

The *H. sieboldii* Complex = コバギボウシ Part 2

This part includes *Hosta sieboldii* ‘Albomarginata’ (formerly known as *H. albomarginata*). This variegated mutation was originally described as a taxon and served as the type/basionym for the *H. sieboldii* complex. It is here reduced to cultivar status. Note that the all-green, natural populations of *H. sieboldii* var. *sieboldii* (and its phenotypical variants) are described in *H. sieboldii* Complex Part 1.

Part 1: *H. sieboldii* var. *sieboldii* f. *sieboldii* (in Japan コバギボウシ = Koba Gibōshi), the wild plant growing in the natural habitat.

Part 2: *H. sieboldii* ‘Albomarginata’ (formerly known as *H. albomarginata*).

Part 3: *H. sieboldii* and its botanically named variegated (chloroplast mutant) phenotypes.

H. sieboldii ‘Albomarginata’

(Reduced to a culton per ICNCP (Cultivated Plant Code 2009) P. 32; Art 21B; Ex. 57.

Funckia albo-marginata Hooker (May 1838)

Curtis's Botanical Magazine, 65, tab. 3567 (see Part 1; page 2, 3) (basionym)

Hosta albomarginata (Hooker) Hylander 1954

Funckia albo-marginata *Curtis Bot. Mag.*, 65: tab. 3567 May 1838.

Ohwi: *Acta Phytotaxonomica et Geobotanica*, Vol. 11:265 1942. Hylander: The genus *Hosta* in Swedish gardens, *Acta Horti Bergiani*, Vol. 16, 11:331-420; 1954.

Maekawa: *H. lancifolia* var. *thunbergiana* f. *albomarginata*; 1940.

Hosta sieboldii var. *sieboldii* f. *sieboldii* Hara

J. Jap. Bot., 59, 6:179 1984; (*Hemerocallis sieboldii* Paxton (March 1838; basionym).

へりとりギボウシ = へりとり擬宝珠 = Heritori Gibōshi (Makino & Tanaka 1928)

フンリンギボウシ = 覆輪擬宝珠 = Fukurin Gibōshi (Maekawa 1940)

History and Nomenclature: The proclivity of *H. sieboldii* to undergo plastogene mutation was first researched and reported by K. Yasui (1929). According to Yasui, plastid mutation occurring in *H. sieboldii* are maternally inherited. Vaughn and Wilson (1980) and Vaughn (1979 and 1981) further published on dominant plastome mutations in *Hosta*. The existence of these mutations has given rise to numerous variegated forms of the all-green species. One of these, a white-margined form, was discovered in Japan in the early 19th century. Two engravings exist, one published by J. Paxton as *Hemerocallis sieboldii* in March 1838 (see Part 1, page 2); the other published by W.J. Hooker as *Funckia albomarginata* in May 1838 (see Part 1, page 3). Although mutated specimens occur sporadically in the wild, virtually all of the wild populations lack the white margin. Nevertheless, this

white-margined mutation has served as the taxonomic type for the *H. sieboldii* complex for many years, albeit under the illegitimate name *Funkia albomarginata*. The latter name was illegitimate because the generic name *Hosta* Trattinnick was



***Hosta sieboldii* 'Albomarginata'**

▲ Left: Part mutation to *H.* 'Beatrice'

Right: Typical leaf mound ▲

Hosta Hill R.G. © W.G. Schmid 1987.06.09

HL/Crockett Garden © C. Crocket

conserved in 1905 by the International Botanical Congress (IC) of Vienna in accordance with Article 20 (cfr. IR 1935) and Article 24 (ICBN 1952). Thus, both the generic and species epithet are illegitimate but this does not prevent the epithet to be used in a cultivar name. In fact, several names have been suggested under the Cultivated Plant Code (ICNCP). The white-margined culton of *H. sieboldii* is a plastogene mutation that is a rare occurrence in wild populations of the species.

Scientific testing revealed that the white leaf margins cannot be inherited through normal, natural propagation cycles (Yasui, 1929; Vaughn, 1979). As a consequence, this form (*marginata* type) is here considered a mutant and not representative of the extensive wild populations. Because of this, it was reduced to cultivar status since the variegated form is only partially coextensive (Art 16.3; 1995) with the taxon and the name *Hosta sieboldii* 'Paxton's Original' was proposed. Next, the cultivar name was revised



***Hosta sieboldii* 'Albomarginata'**

Emerging shoots 1987.03.15

Hosta Hill R.G. SpV.1087.84.04 ▪ © W.G. Schmid

to *H. sieboldii* 'Sieboldii' based on Hara (1984). However, ICNCP 2004, Art. 19.8; Ex. 14. required the name to be changed to *H. sieboldii* 'Albomarginata'. Maekawa (1940; page 403) did not list either wild types nor type locations, stating "Hab.: *In hortis late distributa* (widely distributed in gardens)" citing as the type Hooker's 1838 *Funckia albomarginata*. I must admit, in my 1991 monograph *The genus Hosta: Gibōshi Zoku* (ギボウシ属), I did not revise the taxonomy, which has caused so much confusion over the years. Maekawa clearly separates the all-green wild populations (コバギボウシ = Koba Gibōshi) from the white-margined mutation by using the wild (all-green genotype) as the type for the complex. Regrettably, he formulated the name *H. lancifolia* var. *thunbergiana*, which is erroneous, because it connects this taxon to the cultivated hybrid *H. 'Lancifolia'*. He used the Japanese name コバギボウシ (小葉擬宝珠 = Koba Gibōshi) for his *H. lancifolia* var. *thunbergiana* (= *H. 'Lancifolia'*), when, in fact the correct Japanese name for *H. 'Lancifolia'* is Saji Gibōshi (= サジギボウシ = 匙擬宝珠 (Iinuma, 1874)). A complete review of taxonomic differentiation of *H. 'Lancifolia'* against *H. sieboldii* is in Part 1, pages 4 to 11. Maekawa (1940) treated *H. sieboldii* 'Albomarginata' as a forma of *H. lancifolia* var. *thunbergiana*, naming it *H. lancifolia* var. *thunbergiana* f. *albomarginata*, the forma epithet standing for *albo* = white and *marginata* = edged, margined. The Japanese names assigned by Maekawa also reflect this feature. Although an older Japanese name existed, namely Heritori Gibōshi (= へりとりギボウシ = へりとり擬宝珠 (Makino & Tanaka 1928)), he designated the new Japanese name Fukurin Gibōshi (= フクリンギボウシ = 覆輪擬宝珠). Both Japanese names translate to "variegated in the margin." In 1984, Hara legitimized the name *H. sieboldii* in Japan, but still maintained Maekawa's connection with *H. 'Lancifolia'* placing the all-green species Koba Gibōshi under *H. sieboldii* var. *sieboldii* f. *lancifolia*. For the white-margined mutant, Hara (1984) assigned the forma rank *H. sieboldii* var. *sieboldii* f. *sieboldii*, which should have been applied to the natural, all-green populations found in the wild. To simplify the nomenclature I have assigned the cultivar name *H. sieboldii* 'Albomarginata' to the variegated (white-margined) cultivar of the species (per ICNCP 2009). As the 1838 engravings of Paxton (*Hemerocallis sieboldii*) and Hooker (*Funckia albomarginata*) demonstrate (see Part 1; pp: 2 and 3), *H. sieboldii* 'Albomarginata' was one of the first live specimens brought to Europe. It was introduced in 1830 to The Netherlands by the German physician P.F. von Siebold. He was the first European to extensively collect and cultivate Japanese *Hosta* species and cultivars. One of these was *H. sieboldii* 'Albomarginata', he introduced under the name *Funkia spathulata* foliis *albomarginatis*. It is notable that about the same time he also introduced live specimens of *Funkia lancifolia*, now cultivated as *Hosta* 'Lancifolia'. Because the two imports looked much alike, they were almost immediately mistaken for each other. Shortly after introducing the white-margined form, von Siebold was able to produce green seedlings by carefully selfing the plants. He named these seedling plants *Funkia spathulata* (= *H. sieboldii* f. *spathulata*) i.e., the green form. The similarity of the plants gave rise for use of both epithets (*spathulata* and *lancifolia*) interchangeably so the current, long-lasting confusion began. E. Sprague Rand's *Garden Flowers* appeared in 1866 and shows that the hosta selection available in the United States included *H.*

'Lancifolia' as *Funkia lancifolia* and *Hosta sieboldii* 'Albomarginata' as *Funkia albomarginata*, mirroring von Siebold's names. Much later, in a 1942 catalog, *H. sieboldii* 'Albomarginata' was listed as *H. lancifolia albomarginata* (also included in this was the white-flowered *H. sieboldii* 'Alba' as *H. minor alba*). The 1960 Mackwoods Gardens catalog listed *H. lancifolia albomarginata*. In 1967, E. Corbett and R. Lighty of USDA-ARS collected specimens of *H. sieboldii* in the wild forming the basis for a *H. sieboldii* species collection. Summers (1972) lists as one of his first acquisitions as *H. lancifolia albomarginata* Summers No. 7 from Vogel 1962. Summers's 1972 compilation does not list the species name *H. sieboldii*, but frequently refers to *H.* 'Lancifolia' (as *H. lancifolia*) and many of the original plants were lost so any connection between them and *H. sieboldii* 'Albomarginata' can no longer be determined. These listings make it evident how confused the horticultural nomenclature was. In the early 1980s, several articles were published in *The American Hosta Society Bulletin* and *The Hosta Journal* to correct the nomenclature for horticulture. *The Hosta Book* (1988), edited by Paul Aden, contained a chapter contributed in part by W.G. Schmid on "Hostas with Latinized Names," which correct nomenclature

***H. sieboldii* ►
'Albomarginata'**

Mature specimen showing reversion of white margin to green color; remaining traces of white margins are visible. ►►►

Hosta Hill R.G.
© 1987 W.G. Schmid
Sp.V.1084.84.04
1987.07.02
Emerging scapes w/
Bud initials
The Kodak color
label is 1 by 3 inches
(2.5 by 7.6 cm)





◀ ***H. 'Louisa'* (1986)**
F.Williams & C.Williams

This is a culton of *H. sieboldii*
'*Albomarginata*' with
white flowers

Hosta Hill R.G.
© W.G. Schmid
A. No. 1023.83.05
1987.06.13



***H. 'Louisa'* (1986)**
F.Williams & C.Williams
Hosta Hill R.G. © W.G. Schmid
1987.06.13

was suggested. Except for *H. sieboldii* '*Albomarginata*', the taxonomic changes were validly published by Schmid (1991) and a number of variegated taxa were reduced to culta (cultivars). In 1993, the nomenclature of W.G. Schmid (1991; for cultivars) was accepted by (AHS) The American Hosta Society and the American Hosta Growers Association (AHGA) and in 2000 was incorporated in the *Naamlijst Van Vaste Planten* (Boskoop, the Netherlands) and by the Perennial Plant Association (PPA) in 2001. Recently, the new nomenclature was accepted by the international *Naamlijst van Houtige gewassen en Vaste planten*. This "List of Names of Perennials" is recognized as the standard reference work by the ISU (Internationale Stauden Union) and the PPA (Perennial Plant Association). Aside from acceptance in horticulture, the taxonomic changes

made by Schmid (1991, 2007) clarify the taxonomy within the *H. sieboldii* complex, giving the taxa represented by the wild populations primary taxonomic standing and reducing the plastogene mutant forms within the complex to cultivars with appropriate cultivar names in accordance with the ICNCP (International Code of Nomenclature for Cultivated Plants; 2004).

Comparative Plant Morphology: Morphometric data for *H. sieboldii* ‘Albomarginata’ are provided here and is similar in all respects to that of the all-green, endemic form *H. sieboldii* var. *sieboldii* (formerly *H. sieboldii* var. *sieboldii* f. *spathulata* Schmid 1991), except that it is a plastome mutant phenotype with white margins and has therefore been reduced to cultivar rank. Occasionally, it has been observed (Schmid 1991, Zilis 2009) that the leaf size is somewhat smaller than the one found with the all-green endemic taxon, but that may also be due to cultural conditions. In the wild, little differentiation in leaf size has been observed

H. sieboldii ‘Albomarginata’ (formerly *H. sieboldii* var. *sieboldii* f. *sieboldii* Hara 1984): Plant size (medium) 25-40 cm dia. by 20-25 cm high (10-16 by 8-10 in.). Petiole 10–15 cm by 0.5 cm wide (4–6 by 0.20 in. wide), erect, forming a vase-shaped plant, green with no purple dots at the base. Leaf 10–15 cm by 5 cm wide (4–6 by 2 in.), erect and in line with petiole, lanceolate to ovate-lanceolate, petiole transition gradual, decurrent or attenuate, margins entire, in some phenotypes slightly undulate, erect, smooth, shiny light, dull, medium to dark green above, glossy lighter green below, tip acute, sometimes slightly acuminate; margin white, narrow, variable in width from 1mm to 3mm (0.04 to 0.12 in.) wide; sometimes whitish streaks emanating from margin toward leaf center; in some leaves the margin may be present and a mix of variegated and non-variegated leaves combine in a clump (see photo page 2). Venation 3–4, lightly impressed above, smooth below. Scape 25–60 cm long (10–24 in.), straight and erect, not bending, light green, terete, no purple marks. Sterile bracts 2–3, tightly clasping stem, persistent; fertile bracts, short, navicular, thin, membranous, green, withering at anthesis but not falling away. Raceme with 6–12 flowers, widely spaced. Flowers 5 cm long and 3.5 cm broad (2 by 1.50 in.), Type C Tepal coloration (Schmid 1991 ▲▲▲); purple-striped, purple, thin narrow tube, perianth expanding, lily-shaped, lobes spreading, recurving, widely open, short pedicels, projecting stamens and style. Anthers yellow. Blooms July to early August. Fertile (95-97%).



Karyotype-Chromosomes: Sporophytic Count $2N = 60$; 12 large, 48 small.

Genomic DNA: Nucleotide sequence (nucleotides are structural units of DNA) was determined in (Ito, M. et al; 1999) for *Hosta sieboldii* (= taxon 82205); plastid chloroplast gene for maturase; gene 1>1139 = matK; translation table 11; maturase product; extracted sequence :

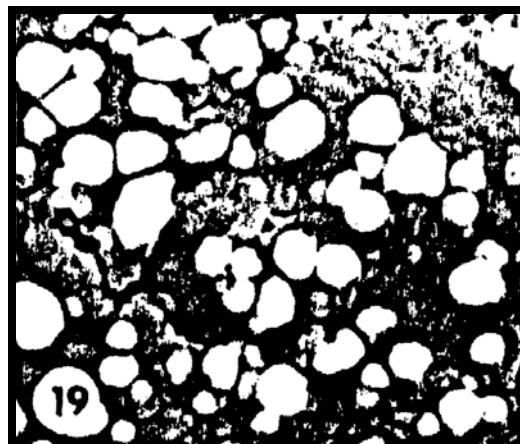
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1 TTGGTTATGA CAATAAATCT AGTTTAGCAC TTGTAAAACG CCTAATTACT CGAATCTATC
61 AACAGAATTA TTTGATTCTC TCGGTTAATG ATTCTAACCA AAAGAGGTTC ATTGGGCATA
121 ACAATTTTTT TTATTCTCAT TTTGATTCTC AAATTATATC AGAAAGTTTT GCAATTATTG
181 TAGAAATTCC GTTCTCGCTG CGATTAGTAT CTTTTTTCGG AGAAAAAAAA GAAATACCAA
301 ATTTAAATTA TGTCTCAGAT ATACTAATAC CTCATCCCAT CCATATGGAA ATCTTGGTTC
361 AAATTCTTCA ATGCTGGATT CAAGATGTTC CTTTTTTGCA TTCATTGCGA TTCTTTCTTC
421 ACGAATATCA TAATTGGAAT AGTCTTCTCA TTACTCATAA AAAATCTATT TGTATTTTTT
481 CAAAAGAAAA TAAAAGACTA TTTCGGTTC TGTACAATTC TTATATATTT GAATGTGAAT
541 TTTTCTTAGT TTTTTTTCGT AAACAATCTT CTTATTTACG ATTAACATCT TCTAGAACTT
601 TTCTTGAGCG AACACATTTT TATGGAAAAA TGGAACATTT TCAAATAAAA CATTTCGATT
661 TTATAGTAGT ATGTCCTAAC TATTTTTATA AGATCCTATG GTCCTTCAAA GAACCTTTCA
721 TACATTATGT TCGATATCAA GGAAAAGCAA TTCTTGCTTC AAAGGGGACT CATCTTGTA
781 TGAAGAAATG GAAATATCAT TTTGTCAATC TTTGGCAATA TTATTTTCAC TTTTGGTCTC
841 AACCGTACAG GATCCATATA AATCAATTAT CAAACTATTC TTTCTATTTT CTGGGTATT
901 TTTCAAGTCT ACTAATAAAT TCTTCGGCAG TAAGGAATCA AATGTTAGAG AATTCGTTTC
961 TAATAGATAT CATTACTAAG AAATTTGATA CCATAATCCC TGTTATTCTT CTTATTGGAT
1021 CCTTGTCTAA AGCTCAATTT TGTACCGTAT CGGGCCATCC TATTAGTAAG CCGATCTGGG
1081 CCGATTTATC AGATTCTGAT ATTCTTGATC GATTTCGGTTG GATATGTAGA AATCTTTCT

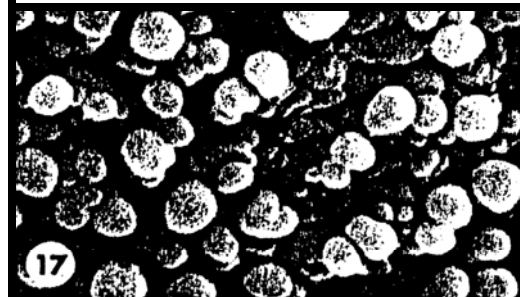
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Pollen: *H. sieboldii* 'Albomarginata' has a Pollen Subtype RG (II-B) (= rugulate granulate; subtype II-B) with shape OS (oblate-spheroidal) (Pollen shape after Erdtman, 1966). *H. sieboldii* 'Albomarginata' (UGA Vouchers as *H. albomarginata* ex BH) is in the size range of P 77.3 to 77.6 ± 3.3 × E 65.4 ± 3.2. Sizes given in µm polar axis (P) × equatorial axis (E). This taxon has a distinct pollen grain sub-type, which allows for taxonomic differentiation: Fujita (1976) and Hara (1984) placed *H. rectifolia* in synonymy with *H. albomarginata* (= *H. sieboldii* 'Albomarginata'). Pollen morphology does not support this taxonomic treatment. In addition, *H. 'Lancifolia'* (BH Bailey Vouchers) is here determined to be a related putative, near sterile hybrid with similar pollen grain size but differentiated by having pollen shape SO (sub-oblate) [not OS (oblate-spheroidal!)] (Chung and Jones, 1989).

Genome Size: DNA content (2C) average for *H. sieboldii* var. *sieboldii* in pg (10⁻¹² gram) was determined to be 22.5 with a ratio of PI/DAPI of ± 1.12 (Zonneveld, B.J.M. and F. Van Iren. 2001). This result is close but not equal to *H. rectifolia* forma typica (= 21.3 ± 1.14). This is another data



H. sieboldii var. *sieboldii*
Pollen Type RG (II-B)
Grain Surface Detail; Shape = OS
SEM × 4000 (Chung and Jones 1989)



H. 'Lancifolia'
Pollen Type RG (II-B)
Grain Surface Detail; Shape = SO (!)
SEM × 4000 (Chung and Jones 1989)

set allowing for differentiation of *H. sieboldii* var. *sieboldii* and *H. rectifolia* and so does not support the synonymy of these taxa as suggested Fujita 1976 and Hara 1984.

DNA Banding:

Recent RAPD analysis as included in Y. Yu (2002) and Sauve, R.J., S. Zhou, Y. Yu, and W.G. Schmid (2005) excluded *H. sieboldii* var. *sieboldii*, since its taxonomic position has been established otherwise by macro- and micro-morphological methods, among them genome weight and pollen viability (Zonneveld, B.J.M. and F. Van Iren. 2001), palynology (M.G. Chung and S.B. Jones, 1989), and genomic DNA (Ito, M. et al 1999).



H. sieboldii 'Albomarginata'
Bud initial on 8 July 1987
Hosta Hill R.G. Sp10848404
© W.G. Schmid 1987

Taxonomic Type and Synonymy:

H. sieboldii 'Albomarginata' (per ICNCP (Cultivated Plant Code 2009) P. 32; Art 21B; Ex. 57 ergo now a cultivar based on: *Funcikia albo-marginata* Hooker (May 1838) in *Curtis's Botanical Magazine*, 65, tab. 3567 (see Part 1; page 2, 3); May 1838; basionym; also Ohwi: *The Flora of Japan*, 11:290 1965; Fujita: *Acta Phytotaxonomica et Geobotanica*, Vol. 27, 3/4:89 1976 (excluding all of the synonyms); Ohwi: *Acta Phytotaxonomica et Geobotanica*, Vol. 11:265 1942; Hylander: *The genus Hosta in Swedish gardens, Acta Horti Bergiani*, Vol. 16, 11:331-420; 1954; Maekawa: *H. lancifolia* var. *thunbergiana* f. *albomarginata*; 1940; *Hosta sieboldii* var. *sieboldii* f. *sieboldii* Hara: *J. Jap. Bot.*, 59, 6:179 1984.). In Japan named へりとりギボウシ = へりとり擬宝珠 = Heritori Gibōshi (Makino & Tanaka 1928) et フンリンギボウシ = 覆輪擬宝珠 = Fukurin Gibōshi (Maekawa 1940).

Typus: Ill. in *Curtis's Botanical Magazine*, 65, tab. 3567 (holotype).

Hab.: *In hortis late distributa* (Maekawa 1940), ergo: A garden form here reduced to (culton) cultivar status. This is a non-perpetuating chloroplast mutant rarely found in the wild among natural populations of *Hosta sieboldii* var. *sieboldii* (see *H.sieboldii* Complex; Part 1).

Botanical Synonyms:

- Hemerocallis sieboldii* Paxton (March) 1838
Funkia albomarginata Hooker (May) 1838.
Funkia spatulata foliis albomarginatis nom. nud.
Siebold 1844.
- Funkia ovata* var. γ *albomarginata* Miquel 1867.
Funkia ovata f. *spathulata* lusus α Miquel 1869.
Funkia lancifolia f. *albomarginata* Baker 1870.
Funkia lancifolia f. *albomarginata* Regel 1876.
Hostia japonica f. *albomarginata* Voss 1896.
Hosta caerulea f. *albomarginata* Matsumura 1905.
H. japonica var. *albimarginata* Ascherson and
Gräbner 1905.
- Niobe japonica* var. *albomarginata* Nash 1911.
Hosta japonica f. *albomarginata* Makino 1925.
H. lancifolia var. *albomarginata* Stearn 1931.
H. lancifolia var. *thunbergiana* f. *albomarginata*
Maekawa 1940.
H. albomarginata Ohwi 1942.
H. lancifolia var. *thunbergiana* f. *sieboldii*
Maekawa 1950.
H. albomarginata f. *albomarginata* Hensen 1963.
H. sieboldii var. *sieboldii* f. *sieboldii* Hara 1984.

Japanese Synonyms:

- へりとりギボウシ = へりとり擬宝珠 = Heritori
Gibōshi (Makino & Tanaka 1928)
フンリングイボウシ = 覆輪擬宝珠 = Fukurin
Gibōshi (Maekawa 1940)
オゼミズギボウシ = 尾瀬水擬宝珠 Oze Mizu
Gibōshi (actually is *H. rectifolia*) **Jap.**
incorrect.

Horticultural Synonyms:

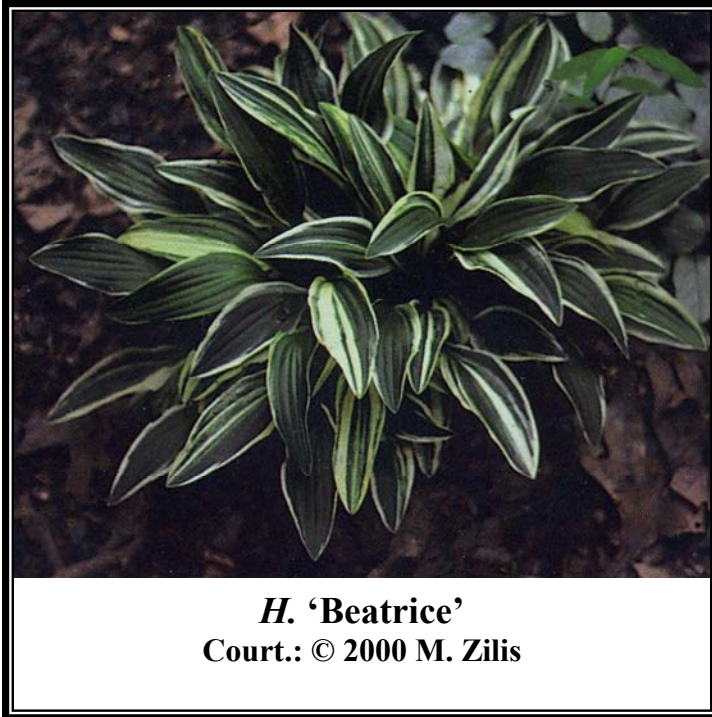
- Hosta albomarginata* 'Albo-marginata' Hensen 1963.
H. albomarginata hort. Japan 1985.
H. lancifolia 'Albomarginata' **hort. incorrect.**
H. lancifolia var. *albomarginata* **hort. incorrect.**
H. sieboldii 'Albomarginata' hort.
H. sieboldii f. *albomarginata* **hort. incorrect.**
H. sieboldii (syn. *albomarginata*) hort.
Whiterim Plantain Lily.
Whiterim Purple Plantain Lily.
Schmale Weissrandfunkie Hansen et al., 1964 (German).
Weissrandfunkie Foerster 1957 (German).



H. sieboldii
'Albomarginata'
Elongating raceme 15 July
1987
Hosta Hill R.G. Sp10848404
© W.G. Schmid 1987

H. sieboldii ‘Albomarginata’ in Cultivation:

This cultivar is taxonomically important as the former type species for the *H. sieboldii* complex. Horticulturally, it is of minor importance and has been replaced in gardens by some of its hybrid progeny and its various variegated mutants (see Part 3) and other non-related small cultivars. For this reason, no further specific horticultural details are included here.



Horticultural Progeny:

H. sieboldii ‘Albomarginata’ has served as a pod parent for numerous hybrids. Its many offspring are planted in gardens. The sport itself has been replaced by other variegated cultivars related to it. Details involving horticultural progeny, are given on the Web site of the International Registrar for the genus *Hosta*, K. Walek (= HostaRegistrar.org) A “parent” search on this website will list all registered cultivars with *H. sieboldii* ‘Albomarginata’ association. Albeit, there is another named cultivar of consider-

able importance, namely *H. 'Beatrice'* (see this page and page 2). This named, plastogenic mutation has little importance as a garden plant due to its unstable variegation with leaf colors ranging from streaked to margined to solid-colored forms. It will pass on variegation as a pod parent an numerous crosses with other hosta species and cultivars have been made. *H. 'Beatrice'* was selected in 1958 by Frances Williams from a large group of *H. sieboldii* seedlings and named for the daughter of a friend. As Vaughn (1982) pointed out, by using pollen from yellow plants on variegated hybrids derived from *H. 'Beatrice'*, a large number of yellow and white variegated progeny will develop. A parent search under *H. 'Beatrice'* at HostaRegistrar.org reveals a progeny of 25 named and registered variegated cultivars.

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H. sieboldii* var. *sieboldii (コバギボウシ= Koba Gibōshi in situ)
 Loc. cit.: Saragamine Wetland (皿ヶ嶺湿地) Court.: © plala/saragamine

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