

A New Species of *Anemone* (Ranunculaceae) from the Imperial Gardens, the Imperial Palace Grounds, Tokyo, Japan

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Abstract. A new species of *Anemone* (Ranunculaceae), *A. imperialis* Kadota, is described from the Imperial Garden, the Imperial Palace, Tokyo, Japan based on cultivated materials. *Anemone imperialis* is closely related to *A. flaccida* F. Schmidt but differs from the latter by having with longer pedicels, erect flowers with open sepals during good weather and nodding flowers with semi-open sepals during rainy weather, pillow-shaped stigmata, longer petiolules of lateral leaflets of the basal leaves and narrowly elliptic anthers. *Anemone imperialis* exclusively occurs in the Imperial Gardens, the Imperial Palace and the Akasaka Imperial Ground, Tokyo, however, the original locality of this species is hitherto not known.

Key words: *Anemone flaccida*, *Anemone imperialis*, the Imperial Palace, new species, Ranunculaceae, Tokyo.

Introduction

Anemone flaccida F. Schmidt described from Sakhalin, Russia is a slender, herbaceous perennial of the family Ranunculaceae and widely distributed in Japan, Russia and China (Shishkin, 1937; Ohwi, 1953; Kitamura and Murata, 1961; Wang, 1980; Wang *et al.*, 2001). *Anemone flaccida* is a representative of spring ephemerals in Japan. In Japan *Anemone flaccida* is rather common and is distributed in Hokkaido, Honshu, Shikoku and Kyushu (Ohwi, 1953; Kitamura and Murata, 1961; Tamura, 1982; Ohwi (Kitagawa), 1983; Kadota, 2006; see Appendix I).

According to the taxonomic literatures (e.g., Shishkin, 1936; Ohwi, 1953; Kitamura, Murata, 1961; Wang, 1980; Ohwi (Kitagawa), 1983; Tamura, 1985; Starodubtsev, 1991, 1991, 1995; Wang *et al.*, 2001; Ziman *et al.*, 2004a, 2004b, 2004c, 2005, 2006a, 2006b; Kadota, 2006; Luferov and Probatova, 2006), the attribute 'flowers are upright or nodding' is never discussed for *Anemone flaccida*.

Previous surveys reported that *Anemone flac-*

cida was known from the Imperial Palace Grounds (Biological Laboratory, 1989; Konta *et al.*, 2000), and it was not mentioned that plants had upright flowers or nodding flowers. Nevertheless, my repeated observations showed that in the natural populations throughout Japan all the *Anemone flaccida* plants were characterized by the upright flowers. However, in April 2009 (Fig. 1, bottom), I found the *Anemone* plants similar to this taxon but having the nodding flowers at Ôibaba-ato, the Imperial Gardens, the Imperial Palace Ground (here called 'the Ôibaba-ato type'; Fig. 1, bottom). Afterwards the first author continued his observations in 2011 and 2012 at Ôibaba-ato which confirmed the presence of plants having nodding flowers in the above-mentioned cultivated populations. Meanwhile, the next examination of the herbarium material of *Anemone* plants in KYO, TI and TNS did not result the occurrence of plants belonging to 'the Ôibaba-ato type' in the natural populations throughout Japan. I continued the field search of *Anemone* plants belonging to 'the Ôibaba-ato type' in April 2012 (Akasaka Imperial Ground,



Fig. 1. *Anemone imperialis* Kadota at the Imperial Garden, the Imperial Palace, Tokyo, Japan. Top. On 18 April 2013 (good weather). Bottom. On 21 April 2012 (rainy weather).

Moto-Akasaka, Minato-ku, Tokyo Prefecture) and in March 2013 (at the fountainhead of the Hayama Imperial Villa, Hayama-cho, Miura-gun,

Kanagawa Prefecture). As a result the *Anemone* plants ascribed to the 'Ôibaba-ato type' were also obtained at the Akasaka Imperial Ground. How-

ever, in the vicinity of the Hayama Imperial Villa, *Anemone flaccida* were only collected.

After a detailed comparative morphological study of the both groups of plants, *Anemone flaccida* and 'the Ôibaba-ato type', I describe the new species *Anemone imperialis* Kadota and to publish this description within the "Flora and Fauna of the Imperial Palace, Tokyo II" organized by the National Museum of Nature and Science, Japan. Unfortunately, the place of the origin of *Anemone imperialis* was not fixed because in the all known localities the plants were transplanted from the unknown natural populations.

Materials and Methods

Field examinations at Ôibaba-ato, the Imperial Gardens, the Imperial Palace Grounds, Chiyodaku, Tokyo Prefecture were executed in 2009, 2011, 2012, and 2013. Field works were also done in the Akasaka Imperial Grounds, Moto-Akasaka, Minato-ku, Tokyo Prefecture in 2012 and at the fountainhead of the Hayama Imperial Villa, Suigenchi, Hayama-cho, Miura-gun, Kanagawa Prefecture in 2013. Specimens collected in the field works are deposited in the Herbarium, Department of Botany, the National Museum of Nature and Science (TNS).

Specimens preserved in the Herbarium, the University Museum, the University of Tokyo (TI) and the Herbarium of the University Museum, Kyoto University (KYO) were also employed in this study.

Taxonomic treatment

Anemone (subgen. *Stolonifera* sect. *Stolonifera*) *imperialis* Kadota, sp. nov.

[Figs. 1–6]

Anemone flaccida auct. non F. Schmidt: Konta & al. in Mem. Natn. Sci. Mus., Tokyo no. 34: 20 (2000).

Anemone imperialis Kadota is different from *A. flaccida* F. Schmidt by having longer pedicels, erect flowers with open sepals during good weather and nodding flowers with semi-open

sepals during rainy weather, pillow-shaped stigmata, longer petiolules of lateral leaflets of the basal leaves and narrowly elliptic anthers.

TYPE: JAPAN. Honshu. Tokyo Pref., Chiyoda-ku, Chiyoda, the Imperial Palace Grounds, the Imperial Gardens, Ôibaba-ato, alt. ca. 20 m, 18 April 2013, Y. Kadota s.n. (TNS01179802; Fig. 2).

A herbaceous perennial, 40–50 cm tall. Rhizome cylindrical with internodes 3–5 mm long, frequently branched, 5–7 cm long or longer, 6–10 mm in diameter, dark brown, running horizontally. Basal leaves 3–5, long petiolate; blades pentagonal in outline, 7–8 cm long, 6.5–10 cm broad, ciliate along the margin, sparingly sericeous with appressed hairs on the adaxial side, glabrous on the abaxial side, ternate, cordate to deeply cordate at base; petioles 20–30 cm long, glabrous, vaginate at base. Middle leaflets obovate-rhombic, shallowly trilobed, cuneate at base, with obtuse, ovate lacinae 3–5 mm wide; petiolules 5 mm long. Lateral leaflets unequally, medially bilobed; petiolules 2–3 mm long; broadly cuneate to truncate at base, subsequently middle and lateral leaflets overlapping each other. Flowers in April, (1–)2–3, 2.5–3 cm in diameter. Scapes 1–2, glabrous; subtending leaves 3, deeply trilobed, hardly variegated, sessile, similarly pubescent to the basal. Sepals 5–6, white, oblong to obovate-oblong, 15–17 mm long, 8–11 mm broad, obtuse to rounded at apex, stalked, glabrous on the adaxial side, hirsute on the abaxial side; pedicels 7–14 cm long, hirsute. Stamens 8–10 mm long, glabrous; anthers ca. 2 mm long, narrowly elliptic, basifixed, pale yellow; filaments 6–8 mm long, white, filiform. Carpels 10–11, pale yellow; ovaries villous with spreading, yellowish hairs; stigmata pillow-shaped; styles hardly recognizable. Achenes 4 mm long, 3.5 mm broad, ellipsoidal, densely villous, shortly stalked.

Japanese name: Fukiage-nirinsô (nov.).

新和名：フキアゲニリンソウ（吹上二輪草）

Distribution: Only known from the Imperial Gardens, the Imperial Palace Grounds and the Akasaka Imperial Ground, Tokyo, Japan.



Fig. 2. Type of *Anemone imperialis* Kadota (Ôibaba-ato, the Imperial Garden, the Imperial Palace Ground, Chiyoda, Chiyoda-ku, Tokyo Pref., Honshu, Japan, alt. ca. 20 m, 18 April 2013, Y. Kadota s.n., TNS01179802, holotype).

Additional specimens examined: JAPAN. Honshu: Tokyo Pref., Chiyoda-ku, Chiyoda, the Imperial Palace Grounds, the Imperial Gardens, Ôibaba-ato, alt. ca. 20 m, 30 Apr. 1996, F. Konta & al. 161 (TNS 637784); Ôibaba-ato, 21 Apr. 2011, Y. Kadota & K. Hamasaki s.n. (TNS01191695–01191696); Ôibaba-ato, 18 Apr. 2013, Y. Kadota s.n. (TNS01179792–01179800, 01179802–01179804). Minato-ku, Moto-Akasaka, Akasaka Imperial Ground, 23 Apr. 2012, Y. Kadota s.n. (TNS01188625–01188632).

Anemone flaccida F. Schmidt var. *aconitifolia* Honda (1932) described from Iwate Prefecture, northern Honshu, Japan is characterized by having quinquesect basal leaves with linear to lanceolate laciniae. However, var. *aconitifolia* should be included into *A. flaccida* because this species has a wide range of variation in the lobe incision of the basal leaves.

Observations

Direction of flowering

Most species of the genus *Anemone* bloom upright (e.g., Shishkin, 1937; Kitamura and Murata, 1961; Wang, 1980; Wang *et al.*, 2001). Among the Japanese species *A. debilis* Fisch. ex Turcz., *A. nikoensis* Maxim. and *A. pseudoaltaica* H. Hara bloom oblique, however, the flowers are never nodding (e.g., Kitamura and Murata, 1961; Tamura, 1982, 1995; Kadota, 2006; Ohashi *et al.*, 2008).

Anemone gortschakowii Kar. & Kil. and *A. petiululosa* Juz. from Tien Shan Mountains and Pamir, Central Asia have nodding flowers. According to Shishkin (1937) the pedicels initially extend obliquely and later the flowers inclines in these two species. Both species are characterized by having the subglobose receptacles and the flattened, long-beaked achenes and belong to subgen. *Anemone* sect. *Anemone*. Hence the two species have less relation to *Anemone imperialis*.

Anemone nutantiflora W. T. Wang & L. Q. Li described from Yunnan Province, China, has pendulous fruiting heads (Wang and Li, 1986;

fig. 2, 1–2). This species is akin to *A. demissa* Hook. f. & Thomson from the Himalayan region and belongs to subgen. *Omalocarpus* (DC.) Juz. sect. *Omalocarpus*. *Anemone nutantiflora* was described based on the type specimen only. This specimen is in fruiting stage and has no flowers. Furthermore Wang *et al.* (2001) did not mention this species for the *Anemone* flora of China. Consequently there is no information about the flowers of *A. nutantiflora*.

In this way the species provided with nodding flowers like *Anemone imperialis* are rather rare in the genus *Anemone*.

On 18th April 2013 a complimentary survey was made in Ôibaba-ato, the Imperial Gardens, the Imperial Palace Grounds. It was fine at that time and *Anemone imperialis* had erect flowers (Figs. 1, top, 3, A, C). On the contrary during rainy weather *A. imperialis* always had nodding flowers (Fig. 1, bottom, 3, B, E, F, 4). The situation of flowering therefore seems to have a relationship with weather condition. In *A. flaccida* flowers show an open and close movement corresponding to the temperature change (thermonasty; Azegami, 1996, 2013; Kadota, pers. obs.). The movement of pedicels and flowers seen in *A. imperialis* is considered to be an indication of thermonasty.

Stigma shape

Anemone imperialis is different from *A. flaccida* in the shape of stigma; in *A. imperialis* the stigmata are pillow-shaped (Fig. 5, left; Fig. 6, left), while in *A. flaccida* they are narrowly pyramidal (Fig. 5, right; Fig. 6, right). The styles of both *A. imperialis* and *A. flaccida* are very short and hardly recognizable. The capitate stigmata and the short styles are both characteristic of *Anemone* sect. *Stolonifera* ser. *Stolonifera* (Ziman *et al.*, 2004a).

Rhizome

Anemone imperialis had a brownish, horizontal, rather thick rhizome (Fig. 7, left) while the rhizome of *A. flaccida* was almost black, horizontal, thinner (Fig. 7, right). In both species the

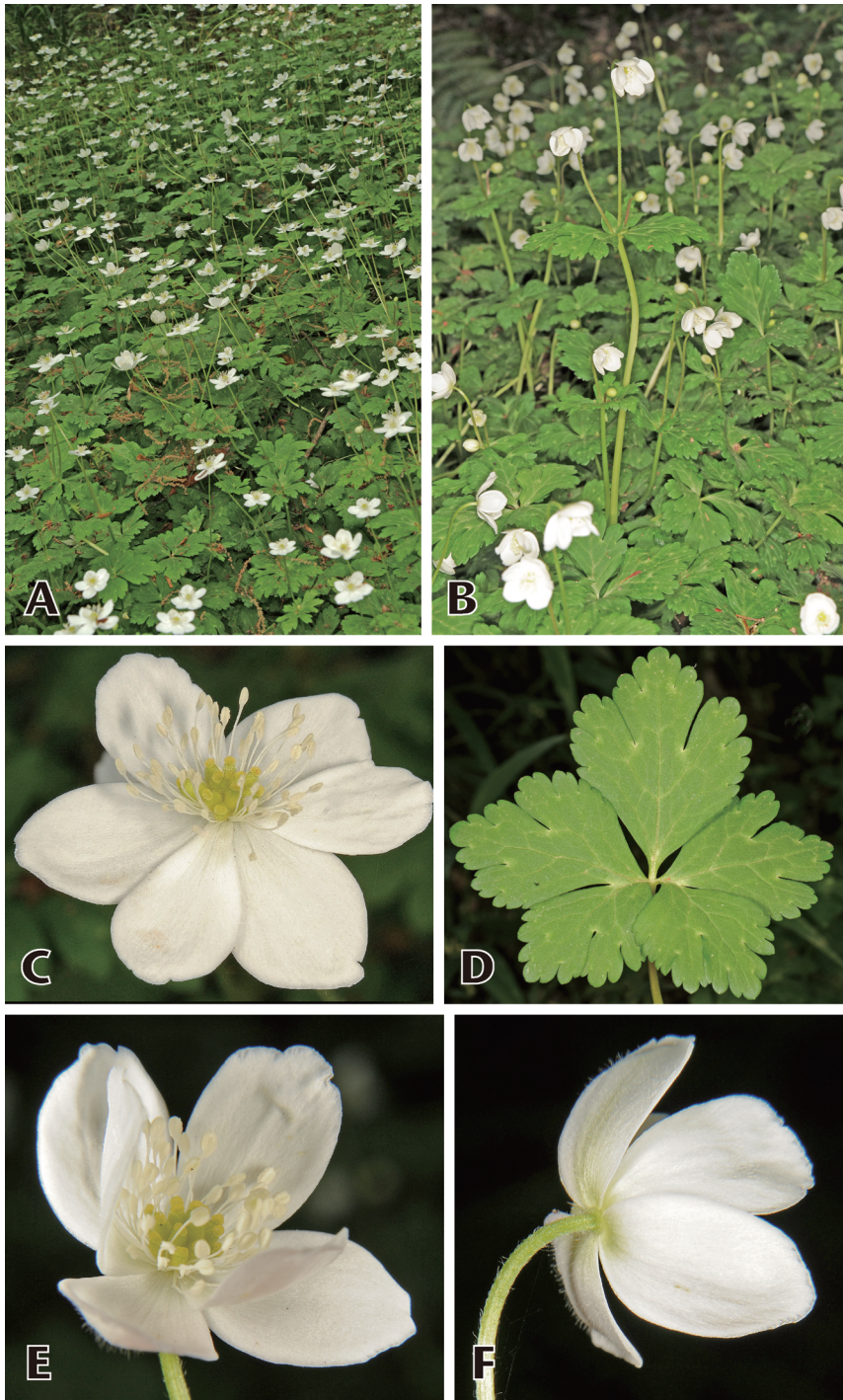


Fig. 3. *Anemone imperialis* Kadota at Ôibaba-ato, the Imperial Garden, the Imperial Palace Ground, Chiyoda, Chiyoda-ku, Tokyo Pref., Honshu, Japan. A. Erect flowers during good weather. B. Nodding flowers during rainy weather. C. Erect flower with open sepals (good weather). D. Basal leaf blade. D. Nodding flower with semi-open sepals. E. Abaxial side of nodding flower. A, C. 18 April 2013. B, D, E, F. 21 April 2011.



Fig. 4. *Anemone imperialis* Kadota in the Akasaka Imperial Grounds, Moto-Akasaka, Minato-ku, Tokyo Pref., Honshu, Japan. A. Habit. B. Nodding flowers. C. Flower showing pillow-shaped stigmata. On 23 April 2012 (rainy weather).

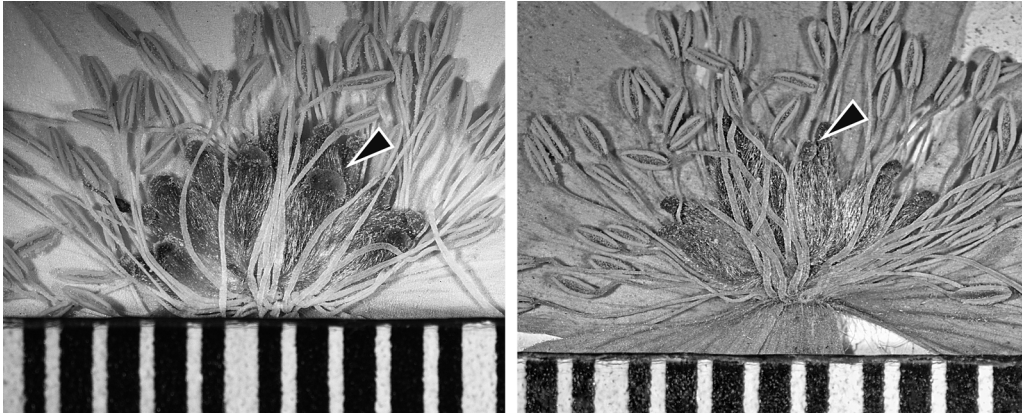


Fig. 5. Comparison of stigma between *Anemone imperialis* Kadota (left) and *A. flaccida* F. Schmidt (right). Left. *A. imperialis* (voucher: The Imperial Palace Ground, Kadota s.n., TNS01179803, holotype). Right. *A. flaccida* (voucher: Tokyo Pref., Nishi-Tama-gun, Hibara-mura, T. Iwasaki 403, TNS 856974). Arrowhead indicates stigma.



Fig. 6. Comparison of flower between *Anemone imperialis* Kadota (left) and *A. flaccida* F. Schmidt (right). Left. *A. imperialis*: Ôibaba-ato, The Imperial Palace Ground, 18 April 2013. Right. *A. flaccida* with immature achenes: Kanagawa Pref., Miura-gun, Hayama-cho, the Hayama Imperial Villa, 5 April 2013.

rhizomes shortly branched after flowering and the short branches were disengaged from the main rhizomes in late autumn to winter. The segregation of short branches is considered to cause asexual reproduction in both species.

Plant size

Anemone imperialis is usually distinguished from *A. flaccida* by its larger habit (rhizome,

basal leaves, scapes, flowers, sepals, anthers, achenes and so on). As already stated above *A. flaccida* is widely distributed in Japan and shows a wide range of morphological variation. Especially populations from heavily snowy regions on the Japan Sea side of Tohoku District, northern Honshu, Japan, are similarly characterized by the larger habit. Consequently *A. imperialis* is not always discriminated from *A. flaccida* by the



Fig. 7. Comparison of rhizome between *Anemone imperialis* Kadota (left) and *A. flaccida* F. Schmidt (right). Left. *A. imperialis*: Ôibaba-ato, The Imperial Palace Ground, 18 April 2013. Right. *A. flaccida*: Kanagawa Pref., Miura-gun, Hayama-cho, the Hayama Imperial Villa, 5 April 2013.

plant size.

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皇居吹上御苑からの1新種, フキアゲニリンソウ (キンポウゲ科)

門田 裕一

皇居吹上御苑覆馬場跡に栽培されている植物をもとにして、キンポウゲ科イチリンソウ属の1新種、フキアゲニリンソウ *Anemone imperialis* Kadota を記載した。フキアゲニリンソウはニリンソウ *A. flaccida* F. Schmidt に似ているが、①花梗がより長く、②花は普通直立して咲き、萼片は平開するが、雨天時には點頭して、萼片は斜開し、③柱頭が枕型で大きく、④根生葉の側小葉の小葉柄が長く、そのために小葉は互いに縁が重なり合い、⑤葯が長楕円形であることで区別される。フキアゲニリンソウは全体的により大型であることも特徴の一つである。フキアゲニリンソウは、例えば関東地方のニリンソウの二倍以上の大きさがある。しかしながら、ニリンソウは分布域が広く、形態的変異の幅も広い。とくに、東北地方の日本海側多雪地では全体が大型になる傾向がある。このため、サイズの点だけで両種を区別することはできない。岩手県から記載されたオオニリンソウ *A. flaccida* F. Schmidt var. *aconitifolia* Honda は根生葉の葉身が5全裂し、裂片が線形ないし披針形であることが特徴とされた。しかし、これはニリンソウの変異の中に入るもので、フキアゲニリンソウと直接の関係は認められない。

フキアゲニリンソウは皇居吹上御苑と赤坂御用地に栽培されているが、本来の自生地については不明である。

Appendix I. Specimens examined of *Anemone flaccida* F. Schmidt in Sakhalin and Japan

SAKHALIN: Toyohara-cho, 1927, G. Momose (H. Koidzumi 83567) (TNS 915195). Mt. Susuya-san, June 1927, no collector's name (TNS 1066735). Torechapaach, July 1906, no collector's name (TNS 24511). Insula Sachalin, in viciniis opp. Dolinsk, pratula in salicetis alnetisque ropariis in "Cholonaja dolina" apud marginem orientalem oppidi, 10 June 1952, L. Motolina s.n. (TNS 201876; Gerb. Flor. SSSR no. 3865).

JAPAN

HOKKAIDO: **Kitami Subpref.**, Esashi-gun, Esashi-cho, Utanobori, 29 April 1972, M. Yamanoi 120 (TNS 319392). **Kamikawa Subpref.**, Nakagawa-gun, Otoineppu-mura, Kitasakkuru, 14 June 1940, no collector's name (TNS 396790). Uryu-gun, Horokanai-cho, Moshiri, in the Experimental Forest of Hokkaido Univ., deciduous forest along Bukokamabetsu-gawa, alt. 300 m, 15 June 1978, K. Mimoro & S. Tsugaru 5119 (TNS 426253). Asahikawa-shi, Etanbetsu-cho, Inô, July 1913, H. Koidzumi 73688 (TNS 915110); Asahikawa-shi, Nishikagura, alt. 140 m, 3 May 1984, K. Tsuchikura 567 (TNS 695334); Asahikawa-shi, May 1917, H. Koidzumi 64125 (TNS 915134); Asahikawa-shi, Kaguragaoka, 25 May 1917, H. Koidzumi 75454 (TNS 915008); Asahikawa-shi, Chikabumi, 20 May 1917, H. Koidzumi 75323, 75328 (TNS 914999, 915094); Asahikawa-shi, Kaguragaoka, May 1917, H. Koidzumi 65419 (TNS 915095); Asahikawa-shi, Kamui-cho, Uzun, alt. 200 m, 7 May 1985, K. Tsuchikura 1452 (TNS 696394). Taisetsusan Mountains, Shôsen-kyô, 28 July 1917, H. Koidzumi 77832 (TNS 914940); Taisetsusan Mountains, Mt. Asahi-dake, 29 July 1917, H. Koidzumi 77841 (TNS 915023). Sorachi-gun, Minami-Furano-cho, Kanayama, alt. 300 m, 27 May 1987, S. Tsugaru & Y. Inoue 7768 (TNS 568333). Yufutsu-gun, Shimukappumura, Chû-ô, 10 May 1975, S. Mimoro 2474 (TNS 338979). **Kushiro Subpref.**, Kushiro-gun,

Kushiro-cho, Obirashike, at the edge of woods, alt. 20 m, 10 June 1988, K. Takita 3640 (TNS 1087013). **Ishikari Subpref.**, Sapporo-shi, Maruyama, 1 May 1913, H. Koidzumi 91120 (TNS 915148); Sapporo-shi, Maruyama, 18 May 1964, M. Watanabe s.n. (TNS 309255); Sapporo-shi Minami-ku, Nakayama-tôge pass, 1 June 1966, J. Sugimoto s.n. (TNS 174603); Sapporo-shi, Maruyama, 29 April 1994, N. Hiratsuka 3221 (TNS 653114); Sapporo-shi, Mt. Sankakuyama, 13 May 1922, N. Hiratsuka 3223 (TNS 653113). Yubari-shi, 22 May 1953, Y. Murata s.n. (TNS 913694, 108855). **Shiribeshi Subpref.**, Otaru, T. Kawada s.n. (TNS 81551). Iwanai-gun, Kyôwa-cho, Iwanai-Shinsen'numa pond, alt. 300 m, 24 May 1964, M. Watanabe s.n. (TNS 309269).

HONSHU: **Tohoku Distr. Aomori Pref.**, Shimokita-gun, Kazamura-mura, 29 April 1954, J. Haginiwa JH041934 (TNS 991934). **Akita Pref.**, Kadzuno-gun, Urashinai, 8 June 1941, M. Henmi 326 (TNS 128352). Daisen-shi, Kyôwa Mineyoshikawa, Shiraito-no-taki fall, alt. 30 m, 25 May 2007, Y. Horii 07-01 (TNS 765050-765051). Senboku-gun, Ôta-machi, Kawaguchi-gawa, alt. 180 m, 3 May 2003, Y. Miyamoto s.n. (TNS 724117). **Iwate Pref.**, Shimo-Hei-gun, Kawaimura, Mt. Hayachine-san, alt. ca. 400 m, 22 May 1967, E. Ito & M. Togashi 68 (TNS 177776). Iwate-gun, Matsuo-mura, Akasakata-Iwate Matsuo, 15 May 1941, M. Henmi 233 (TNS 143582-143583). **Yamagata Pref.**, Yamagata-shi, from Sasaya-tôge pass to Sekizawa, 25 May 1984, S. Matsuda s.n. (TNS 856951). Sagae-shi, Chômeisui, 15 Apr. 1894, T. Nagasawa s.n. (TNS 54110). Kita-Murayama-gun, Tôgô-mura, Numasawa, 8 May 1926, S. Okuyama 144 (TNS 653158); Nichikawa-machi, Hibara, near the confluence of Sagae-gawa river, in grassland on dried riverbed, alt. 400 m, 6 June 1986, S. Tsugaru & T. Takahashi 6716 (TNS 594695). Yonezawa-shi, 1 May 1951, H. Koidzumi 27403 (TNS 914964). **Fukushima Pref.**, Shinobu-gun, Mt. Benten-yama, 28 Apr. 1904, G. Nakahara s.n. (TNS 24510). Higashi-Shirakawa-gun, Tanakura-machi, on the north slope of Mt.

Yamizo-san, alt. 900 m, 29 Apr. 1983, F. Suzuki s.n. (TNS00799879). Minami-Aidzu-gun, Asahida-mura, 20 Apr. 1930, no collector's name (TNS 395278); Shimogô-machi, Nasu Mountains, Santogoya-tôge pass, 5 June 1932, no collector's name (TNS 394517).

Kanto Distr. Ibaraki Pref., Kuji-gun, Daigomachi, Mt. Yamizo-san, Apr. 1958, T. Matsumoto 188 (TNS 01066762). Kita-Ibaraki-shi, Sekimoto-machi, Saimaru, alt. 440 m, 7 Apr. 2009, A. Ebihara & *al.* KT2009–2050 (TNS 736740). Tsukuba-shi, Mt. Tsukuba-san, 27 Apr. 1971, H. Ito s.n. (TNS 01066774–01066775); Mt. Tsukubasan, alt. 550 m, 12 Feb. 2004, G. Kokubugata 1649 (TNS 9517680). **Tochigi Pref.**, Utsunomiya-shi, Mt. Taki-yama, 26 Apr. 1981, S. Ogawa s.n. (TNS00799881); Dôjôjuku-machi, alt. 120 m, 26 Apr. 1988, T. Noguchi s.n. (TNS00799880). **Gunma Pref.**, Agatsuma-gun, Agatsumna-machi, Mishima, 1 May 1966, K. Masuda 2212 (TNS 379506). Saba-gun, Akahorimura, Imai, 5 Apr. 1957, K. Takami s.n. (TNS 133235). **Saitama Pref.**, Urawa-shi, Daimonjinja shrine, 20 Apr. 1975, T. Kawasaki 3697 (TNS 652611–652612). Chichibu-gun, Ojikanomachi, Mt. Kan'non-yama, Ushikubi-tôge pass, 4 Apr. 2003, G. Kokubugata 1055 (TNS 9515874). **Tokyo Pref.**, Chiyoda-ku, Chiyoda, the Imperial Palace Grounds, the Imperial Gardens, in the vicinity of Ô-ike pond, alt. ca. 20 m, 21 Apr. 2011, Y. Kadota & K. Hamasaki s.n. (TNS). Kita-ku, Akabane, May 1924, no collector's name (TNS 01066740); Akabane, 10 May 1953, T. Kawasaki s.n. (TNS 01066767). Itabashi-ku, Honhasunuma, 28 Apr. 1929, Y. Jotani 296 (TNS 856983); Shimura, 5 May 1953, H. Ito s.n. (TNS 01066751). Toshima-ku, Somei cemetery, 28 Apr. 1957, K. Kawamoto s.n. (TNS 505416). Bunkyo-ku, Sashigaya-cho, 6 Apr. 1955, H. Tanaka 288–3 (TNS 913324); Ôtsuka, in the campus of Tokyo University of Education, 19 Apr. 1961, K. Sôma s.n. (TNS 01066770). Nerima, 20 Apr. 1934, H. Sato s.n. (TNS 44649). Setagaya-ku, Ryokuchi-kôen park, 26 Apr. 1966, K. Kawamoto s.n. (TNS 505400). Kita-Tama-gun, Kiyose-machi, near Yanase-gawa river, 15

Apr. 1967, H. Ohba 3419 (TNS 184004). Nishi-Tama-gun, Itsukaichi-machi, 5 May 1970, M. Harimoto s.n. (TNS 754765); Itsukaichi-machi, Mt. Kariyose-yama, 14 Apr. 1968, K. Inoue 900–901 (TNS 856962–856963); Itsukaichi-machi, Mt. Bazukari-yama, 27 Apr. 1970, K. Inoue 2460 (TNS 856957); Itsukaichi-machi, Bonbori, 15 May 1979, Y. Takai 230, 261 (TNS 856960–856961); Itsukaichi-machi, Bonbori-gawa, 23 Apr. 1978, Y. Sakuma 69276 (TNS 856959); Itsukaichi-machi, Bonbori-gawa, 23 Mar. 1978, H. Takizawa 69275 (TNS 856958); Oku-Tama-cho, Umisawa-dani, 21 Apr. 1974, S. Oda 12004 (TNS 856968); Oku-Tama-cho, in Experimental Forest of Tokyo University of Agriculture, 25 May 1980, K. Yoshizawa 76423–76424 (TNS 856971–856972); Oku-Tama-cho, in Experimental Forest of Tokyo University of Agriculture, 25 May 1980, N. Ôno 76410 (TNS 856970); Hibara-mura, Honjuku, Hotokesawa-no-taki fall, 25 Apr. 1970, T. Iwasaki 402–404 (TNS 856973–856974, 856984); Hibara-mura, Honjuku, 25 Apr. 1970, T. Iwasaki 405 (TNS 856975). Ômeshi, Mt. Mitake-san, 22 May 1927, K. Morishita 2286 (TNS 381502); Mt. Mitake-san, 3 June 1931, Y. Jotani 90 (TNS 856956). Minami-Tama-gun, Tama hill, 26 Apr. 1964, N. Masua 142 (TNS 856955). Tama-shi, Renkô-ji temple, 13 Apr. 1895, K. Watanabe s.n. (TNS 305789). Ongata-mura, Shiroyama, 4 Apr. 1934, T. Satow 2291 (TNS 648755); Hachiôji-shi, Shiroyama, 28 Apr. 1935, K. Shirai s.n. (TNS 651473); Mt. Takao-san, 27 Apr. 1947, J. Haginiwa JH000050 (TNS 950050); Mt. Takao-san, 2 May 1948, Y. Jotani 25053–25054 (TNS 856953–856954); Mt. takao-san, 11 May 1947, Y. Jotani 11125 (TNS 856952); Umenoki-daira, 20 Apr. 1952, C. Ôkawa s.n. (TNS 411945); Irisawa, 20 Apr. 1952, C. Ôkawa s.n. (TNS 411879–411880, 411943–411944); Asakawa, 9 Apr. 1956, S. Okuyama 21326 (TNS 286311); Mt. Kagenobuyama, 2 Apr. 1957, H. Makinouchi s.n. (TNS 163759). Katayama, 17 Apr. 1951, M. Togashi s.n. (TNS 98063); Katayama, 30 Mar. 1955, G. Ito s.n. (TNS 308257). **Chiba Pref.**, Kashiwashii, Apr. 1955, K. Nagata s.n. (TNS 112760).

Sakura-mura, 15 May 1935, G. Suzuki (H. Koidzumi 96774) (TNS 915019); Sakura-shi, Yoshimi, 24 Apr. 1982, J. Haginiwa JH000039, JH034974 (TNS 950039, 984974). Yotsukaidô-shi, Kamezaki, 24 Apr. 1982, J. Haginiwa JH000058, JH000037–000038 (TNS 950037–950038, 950058). Kamogawa-shi, Mt. Kiyosumi-yama, 3 May 1953, S. Asano s.n. (TNS 115884). **Kanagawa Pref.**, Yokohama-shi, Hodogaya-ku, 20 Apr. 1958, K. Sugano s.n. (TNS 146394); Yokohama-shi, Kanazawa-ku, Horiguchi, 20 Apr. 1960, M. Watanabe s.n. (TNS 146907). Zushi-shi, Junmuji, 10 Apr. 1946, J. Haginiwa JH041933 (TNS 991933). Tsukui-gun, Sagami-ko lake, 24 Apr. 1953, T. Nakamura 3159 (TNS 856976); Fujino-machi, Sanogawa, alt. 380 m, 20 Apr. 2007, H. Suganuma s.n. (TNS 767336). Miura-gun, Hayama-cho, Suigenchi, at the fountainhead of the Hayama Imperial Villa, alt. 55 m, 5 Apr. 2013, Y. Kadota s.n. (TNS01179805–01179831). Hiratsuka-shi, Takane, 26 Apr. 1970, J. Moriya s.n. (TNS 281040). Hadano-shi, Mt. Ô-yama, May 1925, T. Satow s.n. (TNS 37756). **Chubu Distr. Yamanashi Pref.**, Ôtsuki-shi, Sasago, Apr. 1933, F. Maekawa s.n. (TNS 856979). Minami-Koma-gun, Nanbu-cho, Kozori, Mt. Tenshiga-take, alt. 1300 m, 19–20 Apr. 1975, Y. Kadota 2705 (TNS 664708). **Shizuoka Pref.**, Idzu, Mt. Amagi-san, 1 May 1938, R. Imazeki s.n. (TNS 65792). Fuji-shi, Marubi Shizen-kôen, alt. 570 m, 5 May 1986, T. Sato 8990 (TNS 904049). Fujinomiya-shi, Shiraito-no-taki fall, 3 May 1925, Y. Yabe s.n. (TNS 01066742); Fujinomiya-shi, Kakesubata, alt. 600 m, 29 Apr. 1976, F. Konta 10795 (TNS 636981, 904051); Fujinomiya-shi, Mt. Fuji, Nishi-Usudzuka, alt. 1250 m, 19 May 1984, T. Sato 5169 (TNS 904065); Fujinomiya-shi, Fumoto, 20 May 1952, Y. Jotani 25639, 25683 (TNS 856980–856981); Fujinomiya-shi, Fumoto, alt. 880 m, 5 May 1984, T. Sato 5067 (TNS 904054); Fujinomiya-shi, Numakubo, alt. 100 m, 14 Apr. 1984, T. Sato 4940 (TNS 904055); Fujinomiya-shi, Inokashira, alt. 750 m, 14 Apr. 1985, T. Miyazawa 104 (TNS 904062); Fujinomiya-shi, Saori, 19 Apr. 1975, Y. Kadota 23 (TNS 664710); Fujinomiya-shi, Saori,

north of Ôkura dam, alt. 500 m, 13 Apr. 1985, T. Sato 7394 (TNS 904060); Fujinomiya-shi, Nebara, Asagiri heights, alt. 880 m, 24 Apr. 1990, F. Konta & J. Kitagawa 17097 (TNS 904061, 904244); Fujinomiya-shi, Motomurayama, in the vicinity of Sengen-jinja shrine, alt. 500 m, 24 Apr. 1993, F. Konta 17316 (TNS 17316). Susono-shi, Jûrigi, southern slope of Mt. Fuji, alt. 1000 m, 27 May 1976, A. Takahashi & F. Konta 11041 (TNS 904063). Ihara-gun, Fujikawa-cho, Kitamatsuno, Kuchiwa, alt. 80 m, 5 Apr. 1985, T. Sto 7336 (TNS 904046); Fujikawa-cho, Kijima, alt. 60 m, 6 Apr. 1985, T. Sato 7382 (TNS 21812). Fuji-gun, Shibakawa-cho, Ôshika, Kubodera-shinden, alt. 180 m, 5 May 1984, T. Sato 5107 (TNS 904066); Shibakawa-cho, Ozaki, Honjô-ji temple, alt. 80 m, 10 Apr. 1985, F. Konta 15274 (TNS 904064); Shibakawa-cho, Kamiinako, Mukôda, alt. 180 m, 12 Apr. 1985, T. Sato 7388 (TNS 904059); Shibakawa-cho, Torinami, alt. 200 m, 5 May 1985, T. Sato 9091 (TNS 904050); Shibakawa-cho, Kamiinako, Nishizawa, 20 Apr. 1986, T. Sato 8921 (TNS 904057); Shibakawa-cho, Nishiyama, along the pref. road Misawa–Fujinomiya line, alt. 140 m, 29 Apr. 1986, T. Sato 8972 (TNS 904048). Yaidzu-shi, Mt. Takakusa-yama, alt. ca. 200 m, 14 Apr. 1968, F. Konta 6769, 6782 (TNS 904056, 904058). Iwata-shi, Mukai-ichiba, 4 May 1976, H. Mochizuki 932 (TNS 856982). Iwata-gun, Misakubo-cho, Tôki-sawa, Hyôgoe-tôge pass, alt. 850 m, 4 May 1983, M. Kurosawa 324 (TNS 904045); Sakuma-cho, Hanba–Kadzuma, 3 May 1973, no collector's name (TNS 904052). Tenryû-shi, Futamata, Futamata–Osono, alt. ca. 50 m, 13 Mar. 1972, Y. Yokoë 550 (TNS 904047). **Aichi Pref.**, Kita-Shidara-gun, Tôeicho, Kawakado, alt. ca. 250 m, 3 May 1992, K. Yoshida 920329 (TNS 589000). **Niigata Pref.**, Niigata-shi, Mt. Yahiko-yama, 16 Apr. 1939, I. Ito s.n. (TNS 65793); Mt. Yahiko-yama, 5 May 1956, K. Noda s.n. (TNS 306288). Mishima-gun, Yoita-machi, 2 Apr. 1955, T. Kusumi s.n. (TNS 117115). **Nagano Pref.**, Kita-Azumi-gun, Otarimura, Mt. Yakushi-dake, alt. 1000–1500 m, 31 May 1977, S. Tsugaru 3385 (TNS 376175);

Hakuba-mura, Mt. Shirouma-dake, 7 June 1938, H. Koidzumi 109031 (TNS 907107); Hakuba-mura, Mt. Shirouma-dake, no date, H. Hiratsuka 3238 (TNS 430622). Shimo-Takai-gun, Yamanoouchi-machi, Shiga heights, Biwa-ike rindo, 11 July 1931, H. Koidzumi 29381 (TNS 9149850); Yamanoouchi-machi, Shiga heights, Tengu-no-yu, 1956, K. Kawamoto s.n. (TNS 505401). Nagano-shi, Mt. Iidzuna-yama, 5 May 1979, Y. Takai 344–345 (TNS 71505, 71512). Kamiminouchi-gun, Togakushi-mura, Okusha, alt. 1100 m, 26 May 1974, S. Ito 201 (TNS 323109, 329654). Higashi-Chikuma-gun, Hngô-mura, Sansaiyama-tôge pass, 14 May 1921, H. Koidzumi 2386 (TNS 914916). Ômachi-shi, Kizaki-ko lake, Apr. 1921, H. Koidzumi 67007 (TNS 389777). Adzuminoshino-shi, Tokugô-toge pass, 21 June 1925, H. Koidzumi 64108 (TNS 915042). Minami-Sakugun, Manami-Maki-mura, Nobeyama, Itabashi, 29 May 1969, T. Osada s.n. (TNS 254301). Suwa-shi, 5 July 1932, H. Tobita s.n. (TNS 40656); Suwa-shi, Mt. Kuruma-yama, 5 July 1932, R. Mochizuki (H. Koidzumi 36597) (TNS 904113). Kami-Ina-gun, Miyoshi-mura, upper stream of Oguro-gawa, 21–23 May 1927, H. Koidzumi 53787 (TNS 915034). Shimo-Ina-gun, Ôshikawa-mura, Kitagawa, 20 May 1932, M. Furuse 1102 (TNS 915026); Ôshikawa-mura, Kamigura, Noga-ike, 10 May 1932, K. Katsumata 93 (TNS 126257); Tenryû-mura, Sakabe, 21 Apr. 1957, M. Muramatsu 5279 (TNS 298338). Kiso-gun, Agematsu-cho, Agematsu, alt. 870 m, 28 Apr. 2008, G. Kokubugata 10999 (TNS 9543172). **Gifu Pref.**, Yoshiki-gun, Miyagawa-mura, Man'nami, 2 June 1957, M. Ihara s.n. (TNS 132184–132185). Gujô-gun, Hachiman-cho, Horikoshi-tôge pass, 30 Apr. 1990, K. Yoshida 900148 (TNS 562946); Yamato-cho, Kamikodô, alt. 550 m, 20 Apr. 2004, H. Takahashi 21461 (TNS 729857). Ena-gun, Kamiyahagi-cho, Shima, alt. ca. 500 m, 17 Apr. 1999, H. Takahashi & al. 18726 (TNS 688747). Yamagata-gun, Miyam-cho, Kaminobora, in the vicinity of Nishibora, alt. 300–400 m, 1 May 1993, H. Takahashi 14733 (TNS 646525). Ibi-gun, Tanigumimura, Kaminare, alt. ca. 100 m, 1 Apr. 1997, H. Takahashi 17006 (TNS 656097); Fujihashi-mura, Kadonyû, Iritani, alt. ca. 460 m, 2 May 1999, K. Okuda 333–4, 333–5 (TNS 689010, 715248); Kasuga-mura, Furuya, alt. ca. 480 m, 20 Apr. 2001, H. Takahashi 20593 (TNS 714849); Ibigawa-cho, Kunimi-tôge pass — Mt. Ibuki-yama, limestone area, flowers white or pinkish, alt. 1120 m, 20 May 2005, H. Takahashi 22252 (TNS 769482). **Toyama Pref.**, Shimo-Niikawa-gun, Asahi-cho, Mt. Shôzu-dake, 11 Aug. 1933, H. Yamamoto 645 (TNS 226882). Nei-gun, Hosoirimura, Nirehara, 30 Apr. 1939, R. Kotô s.n. (TNS 65794); Yatsuo-machi, 23 Apr. 1955, A. Kirino 675 (TNS 122340). Higashi-Tonami-gun, Nawagaike, 18 May 1958, N. Satomi 10151 (TNS 136502). **Ishikawa Pref.**, Kanazawa-shi, Kiso-machi, 4 May 1954, N. Satomi s.n. (TNS 111039); Komatsu-shi, Nishimata-machi, Torigoe, alt. 140 m, 28 May 1986, K. Deguchi & al. 7160 (TNS 594696); Komatsu-shi, Maruyama-cho, Naruyama power station, alt. 400 m, 28 Apr. 1987, S. Tsugaru & al. 7851 (TNS 568324). **Kinki Distr. Shiga Pref.**, Maibara-shi, Mt. Ibuki-yama, 28 Apr. 1943, C. Hashimoto 10712 (TNS 648398); Mt. Ibuki-yama, alt. 1000 m, 19 May 1963, G. Murata & H. Koyama s.n. (TNS 158791; Pl. Jap. Excicc. No. 48). Takashimagun, Kutsuki-mura, Kijiyama, 27 Apr. 1969, T. Kodama 12239 (TNS 253215); Makino-cho, Makino, 26 Apr. 1971, H. Takahashi 865 (TNS 904067). Inukami-gun, Taga-cho, Ojigahata, alt. 600 m, 28 Apr. 1963, G. Murata & N. Fukuoka 18 (TNS 246776); Taga-cho, Ryôzen, Mt. Ryôzen, 3 May 1968, M. Tamura 9857 (TNS 01053895); Taga-cho, Ojigahata, alt. ca. 340 m, 22 Apr. 2004, H. Takahashi 21516 (TNS 729983); Taga-cho, Akenbara, Gongen-dani, 2 May 1995, H. Marui 1167 (TNS 699009). **Kyoto Pref.**, Kyoto-shi, Ôhara, Nomura, 23 Apr. 1933, H. Yamamoto s.n. (TNS 57160); Kyoto-shi, Ôhara, Kochidani, 10 Apr. 1955, G. Murata 8545 (TNS 125187); Kyoto-shi, Mt. Kurama-yama, 24 Apr. 1932, Y. Araki 2926 (TNS 654442); Kyoto-shi, Mt. Kurama-yama, 16 Apr. 1932, H. Yamamoto 868 (TNS 226870); Kyoto-shi, Mt. Sajikidake, 26 Apr. 1908, I. Sono s.n. (TNS 16769).

Naka-gun, Ômiya-cho, Garagara-dani, 29 Apr. 1991, M. Nuno s.n. (TNS 703071). Kameokashi, Nishibetsuin-cho, Yunohara, alt. 400 m, 18 Apr. 1994, S. Tsugaru & *al.* 19830 (TNS 630709). Kita-Kuwada-gun, Miyama-cho, Ashiu, Experimental forest of Kyoto University, Simodani, 1 May 1937, S. Okamoto s.n. (TNS 241540); Miyama-cho, Ashiu, Jizô-tôge–Mikunitôge, Makura-dani, alt. 640 m, S. Fujii 2955 (TNS 667425). **Nara Pref.**, Yoshino-gun, Tenkawa-mura, Kawai, Gyôjagaeri – Ichino-tô, alt. 1300–1500 m, 8 May 1965, H. Koyama 1854 (TNS 179924). **Hyogo Pref.**, Taki-gun, Ôyamamura, Miya, 17 Apr. 1938, Z. Tashiro s.n. (TNS

65795). Shisô-gun, Haga-cho, Otomizu, alt. 330–400 m, 29 Apr. 1994, M. Yauchi 19112 (TNS 632234). Mikata-gun, Kami-cho, Hachikita heights, alt. 810 m, 9 May 2008, G. Kokubugata 10652 (TNS 01103263).

Chugoku Distr. Okayama Pref., Niimi-shi, Kawanose, on limestone hill, alt. ca. 300 m, 25 Apr. 1976, G. Murata & H. Nishimura 1811 (TNS 338097). **Shimane Pref.**, Oki-gun, Okinoshima-cho [Oki Island], 21 Apr. 1977, J. Haginiwa JH000045 (TNS 950045).

KYUSHU: Kumamoto Pref., Aso-gun, Ichinomiya-cho, Teno-jinja shrine, 29 Apr. 1959, Y. Shimada 1128B (TNS 143682).