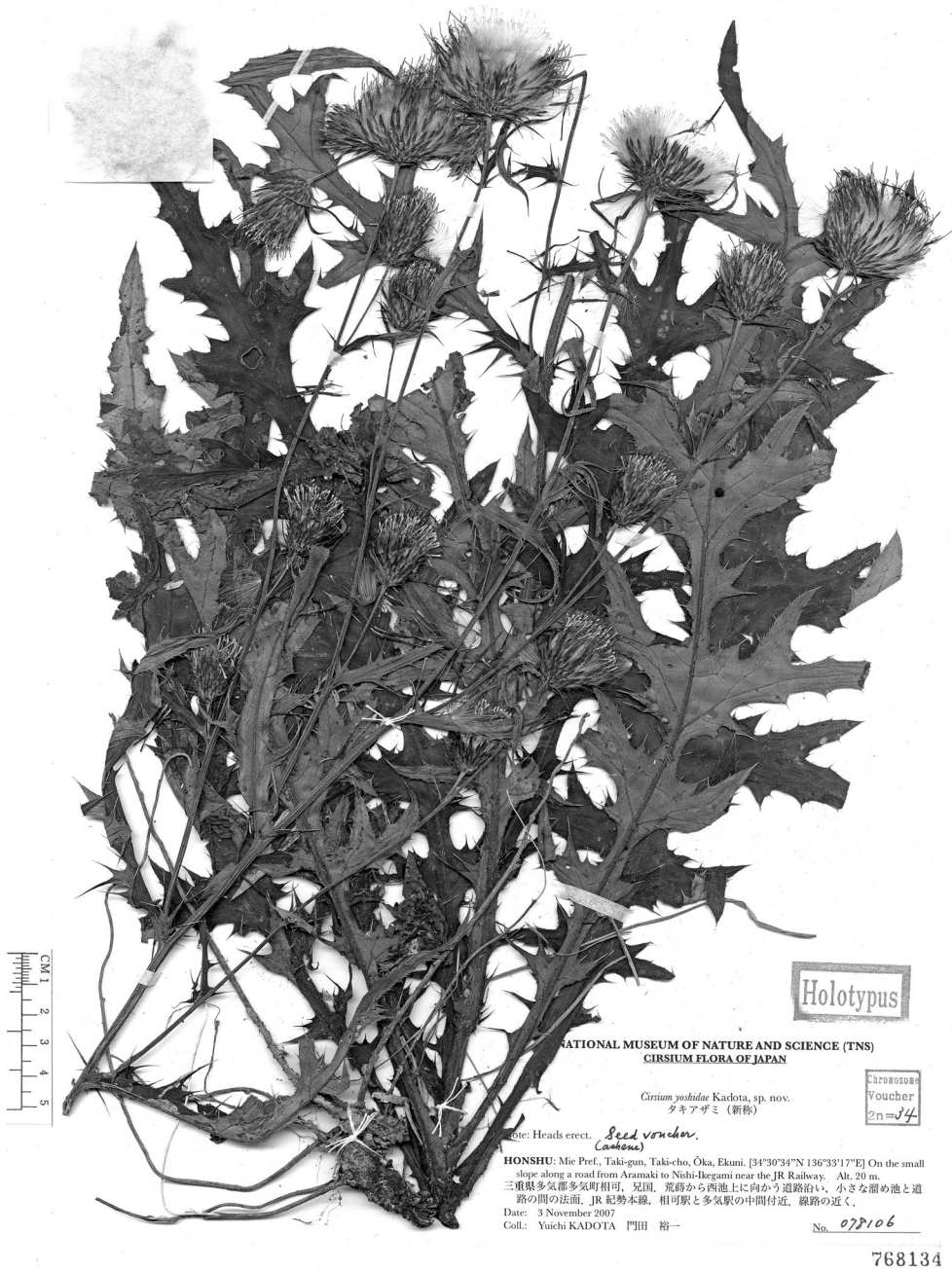


Fig. 5. Type specimen of *Cirsium yoshidae* Kadota (JAPAN: HONSHU; Mie Pref., Taki-gun, Taki-cho, Ôka, Ekuni, 34°30'34"N 136°35'17"E, alt. 20 m, 3 November 2007, Y. Kadota 078106, TNS 768134, holotype).

Fig. 4. Habit of *Cirsium yoshidae* Kadota (JAPAN: HONSHU; Mie Pref., Taki-gun, Taki-cho, Ôka, Ekuni, 34°30'34"N 136°35'17"E, alt. 20 m, 3 November 2007). Left corner inset shows an erect capitulum.



Fig. 6. Comparison between *Cirsium yoshihidae* Kadota and *C. grandirosuliferum* Kadota in involucre. A. *C. yoshihidae* (JAPAN: HONSHU; Mie Pref., Taki-gun, Taki-cho, Ôka, Ekumi). B. *C. grandirosuliferum* (JAPAN: HONSHU; Nagano Pref., Kiso-gun, Nagiso-machi, Fukibata).

brownish hairs along the veins on the abaxial side, medially to deeply pinnatilobate, with petioles 2–6 cm long, amplexicaul; lobes 5–8-jugate, ovate, 0.5–6 cm long, 0.5–3 cm wide, with sharp spines 2–4 mm long. Cauline leaves few, lanceolate and smaller than the basal, diminishing in size, similarly pubescent to the basal, sessile, not amplexicaul. Flowers in late October to November. Capitula erect to oblique, 3–4 to numerous in a loose corymb or solitary, long pedunculate; peduncles (1–)6–20 cm long, densely arachnoid; subtending leaves several, narrowly elliptic and foliaceous to lanceolate, 0.5–5 cm long, provided with sharp spines 1–2 mm long. Involucres cylindrical to narrowly cylindrical, slightly glutinous, 17–20 mm long, 5–12 mm (*in vivo*) and ca. 20 mm (*in sicco*) in diameter, arachnoid. Phyllaries 10–11-seriate, subcoriaceous, terminated with sharp spines ca. 1 mm long; innermost phyllaries broadly linear, ca. 20 mm long, erect; middle phyllaries lanceolate, ca. 1 cm long, ascending to recurved; outer phyllaries narrowly ovate with strongly or gently recurved with caudate tips, 2–3 mm long, 1/5 shorter than the inner ones; glandular bodies narrowly oblanceolate on the inner ones, narrowly lanceolate on the middle ones, vestigial. Corollae pale pinkish violet, 18–20 mm long; lobes 3–5 mm long; throats 7–8 mm long; tubes 8–9 mm long, slightly longer than the throats. Achenes brownish gray, ca. 4 mm long, ribbed, finely striate, tapered to the base; pappi sordid, 10–16 mm long.

Chromosome number: $2n = 2x = 34$.

Distribution: Central Honshu (Mie Pref.; Fig. 7). Endemic.

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

Additional specimens examined: JAPAN: HONSHU; Mie Pref., Taki-gun, Taki-cho, Ôka, Ekuni, 34°30'34"N 136°35'17"E alt. 20 m, 3 November 2007, Y. Kadota 078101–078105, 078107–078127 (TNS 768120–768133, 758135–768151, 769315–769320). Tsu-shi (formerly Ichishi-gun), Ichishi-cho, Iseki, October 2007, K. Yoshida 07-01–07-03 (TNS 768152–768154).

The specific epithet “*yoshidae*” is dedicated to Dr. Kuniji Yoshida, the discoverer of this new

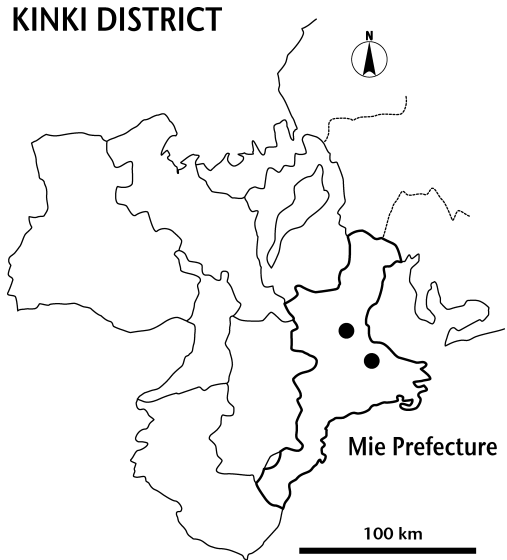


Fig. 7. Distribution of *Cirsium yoshidae* Kadota.

species.

Cirsium yoshidae is similar to *C. grandirosuliferum* Kadota in having rosulate, basal leaves at anthesis, erect heads, cylindrical to narrowly cylindrical involucre and the chromosome number of $2n = 2x = 34$. However, *C. yoshidae* is clearly distinguished from *C. grandirosuliferum* by the mode of stem branching (branched below the middle of stem with elongated branches vs. branched above the middle part of stem with less elongated branches), the number of involucre phyllaries (10–11-seriate vs. 13–14-seriate), the number of subtending leaves (several to none or few), the size of florets (18–20 mm long vs. 14–18 mm long), the shape and direction of involucre phyllaries (narrowly ovate and ascending to recurved vs. ovate and appressed), the shape and state of glandular bodies (oblanceolate to lanceolate but almost vestigial vs. oblanceolate to elliptic and well developed). *Cirsium grandirosuliferum* is distributed in Gifu and Nagano Prefectures, central Honshu (Kadota, 1995, Fig. 2), and grows in marshlands. However, *C. yoshidae* never grows in wet grounds.

Cirsium yoshidae is distributed only in Mie Prefecture, Honshu, central Japan (Fig. 7). This thistle grows in grasslands together with *Osmun-*

da japonica, *Athyrium niponicum*, *Clematis terniflora*, *Rubus illecebrosus*, *Sanguisorba officinalis*, *Adenophora triphylla* var. *japonica*, *Artemisia indica* var. *maximowiczii*, *Aster yomena*, *Eupatorium makinoi* and so on. Such a type of vegetation is quite common in this area and there is no novelty in the vegetation type. Geologically the area is covered with sediment from the Quaternary. It is therefore unknown why *C. yoshidae* is restricted to the narrow area in Mie Prefecture.

Acknowledgement

I wish to give my sincere thanks to Prof. Dr. T. Nishikawa for his counting the chromosome numbers of *Cirsium ito-kojanum* and *C. yoshidae* and his guidance to the Kushiro and Akkeshi area, Hokkaido; to Mr. S. Umezawa for his presenting herbarium specimens and photographs of *C. ito-kojanum*; to Dr. K. Yoshida for his guidance to the localities of *C. yoshidae* and presenting herbarium specimens of this species.

References

- Ito, Ko., Hinoma, A. and Takugin Research Institute. 1987. *Cirsium*. Check List of Higher Plants in Hokkaido IV (sympetalae): 157–162. Takugin Research Institute, Sapporo (in Japanese).
- Kadota, Y. 1989. Genus *Cirsium*. In: Ono, M., Ohba, H. and Nishida, M. (eds.), Makino's New Illustrated Flora of Japan. pp. 799–807. Hokuryukan, Tokyo (in Japanese).
- Kadota, Y. 1990. Taxonomy and distribution of *Cirsium brevicaulis* A. Gray and its related species (Asteraceae). *Memoir of the National Science Museum* (23): 51–61.
- Kadota, Y. 1991. Taxonomic studies of *Cirsium* (Asteraceae) of Japan I. Alpine species of central Honshu — the *Cirsium fauriei* group. *Bulletin of the National Science Museum, Series B* 17: 123–139.
- Kadota, Y. 1993. Lectotypification of six species and a new species of Japanese *Cirsium* (Asteraceae). *Bulletin of the National Science Museum, Series B* 19: 45–57.
- Kadota, Y. 1995a. Genus *Cirsium* (Asteraceae). In: Iwatsuki, K., Yamazaki, T., Boufford, D.E. and Ohba, H. (eds.), Flora of Japan new English ed., 2nd ed. IIIb: 119–151. Maruzen, Tokyo.
- Kadota, Y. 1995b. Taxonomic studies of *Cirsium* (Asteraceae) of Japan II. Three new species and a new variety of *Cirsium nipponicum* (Maxim.) Makino from central Honshu. *Bulletin of the National Science Museum, Series B* 20: 13–27.
- Kadota, Y. 1996. *Cirsium abukumense* — a new species of *Cirsium* (Asteraceae) from the Abukuma Mountains, northeastern Japan. *Memoir of the National Science Museum* (29): 93–98.
- Kadota, Y. 1997a. Taxonomic studies of *Cirsium* (Asteraceae) of Japan III. *Cirsium occidentalinipponense*, sp. nov. with special reference to the lectotypification of *Cirsium borealinipponense* Kitam. *Bulletin of the National Science Museum, Series B* 23: 115–125.
- Kadota, Y. 1997b. Genus *Cirsium*. In: Shimizu, T. (ed.), Flora of Nagano Prefecture, pp. 1127–1140. Shinano Mainichi Shinbunsha, Nagano (in Japanese).
- Kadota, Y. 1998a. Taxonomic studies of *Cirsium* (Asteraceae) of Japan IV. Notes on *Cirsium lucens* Kitam. from southwestern Japan. *Memoir of the National Science Museum* (30): 65–71.
- Kadota, Y. 1998b. Taxonomic studies of *Cirsium* (Asteraceae) of Japan V. *Cirsium umezawanum*, a new species from Island Rishiri, Hokkaido and a new white-flowered form of *Cirsium amplexifolium* Kitam. *Bulletin of the National Science Museum, Series B* 24: 147–156.
- Kadota, Y. 1999. Taxonomic studies of *Cirsium* (Asteraceae) of Japan VI. Two new species, *Cirsium hidakamontanum* and *Cirsium zawoense* from northern Japan. *Bulletin of the National Science Museum, Series B* 25: 95–105.
- Kadota, Y. 2000. Taxonomic studies of *Cirsium* (Asteraceae) in Japan VII. Notes on *Cirsium congestissimum* Kitam. and *Cirsium tenue* Kitam. and the identity of *Cirsium tenue* Kitam. var. *ishizuchiense* Kitam. *Memoir of the National Science Museum* (32): 127–134.
- Kadota, Y. 2002a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan VIII. *Cirsium shidokimontanum*, a new species from middle Honshu. *Bulletin of the National Science Museum, Series B* 28: 99–106.
- Kadota, Y. 2002b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan IX. On the entity of *Cirsium yatsugatakense* Nakai. *Memoir of the National Science Museum* (38): 110–118.
- Kadota, Y. 2003. Taxonomic studies of *Cirsium* (Asteraceae) in Japan X. Species described by Franchet and Savatier. *Bulletin of the National Science Museum, Series B* 29: 45–64.
- Kadota, Y. 2004a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XI. A new subsection and two new species belonging to the subsection, from southern Kyushu. *Bulletin of the National Science Museum, Series B* 30: 63–69.
- Kadota, Y. 2004b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XII. Subsect. *Niponensia* subsect. Nov. and a new species, *C. hachimantaiense*, belonging to

- the new subsection. *Bulletin of the National Science Museum, Series B* **30**: 117–133.
- Kadota, Y. 2004c. Classification of the genus *Cirsium* (Asteraceae) in Japan. *Bulletin of the Fukui Botanical Garden* (2): 1–6 (in Japanese).
- Kadota, Y. 2005. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XIII. Three new species from Tohoku district, northern Japan. *Bulletin of the National Science Museum, Series B* **31**: 35–47.
- Kadota, Y. 2006a. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XIV. Notes on *Cirsium hachijoense* Nakai. *Memoir of the National Science Museum* (42): 89–98.
- Kadota, Y. 2006b. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XV. Four new species from western Japan. *Bulletin of the National Science Museum, Series B* **32**: 85–101.
- Kadota, Y. 2007. Taxonomic studies of *Cirsium* (Asteraceae) in Japan XVI. A new subsection and four new species from the Tohoku district, northern Japan. *Bulletin of the National Museum of Nature and Science, Series B* **33**: 29–45.
- Kadota, Y. and Nagase, H. 1988. A new species of *Cirsium* (Asteraceae: Cynareae) from Hida Province, central Japan. *Memoir of the National Science Museum* (14): 9–20.
- Umezawa, S. 2007. *Wild Flowers of Hokkaido*. 462 pp. Hokkaido University Press, Sapporo (in Japanese).
- Watanae, S. and Imae, S. 1976. A new variety of *Cirsium lucens*. *The Journal of Japanese Botany* **51**: 158–160.