

New Combinations in *Chrysanthemum* (Compositae–Anthemideae) of Asia with a List of Japanese Species

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(Received on January 10, 2004)

New combinations or new names for two sections, 28 species and the infraspecific taxa are proposed under the conserved generic name *Chrysanthemum* L. The genus is circumscribed here almost as identical with *Dendranthema* of Kitamura (1978) including *Ajania*, *Arctanthemum*, *Dendranthema* and *Phaeostigma* in the sense of Bremer and Humphries (1993). A list of the Japanese species of *Chrysanthemum* is provided.

Key words: Asia, *Chrysanthemum*, *Dendranthema*, new combinations, new names.

The generic name *Chrysanthemum* L. is conserved with a conserved type *C. indicum* L. (Brummitt 1998, Greuter et al. 2000). The generic name *Dendranthema* Des Moul. became a synonym of *Chrysanthemum*, although the name had been recently accepted in E. Asia (Kitamura 1978, 1981, Shih and Fu 1983, Barkalov 1992, Koyama 1995, Peng et al. 1998) and also in a generic monograph by Bremer and Humphries (1993).

Bremer and Humphries (1993) discussed relations between *Chrysanthemum* (as *Dendranthema*) and its satellite genera including *Ajania*, *Arctanthemum* and *Phaeostigma*, which were included in *Dendranthema* by Kitamura (1978). The genus *Ajania* Poljak. (Poljakov 1955) based on *A. pallasiana* (Turcz. ex Besser) Poljak. has been accepted by many authors, especially in Russia and China, as distinct from *Chrysanthemum* or *Dendranthema* (Tzvelev 1961, Shih 1979, 1994, Muldashev 1983, Shih and Fu 1983, Barkalov 1992, Bremer and Humphries 1993). Bremer and Humphries (1993) kept both genera separate, and treated two disciform Japanese species

of *Dendranthema* as *Ajania* (*A. pacifica* (Nakai) K. Bremer & Humphries and *A. shiwogiku* (Kitam.) K. Bremer & Humphries). However, morphological distinction and genetic isolation between them are considered to be insufficient to recognize them as different genera. Many hybrids are known between *Ajania* and *Chrysanthemum* in Japan (Table 1). The chromosomes of *Ajania* and *Chrysanthemum* are similar to each other (Nakata et al. 1987). Distinctness of *Ajania* from *Chrysanthemum* was already suspected by Tzvelev based on extensive examination of Chinese material (see Bremer and Humphries 1993). We regard *Ajania* as a section of *Chrysanthemum*. This was already proposed by Kitamura (1978) under *Dendranthema*. *Phaeostigma* is separated from *Ajania* by Muldashev (1981, 1983), but Shih and Fu (1983) included it in *Ajania*. We include *Phaeostigma* into *Chrysanthemum*.

Chrysanthemum arcticum L. (including *Dendranthema kurilense* Tzvelev) is often regarded as comprising the genus *Arctanthemum* Tzvelev (1985) based on its distinctly ribbed cypselas without myxogenic

Table 1. Intersectional hybrids between *Chrysanthemum* sect. *Chrysanthemum* (= *Dendranthema*) and sect. *Ajanía* (= *Ajanía*) found in Japan

Hybrid (sect. <i>Chrysanthemum</i> × sect. <i>Ajanía</i>)
<i>C. makinoi</i> × <i>C. pallasianum</i> = <i>Chrysanthemum</i> × <i>konoanum</i> Makino トガクシギク
<i>C. morifolium</i> × <i>C. pacificum</i> = <i>Chrysanthemum</i> × <i>marginatum</i> (Miq.) N. E. Br. ハナイソギク
<i>C. indicum</i> × <i>C. kinokuniense</i> = <i>Chrysanthemum</i> × <i>ogawae</i> Kitam. ヒノミサキギク
<i>C. makinoi</i> × <i>C. rupestre</i> = <i>Chrysanthemum</i> × <i>todayense</i> H. Ohashi & Yonek.* リュウノウイワインチン
<i>C. makinoi</i> × <i>C. kinokuniense</i>
<i>C. morifolium</i> × <i>C. kinokuniense</i>
<i>C. makinoi</i> × <i>C. shiwogiku</i>
<i>C. morifolium</i> × <i>C. shiwogiku</i>

*New names see text

cells (Bremer and Humphries 1993). This species is, however, very similar to *C. yezoense* Maek. which is often regarded as a subspecies of *C. arcticum* as subsp. *maekawanum* Kitam. More precise analyses on achene characters are needed for *C. arcticum*, but we consider *Arctantherum* should be treated as a section of *Chrysanthemum*.

New combinations for sections in *Chrysanthemum*

Chrysanthemum sect. *Ajanía* (Poljak.)

H. Ohashi & Yonek., comb. nov.

Ajanía Poljak. in Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS 17: 419 (1955), p. p.; Tzvelev, Fl. URSS 26: 398 (1961); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. 76(1): 102 (1983); Barkalov in Kharkev., Pl. Vasc. Orient. Extr. Soviet. 6: 162 (1992); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) 23(2): 115 (1993). Type species: *A. pallasiana* (Fischer ex Besser) Poljak.

Dendranthema sect. *Ajanía* (Poljak.) Kitam. in Acta Phytotax. Geobot. 29: 168 (1978).

Phaeostigma Muldashev in Bot. Zhurn. SSSR 66: 586 (1981); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) 23(2): 115 (1993).

Chrysanthemum sect. *Arctantherum* (Tzvelev) H. Ohashi & Yonek., comb. nov.

Dendranthema sect. *Arctantherum* Tzvelev, Fl. URSS 26: 385 (1961).

Arctantherum (Tzvelev) Tzvelev in Novit. Syst. Pl. Vasc. 22: 274 (1985); Barkalov in Kharkev., Pl. Vasc. Orient. Extr. Soviet. 6: 109 (1992); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) 23(2): 114 (1993). Type species: *A. arcticum* (L.) Tzvelev.

New combinations for species and infraspecific taxa in alphabetical order of the specific epithet

Chrysanthemum abolinii (Kovalevsk.)

H. Ohashi & Yonek., comb. nov.

Ajanía abolinii Kovalevsk. in Novit. Syst. Pl. Vasc. 23: 247 (1986).

Distr.: C. Asia.

Chrysanthemum alabasium (H. C. Fu) H. Ohashi & Yonek., comb. nov.

Ajanía alabasia H. C. Fu, Fl. Intramong. 6: 325, t. 34 (1982), ed. 2, 4: 585 (1993).

Distr.: China (Inner Mongolia).

Chrysanthemum arcticum L., Sp. Pl. 2: 889 (1753).

subsp. *yezoense* (Maek.) H. Ohashi & Yonek., stat. nov.

Chrysanthemum arcticum var. *yezoense* Maek. in Trans. Sapporo Nat. Hist. Soc. **8**: 14, figs. 1–4 (1921); Kitam. in Mem. Coll. Sci. Kyoto Imp. Univ. ser. B, **15**(3) [Compos. Jap. **2**]: 347 (1940), non *C. yezoense* Maek. (1921).

Dendranthema kurilense Tzvelev, Fl. URSS **26**: 385 (1961), nom. nov. for *C. arcticum* var. *yezoense* Maek.

Arctanthemum kurilense (Tzvelev) Tzvelev in Novit. Syst. Pl. Vasc. **22**: 274 (1985); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 114 (1993).

Arctanthemum aucticum (L.) Tzvelev subsp. *kurilense* (Tzvelev) Tzvelev, Fl. Arct. URSS **10**: 115 (1987); Barkalov in Kharkev., Pl. Vasc. Orient. Extr. Soviet. **6**: 110, in nota (1992).

? *Chrysanthemum arcticum* var. *kurilense* Kudo, Fl. Paramushir.: 167 (1922).

Plants of *Chrysanthemum arcticum* in Nemuro Peninsula of eastern Hokkaido, Kurile Islands and South Sakhalin are characterized by the smaller habit with usually simple stem and more striated ligules of the ray-florets than those of the typical form. Accordingly, they have been distinguished from the typical form as a different taxon at the rank of variety (Maekawa 1921, Kitamura 1940), subspecies (Tzvelev 1987, Barkalov 1992) or a distinct species (Tzvelev 1961, 1985). Kitamura (1967, 1978, 1981) treated this taxon as a synonym of *C. arcticum*, since he regarded plants from Shiretoko Peninsula of eastern Hokkaido are indistinguishable from the typical *C. arcticum*, but we consider that the taxon is distinct because its diagnostic characters are useful and its distribution is separated from the typical form. We recognize the taxon as a subspecies of *C. arcticum*. Unfortunately, the available epithet *kurilense* at the subspecies level can not be used under *Chrysanthemum* due to the existence of *C. arcticum* var. *kurilense* Kudô (1922). The earliest epithet for the taxon under

Chrysanthemum arcticum is var. *yezoense* Maek. (1921), but the name is confusable with *C. yezoense* Maek. (1921) (= *C. arcticum* subsp. *maekawanum* Kitam.) which occurs sympatrically with the former in Nemuro Peninsula (Nishikawa and Kobayashi 1989).

Chrysanthemum brachyanthum (C. Shih) H. Ohashi & Yonek., comb. nov.

Ajania brachyantha C. Shih in Acta Phytotax. Sin. **17**: 114 (1979), in C. Y. Wu, Fl. Xizang. **4**: 736 (1985); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 110, t. 17, fig. 2 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: China (S. Tibet (Xizang)).

Chrysanthemum delavayanum H. Ohashi & Yonek., nom. nov.

Ajania sericea C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 14 (1980); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 118, t. 19, figs. 1 & 2 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993), non *Chrysanthemum sericeum* Adam (1805–1806), nec Hoffm. & Link (1820).

Distr.: China (NW. Yunnan).

The epithet of this species under *Chrysanthemum* is changed to avoid homonymy and renamed after J. M. Delavay, collector of the type specimen.

Chrysanthemum dichrum (C. Shih) H. Ohashi & Yonek., comb. nov.

Dendranthema dichrum C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 8 (1980); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 47 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 114 (1993).

Distr.: N. China (Hebei).

This Chinese species was presumed as an intersectional hybrid in the original descrip-

tion, but the latter authors treat it as a natural species.

Chrysanthemum fastigiatum (C. Winkl.)

H. Ohashi & Yonek., comb. nov.

Artemisia fastigiata C. Winkl. in Acta Hort. Petrop. **11**: 373 (1891).

Ajania fastigiata (C. Winkl.) Poljak. in Not. Syst. Herb. Bot. Inst. Acad. URSS **17**: 428 (1955); Tzvelev, Fl. URSS **26**: 405 (1961); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 125, t. 20, fig. 3 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: C. Asia, S. Siberia, China (Xinjiang) and Mongolia.

Chrysanthemum gracile (Hook. f. & Thomson) H. Ohashi & Yonek., comb. nov.

Tanacetum gracile Hook. f. & Thomson in Hook. f., Fl. Brit. India **3**: 318 (1881).

Ajania gracilis (Hook. f. & Thomson) Poljak. ex Tzvelev, Fl. URSS **26**: 407 (1961); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 124, in nota (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: C. Asia and W. Himalaya.

Chrysanthemum grubovii (Muldashv) H. Ohashi & Yonek., comb. nov.

Ajania grubovii Muldashv in Bot. Zhurn. SSSR **67**: 1529 (1982); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: Mongolia.

Chrysanthemum hypoleucum (Y. Ling ex C. Shih) H. Ohashi & Yonek., comb. nov.

Ajania hypoleuca Y. Ling ex C. Shih in Acta Phytotax. Sin. **32**: 366 (1994).

Distr.: China.

Chrysanthemum junnanicum (Poljak.) H. Ohashi & Yonek., comb. nov.

Ajania junnanica Poljak. in Not. Syst.

Herb. Inst. Bot. Acad. Sci. URSS **17**: 424 (1955); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 109, in nota (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: China (N. Yunnan).

Chrysanthemum khartense (Dunn) H. Ohashi & Yonek., comb. nov.

Tanacetum khartense Dunn in Kew Bull. **1922**: 150 (1922).

Ajania khartensis (Dunn) C. Shih in Acta Phytotax. Sin. **17**: 115 (1979), in C. Y. Wu, Fl. Xizang. **4**: 737 (1985); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 113, t. 17, fig. 3 & t. 1, fig. 9 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: Pamir, the Himalayas and SW. China.

Chrysanthemum kinokuniense (Shimot. & Kitam.) H. Ohashi & Yonek., stat. nov.

Chrysanthemum shiwogiku Kitam. var. *kinokuniense* Shimot. & Kitam. in Kitam. in Acta Phytotax. Geobot. **4**: 73 (1935) & **22** (4–6): 120 (1967).

A plant of *Chrysanthemum* sect. *Ajania* growing in coastal region of Kii Peninsula in southwestern Honshu has been regarded taxonomically as a variety of *C. shiwogiku* distributed in Shikoku (Kitamura 1935, 1940, 1967, 1978, 1981). Shimotomai et al. (1968) revealed it as being a hybrid derivative between octoploid *C. shiwogiku* and decaploid *C. pacificum* distributed in Kanto and Tokai regions. In Kii Peninsula, however, the plants occurring in east of Cape Shionomisaki, the tip of Kii Peninsula, are principally decaploid, whereas those growing in west of the cape are usually octoploid, although many aneuploid plants were observed especially at and around the tip (Shimotomai et al. 1968). Nakata et al. (1987) regarded the octoploid plants as *C. shiwogiku* and decaploid as *C. pacificum* ex-

clusively based on their ploidy differences. Their recognition, however, makes it difficult to discriminate the two species from each other, because their morphological distinctions are often continuous among the plants in Kii Peninsula. We prefer recognizing the plants of Kii Peninsula as an independent species derived from a hybrid origin distinct from the parents.

Chrysanthemum kokanicum (Krasch.)

H. Ohashi & Yonek., comb. nov.

Tanacetum kokanicum Krasch. in Not. Syst. Herb. Hort. Petrop. **4**: 7 (1923).

Ajania kokanica (Krasch.) Tzvelev, Fl. URSS **26**: 408 (1961); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: C. Asia.

Chrysanthemum korovinii (Kovalevsk.)

H. Ohashi & Yonek., comb. nov.

Ajania korovinii Kovalevsk. in Novit. Syst. Pl. Vasc. **23**: 246 (1986).

Distr.: C. Asia.

Chrysanthemum nitidum (C. Shih) H.

Ohashi & Yonek., comb. nov.

Ajania nitida C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 15 (1980); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 123, t. 20, fig. 2 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: China (SW. Sichuan).

Chrysanthemum ornatum Hemsl. in Curtis's Bot. Mag. **130**: t. 7965 (1904).

var. **tokarense** (M. Hotta & Y. Hirai) H. Ohashi & Yonek., comb. nov.

Dendranthema ornatum (Hemsl.) Kitam. var. *tokarense* M. Hotta & Y. Hirai in Acta Phytotax. Geobot. **47**: 103 (1996), "*tokarensis*".

Distr.: Japan: S. Kyushu (Isl. Yaku-shima, Isl. Kuchinoerabu-jima and Tokara Islands).

This variety is dubious in morphological distinctness from var. *ornatum* in Satsuma Peninsula. Due to its remote geographical separation we tentatively recognize it as it was described (Hotta et al. 1996).

Chrysanthemum przewalskii (Poljak.)

H. Ohashi & Yonek., comb. nov.

Ajania przewalskii Poljak. in Not. Syst. Herb. Inst. Bot. Acad. Sci. URSS **17**: 422 (1955); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 109 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: China (Sichuan, Qinghai, E. Gansu and Ningxia).

Chrysanthemum purpureiflorum H.

Ohashi & Yonek., nom. nov.

Ajania purpurea C. Shih in Acta Phytotax. Sin. **17**(2): 115 (1979), in C. Y. Wu, Fl. Xizang. **4**: 738 (1985); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 115 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993), non *Chrysanthemum purpureum* Pers. (1807).

Distr.: China (Tibet (Xizang)).

Chrysanthemum ramosum (C. C.

Chang) H. Ohashi & Yonek., comb. nov.

Chrysanthemum variifolium C. C. Chang var. *ramosum* C. C. Chang in Sinensia **5**: 163 (1934).

Ajania ramosa (C. C. Chang) C. Shih in Acta Phytotax. Sin. **17**: 114 (1979), in C. Y. Wu, Fl. Xizang. **4**: 735 (1985); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 108 (1983).

Phaeostigma variifolium (C. C. Chang) Muldashev var. *ramosum* (C. C. Chang) Muldashev in Bot. Zhurn. SSSR **66**: 587 (1981).

Distr.: China (E. Tibet (Xizang) and W. Sichuan).

Chrysanthemum rhombifolium (Y. Ling

& C. Shih) H. Ohashi & Yonek., comb. nov.

Dendranthema rhombifolium Y. Ling & C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 2 (1980); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 31, t. 5, fig. 1 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 114 (1993).

Distr.: China (Chongqing).

Chrysanthemum roborowskii (Muldashev) H. Ohashi & Yonek., comb. nov.

Ajania roborowskii Muldashev in Bot. Zhurn. SSSR **67**: 1528 (1982); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: SW. China.

var. **tsinghaicum** (Muldashev) H. Ohashi & Yonek., comb. nov.

Ajania roborowskii var. *tsinghaicum* Muldashev in Bot. Zhurn. SSSR **67**: 1529 (1982).

Distr.: China (Qinghai).

Chrysanthemum seticuspe (Maxim.) Hand.-Mazz., Symb. Sin. **7**(4): 1111 (1936).

f. **boreale** (Makino) H. Ohashi & Yonek., comb. nov.

Chrysanthemum indicum L. var. *boreale* Makino in Bot. Mag. Tokyo **16**: 89 (1902).

Chrysanthemum boreale (Makino) Makino in Bot. Mag. Tokyo **23**: 20 (1909); Matsum., Index Pl. Jap. **2**(2): 636 (1912); Kitam. in J. Jpn. Bot. **13**: 167 (1937), in Mem. Coll. Sci. Kyoto Imp. Univ. ser. B, **15** (3) [Compos. Jap. **2**]: 365, t. 1, fig. 2 (1940), in Acta Phytotax. Geobot. **22**(4-6): 129 (1967); H. Hara, Enum. Spermatoph. Jap. **2**: 157 (1952); Ohwi, Fl. Jap.: 1187 (1953); Kitam. & al., Col. Ill. Herb. Pl. Jap. **1**: 61, t. 20, no. 144 (1957); Kitag., Neo-Lineam. Fl. Mansh.: 633 (1979); Ohwi & Kitag., New Fl. Jap.: 1500 (1982).

Chrysanthemum seticuspe var. *boreale* (Makino) Hand.-Mazz., Symb. Sin. **7**(4): 1111 (1936).

Dendranthema boreale (Makino) Y. Ling

[Iconogr. Cormoph. Sin. **4**: 510, fig. 6433 (1975), comb. nud.] ex Kitam. in Acta Phytotax. Geobot. **29**: 167 (1978); Kitam. in Satake & al., Wild Flow. Jap. Herb. Pl. **3**: 167 (1981); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 114 (1993); H. Koyama in K. Iwats. & al., Fl. Jap. **IIIb**: 94 (1995).

Dendranthema lavandulifolium (Fisch. ex Trautv.) Kitam. var. *seticuspe* (Maxim.) C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 6 (1980), p. p.; C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 42 (1983), p. p.

Dendranthema seticuspe (Maxim.) Kitam. f. *boreale* (Makino) Kitam. in Acta Phytotax. Geobot. **38**: 381 (1987); Kitam. & al., Col. Ill. Herb. Pl. Jap. (63th printing) **1**: 61, t. 20, no. 144 (1987).

Distr.: Japan (Honshu and N. Kyushu), Korea and NW. China.

Chrysanthemum seticuspe was rarely cultivated in the Edo era, but considered as extinct in the Meiji period (Kitamura 1940, 1967). Recently it was rediscovered in the Imperial Palace in Tokyo (Kitamura 1987). Kitamura (1987) considered it as merely a cultivated form of wild *C. boreale* distributed in Japan, Korea and China and made the combination *Dendranthema seticuspe* f. *boreale*. We agree with Kitamura's opinion. This species has the same chromosome number and similar karyotypes with Chinese *C. lavandulifolium* Turcz. ex Trautv. As the distinction between the species are often critical, further studies are needed on *C. seticuspe* and *C. lavandulifolium*.

Chrysanthemum shihchuanum H. Ohashi & Yonek., nom. nov.

Ajania latifolia C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 12 (1980); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 106 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993), non *Chrysanthemum latifolium* (DC.) Baksay (1957).

Distr.: China (SW. Sichuan).

The specific epithet under *Chrysanthemum* is renamed after Shih Chu, author of the basionym, to avoid homonymy.

Chrysanthemum* ×*todayense H. Ohashi & Yonek., nom. nov.

Chrysanthemum makinoi Matsum. & Nakai × *C. rupestre* Matsum. & Koidz.: Kitam. in Acta Phytotax. Geobot. **22**(4-6): 113 (1967), cum descr. latin.

Type: **Japan**: Honshu, Nagano Pref. (Prov. Shinano), Kamiinagun, Hasemura, Todai, 1400 m, in locis calcareis. T. Shimizu 5501, 21 Sep. 1959 (KYO-holotype).

This is an intersectional hybrid between sect. *Chrysanthemum* and sect. *Ajania*.

Chrysanthemum trilobatum (Poljak.) H. Ohashi & Yonek., comb. nov.

Ajania trilobata Poljak., Fl. URSS **26**: 880 (1961); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 116, t. 18, fig. 3 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: NW. China (Xinjiang).

Chrysanthemum tripinnatisectum (Y. Ling & C. Shih) H. Ohashi & Yonek., comb. nov.

Ajania tripinnatisecta Y. Ling & C. Shih in C. Shih in Bull. Bot. Lab. N.-E. For. Inst. **6**: 14 (1980); C. Shih & G. X. Fu, Fl. Reipubl. Pop. Sin. **76**(1): 118, t. 19, fig. 5 (1983); Bremer & Humphries in Bull. Nat. Hist. Mus. Lond. (Bot.) **23**(2): 115 (1993).

Distr.: China (NW. Sichuan).

A List of the Japanese species of *Chrysanthemum*

All the Japanese taxa are listed here with the correct name, ploidy in parenthesis, and Japanese name.

I. Sect. *Arctantherum*

1. *Chrysanthemum arcticum* L.

subsp. *arcticum* (diploid) アキノコハマギク

subsp. *yezoense* (Maek.) H. Ohashi & Yonek. (diploid) チシマコハマギク

II. Sect. *Chrysanthemum*

2. *Chrysanthemum crassum* (Kitam.) Kitam. (decaploid) オオシマノジギク

3. *Chrysanthemum indicum* L.
var. *indicum* (tetraploid and hexaploid) シマカンギク

var. *albescens* Makino シロバナハマカンギク

var. *iyoenae* (tetraploid) イヨアブラギク

var. *maruyamanum* Kitam. (tetraploid) オッタチカンギク

var. *tsurugisanense* Kitam. (tetraploid) ツルギカンギク

4. *Chrysanthemum japonense* Nakai
var. *japonense* (hexaploid) ノジギク
var. *ashizuriense* Kitam. (hexaploid) アシズリノジギク

5. *Chrysanthemum makinoi* Matsum. & Nakai (diploid) リュウノウギク

6. *Chrysanthemum okiense* Kitam. (tetraploid) オキノアブラギク

Nakata et al. (1987) doubted its taxonomic status because it has the same chromosome number as *C. indicum*.

7. *Chrysanthemum ornatum* Hemsl.
var. *ornatum* (octoploid) サツマノギク
var. *tokarense* (M. Hotta & Y. Hirai) H. Ohashi & Yonek. (octoploid) トカラノギク

8. *Chrysanthemum seticuspe* (Maxim.) Hand.-Mazz.

f. *seticuspe* (only known in cultivation) カモメギク

f. *boreale* (Makino) H. Ohashi & Yonek. (diploid) キクタニギク

9. *Chrysanthemum wakasaense* Shimot. ex Kitam. (tetraploid; derived from *C. makinoi* × *C. seticuspe* f. *boreale* or *C. indicum*) ワカサハマギク

10. *Chrysanthemum weyrichii* (Maxim.) Miyabe & T. Miyake (octoploid; see Nakata

et al. 1987) ピレオギク

This species was synonymised with *C. zawadskii* (Kitamura 1967, 1981), but is distinct from the cytogenetical and morphological points of view.

11. *Chrysanthemum yezoense* Maek. (decaploid) コハマギク

This plant has been frequently regarded as a subspecies of *C. arcticum* in sect. Arctantherum (Kitamura 1935, 1940, 1967, 1981, Koyama 1995), but is quite distinct as revealed by Nishikawa and Kobayashi (1989). It is rather nearer to *C. zawadskii* and *C. weyrichii* in achene characters (Tzvelev 1961, Hind 1988).

12. *Chrysanthemum yoshinaganthum* Makino ex Kitam. (tetraploid) ナカガワノギク

13. *Chrysanthemum zawadskii* Herbich (hexaploid and octoploid) イワギク

Hexaploid plants sporadically distributed in Honshu, Shikoku and Kyushu are apparently relictal in Japan. Japanese hexaploids dominantly have dissected leaves with narrower lobes, but in some localities plants with wider lobes of leaves are growing. These plants were often referred to the variety of continental Asia, var. *latilobum* Kitam., but are here considered as lying within the range of *C. zawadskii* as stated by Kitamura (1967, 1981).

The octoploid plants recently found in Kitakami Mountains in N. Honshu (Nakata and Kumagai 1999) seem specifically distinct not only from *C. zawadskii* but also from *C. weyrichii*. These plants were suspected as hybrid derivatives between hexaploid *C. zawadskii* and decaploid *C. yezoense* (Nakata and Kumagai 1999).

Cultivated species

14. *Chrysanthemum morifolium* Ramat. (hexaploid probably derived from a hybrid *C. indicum* × *C. zawadskii*) キク

Hybrids in sect. *Chrysanthemum*

15. *Chrysanthemum* × *aphrodite* Kitam. (= *C. indicum* × *C. morifolium*) サンインギク

Kitamura (1967) regarded this plant as a distinct hexaploid species closely related to *C. indicum*, but Nakata et al. (1987) and Nakata and Takeuchi (1998) considered the type specimen of this species is a hybrid derivative between hexaploid *C. indicum* and cultivated *C. morifolium*. The hybridity of this taxon is supported from morphological point of view.

16. *Chrysanthemum* × *cuneifolium* Kitam. (= *C. indicum* × *C. yoshinaganthum*) ワジキギク

17. *Chrysanthemum* × *leucanthum* (Makino) Makino (= *C. makinoi* × *C. seticuspe* f. *boreale*) シロバナアブラギク

18. *Chrysanthemum miyatojimense* Kitam. (= *C. morifolium* × *C. yezoense*) ミヤトジマギク

19. *Chrysanthemum* × *shimotomaii* Makino (= *C. indicum* × *C. japonense*) ニジガハマギク

III. Sect. *Ajanía*

20. *Chrysanthemum kinokuniense* (Shimot. & Kitam.) H. Ohashi & Yonek. (octoploid and decaploid; derived from *C. pacificum* × *C. shiwogiku*) キノクニシオギク

21. *Chrysanthemum pacificum* Nakai (decaploid) イソギク

22. *Chrysanthemum pallasianum* (Fisch. ex Besser) Kom. (hexaploid) オオイワインテン

23. *Chrysanthemum rupestre* Matsum. & Koidz. (diploid) イワインテン

24. *Chrysanthemum shiwogiku* Kitam. (octoploid) シオギク

IV. Intersectional hybrids between sect. *Chrysanthemum* and sect. *Ajanía*

25. *Chrysanthemum* × *konoanum* Makino (*C. makinoi* × *C. pallasianum*) トガクシギク

26. *Chrysanthemum* × *marginatum* (Miq.)

N. E. Br. (*C. morifolium* × *C. pacificum*) ハ
ナイソギク

27. *Chrysanthemum* × *ogawae* Kitam. (*C.*
indicum × *C. kinokuniense*) ヒノミサキギク

28. *Chrysanthemum* × *todaiense* H. Ohashi
& Yonek. (*C. makinoi* × *C. rupestre*) リユ
ウノウイワインチン

29. *Chrysanthemum makinoi* × *C. kino-*
kuniense

30. *Chrysanthemum morifolium* × *C. kino-*
kuniense

31. *Chrysanthemum makinoi* × *C. shiwo-*
giku

32. *Chrysanthemum morifolium* × *C.*
shiwogiku

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大橋広好^a, 米倉浩司^b: アジア産キク科キク属の 新組み合わせと日本産種一覧

キクの仲間がかつては広義の *Chrysanthemum* L. の下に分類されてきたが, 近年はこれを複数の属に細分することが多く, 細分した場合の属名としてはこれまで *Dendranthema* (DC.) Des Moulins が用いられてきた。しかし, 1995年に, これまでシュンギク *Chrysanthemum coronarium* L. をタイプとしてきた *Chrysanthemum* L. をシマカンギク *C. indicum* L. をタイプとして保存することが提案され, これがセントルイスの第16回国際植物学会議で認可された。この結果, *Chrysanthemum* は現行の国際植物命名規約付則 III の保存属名中に掲載されている (Greuter et al. 2000)。このため, キク属の学名は *Chrysanthemum* に戻さねばならない。日本産のキク属植物は大部分 *Chrysanthemum* の下で記載されてきたので, 新組み合わせの必要があるものは少ないが, 近年に *Dendranthema* の下で記載されたトカラノギクや古い栽培植物のカモメギクと品種関係にあることが分かったキクタニギクについては組み合わせが必要となった。

中国やロシアでは, 頭花に舌状花を欠くイワインチンの仲間を *Ajania* や *Phaeostigma*, 瘦果の性質が少し異なるチシマコハマギクを *Arctanthemum* として別属で扱うことが多く, これらの属は世界のキク亜科植物の属レベルのモノグラフをまとめた Bremer and Humphries (1993) にも採用されている。しかし, これらの属の識別形質は小さい差異であり, また, イワインチンの仲間は日本ではキクの仲間とふつうに交雑して遺伝的な隔離はない

ことが知られている。このため, 北村四郎博士はこれらの属をキク属に含め, それぞれ節として取り扱った。われわれは北村博士のキク属の概念を採用する。Bremer and Humphries (1993) は, *Ajania* とキク属との差異が小さいことを認めながらも, 両者を合一することで必要となる多数の新組み合わせを避けて両属を維持し, かえって日本産のイソギクとシオギクを *Ajania* に組み替えた。しかし, ここでは両属を同一属として扱ったので, 中国から中央アジアにかけて最近記載された多数の *Ajania* の種を *Chrysanthemum* に組み替えることが必要となった。この群に属するキノクニシオギク *C. shiwogiku* var. *kinokuniense* Shimot. & Kitam. は, イソギクとシオギクの交雑由来の植物であることが下斗米直昌博士らの研究により既に明らかになっているので種として扱った。

この他, チシマコハマギクの学名の変更と, リュウノウイワインチン (リュウノウギク×イワインチン) に対する新名の提唱を行った。チシマコハマギクに対して新たに定めた学名は, 類似するコハマギクの学名と紛らわしいが, 命名法上やむをえない。

最後に, 日本産のキク属植物の学名を *Chrysanthemum* の下で整理した一覧を示した。

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