A REVISION OF *RHODODENDRON* VI. SUBGENUS *PENTANTHERA* (SECTIONS *SCIADORHODION*, *RHODORA* AND *VISCIDULA*)

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A revision of the seven species of *Rhododendron* sections *Sciadorhodion*, *Viscidula* and *Rhodora* (of subgenus *Pentanthera*; Ericaceae) is presented. A cladistic analysis of *Rhododendron* subgenus *Pentanthera* is provided, and results in the recognition of four sections: *Sciadorhodion*, *Viscidula*, *Rhodora* and *Pentanthera*. The species are delimited and compared, their distributions are mapped, and descriptions and practical keys are developed.

CONTENTS

INTRODUCTION

Rhododendron sections *Sciadorhodion*, *Rhodora* and *Viscidula* contain seven species, and represent the most primitive members of subgenus *Pentanthera* (in terms of patristic distance separating them from the presumed common ancestor of the subgenus). This subgenus is likely the cladistically basal group within *Rhododendron* (see Kron & Judd, 1990). Species of these sections occur in eastern North America (from Newfoundland and Quebec to the mountains of western North Carolina) and in eastern Asia (in Korea and adjacent Russia, and Japan). The group has not been revised since the careful but now dated monograph by Wilson & Rehder (1921). In this treatment we have re-evaluated sectional limits and relationships in the light of recent data and taxonomic methods. We have delimited and compared the species,

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Note: The previous part in the revision of the genus *Rhododendron* (Part V: A revision of *Rhododendron* section *Pentanthera*, by K. A. Kron) appeared in *Edinb. J. Bot.* 50(3): 249–364 (1993).

interpreted their phylogenetic relationships, and developed descriptions and practical keys for identification. In the course of this investigation c.1600 herbarium specimens have been examined.

GEOGRAPHIC DISTRIBUTION

The seven species of sections *Sciadorhodion*, *Rhodora* and *Viscidula* occur in eastern Asia (Korea and adjacent Russia; Japan) and eastern North America (Newfoundland and Quebec south to Pennsylvania and northern New Jersey, and mountains of western North Carolina). Section *Viscidula* is endemic to north-central Honshu, Japan. Section *Sciadorhodion* is more widespread in eastern Asia (throughout Japan, Korea and adjacent Russia). Section *Rhodora* is limited to eastern North America. Members of these sections occur from sea level to c.2000m elevation. The centre of diversity is Japan, where four species can be found in close geographic proximity. *Rhododendron canadense* is the most widely distributed species (Fig. 6) as well as the northernmost. Other species, such as *R. vaseyi* and *R. nipponicum*, are quite narrowly endemic (see Figs 5 and 6).

TAXONOMIC CRITERIA

Entities that have no major internal morphological discontinuities and show separation from other similar entities by consistent morphological gaps are considered to be species (Judd, 1981, 1982). The species recognized within sections *Sciadorhodion*, *Rhodora* and *Viscidula* also possess unique derived characters (or at least unique combinations of derived features) and are thus presumed to be monophyletic (see phylogenetic species concept: Donoghue, 1985; Mishler, 1985; Mishler & Brandon, 1987). Species of these sections are frequently distinguished by floral morphology (especially symmetry, colour, shape, degree of corolla fusion, stamen number and form), inflorescence structure (i.e. number of flowers), timing of flowering, architecture (i.e. position of buds giving rise to vegetative shoots), indumentum, leaf arrangement, shape, and apex, and seed characters (especially presence or lack of tails and a fringe, tightness of testa to seed body). Such entities have definite geographic distributions and ecological preferences. Some species, namely *R. vaseyi*, *R. canadense* and *R. schlippenbachii*, are completely allopatric, while others may occur together, for example *R. pentaphyllum*, *R. quinquefolium* and *R. albrechtii*; *R. pentaphyllum* and *R. quinquefolium* are likely isolated by differences in flowering time.

The taxonomic usefulness of (and variation within) the characters differing in these species is discussed below.

Habit

Species of these sections are typically shrubs to small trees. *Rhododendron canadense* is distinctive in being a rhizomatous shrub, usually not over c.1m in height. A few species, such as *R. nipponicum* and *R. quinquefolium*, have distinctive bark characters,

i.e. papery and shredding in the former, and corky, fissured into irregular more or less longitudinally elongated plates in the latter. As in many other ericads (see Judd, 1981, 1982, 1984, 1986; Kron, 1993) the shoot meristem has a limited life-span, and growth in height is achieved by a succession of equivalent, axillary, orthotropic shoots. All species show Leeuwenberg's model of growth (see Hallé et al., 1978, for description). The shoot apex eventually terminates in an inflorescence; the foliage shoots arise from axillary buds associated with the lowest scaly (lepidote) leaves of the present year's shoots, i.e. within the terminal bud (in two species: *R. schlippenbachii* and *R. quinquefolium*; also in species of subgen. *Tsutsusi* (Sweet) Poyarkova, see Sleumer, 1949, and Wilson & Rehder, 1921), or from axillary buds associated with foliage leaves of the previous year's growth, i.e. below the terminal bud (in the five remaining species). Although the differences in position of buds giving rise to vegetative shoots is useful at the species level, it has been overstressed in the past. Thus the close taxonomic relationship between *R. quinquefolium*, *R. pentaphyllum* and *R. schlippenbachii* (and to a lesser extent *R. albrechtii*) has been obscured (see M. Philipson, 1970, 1980; W. Philipson, 1980; Kron & Judd, 1990).

Indumentum

The trichomes of species of sections *Rhodora*, *Sciadorhodion* and *Viscidula* are of two distinct types: unicellular hairs, and multicellular short- to long-stalked, gland-headed or eglandular hairs. The distribution of these hairs is often taxonomically significant (as in the related sect. *Pentanthera* G. Don; see Kron, 1993). For example, the presence of gland-headed hairs on the cotyledon margins is one of the major features separating sect. *Sciadorhodion* from sections *Viscidula* and *Rhodora*, while the lack of unicellular hairs on the inside of the corolla aids in separating sect. *Rhodora* from sections *Viscidula* and *Sciadorhodion*. The presence of unicellular hairs on the outer surface of the corolla is a unique character of the related sect. *Pentanthera*. At the species level, *R. pentaphyllum* can be distinguished from *R. quinquefolium* by the conspicuous fringe of eglandular hairs on its petioles, *R. albrechtii* from *R. vaseyi* due to its unicellular-pubescent (vs. glabrous) filaments and glandular and eglandular fringed leaf margins (vs. only eglandular-fringed), and *R. canadense* from *R. vaseyi* by the presence of unicellular hairs on its capsules (vs. capsules lacking unicellular hairs). The ovary of *R. pentaphyllum* is glabrous, as are its floral buds, while the ovary of *R. schlippenbachii* is glandular-pubescent, and the terminal buds eglandular-pubescent. Other examples of taxonomically useful differences in indumentum are evident in the keys and descriptions.

Leaves

The leaves may be alternate with the internodes becoming more closely spaced towards the shoot apex (in *R. albrechtii*, *R. vaseyi*, *R. canadense* and *R. nipponicum*) or more or less verticillate, with usually five leaves clustered at the shoot apex (in

R. schlippenbachii, *R. quinquefolium* and *R. pentaphyllum*). Leaves of the related sect. *Pentanthera* are consistently alternate, while the leaves of members of subgen. *Tsutsusi* may be either alternate (in sect. *Tsutsusi* Sweet) or verticillate (in sect. *Brachycalyx* Sweet) (Sleumer, 1949).

Lamina shape varies from rhombic-elliptic or elliptic to obovate, orbicular, or oblong, with apices emarginate to acuminate. Lamina size and shape are usually too variable to be of use in species delimitation. However, leaf size and apex type (acuminate vs. acute to rounded) are useful in distinguishing *Rhododendron vaseyi* and *R. canadense*. Venation patterns are fairly uniform in the group, but leaves of *R. pentaphyllum* have tertiary and higher order veins slightly raised, forming a clearly visible reticulum, while comparable veins of *R. quinquefolium* are flat and obscure.

Glaucous leaves are frequent in *R. canadense* and occasionally occur in some other species (see descriptions).

Inflorescences

The flowers of sections *Sciadorhodion*, *Rhodora* and *Viscidula* are borne in terminal, umbellate to reduced racemes. The number of flowers per inflorescence is taxonomically useful, with some species having from one to three flowers (e.g. *R. quinquefolium* and *R. pentaphyllum*) and others five or six to c.15 flowers (*R. nipponicum* and *R. vaseyi*).

Flowers

The flowers of these sections of subgen. *Pentanthera* provide a source of many taxonomically significant characters (see keys). Corolla shape is important in circumscribing sect. *Rhodora* (i.e. those species with distinctly two-lipped corollas due to more extensive fusion of the upper three lobes contrasting with the two elongate and flaring lower lobes), and in distinguishing sect. *Viscidula* (i.e. a single species with actinomorphic, cylindrical-campanulate corollas with tube longer than lobes). In sect. *Sciadorhodion* the corollas are more or less zygomorphic and vary from broadly rotate and funnelform to rotate-campanulate, with the tube much shorter than lobes. A very short corolla tube is characteristic of *R. vaseyi* (0.4–0.8mm long) and a tube is essentially lacking in *R. canadense*. All corolla lobes may be of similar length (*R. pentaphyllum*, *R. quinquefolium*, *R. nipponicum*), or the uppermost lobe may be smaller (*R. schlippenbachii*, *R. albrechtii*, *R. vaseyi*, *R. canadense*). Size is variable, with the largest flowers occurring in *R. schlippenbachii* (tube 0.8–1.2cm long; upper lobe 1.8–2.8cm long), and the smallest in *R. nipponicum* (tube 1–1.6cm; lobes 0.5–0.9cm) and *R. canadense* (tube ± lacking; upper lobe 0.3–0.8cm). Colour of corolla varies from white to red-purple and is of some significance, for example in separating *R. quinquefolium* (white) from *R. pentaphyllum* (pink); see also keys. Spots on the upper three lobes may be consistently present (most species), always lacking (*R. nipponicum*), or variable in development (*R. canadense*).

Stamens vary in number from ten (most species) to usually seven in *R. vaseyi*, and may be variable in length (most species) to clearly dimorphic (*R. schlippenbachii* and *R. albrechtii*). Species of sect. *Pentanthera* consistently have only five stamens. The stamens vary from included to exserted (see descriptions). Gynoecium features are fairly uniform, although *R. nipponicum* has a straight style; a declinate style occurs in the remaining species.

Pedicel and calyx length are very variable and of little taxonomic significance. The shortest pedicels occur in *R. canadense* (3–10mm) and the longest in *R. quinquefolium* (6–30mm). Bract and bracteole features are too uniform to be of much taxonomic use. Calyx lobes frequently vary greatly, even within a single plant or a single flower. They may be as short as 0.3mm or as long as 8.5mm.

Fruits and seeds

The fruits of sections *Sciadorhodion*, *Rhodora* and *Viscidula* are elongate, five-valved, septicidal capsules, which show little variation in size and shape (see descriptions). However, the fruits of *R. nipponicum* are distinctive in being strongly grooved. By contrast, the seeds of these species show numerous taxonomically important features. The seeds of *R. schlippenbachii*, *R. quinquefolium* and *R. pentaphyllum* are all very similar: angular-ovoid to ellipsoid, lacking both tails and fringes. The testa cells are elongate and tightly appressed to the seed body. The seeds of *R. albrechtii* and *R. nipponicum* possess tails formed from the cells at each end of the seed, which are elongated and fused to form a more or less stellate or stellate-globular tail 0.1–0.5mm long. Finally, the members of sect. *Rhodora* have seeds with well-developed, more or less stellate to flattened tails 0.2–0.9mm long composed of flat to bulbous cells, as well as the cells along angles (=margin) of seed often more or less bulbous or flattened and expanded (in a plane parallel to compression of seed body), forming a slight and irregularly developed to conspicuous wing-like fringe that connects the tails. Seed characters are thus useful at both sectional and specific levels (see keys).

CLADISTIC ANALYSIS

The cladistic analyses were conducted using the branch-and-bound algorithm (see Wiley, 1981; Hendy & Penny, 1982) as employed in the PAUP (Phylogenetic Analysis Using Parsimony, Version 2.4 and Version 3.1.1) computer software developed by Swofford (1985, 1993).

Twenty morphological characters were used and assigned plesiomorphic (ancestral: scored as 0) and apomorphic (derived: scored as 1) states (Tables 1 and 2). Care was taken that character states employed were well delimited (see Almeida & Bisby, 1984; Stevens, 1991). Characters were polarized using outgroup analysis (see Stevens, 1980; Watrous & Wheeler, 1981; Wiley, 1981; Maddison et al., 1984) using *Menziesia* Smith as the outgroup (as suggested by the analyses of Kron & Judd, 1990). Trees

TABLE 1. Characters used in the cladistic analysis of *Rhododendron* subgen. *Pentanthera*.

Plesiomorphic state	Apomorphic state
1. Vegetative buds in the axils of the leaves below the terminal buds	Vegetative buds within the terminal buds
2. Leaves alternate, scattered along the branches	Leaves appearing 5-whorled at the ends of the branches
3. Leaf apices not acuminate	Leaf apices at least sometimes acuminate
4. Leaf margin with gland-headed hairs	Leaf margin with only eglandular hairs
5. Flowering with the leaves	Flowering before the leaves
6. Flowers (2–)3–15/inflorescence	Flowers 1–3/inflorescence
7. Corolla rose-purple	Corolla white
8. Corolla not 2-lipped	Corolla 2-lipped
9. Corolla tube longer than the lobes	Corolla tube shorter than the lobes
10. Inner surface of corolla unicellular-pubescent	Inner surface of corolla glabrous
11. Stamens 10	Stamens less than 10
12. Stamens all alike	Stamens dimorphic
13. Ovary with gland-headed hairs	Ovary lacking gland-headed hairs
14. Style glabrous or with unicellular hairs	Style with gland-headed hairs
15. Style straight or only slightly curved	Style declinate
16. Seeds without tails*	Seeds with tails
17. Seeds without fringe*	Seeds with fringe
18. Cotyledons with one midvein and one or two lateral veins	Cotyledons with one midvein and many lateral veins
19. Cotyledons with gland-headed hairs along the margin	Cotyledons glabrous along the margin
20. Stamens included (at least some of them)	Stamens all exserted

* We use the term 'fringe' to denote the expanded, often flattened portion of the testa between the hilum and chalazal ends of the seed. 'Wing' is not used since in Ericaceae 'winged' seeds have evolved in several groups by different means. 'Tail' denotes the expanded portion of the testa at the hilum and chalazal ends of the seed.

were rooted by using a hypothetical ancestor with all characters scored as plesiomorphic.

Eight Evolutionary Units (EUs) were used in the analyses (Table 2); all represent species except *Rhododendron* sect. *Pentanthera* (designated as 'Pentanthera' on the cladogram). All EUs are considered to be monophyletic due to the presence of autapomorphic features, which were polarized using *Menziesia*. Section *Pentanthera* is considered to be monophyletic because its species share the apomorphic characters of the seeds with a loose testa and the corolla unicellular-pubescent on the outside. Relationships within this section are discussed in detail in Kron (1993). *Rhododendron nipponicum* possesses several autapomorphies, including flowering after the leaves have expanded, and an unspotted corolla that is actinomorphic. In addition, the cotyledons have one midvein and no lateral veins. *Rhododendron canad-*

TABLE 2. Character states of taxa used in cladistic analysis of *Rhododendron* subgen. *Pentanthera* (character numbers correspond to Table 1).

	Characters																			
Taxon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
pentaphyllum	0	1	1	1	1	1	0	0	1	0	0	0	1	0	1	0	0	1	0	0
schlippenbachii	1	1	0	0	1	0	0	0	1	0	0	1	0	1	1	0	0	1	0	0
quinquefolium	1	1	0	1	0	1	1	0	1	0	0	0	1	0	1	0	0	1	0	0
albrechtii	0	0	1	0	1	0	0	0	1	0	0	1	0	0	1	1	0	0	1	0
vaseyi	0	0	1	1	1	0	0	1	1	1	1	0	0	1	1	1	1	0	1	0
canadense	0	0	0	1	1	0	0	1	1	1	0	0	0	0	1	1	1	0	1	1
pentanthera	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	1	0	1	1
nipponicum	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0

ense is a tetraploid (the only other known tetraploid in *R.* subgen. *Pentanthera* is *R. calendulaceum* of sect. *Pentanthera*). This species also possesses an upper corolla lobe that is much smaller than the remaining lobes. In addition, the corolla in this species is split laterally to the base of the tube. *Rhododendron vaseyi* is the only member of the subgenus with glabrous staminal filaments. The corky bark of *R. quinquefolium* distinguishes this species from all others in the subgenus, and *R. pentaphyllum* is the only species to possess bearded petioles. The remaining two species, *R. schlippenbachii* and *R. albrechtii*, are distinguished on the basis of possessing a unique combination of characters (see Taxonomic Account). *Rhododendron schlippenbachii* is distinctive in having a consistently glandular-pubescent style, although a few gland-headed hairs are sometimes present on the styles of *R. vaseyi* (a likely parallelism). Both *R. schlippenbachii* and *R. albrechtii* have clearly dimorphic stamens (an apomorphy), and preliminary analyses indicated that this unusual androecium likely evolved in parallel in these species.

The PAUP 2.4 and 3.1.1 analyses described above gave identical results and resulted in the discovery of six trees of 34 steps each (C.I. = 0.59; R.I. = 0.58). The strict consensus tree and two fully resolved trees are presented in Figures 1 and 2, respectively. Three characters stand out as exhibiting homoplasy, affecting the topology of the six discovered trees. Character 3 (leaf apices at least sometimes acuminate) independently arises three times or arises twice followed by a subsequent loss in one lineage. Since this is a rather weak character, we ran an analysis without it (using PAUP 2.4). The resulting trees are identical in number and topology to the trees generated when character 3 was included in the analyses. The only changes (and these were expected) were a decrease in the number of steps (to 31) and an increase in the consistency index (C.I. = 0.61). In character 4 (leaf margin with only glandular hairs) half of the trees indicate three steps involved in its distribution in the subgenus. The other three trees show only two steps: either parallel gains or a gain followed by a loss. The third character is number 17 (seeds with a fringe) and

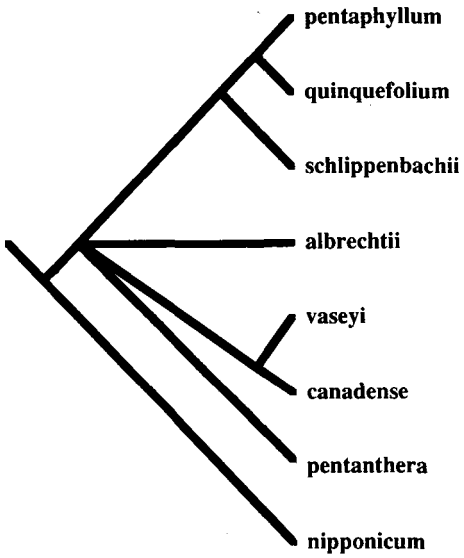

FIG. 1. Consensus tree resulting from cladistic analysis of *Rhododendron* subgen. *Pentanthera.*

exhibits either parallel gains or a gain followed by a loss in three trees. However, in the remaining trees this character only arises once.

The strict consensus tree indicates the clades that were constant among the six trees. *Rhododendron nipponicum* is consistently placed as a sister taxon to the remaining taxa in the subgenus. *Rhododendron* sect. *Pentanthera* is a sister group to the *R. vaseyi–R. canadense* clade in three trees. When these two groups are joined as sister taxa on the tree fewer parallel gains are required; thus we prefer this topology (Fig. 2). The relationships of *R. albrechtii* to other groups within subgen. *Pentanthera* are problematic. In some trees this species is linked to the *R. schlippenbachii–R. quinquefolium–R. pentaphyllum* clade (Fig. 2a). In others, it is placed in a clade including *R. vaseyi*, *R. canadense* and *R.* sect. *Pentanthera*, or as an isolated species cladistically basal to all of the above-mentioned taxa (Fig. 2b). In any case, it is always basal to any members of either of these two clades. Like *R. nipponicum*, *R. albrechtii* shares very few derived characters with any other member of the subgenus. Thus, the relationships among the sections are not entirely resolved primarily because of doubt concerning the placement of *R. albrechtii.* The *R. pentaphyllum–R. quinquefolium–R. schlippenbachii* clade is defined by the presence of vegetative buds within the terminal bud, the leaves appearing 5-whorled, seeds without tails (a reversal), cotyledons with one midvein and many lateral veins, and with gland-headed hairs along the margins. The *R. vaseyi–R. canadense* clade is defined by the shared possession of a two-lipped corolla and the inner surface of the corolla glabrous.

For the most part, the sections recognized in this revision (Table 3) correspond

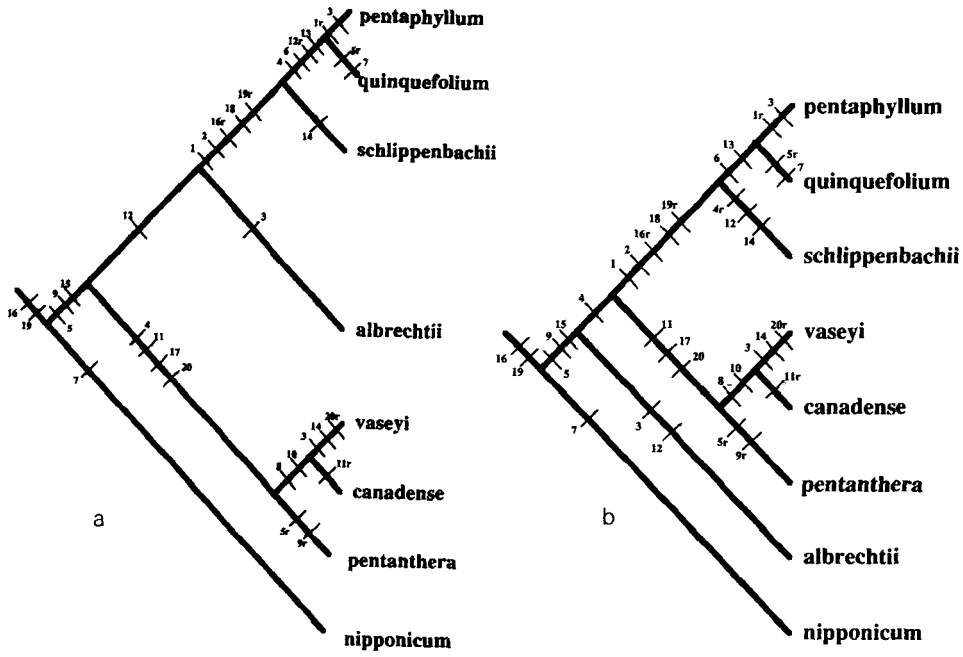

FIG. 2. Two 43-step cladograms (out of six equally parsimonious trees) indicating relationships within *Rhododendron* subgen. *Pentanthera* generated by PAUP (see discussion in text); synapomorphies indicated on cladograms, reversals indicated by an 'r' (see Table 1 for characters).

to the clades defined in the consensus tree (Fig. 1). *Rhododendron nipponicum* is placed in its own section: *R.* sect. *Viscidula*. *Rhododendron* sect. *Rhodora*, comprising *R. vaseyi* and *R. canadense*, is distinguished from the likely related *R.* sect. *Pentanthera*. The closely related species *R. pentaphyllum*, *R. quinquefolium* and *R. schlippenbachii* are placed in *R.* sect. *Sciadorhodion*, along with *R. albrechtii*. While it is clear that the first three species form a monophyletic group, the relationship of *R. albrechtii* to this clade (or other clades within the subgenus) is not presently resolvable. *Rhododendron albrechtii* is thus included in *R.* sect. *Sciadorhodion* primarily for nomenclatural stability and convenience, and because it is phenetically similar to the other species of the section. However, it is noteworthy that occasional multicellular gland-headed hairs similar to those of *R. pentaphyllum*, *R. quinquefolium* and *R. schlippenbachii* occur on the cotyledons of *R. albrechtii* in a varying but small proportion of different seedling populations (M. Philipson, 1970, 1980). The presence of such hairs may be a synapomorphy, linking this species with the others of sect. *Sciadorhodion* (see discussion in Taxonomic Account). At this point, it is probably best to consider sect. *Sciadorhodion* to be metaphyletic (see Mishler & Brandon, 1987).

Although the seven species treated in this revision have consistently been recognized as distinct taxa, their relationships to each other and to *R.* sect. *Pentanthera*

TABLE 3. Proposed classification of *R.* subgen. *Pentanthera.*

Rhododendron subgen. *Pentanthera*	
section *Viscidula*	
	R. nipponicum
section *Pentanthera* (15 species; see Kron, 1993)	
section *Rhodora*	
	R. canadense
	R. vaseyi
section *Sciadorhodion**	
	R. quinquefolium
	R. pentaphyllum
	R. schlippenbachii
	R. albrechtii

* Metaphyletic.

have not been well understood. Wilson & Rehder (1921) placed *R. schlippenbachii* and *R. quinquefolium* with four other whorled-leaved taxa (*R. farrarae* Tate, *R. mariesii* Hemsley & Wilson, *R. weyrichii* Maxim. and *R. reticulatum* D. Don) in their *R.* sect. *Sciadorhodion.* This section was recognized by Sleumer as sect. *Brachycalyx* and placed in *R.* subgen. *Tsutsusi.* Wilson & Rehder (1921) included *R. pentaphyllum* and *R. albrechtii* in their *R.* sect. *Rhodora* along with *R. vaseyi, R. canadense* and *R. nipponicum.*

Philipson, W. (1980) and Philipson, M. (1980) re-evaluated these proposed relationships primarily on the basis of cotyledon and seedling characters. They recognized *R.* sect. *Rhodora* in a more narrow sense, including only *R. vaseyi* and *R. canadense. Rhododendron nipponicum* was placed in its own sect. *Viscidula.* The Philipsons removed *R. schlippenbachii* and *R. quinquefolium* from sect. *Brachycalyx* and placed these species with *R. pentaphyllum* and *R. albrechtii* in a newly circumscribed *R.* sect. *Sciadorhodion.* The sectional circumscriptions resulting from our phylogenetic analyses give strong support to the sectional delimitations of W. Philipson (1980) and M. Philipson (1980). Our analyses (Fig. 2) also support, at least in part, the close relationship between sections *Pentanthera* and *Rhodora*, as suggested by Spethmann (1987).

TAXONOMIC ACCOUNT

Measurements

All measurements included in descriptions of species come directly from dried herbarium material, except plant height and flower colour, which were taken from field observations or information given on specimen labels.

Specimens examined

In the citation of specimens, abbreviations of institutions follow the seventh edition of *Index Herbariorum* (Holmgren et al., 1981). In order to conserve space, only selected specimens have been cited. Specimens have been borrowed for study from ACAD, CLEM, DUKE, E, FLAS, GH, NCU, NY, QFA, TI, TRT, UC and US.

Rhododendron subgen. **Pentanthera** (G. Don) Poyarkova, Fl. SSR 18: 57 (1952).

Syn.: *Rhododendron* sect. *Pentanthera* G. Don, Gen. Syst. 3: 846 (1834). *Azalea* subgen. *Pentanthera* (G. Don) Koch, Dendrol. 2: 186 (1872). Type: *Rhododendron flavum* G. Don (= *Rhododendron luteum* Sweet).

Anthodendron Reichenbach in Mössler, Handb. Gewächsk. ed. 2, 1: 244, 308 (1827). *Rhododendron* a. *Anthodendron* (Reichenbach) Endl., Gen. Pl. 759 (1839) [rank not specified]. *Rhododendron* subgen. *Anthodendron* (Reichenbach) Rehder, Monogr. Azaleas 115 (1921). Type: *Rhododendron flavum* G. Don (= *Rhododendron luteum* Sweet).

Rhododendron subgen. *Pseudanthodendron* Sleumer, Bot. Jahrb. Syst. 74: 550 (1949). Type: *Rhododendron luteum* Sweet.

Deciduous shrubs or small trees, non-rhizomatous to strongly rhizomatous. Branches terete to lens-shaped, the branching often pseudo-verticillate. Indumentum of unicellular hairs and multicellular, long- to short-stalked, gland-headed or eglandular hairs. Leaves alternate, often clustered towards shoot apex (occasionally forming a whorl of 5 leaves at apex), membranaceous to chartaceous, elliptic to obovate, the base attenuate to acute, the apex acuminate, acute, to rounded-mucronate or emarginate, the margins entire to slightly serrulate; vegetative shoots arising from axillary buds associated with foliage leaves of the previous year's shoot, i.e. below the terminal bud (or less commonly, from axillary buds associated with lowest scaly leaves of the present year's shoots, i.e. within the terminal bud). Flowers borne in fasciculate to reduced c.15- to 1-flowered, perulate racemes borne terminally on shoots of the preceding year; appearing before, with, or after the leaves expand, each flower subtended by one basal spathulate bract and 2 basal linear-spathulate bracteoles. Calyx of 5 lobes, very slightly fused at base, often varying in length on the same flower. Corolla of 5 connate petals, zygomorphic, rarely actinomorphic, tubular-campanulate, broadly rotate or rotate-campanulate, narrowly to broadly funnelform, or slightly to distinctly 2-lipped, white to pink or rose-purple, or yellow to orange or red, sometimes with blotch on upper petal or sometimes spotted on upper three petals, the indumentum various, the tube lacking to conspicuous. Stamens 5 to 10, variable in length or dimorphic, usually declinate, the filaments glabrous to densely unicellular-pubescent. Gynoecium 5-carpellate, the ovary elongate, sometimes 5-grooved, the style declinate, rarely straight, variable in indumentum; fruits ovoid to ±cylindrical, septicidal capsules; seeds with or without tails and/or fringes, the testa tight to loose, composed of elongated to ±isodiametric cells; germination epigeal.

Subgenus *Pentanthera* (including four sections: *Sciadorhodion*, *Viscidula*, *Rhodora* and *Pentanthera*) is characterized by its deciduous leaves with an indumentum of multicellular gland-headed and/or eglandular hairs and unicellular hairs, with terminal racemose inflorescences, and vegetative shoots usually from axillary buds associated with foliage leaves of the previous year's growth. Gossypetin is lacking (see Harborne & Williams, 1971; King, 1980). The group is possibly cladistically basal within *Rhododendron* (Kron & Judd, 1990), and the species of sections *Rhodora*, *Sciadorhodion* and *Viscidula* contain numerous plesiomorphic characters (see Cladistic Analysis). The phylogenetic relationships of the subgenus are discussed in more detail by Kron & Judd (1990). The subgenus has frequently been confused with the phenetically similar subgen. *Tsutsusi* (see Kron & Judd, 1990). Members of subgen. *Pentanthera* may be separated from those of subgen. *Tsutsusi* by their lack of gossypetin, deciduous (vs. semi-deciduous to persistent) leaves, and lack of stiff, ferrugineous, flattened, scale-like hairs (composed of elongated cells).

The name *Azalea* L. was based primarily upon *Azalea procumbens* L. and was effectively typified by this species by Salisbury. Therefore, *Azalea* properly belongs as a synonym of *Loiseleuria* Desv. (see Rehder, 1921b; Wood, 1961, for discussion).

There has been some confusion regarding priority at the rank of subgenus in respect of *Anthodendron* and *Pentanthera*, the former being originally introduced as a genus, the latter as a section. The first of these names to be used at the specified rank of subgenus appears to be *Pentanthera* (Koch, *loc. cit.*; see Brizicky, 1969: 658). Although *Anthodendron* was earlier used at an unspecified infrageneric rank by Endlicher (*loc. cit.*; 1841), there is no indication that the rank of subgenus was intended (Brizicky, 1969; Stafleu & Cowan, 1976: 751). The first use of *Anthodendron* as a subgenus appears to be by Rehder in 1921.

Key to sections of subgenus Pentanthera

1a. Corolla unicellular-pubescent on outside; stamens 5; testa usually ± loose; [Eastern Asia (1 sp.), Europe (1 sp.), North America (13 spp.)] ——— **I. R.** sect. **Pentanthera**

1b. Corolla glabrous on outside; stamens 10 or 7 (rarely 5); testa tightly appressed to seed body ——— 2

2a. Flowers actinomorphic; corolla white, unspotted, tubular-campanulate; blooming with to after leaf emergence; cotyledons with only a midvein; [Japan (1 sp.)] ——— **III. R.** sect. **Viscidula**

2b. Flowers zygomorphic; corolla white to pink or rose-purple, usually spotted, broadly rotate and funnelform, rotate-campanulate, or slightly to distinctly 2-lipped; blooming before to with leaf emergence; cotyledons with 1 to several secondary veins in addition to midvein ——— 3

3a. Corolla 2-lipped due to extensive fusion of upper 3 lobes contrasting with the 2 elongate and flaring lower lobes, glabrous on inner surface; seeds with elongated cells at each end forming tails, and cells along angles (=margin) of

seed often ± bulbous or flattened, and expanded to form a slight and irregularly developed to conspicuous and well-developed wing-like fringe connecting the tails; cotyledons lacking multicellular hairs; [eastern North America (2 spp.)] ——— **IV. R.** sect. **Rhodora**

3b. Corolla broadly rotate and funnelform to rotate-campanulate, not 2-lipped, with unicellular hairs on inner surface; seeds neither tailed (except *R. albrechtii*) nor fringed; cotyledons usually with conspicuous multicellular gland-headed hairs along margin (these nearly lacking in *R. albrechtii*); [Eastern Asia (4 spp.)] ——— **II. R.** sect. **Sciadorhodion**

I. Rhododendron sect. **Pentanthera** G. Don, Gen. Syst. 3: 846 (1834). *Rhododendron* sect. *Azalea* Planchon in Rev. Hort. ser. 4, 3: 43 (1854). Type: *Rhododendron flavum* G. Don [= *Rhododendron luteum* Sweet].

See Kron (1993) for a systematic revision of this section.

II. Rhododendron sect. **Sciadorhodion** Rehder & Wilson in Wilson & Rehder, Monogr. Azaleas 79 (1921).

Syn.: *Azalea* subgen. *Sciadorhodion* (Rehder & Wilson) Copeland, Am. Midl. Nat. 30: 597 (1943). Lectotype: *Rhododendron quinquefolium* Bisset & Moore (selected by Copeland, 1943).

Shrub or small tree; indumentum of unicellular hairs and multicellular gland-headed to eglandular hairs; new foliage shoots arising from axillary buds associated with the lowest scaly leaves of the present year's shoots, i.e. within the terminal bud, or from axillary buds associated with foliage leaves of the previous year's shoot, i.e. below the terminal bud. Leaves deciduous, pseudo-verticillate, with (3–)5(–9) leaves clustered at shoot apex, or alternate with internodes becoming closely spaced towards shoot apex (in *R. albrechtii*); apex emarginate to shortly acuminate. Inflorescence a reduced to umbellate, terminal raceme of 1–6 flowers, blooming before or with the leaves. Corolla ± zygomorphic, white to deep pink, usually green to red-brown spotted on upper 3 lobes, broadly rotate and funnelform to rotate-campanulate, the tube much shorter than the limb and gradually expanding into it, 0.4–1.2cm long; outer surface of corolla glabrous; inner surface of corolla very sparsely to sparsely unicellular-pubescent towards base. Stamens 10, dimorphic to merely variable in length, included to slightly exerted. Style declinate. Seeds with testa tightly appressed to body, the cells elongate; tails lacking (except in *R. albrechtii* where they are stellate-globular and 0.1–0.3mm long). Cotyledons with conspicuous, multicellular, gland-headed hairs along margin (to only a few such hairs developed on some cotyledons in *R. albrechtii*), and well-developed reticulate venation (but only a small number of poorly developed secondary veins in *R. albrechtii*).

Distribution. Japan, Korea and adjacent Russia.

This section is often treated as a synonym of sect. *Brachycalyx* Sweet (see Sleumer, 1949). The Philipsons (M. Philipson, 1980; W. Philipson, 1980) have indicated that the name is available for use if typified by *R. quinquefolium* (following Copeland, 1943). In addition to *R. quinquefolium* and *R. schlippenbachii*, Wilson & Rehder (1921) included several species now considered in sect. *Brachycalyx* (of subgen. *Tsutsusi*). Their description included features of all of these species, but several characters, such as 'shoots without bristle like hairs' and 'leaves in whorls of 3 to 5 at the end of the branches' and 'rotate-campanulate' corollas certainly agree with the species included here (see Wilson & Rehder, 1921: 79).

Key to species of sect. Sciadorhodion

1a. Leaves clearly alternate (but internodes becoming shorter near shoot apex), the shoots lacking a terminal 'whorl' of 5 leaves; seeds with cells at each end forming a ± stellate-globular tail 0.1–0.3mm long; cotyledons with midvein and a few poorly developed secondary veins, lacking or with only a few gland-headed hairs along margin ——— **4. R. albrechtii**

1b. Leaves pseudo-verticillate, with (3–)5(–9) leaves closely clustered at shoot apex; seeds lacking tails; cotyledons with well-developed reticulate venation and conspicuously fringed with multicellular gland-headed hairs ——— 2

2a. Vegetative shoots arising from axillary buds associated with foliage leaves of the previous year's shoots, i.e. below the terminal bud; flowers usually appearing before the leaves, solitary or in pairs; corolla pink; petiole with fringe of conspicuous multicellular eglandular hairs ——— **3. R. pentaphyllum**

2b. Vegetative shoots arising from axillary buds associated with the lowest scaly leaves of the present year's shoots, i.e. within the terminal bud; flowering condition and inflorescence structure variable; corolla pink or white; petiole with or without multicellular gland-headed and/or eglandular hairs, but these not forming a conspicuous fringe ——— 3

3a. Terminal bud glabrous; leaf margin with fringe of unicellular hairs and often with multicellular eglandular hairs intermixed; bark corky; flowers emerging with the leaves, in 1- to 3-flowered fasciculate inflorescences; corolla white; stamens variable in length but not dimorphic, 0.9–2.2cm long; style and ovary glabrous to unicellular-pubescent ——— **2. R. quinquefolium**

3b. Terminal bud sparsely to densely covered with multicellular eglandular hairs intermixed with a few inconspicuous unicellular hairs; leaf margin with fringe of multicellular gland-headed and eglandular hairs; bark not corky; flowers emerging before or with the leaves, in 3- to 6-flowered fasciculate inflorescences; corolla pink; stamens dimorphic, 1.5–4.5cm long; style and ovary with multicellular gland-headed hairs ——— **1. R. schlippenbachii**

1. Rhododendron schlippenbachii Maxim., Bull. Acad. Sci. St Pétersbourg, sér. 3, 15: 226 (1870).

Syn.: *Azalea schlippenbachii* (Maxim.) Kuntze, Revis. Gen. Pl. 2: 387 (1891). Type: [Russia] Manchuria, shores of Possiet Bay, [SW of Vladivostok], 1860, *C. Maximowicz* (lecto., n.v., designated here, LE; isolecto. GH, NY).

Shrub or small tree to 2.5(–5)m tall; bark thinly and vertically furrowed; young twigs pale brown, very sparsely to moderately covered with unicellular hairs and with scattered multicellular gland-headed hairs, sometimes with multicellular eglandular hairs intermixed; new foliage shoots arising from axillary buds associated with the lowest scaly leaves of the present year's shoots (i.e. within the terminal bud), and from some terminal buds. Vegetative bud scales sparsely to densely covered with pale to ferrugineous, multicellular eglandular hairs intermixed with a few inconspicuous unicellular hairs on both surfaces; margin fringed with multicellular eglandular and unicellular hairs; lowermost scales with long aristate apices or rudimentary blades. Leaves deciduous, dark green adaxially, pale abaxially, turning yellow, orange and red in autumn, pseudo-verticillate, with (4 or) 5(–9) leaves clustered at apex of shoot and sometimes 1 or 2 smaller leaves borne along shoot below terminal cluster. Blade membranaceous, obovate, often very broadly so, to nearly orbicular or elliptic, 2.5–11.7 × 0.9–7.2cm; base narrowly to broadly cuneate to attenuate; apex occasionally obtuse but more commonly rounded to emarginate, with a short mucro; midvein and secondary veins slightly to strongly raised and prominent abaxially; adaxial surface sparsely to moderately covered with ± curled unicellular hairs and scattered multicellular gland-headed hairs, the midvein moderately to densely covered with curled to straight unicellular hairs and scattered multicellular gland-headed hairs; abaxial surface glabrous to sparsely unicellular-pubescent (especially at base of blade), the lateral surfaces of midvein ± densely fringed with long, straight to crisped, unicellular hairs (especially near base), and the middle portion sparsely to moderately covered with short, curled unicellular hairs, or such hairs lacking, throughout with scattered multicellular short- to long-stalked gland-headed hairs, the secondary veins with only scattered multicellular gland-headed or eglandular hairs with indumentum similar to that of midvein (especially towards base of blade); margin entire to irregularly undulate/crenate with fringe of multicellular gland-headed to eglandular hairs; petiole 2–6.5mm long, very sparsely to densely covered with unicellular hairs and with scattered multicellular gland-headed hairs, sometimes with a few multicellular eglandular hairs, the base of petiole abruptly expanded into a somewhat broadened point of attachment. Flower bud scales with abaxial surface moderately to densely covered with ± ferrugineous elongate multicellular eglandular hairs and sparsely covered with unicellular hairs; margin ciliate with multicellular eglandular (and sometimes also gland-headed) hairs and unicellular hairs. Flowers appearing before or with the leaves; inflorescence an umbellate raceme of 3 to 6 flowers. Pedicels 8–23mm long, moderately to densely covered with multicellular gland-headed hairs, sometimes also very sparsely unicellular-pubescent. Calyx lobes broadly lingulate, ovate or nearly orbicular, to obovate or ovate, 1.5–7 × 1.5–4.7mm; apex rounded; margin

fringed with unicellular hairs and multicellular gland-headed hairs; adaxial surface glabrous to moderately unicellular-pubescent; abaxial surface moderately covered with multicellular gland-headed hairs, often also very sparsely unicellular-pubescent. Corolla very light to deep pink, with red-brown spots on the upper three lobes, fragrant, zygomorphic, broadly rotate to funnelform, the tube much shorter than the limb and gradually expanding into it; upper corolla lobe 1.5–2.8 × 1.6–2.9cm; lateral lobes 1.5–3.5 × 1.2–2.5cm; corolla tube 0.8–1.2cm long; outer surface of corolla glabrous; inner surface of corolla sparsely unicellular-pubescent towards base. Stamens 10, declinate, dimorphic, the upper 5, 1.5–2.6cm long, the lower 5, 3–4.5cm long, included to slightly exserted; filament glabrous distally, becoming densely covered with flattened unicellular hairs proximally. Ovary 3.5–4mm long, moderately covered with multicellular gland-headed hairs; style declinate, 2.7–4cm long, glabrous distally, but with scattered multicellular gland-headed hairs on proximal portion. Capsules ovoid, 1–1.9 × 0.6–1cm, moderately covered with multicellular gland-headed hairs. Seeds shiny and dark chestnut-brown, angular-ovoid to ellipsoid, 1.6–2.7 × 0.7–1mm; testa tightly appressed to body, tails lacking, the cells elongate. Cotyledons with multicellular gland-headed hairs along margin and well-developed reticulate venation. $2n = 26$ (Sax, 1930).

Distribution and ecology. Korea and adjacent Russia (SW of Vladivostok) (Fig. 3). Forests and thickets from 400 to 1500m. Flowering from April to early June.

Rhododendron schlippenbachii is probably most closely related to *R. quinquefolium* and *R. pentaphyllum* because all three species usually have five leaves forming a pseudowhorl at the tip of each of their branches, cotyledons with a well-developed reticulate venation and margin conspicuously fringed with multicellular gland-headed hairs, and seeds lacking tails (see Cladistic Analysis; M. Philipson, 1980; W. Philipson, 1980). In addition, it shares with *R. quinquefolium* the character of having vegetative shoots that develop from buds included within the terminal inflorescence bud. This feature may have been lost in *R. pentaphyllum,* in which the vegetative shoots arise from buds in the axils of foliage leaves below the terminal (inflorescence) bud. As discussed by W. Philipson (1980) and Kron & Judd (1990), the position of buds giving rise to vegetative shoots has probably been overstressed by systematists working in *Rhododendron*, and it is probably subject to developmentally simple modification through reduction of the subtending leaf. This species may be distinguished easily by the characters given in the key, especially its style with multicellular gland-headed hairs.

Illustrations of this beautiful, and horticulturally significant (Wilson, 1921), species may be found in Maximowicz (1870), Hooker (1894), Nakai (1919), and Anonymous (1974).

2. Rhododendron quinquefolium Bisset & S. Moore, J. Bot. 15: 292 (1877).

Syn.: *Azalea quinquefolia* (Bisset & S. Moore) Olmsted, Coville, & Kelsey, Stand. Pl. Names 27 (1923). Type: Japan, Honshu, Nikko, 23 v 1876, *Bisset* 233 (lecto., designated here, E).

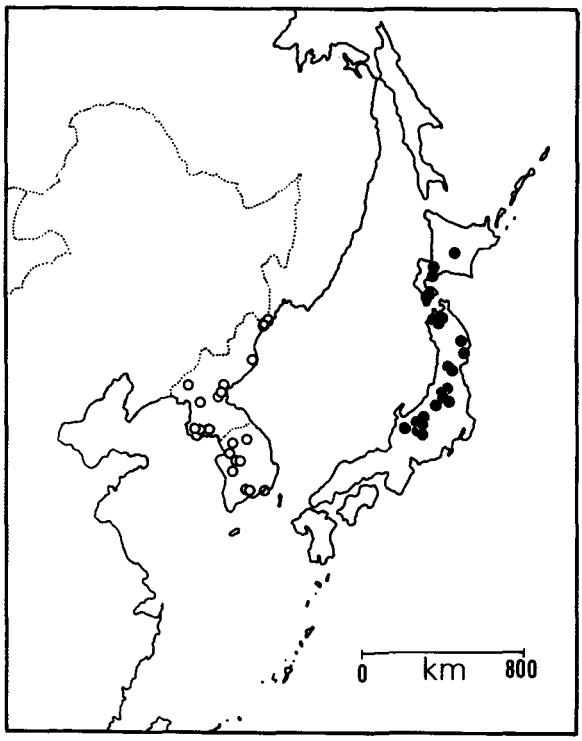

FIG. 3. Distribution of *Rhododendron schlippenbachii* (○) and *Rhododendron albrechtii* (●).

Rhododendron quinquefolium Bisset & S. Moore f. *speciosum* N. Yonezawa, J. Phytogeogr. Taxon. 35(2): 101 (1987). Type: Japan, Honshu, pref. Shiga, Mt Hira, c.1020m, 24 v 1987, *N. Yonezawa* s.n. (holo., KANA #121504, n.v.).

Shrub or small tree to 6(–8)m tall; young twigs dark to reddish brown, glabrous; bark grey-brown, corky, fissured into irregular ± longitudinally elongated plates; new foliage shoots arising from axillary buds associated with the lowest scaly leaves of the present year's shoots (i.e. within the terminal bud), and from some terminal buds. Vegetative bud scales glabrous abaxially, sparsely unicellular-pubescent adaxially; margin fringed with unicellular hairs, with multicellular glandular hairs intermixed, especially just below apical region; lowermost scales with long aristate apices or rudimentary blades. Leaves deciduous, dark green adaxially, pale green abaxially, often tinged with reddish purple along margin, turning red in autumn, pseudo-verticillate, with (3–)5 leaves clustered at apex of shoot. Blade membranaceous, broadly rhombic-elliptic to obovate, 1–5.8 × 0.6–3.6cm; base cuneate to attenuate; apex acute to rounded, occasionally slightly emarginate, with a short mucro; midvein and secondary veins slightly to moderately raised and visible abaxially; adaxial surface sparsely covered with straight to curled unicellular hairs to glabrous, sometimes also with scattered multicellular eglandular hairs, especially

near midvein or margin, the midvein ± densely covered with flattened, ± straight to curled unicellular hairs, sometimes with scattered multicellular gland-headed hairs and/or eglandular hairs; abaxial surface glabrous to moderately unicellular-pubescent, especially at base of blade, the midvein or its lateral surfaces sparsely to densely covered with long, straight to crisped, unicellular hairs, especially towards base, or such hairs lacking, often with scattered multicellular gland-headed hairs and eglandular hairs, the secondary veins glabrous to sparsely unicellular-pubescent, especially at base of blade; margin entire, with fringe of unicellular hairs, often with multicellular eglandular hairs intermixed; petiole 1–5mm long, very sparsely to densely covered with unicellular hairs, sometimes with a few multicellular gland-headed and/or eglandular hairs, the base of petiole slightly expanded at point of attachment. Flower bud scales larger, but otherwise similar to those of vegetative buds. Flowers appearing with the leaves; inflorescence a reduced raceme of 1 to 3 flowers. Pedicels 6–30mm long, glabrous to moderately covered with multicellular gland-headed or eglandular hairs. Calyx lobes narrowly triangular, 0.8–3 × 0.5–1.5mm; apex acute or acuminate to rounded; margin usually fringed with multicellular gland-headed and/or eglandular hairs, occasionally these very sparse and margin essentially glabrous, sometimes with unicellular hairs; adaxial surface glabrous; abaxial surface glabrous, rarely with a few multicellular gland-headed hairs at extreme base. Corolla white, with greenish spots on upper three lobes, slightly zygomorphic, broadly rotate-funnelform, the tube shorter than the limb and gradually expanding into it; corolla lobes ± all similar, 1–2 × 0.8–1.7cm; corolla tube 0.7–1.2cm long; outer surface of corolla glabrous; inner surface of corolla sparsely unicellular-pubescent towards base. Stamens 10, declinate, variable in length, 0.9–2.2cm long, included; filaments glabrous distally, becoming densely covered with flattened unicellular hairs proximally. Ovary 2–3.5mm long, densely covered with unicellular hairs to nearly glabrous, with unicellular hairs limited to apex; style declinate, 1.3–2.5cm long, glabrous distally, often sparsely covered with unicellular hairs on proximal portion. Capsules ovoid to ± cylindric, often curved, 0.9–1.6 × 0.4–0.6cm, glabrous to sparsely unicellular-pubescent, especially at apex. Seeds light brown, angular-ovoid to ellipsoid, 2.5–3 × 0.7–1mm; testa tightly appressed to body, tails lacking, the cells elongate. Cotyledons with multicellular gland-headed hairs along margin and well-developed reticulate venation.

Distribution and ecology. Japan (Honshu, Shikoku) (Fig. 4). In deciduous or coniferous forests and thickets from 300 to 1700m. Flowering in May and June.

Rhododendron quinquefolium is probably closely related to *R. pentaphyllum* since, in addition to the characters of the section, the two species share few-flowered inflorescences, c.1–6cm long and more or less 5-whorled leaves at shoot apices, a lack of gland-headed hairs along the leaf margins, and glabrous or nearly glabrous fruits. Their phenetic similarity is such that they have occasionally been confused (see Rehder, 1916) and misidentified specimens are common. However, the two are easily distinguished because *R. quinquefolium* usually blooms with the leaves (vs. before

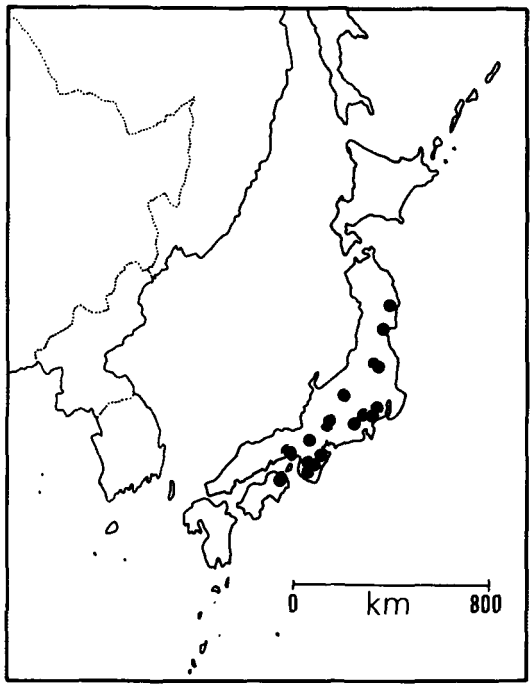

FIG. 4. Distribution of *Rhododendron quinquefolium*.

the leaves in *R. pentaphyllum*) and has white (vs. pink) corollas. The vegetative shoots of *R. quinquefolium* arise from axillary buds within the terminal floral bud, whereas those of *R. pentaphyllum* are associated with foliage leaves below the terminal bud (see key). In addition, the leaves and petiole margins of this species lack the conspicuous eglandular fringe so characteristic of *R. pentaphyllum*. *Rhododendron quinquefolium* also has a distinctive corky bark.

The difference in position of the vegetative buds led Wilson (1921) to place *Rhododendron quinquefolium* and *R. pentaphyllum* in two different sections (i.e. sect. *Tsutsusi* and sect. *Rhodora*), a placement followed by Sleumer (1949, 1980). However, Wilson (1921: 87) noted that 'In habit of growth, arrangement and shape of leaves and in the shape of the flowers it superficially resembles *R. pentaphyllum* Maxim.'. The similarity between these two species was also recognized by Maximowicz (1887). It is our opinion that these similarities are more than superficial; they are likely synapomorphic and indicative of a close relationship.

This horticulturally important species (Wilson, 1921) has been illustrated by Komatsu (1912) and Makino (1956).

3. Rhododendron pentaphyllum Maxim., Bull. Acad. Sci. St Pétersbourg, sér. 3, 31: 65 (1887).

Syn.: *Azalea pentaphylla* (Maxim.) Copeland, Am. Midl. Nat. 30: 595 (1943). Type: Japan, Kyushiu, prov. Osumi, summit, Mt Taka-kuma, *Tashiro* (holo. LE, n.v.).

Rhododendron pentaphyllum Maxim. var. *nikoense* Komatsu, Icon. Pl. Koisikav. 3: 45, t. 168 (1916). *Rhododendron nikoense* (Komatsu) Nakai in Nakai & Koidz., Trees and Shrubs Japan 1: 68 (1922). Type: Japan, central mountains (n.v.).

Rhododendron quinquefolium Bisset & S. Moore var. *roseum* Rehder in Bailey, Stand. Cycl. Hort. 5: 2947 (1916). Type: n.v.

Rhododendron pentaphyllum Maxim. var. *shikokianum* T. Yamazaki, J. Jap. Bot. 63: 312 (1988). Type: Japan, Shikoku, pref. Kochi, Agawagun Nanokawa, 21 iv 1890, *K. Watanabe* s.n. (holo. TI, n.v.).

Shrub or small tree to 4(–8)m tall; young twigs reddish brown, glabrous to sparsely covered with multicellular eglandular or gland-headed hairs; bark pale grey-brown, vertically furrowed; new foliage shoots arising from axillary buds associated with foliage leaves of terminal cluster of the previous year's shoot (i.e. just below terminal bud), and from some terminal buds. Vegetative bud scales glabrous abaxially, sparsely unicellular-pubescent adaxially; margin fringed with unicellular hairs, usually with multicellular glandular hairs intermixed, especially just below apical region; lowermost scales with apices similar to those of upper scales, not long aristate. Leaves deciduous, lustrous green adaxially, light green abaxially, often with red-tinged margins on young plants, turning orange to red in autumn, pseudo-verticillate, with (4–5(–7) leaves clustered at apex of shoot. Blade chartaceous, elliptic to obovate, 2.1–6.3 × 1.1–3.8cm; base cuneate to attenuate; apex shortly acuminate to acute or obtuse, with a short mucro; midvein moderately to strongly raised abaxially, secondary, tertiary, and higher order veins slightly raised and forming a clearly visible reticulum; adaxial surface glabrous to sparsely covered with multicellular eglandular hairs, the midvein ± densely covered with unicellular hairs, often with a few multicellular eglandular hairs; abaxial surface glabrous to very sparsely unicellular-pubescent near base of blade, the lateral surface of midvein sparsely to densely covered with long, ± straight to crisped, unicellular hairs toward base, often with scattered multicellular eglandular and gland-headed hairs, the secondary veins glabrous, to sparsely unicellular-pubescent at base of blade; margin serrulate, with fringe of long, multicellular eglandular hairs; petiole 2.5–8mm long, sparsely unicellular-pubescent adaxially and these hairs associated with very long, multicellular eglandular hairs, often also a few gland-headed hairs, the base of petiole slightly expanded at point of attachment. Flower bud scales larger, but otherwise similar to those of vegetative buds. Flowers appearing before, or rarely with, the leaves; inflorescence a reduced raceme of 1 or 2 flowers. Pedicels 6–16mm long, glabrous or moderately covered with multicellular gland-headed hairs. Calyx lobes broadly to narrowly triangular to ovate, 0.5–5 × 1.2–1.6mm; apex attenuate, acuminate, or acute, to rounded; margin entire to slightly erose, glabrous to fringed with unicellular hairs, the hairs often irregularly spaced or limited to tuft(s) at apex; adaxial surface glabrous; abaxial surface glabrous. Corolla pink to deep rose, with red-brown spots on upper three lobes or limited to upper lobe, occasionally spots lacking, fragrant, zygomorphic, rotate-campanulate, the tube much shorter than the limb and gradually

expanding into it; corolla lobes all ± similar, 1.2–2.6 × 1.1–2.5cm; corolla tube 0.4–1cm long; outer surface of corolla glabrous; inner surface of corolla very sparsely unicellular-pubescent towards base. Stamens 10, declinate, variable in length, 0.8–2.5cm long, included; filaments glabrous throughout to very sparsely to densely covered with flattened unicellular hairs proximally, the shorter filaments tending to be more pubescent than the longer ones. Ovary 3.5–4.5mm long, glabrous; style declinate, 2.2–2.8cm long, glabrous. Capsules ovoid, 1.2–2 × 0.5–0.8cm, glabrous. Seeds shiny and dark to light chestnut-brown, angular ovoid to ellipsoid, 2–3.5 × 1–1.5mm; testa tightly appressed to body, tails lacking, the cells elongate. Cotyledons with multicellular gland-headed hairs along margin and well-developed reticulate venation.

Distribution and ecology. Japan (Honshu, Shikoku, Kyushu) (Fig. 5). In deciduous and coniferous forests and thickets from 500 to 1700m. Flowering in April and May (early June).

Plants with glandular-pubescent pedicels and those with glabrous pedicels can occur together, and bloom at the same time. However, these characters do not show correlation with other morphological features or geography. Thus, the recognition of three varieties within *R. pentaphyllum*, as was done by Komatsu (1916), Ohwi (1965), and Yamazaki (1988), cannot be justified.

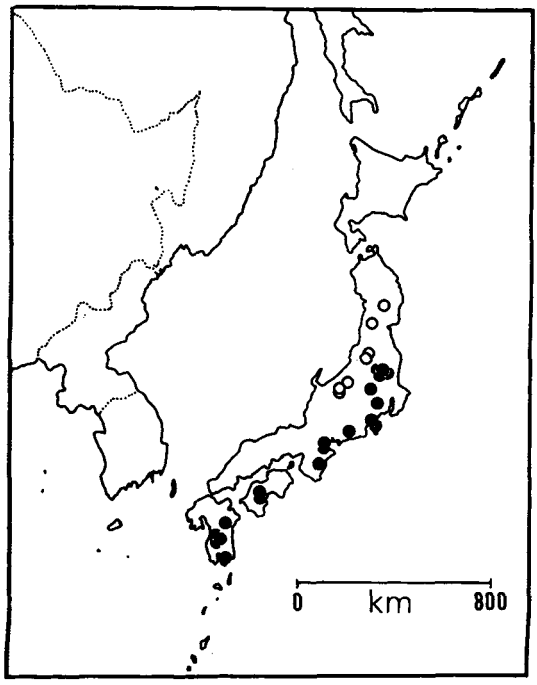

FIG. 5. Distribution of *Rhododendron pentaphyllum* (●) and *Rhododendron nipponicum* (○).

Rhododendron pentaphyllum is most closely related to *R. schlippenbachii* and *R. quinquefolium*, especially the latter; see key and discussion following descriptions of these species for distinguishing characters. The Philipsons (M. Philipson, 1980; W. Philipson, 1980) were the first to recognize the close affinity of *R. pentaphyllum* to *R. quinquefolium*, although the similarity of the two species was noted by Maximowicz (1887). *Rhododendron pentaphyllum* is easily distinguished from *R. quinquefolium* by its flowers that usually bloom before the leaves (vs. with leaves), pink (vs. white) corolla, and vegetative shoots arising from axillary buds associated with foliage leaves (see key). In addition, the leaves and petiole margins of *R. pentaphyllum* have a conspicuous fringe of multicellular eglandular hairs, and the bark is thin.

The species has potential as an ornamental (Wilson, 1921); illustrations may be found in Komatsu (1916) and Makino (1956).

4. Rhododendron albrechtii Maxim., Bull. Acad. Sci. St Pétersbourg, sér. 3, 15: 227 (1870).

Syn.: *Azalea albrechtii* (Maxim.) Kuntze, Revis. Gen. Pl. 2: 387 (1892). Type: Japan, Hakodate, in subalpine valley near Nodafu, 1861, *C. Maximowicz* (lecto. LE, n.v.).

Shrub to 2.5m tall; bark thin with shallow vertical furrows; young twigs pale to reddish brown, sparsely to moderately covered with multicellular gland-headed hairs, becoming glabrous with age; new foliage shoots arising from axillary buds associated with foliage leaves of the previous year's shoot (i.e. below terminal bud), and some terminal buds. Vegetative bud scales glabrous to moderately unicellular-pubescent abaxially, sometimes with a few multicellular gland-headed hairs near apex, sparsely to moderately unicellular-pubescent adaxially, especially near apex, and sometimes with a few multicellular gland-headed hairs near apex; margin fringed with unicellular hairs or with mixed unicellular and gland-headed hairs; lowermost scales with long aristate apices or rudimentary blades. Leaves deciduous, dark green adaxially, pale green or occasionally glaucous abaxially, turning yellow to red in autumn, alternate (with internodes becoming more closely spaced towards tip of shoot), thus leaves sometimes appearing pseudowhorled at shoot apices. Blade membranaceous, obovate to occasionally elliptic, 2.1–13.5 × 0.9–6.3cm; base attenuate with blade decurrent along petiole; apex shortly acuminate, acute to obtuse, with a short mucro; midvein strongly raised and prominent abaxially, the secondary veins slightly raised abaxially; adaxial surface, including midvein, moderately covered with multicellular gland-headed and eglandular hairs, the midvein unicellular-pubescent; abaxial surface glabrous to moderately covered with unicellular hairs, especially near base, and usually with a few multicellular gland-headed hairs, the lateral (and sometimes all) surfaces of midvein very sparsely to densely covered with straight to crisped, unicellular hairs, especially towards base, and with multicellular gland-headed hairs and usually also ± flattened glandular to eglandular hairs, the secondary and tertiary

veins similar but less frequently unicellular-pubescent and usually lacking ± flattened glandular hairs; margin serrulate and often with conspicuous irregular undulations, with a fringe of multicellular gland-headed and eglandular hairs; petiole ± lacking to 6mm long, sparsely unicellular-pubescent, especially adaxially, and with scattered multicellular gland-headed hairs, the base of petiole abruptly expanded into a very broadened point of attachment, forming a ± triangular slight protuberance below terete portion. Flower buds larger than, but otherwise similar to, vegetative buds. Flowers appearing before or with the leaves; inflorescence an umbellate raceme of 2 to 5 flowers. Pedicels 5–27mm long, moderately to densely covered with multicellular gland-headed hairs, sometimes also sparsely unicellular-pubescent. Calyx lobes broadly lingulate to ovate-triangular, 1–3.5 × 1.5–2mm; apex rounded; margin fringed with multicellular gland-headed and sometimes also eglandular hairs; adaxial surface glabrous; abaxial surface sparsely to densely covered with multicellular gland-headed hairs, sometimes also very sparsely unicellular-pubescent. Corolla pink to red-purple, with greenish spots on the upper 3 lobes, fragrant, zygomorphic, broadly rotate to funnelform, the tube much shorter than the limb and gradually expanding into it; upper corolla lobe 1–1.7 × 1–1.6cm; lateral lobes 1.2–2.2 × 0.7–1.7cm; corolla tube 0.4–1cm long; outer surface of corolla glabrous; inner surface of corolla sparsely unicellular-pubescent towards base. Stamens 10, declinate, dimorphic, the upper 5, 0.8–1.7cm long, the lower 5, 2.2–3.3cm long, included to equalling corolla; filaments glabrous distally, becoming densely covered with flattened unicellular hairs proximally, the shorter filaments more pubescent than the longer ones. Ovary 3–4mm long, moderately to densely covered with multicellular gland-headed hairs, sometimes with a few unicellular hairs at apex; style declinate, 2.4–3.4cm long, glabrous to unicellular-pubescent near base. Capsules ovoid, 0.8–1.3 × 0.5–0.7cm, moderately covered with multicellular gland-headed hairs, sometimes with a few unicellular hairs at apex. Seeds shiny and light brown, ellipsoid, 0.7–1.6 × 0.3–0.5mm; testa tightly appressed to body, with cells at each end elongated and fused to form ± stellate-globular tails 0.1–0.3mm long, the cells covering body elongate. Cotyledons lacking multicellular hairs or very occasionally with a few gland-headed hairs and with venation represented by midvein and a small number of poorly developed secondary veins.

Distribution and ecology. Japan (Hokkaido, Honshu) (Fig. 3). In coniferous or deciduous forests and thickets from 800 to 2000(–2300)m elevation. Flowering during May and June (July).

Rhododendron albrechtii is a phylogenetically isolated species of equivocal relationship. It is possibly most closely related to *R. schlippenbachii*, *R. quinquefolium* and *R. pentaphyllum*, being weakly linked with these species in at least some cladograms on the basis of its dimorphic stamens (present in *R. schlippenbachii* and slightly developed in *R. pentaphyllum*) and possibly also the loss of fringed seeds (see Cladistic Analysis). The species is here considered tentatively to be an isolated (and possibly cladistically basal) member of sect. *Sciadorhodion*. This placement agrees with that

arrived at by M. Philipson (1980) on the basis of cotyledon characters. It is noteworthy that occasional multicellular gland-headed hairs similar to those of *R. pentaphyllum*, *R. quinquefolium* and *R. schlippenbachii* occur on *R. albrechtii* cotyledons in a varying but small proportion of different seedling populations (M. Philipson, 1970, 1980). The presence of such hairs may be an additional synapomorphy linking this species with sect. *Sciadorhodion*. However, a cladistic relationship to *R. vaseyi* (of sect. *Rhodora*) can be hypothesized due to the presence of acuminate leaf apices in both species. The seeds of *R. albrechtii* have a small appendage (or tail) at each end, as do those of both *R. vaseyi* and *R. canadense* (a probable symplesiomorphy) and, like these species, the vegetative shoots (bearing alternate and not obviously 5-whorled leaves) develop from axillary buds associated with foliage leaves of the previous season (other likely symplesiomorphies). The phenetic closeness of *R. albrechtii* and *R. vaseyi* has been noted by Sargent (1888), Gray (1879), Rehder (1921a), and Wood (1961). It is likely that *R. albrechtii* diverged early in the evolutionary history of *Rhododendron* subgen. *Pentanthera*, and since nearly all features of this species are plesiomorphic, determining the species' cladistic relationships are difficult.

This attractive species has been illustrated by Maximowicz (1870) and Makino (1956).

III. Rhododendron sect. **Viscidula** Matsum. & Nakai, Bot. Mag. (Tokyo) 30: 289 (1916). Type: *Rhododendron nipponicum* Matsum.

Shrub; indumentum of unicellular hairs, and multicellular gland-headed and eglandular hairs; new foliage shoots arising from axillary buds associated with foliage leaves of the previous year's shoot (i.e. below the terminal bud). Leaves deciduous, alternate, with internodes becoming more closely spaced towards tip of shoot; apex rarely obtuse, usually rounded to emarginate. Inflorescence an umbellate raceme of 6–15 flowers, blooming with or after the leaves. Corolla actinomorphic, white, lacking spots, tubular-campanulate, the tube longer than the limb and broadly expanding into it, 1–1.6mm long; outer surface of corolla glabrous; inner surface of corolla sparsely unicellular-pubescent towards base. Stamens 10, variable in length, included. Style straight. Seeds with testa tightly appressed to body, the cells elongate; the ends of seed with stellate tails 0.2–0.5mm long. Cotyledons lacking multicellular hairs along margin and with venation represented only by midvein.

Distribution. Japan (north-central Honshu).

1. Rhododendron nipponicum Matsum., Bot. Mag. (Tokyo) 13: 17 (1899).

Syn.: *Azalea nipponica* (Matsum.) Copeland, Am. Midl. Nat. 30: 595 (1943). Type: Japan, prov. Uzen, Gassan-hen, 24 vii 1887, *S. Okubo & R. Yatabe* s.n. (lecto., designated here, TI).

Shrub to 2m tall; bark light brown, papery and shredding, revealing polished brown stems and branches; young twigs pale to red-brown, sparsely covered with multicellular gland-headed and eglandular hairs; new foliage shoots arising from axillary buds associated with foliage leaves of the previous year's shoot (i.e. below terminal bud), and some terminal buds. Vegetative bud scales glabrous abaxially, to occasionally with a few multicellular gland-headed and/or eglandular hairs near apex, sparsely to moderately unicellular-pubescent adaxially, especially near apex, and sometimes with a few multicellular gland-headed and eglandular hairs near apex; margin fringed with unicellular hairs distally, becoming glabrous proximally; lowermost scales with apices similar to those of upper scales, not long aristate (although occasionally with rudimentary blade). Leaves deciduous, dark green adaxially, pale green abaxially, turning orange to red in autumn, alternate (with internodes becoming more closely spaced towards tip of shoot). Blade membranaceous, obovate, often broadly so, to rarely broadly elliptic, 4–18 × 1.5–8.5cm; base attenuate, with blade decurrent along basal portion of midvein; apex rarely obtuse, usually rounded to emarginate, with a short mucro; midvein strongly raised and prominent abaxially, the secondary, tertiary, and some higher order veins slightly raised abaxially, thus vein reticulum usually conspicuous; adaxial surface, including midvein, with scattered multicellular gland-headed and eglandular hairs; abaxial surface with scattered multicellular gland-headed and eglandular hairs, the lateral surfaces of midvein very sparsely to moderately fringed with straight to crisped, unicellular hairs, especially near base, or such hairs lacking, and with multicellular gland-headed and eglandular hairs, the secondary veins with scattered multicellular hairs, sometimes sparsely unicellular-pubescent near junction with midvein, especially at base of blade; margin entire to irregularly undulate with a fringe of multicellular eglandular hairs, usually with a few gland-headed hairs intermixed; petiole essentially lacking, the base abruptly expanded into a very broadened point of attachment, forming a ± triangular slight protuberance below terete portion of midvein.

Flower bud scales with abaxial surface glabrous, sometimes with a few unicellular hairs or multicellular gland-headed or eglandular hairs near apex, the adaxial surface sparsely to densely covered with unicellular hairs, especially near apex, often with a few multicellular hairs near apex; margin ciliate with unicellular hairs, usually with a few glandular hairs intermixed, to unicellular-ciliate near apex and with closely associated multicellular glandular hairs proximally. Flowers appearing with or after the leaves; inflorescence an umbellate raceme of 6–15 flowers. Pedicels 8–25mm long, moderately to densely covered with multicellular gland-headed hairs. Calyx lobes lingulate to broadly ovate-triangular, 0.9–6 × 1.2–2mm; apex rounded to acute; margin fringed with multicellular gland-headed hairs; adaxial surface glabrous; abaxial surface with scattered multicellular gland-headed hairs, often sparsely unicellular-pubescent near apex. Corolla white, lacking spots, ± actinomorphic, tubular-campanulate, the tube longer than the limb and broadly expanding into it; corolla lobes all ± similar, 0.5–0.9cm long and wide; corolla tube 1–1.6mm long; outer surface of corolla glabrous; inner surface of corolla sparsely unicellular-pubescent

towards base. Stamens 10, straight, variable in length, 1.4–2.2cm long, included; filaments glabrous distally, becoming densely covered with flattened unicellular hairs proximally. Ovary 3–5mm long, moderately to densely covered with multicellular gland-headed hairs; style straight, 1.2–1.8cm long, glabrous. Capsules ovoid to ellipsoid, 0.7–1.7 × 0.5–0.7cm, strongly grooved, moderately covered with multicellular gland-headed hairs. Seeds light yellowish brown, ellipsoid with 5 well-developed longitudinal furrows, 0.6–1 × 0.2–0.35mm; testa tightly appressed to body, with cells at each end elongated and fused to form ± stellate tails 0.2–0.5mm long, the cells covering body elongate. Cotyledons lacking multicellular hairs and with venation represented only by midvein.

Distribution and ecology. Japan (north-central Honshu) (Fig. 5). Woods and thickets from 1000 to 1850m. Flowering in July and August.

Rhododendron nipponicum is a taxonomically isolated species. It is easily distinguished from other primitive members of subgen. *Pentanthera* (i.e. the species of sections *Rhodora* and *Sciadorhodion*) by its flowers with a white, unspotted, actinomorphic, tubular-campanulate corolla with the tube longer than the limb, and a straight style, which are produced with or after the leaves. In addition, its cotyledons are distinctive because they possess only a midvein (M. Philipson, 1980). The species has a distinctive bark that is papery and shredding, revealing polished brown stems and branches. Like members of sect. *Rhodora*, this species has tailed seeds and vegetative shoots that lack a terminal 'whorl' of leaves and arise from axillary buds associated with foliage leaves (all likely symplesiomorphies). As pointed out by Wilson (1921), the leaves of this species are most similar to those of *R. schlippenbachii* (of sect. *Sciadorhodion*), but considering the numerous differences between these two species in floral and seed characters their similarities in leaf form are likely due to convergence.

Rhododendron nipponicum may be the cladistically basal member of subgen. *Pentanthera*, and its placement in the monotypic sect. *Viscidula*, as proposed by Matsumura & Nakai (1916) and maintained by Sleumer (1949, 1980) and M. Philipson (1970, 1980), is clearly supported (see Cladistic Analysis).

Illustrations of this species are found in Komatsu (1911) and W. Philipson (1980).

IV. Rhododendron sect. **Rhodora** (L.) G. Don, Gen. Syst. 3: 848 (1834).

Syn.: *Rhodora* L., Sp. Pl. ed. 2, 1: 561 (1762). *Hochenwartia* Crantz, Inst. Rei Herb. 2: 468 (1766). *Azalea* subgen. *Rhodora* (L.) Copeland, Am. Midl. Nat. 30: 595 (1943). Type: *R. canadense* (L.) Torrey.

Biltia Small, Fl. S.E. U.S. 884 (1903). Type: *R. vaseyi* A. Gray.

Shrub to small tree; indumentum of unicellular hairs and multicellular gland-headed to eglandular hairs; new foliage shoots arising from axillary buds associated with foliage leaves of previous year's shoots, i.e. below the terminal bud. Leaves deciduous, alternate, with internodes becoming more closely spaced towards shoot apex; apex

acute to rounded, or acuminate. Inflorescence an umbellate raceme of 3–15 flowers, blooming before the leaves. Corolla strongly zygomorphic, usually pink to rose-purple, red to orange-brown spotted on upper 3 lobes, occasionally lacking spots, 2-lipped due to more extensive fusion of the upper 3 lobes contrasting with the 2 elongate and flaring lower lobes, the tube much shorter than the limb and broadly expanding into it, or lacking, 0–0.8cm long; outer and inner surfaces of corolla usually glabrous. Stamens 10 or 7 (rarely 5), variable in length, included to exerted. Style declinate. Seeds with testa tightly appressed to body; the cells covering central portion of body elongated and non-bulging, those along angles (=margins) often ± bulbous and/or flattened, expanded (in plane parallel to compression of seed body) forming a slight and irregularly developed to conspicuous wing-like fringe connecting the tails; the cells at each end elongated and bulging or flattened, forming flat to ± stellate tail 0.2–0.9mm long. Cotyledons lacking multicellular hairs along margin and with venation represented by midvein and one (or very few) poorly developed secondary veins.

Distribution. Eastern North America.

Key to species of sect. Rhodora

1a. Corolla tube lacking due to deep division between 2 lower lobes and between lateral and lower lobes; upper corolla lobe 0.3–0.8cm long; stamens 10, filaments unicellular-pubescent at base; capsules moderately covered with multicellular gland-headed and eglandular hairs, and densely covered with unicellular hairs; seeds with flattened tails (composed of elongated and flattened cells); leaves with acute to rounded apices and ± revolute margins; low shrub to 1m tall ——— **2. R. canadense**

1b. Corolla tube 0.4–0.8mm long, upper corolla lobe 1–1.8cm long; stamens (5–)7, filaments glabrous; capsules sparsely to moderately covered with multicellular gland-headed hairs; seeds with ± stellate-globular tails (composed of bulging cells); leaves with acuminate apices and plane margins; shrub or small tree to 2.5(–5.5)m tall ——— **1. R. vaseyi**

1. Rhododendron vaseyi A. Gray, Proc. Amer. Acad. 15: 48 (1879).

Syn.: *Azalea vaseyi* (A. Gray) Rehder in Möller's Deutsch. Gärtn.-Zeitung. 14: 332 (1899). *Biltia vaseyi* (A. Gray) Small, Fl. S.E. U.S. 884 (1903). Type: United States, North Carolina, Jackson Co., summit of a balsam mountain c.7mi SW of Webster, 3 vi 1878, *Vasey* s.n. (holo. GH; iso. NY, US, US (frag.)).

Rhododendron vaseyi A. Gray var. *album* Bean, Trees and Shrubs Brit. Isles 2: 384 (1914). *Rhododendron vaseyi* f. *album* (Bean) Rehder in Mitt. Deutsch. Dendrol. Ges. 24: 225 (1916). Type: n.v.

Shrub to small tree to 2.5(–5.5)m tall; bark thin, flaky or longitudinally shredding; young twigs pale to reddish brown, very sparsely covered with multicellular eglandu-

lar and gland-headed hairs, very sparsely to sparsely covered with short unicellular hairs, becoming glabrous with age; new foliage shoots arising from axillary buds associated with foliage leaves of previous year's shoot (i.e. below terminal bud), and some terminal buds. Vegetative bud scales glabrous to moderately unicellular-pubescent abaxially and sometimes with scattered multicellular gland-headed hairs, especially near apex, sparsely to moderately unicellular-pubescent adaxially, especially near apex, and sometimes with a few multicellular gland-headed hairs near apex; margin fringed with unicellular hairs with intermixed gland-headed hairs, occasionally also with a few eglandular hairs near apex; lowermost scales sometimes with aristate apices or rudimentary blades. Leaves deciduous, dark green adaxially, pale green abaxially, turning red in autumn, alternate (with internodes becoming more closely spaced towards tip of shoot). Blade membranaceous, elliptic to obovate, 2.3–17 × 0.8–5.5cm; base cuneate to attenuate; apex acuminate, with a short mucro; midvein strongly raised and prominent abaxially, the secondary veins slightly raised abaxially; adaxial surface, including midvein, sparsely covered with multicellular gland-headed and eglandular hairs, glabrescent, the midvein unicellular-pubescent; abaxial surface with scattered multicellular gland-headed hairs, the midvein with scattered gland-headed and longer eglandular hairs, the secondary veins with gland-headed hairs only; margin entire to undulate, with widely scattered to definite fringe of multicellular eglandular hairs; petiole 3–15mm long, sparsely unicellular-pubescent adaxially, and with scattered multicellular gland-headed and eglandular hairs, the base of petiole often expanded into a broadened point of attachment, forming a ± triangular slight protuberance below terete portion.

Flower buds larger than vegetative buds, more frequently unicellular-pubescent abaxially, and with portion of margin often completely glandular. Flowers appearing before the leaves; inflorescence an umbellate raceme of 5–15 flowers. Pedicels 5–26mm long, moderately covered with multicellular gland-headed hairs and sparsely to moderately unicellular-pubescent. Calyx lobes broadly subovate to narrowly triangular-lingulate, 0.3–8.5mm long (often extremely variable, even within a single flower), 1.2–2mm wide; apex rounded; margin fringed with multicellular gland-headed hairs; adaxial surface glabrous; abaxial surface ± glabrous to with a few multicellular gland-headed hairs. Corolla pink to occasionally white, with orange-brown to red spots on the upper 3 lobes, fragrant, zygomorphic, broadly rotate-funnelform, appearing ± 2-lipped due to more extensive fusion of the upper 3 lobes and the 2 flaring lower lobes being slightly longer, the tube much shorter than the limb and gradually expanding into it; upper corolla lobe 1–1.8 × 0.8–1.3cm; lateral lobes 1.4–2.4 × 0.8–1.4cm; lower lobes 1.5–2.6 × 0.8–1.3cm; corolla tube 0.4–0.8cm long; outer and inner surfaces of corolla glabrous. Stamens (5–)7, declinate, variable in length, 1.2–3.7cm long, the shorter stamens included, longer ones exserted; filaments glabrous throughout their entire length. Ovary 3–5mm long, sparsely to moderately covered with multicellular gland-headed hairs; style declinate, 2–3.8cm long, glabrous to with a few multicellular gland-headed hairs near base. Capsules ovoid to oblong-ellipsoid and slightly grooved, 0.9–1.7 × 0.3–0.6cm, sparsely to moderately

covered with multicellular gland-headed hairs. Seeds brown, angular-ellipsoid, 1–1.7 × 0.4–0.6mm; testa tightly appressed to body, with cells at each end elongated, bulging, and fused to form ± stellate tails 0.2–0.5mm long, the cells covering central portion of body elongate and non-bulging, those along angles often ± bulbous and expanded (similar to those of tails) and often forming a slight fringe. Cotyledons lacking multicellular hairs and with venation represented by midvein and a small number of poorly developed secondary veins. $2n = 26$ (Sax, 1930).

Distribution and ecology. United States, North Carolina (Fig. 6). Bogs, thickets and deciduous or coniferous forests from 900 to 1830m. Flowering in late April, May, and June.

Rhododendron vaseyi is a distinctive species probably most closely related to the more northerly *R. canadense*. The phenetic divergence between these two species (and their separation from other 'azaleas') is seen in the fact that both have, at various times, been recognized as monotypic genera, *R. vaseyi* as *Biltia* (Small, 1903) and *R. canadense* as *Rhodora* (Linnaeus, 1762). *Rhododendron vaseyi* and *R. canadense* both have 2-lipped corollas with a glabrous inner surface, and tailed and ornamented

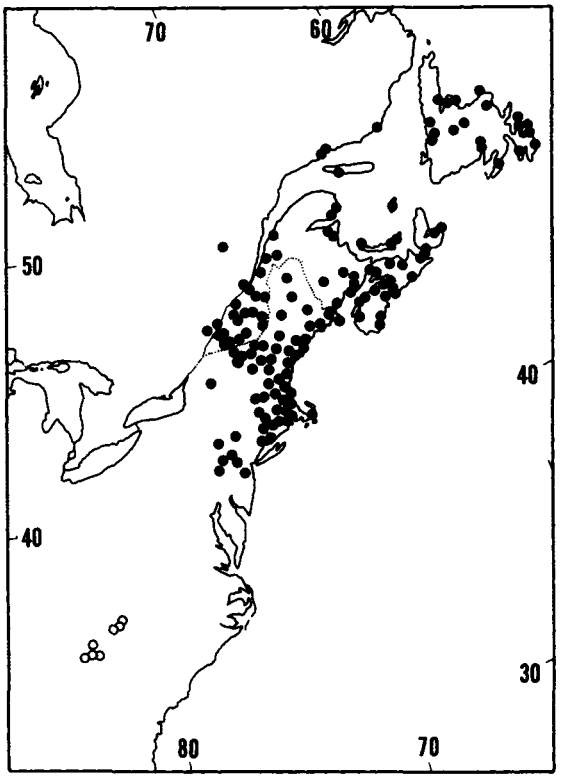

FIG. 6. Distribution of *Rhododendron vaseyi* (○) and *Rhododendron canadense* (●).

(or fringed) seeds (of flattened or bulging cells). Together these species comprise the North American sect. *Rhodora.* The taxonomic connection between *R. vaseyi* and *R. canadense* has long been recognized (Sargent, 1888; Rehder, 1921a; Wood, 1961). *Rhododendron vaseyi* is easily distinguished from *R. canadense* by its corolla which is not cut to the base, less strongly 2-lipped, with a longer upper lobe (1–1.8 vs. 0.3–0.8cm), leaves with acuminate (vs. acute to rounded) apices, and plane (vs. revolute) margins, usually 7 (vs. 10) stamens, glabrous (vs. basally pubescent) filaments, capsules with sparse to moderate covering of gland-headed hairs (vs. densely unicellular-pubescent with gland-headed and eglandular hairs intermixed), seeds with fringe of bulging (vs. flattened) cells, and a diploid (vs. tetraploid) karyotype.

Illustrations of this beautiful and horticulturally important species can be found in Sargent (1888), Small (1903, 1933), Skan (1906), Bean (1914), Rehder (1916), Radford et al. (1968) and Wood (1961).

2. Rhododendron canadense (L.) Torrey in Cat. Pl. 151 [in Geol. Surv. New York Assembly, No. 50] (1841).

Syn.: *Rhodora canadensis* L., Sp. Pl. ed. 2, 561 (1762). *Hochenwartia canadensis* (L.) Crantz, Inst. Rei Herb. 2: 469 (1766). *Rhododendron rhodora* J. F. Gmelin, Syst. Nat. 2(1): 694 (1791), *nom. superfl. Azalea canadensis* (L.) Kuntze, Revis. Gen. Pl. 2: 386 (1891). Type: n.v.

Rhododendron rhodora J. F. Gmelin f. *albiflora* E. L. Rand & Redf., Fl. Mt Desert Isl. 127 (1894). *Rhododendron canadense* (L.) Torrey f. *albiflorum* (E. L. Rand & Redf.) Rehder in Wilson & Rehder, Monogr. Azaleas 122 (1921). Type: United States, Maine, Hancock Co., Mt Desert Isl., Southwest Harbor, vii 1888, *A. J. Downs* s.n. (holo. NEBC).

Rhododendron canadense (L.) Torrey f. *album* Voss, Vilmorin's Blumengartn. 1: 587 ([1894–]1896). Type: n.v.

Rhododendron canadense (L.) Torrey f. *viridifolium* Fernald, in Wilson & Rehder, Monogr. Azaleas 122 (1921). Type: Canada, Nova Scotia, boggy thickets bordering Trefry's Lake, Arcadia, 29 viii 1920, *Fernald & Long* 22150 (holo. GH; iso. NY).

Rhizomatous shrub to 1m tall; bark reddish brown to grey, smooth to very slightly longitudinally grooved and flaking; young twigs pale to reddish brown, often with a pink tinge, usually glaucous, sparsely covered with multicellular eglandular and shorter gland-headed hairs, moderately to densely covered with short unicellular hairs; new foliage shoots arising from axillary buds associated with foliage leaves of previous year's shoot (i.e. below terminal bud), and some terminal buds. Vegetative bud scales moderately to densely unicellular-pubescent abaxially and often with scattered multicellular gland-headed and eglandular hairs, especially near apex or along midvein, moderately to densely unicellular-pubescent adaxially; margin fringed with unicellular hairs, the lowermost scales often with aristate apices or rudimentary blades. Leaves deciduous, dull bluish green (glaucous) to rarely dark green adaxially, pale to whitish green abaxially, turning red in autumn, alternate (with internodes

becoming more closely spaced towards tip of shoot). Blade membranaceous to chartaceous, elliptic or oblong to obovate, 1–8.3 × 0.4–3cm; base cuneate or acute to rounded, apex acute to rounded, usually with a short mucro; midvein strongly raised and prominent abaxially, the secondary veins flat to slightly raised abaxially; adaxial surface, including midvein, sparsely to moderately covered with short unicellular hairs and multicellular eglandular and gland-headed hairs; abaxial surface, including midvein and higher order veins, moderately to densely covered with short unicellular hairs and moderately covered with multicellular eglandular and gland-headed hairs, the eglandular hairs of midvein larger than those of higher order veins and lamina; margin entire, revolute to less commonly plane, fringed with multicellular eglandular hairs and with inconspicuous unicellular hairs; petiole 1–12mm long, moderately to densely unicellular-pubescent, and with scattered multicellular eglandular and gland-headed hairs, the base of petiole slightly expanded at point of attachment.

Flower buds terminal (rarely also from axillary buds just below terminal bud), larger than, but otherwise ± similar to, vegetative buds, more frequently densely unicellular-pubescent. Flowers appearing before or occasionally with the leaves; inflorescence an umbellate raceme of 3–9 flowers. Pedicels 3–10mm long, usually glaucous, usually sparsely covered with multicellular gland-headed hairs, and lacking to densely covered with unicellular hairs. Calyx lobes broadly subovate to triangular-ovate, 0.4–1.5 × 0.7–1.6mm; apex rounded; margin fringed with multicellular gland-headed and/or eglandular hairs, and unicellular hairs; adaxial surface glabrous; abaxial surface usually glaucous, glabrous to densely unicellular-pubescent, often with scattered multicellular gland-headed hairs. Corolla rose-purple to pink, or rarely white, unspotted to red-spotted on upper 3 lobes, fragrant, strongly zygomorphic, clearly 2-lipped due to the very extensive fusion of the upper 3 lobes contrasting with the 2 elongate and widely divergent lower lobes, the tube essentially lacking due to deep division between 2 lower lobes and between lateral and lower lobes; upper corolla lobe 0.3–0.8 × 0.25–0.5cm; lateral lobes 1.2–2.2 × 0.25–0.4cm (closely fused with upper lobe); lower lobes 1.2–2.2 × 0.25–0.6cm (± free); outer and inner surfaces of corolla glabrous to occasionally with few scattered multicellular gland-headed hairs. Stamens 10, slightly declinate to ± straight, variable in length, 0.9–2cm long, exserted (due to deeply cut corolla); filaments glabrous distally, becoming densely covered with flattened unicellular hairs proximally. Ovary 1.7–3mm long, densely covered with multicellular gland-headed and eglandular hairs and unicellular hairs; style slightly declinate, 1.1–2.2cm long, glabrous to unicellular-pubescent near base, often glaucous. Capsules ovoid to nearly cylindrical and curved near the base, slightly grooved, 0.7–1.7 × 0.3–0.6cm, often glaucous, moderately covered with multicellular gland-headed and eglandular hairs and densely covered with short unicellular hairs. Seeds brown, flattened ellipsoid, 1–2.7 × 0.4–1.3mm; testa tightly appressed to body, with cells at each end elongated and expanded, forming a flat tail 0.3–0.9mm long, the cells covering central portion of body elongate and non-bulging, those along margin expanded and flattened (in plane parallel to compression of seed body), forming an irregular wing-like fringe connecting the tails. Cotyledons

lacking multicellular hairs and with venation represented by midvein and one (or very few) poorly developed secondary veins. $2n=52$ (Sax, 1930).

Distribution and ecology. Distributed from Newfoundland and Quebec, south to eastern Pennsylvania and northern New Jersey (Fig. 6). In moist to dry coniferous or deciduous forests, thickets, open rocky areas, lake margins, bogs, and swamps, from near sea level to c.1900m. Flowering from April through early July.

Rhododendron canadense is a very distinctive species most closely related to *R. vaseyi*; see discussion following the latter species. Although originally described as the genus *Rhodora* (Linnaeus, 1762), its close relationship to *Rhododendron* has long been recognized (see Rehder, 1921a; Sleumer, 1949, 1980; Wood, 1961).

The artificial (and infertile) hybrid between *Rhododendron canadense* and *R. molle* (Blume) G. Don subsp. *japonicum* (A. Gray) K. Kron is referred to as *R. fraseri* W. Watson (Gard. Chron., ser. 3, 67: 225, 1920). Representative specimens of this entity include: *Fraser* s.n., 1929 (A); *C.E.K. & C.K.A.*, Arnold Arbor. #15359 (A); *Rehder* s.n., 29 iii 1920 (A); *E.J.P.*, Arnold Arbor. #15359-1 (A).

Illustrations of this beautiful species may be found in Meerburgh (1798), Sims (1800), Duhamel (1806), Britton & Brown (1897), Marie-Victorin (1947), Graves (1956), Gleason (1952), and Campbell & Hyland (1975).

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APPENDIX

Specimen citations

Rhododendron schlippenbachii

Representative specimens. **Korea**. Kwangnung, Kyonggi-Do, 37°44′N, 128°06′E, *Chung* 2055 (E); Hoang-heito, *Faurie* 668 (A, E); prov. Primorje, distr. Chasan, vicinity of Kraskino, 20–22 v 1966, *Gorovoi et al.* s.n. (A, E, NY); Surak-san, 37°41′N, 127°06′E, *Moran* 5166 (GH); Mok-chon, 36°51′N, 127°13.5′E, *Moran* 5170 (GH, US); Kuje-do, Oknyo-bong, *Nakai* 11961 (TI); Honsan, 5 ix 1903, *Sargent* s.n. (A); N coast, 1854, *Schlippenbach* s.n. (GH); Chang-sang-san-sung, prov. Whanghai, 13 v 1934, *Smith* s.n. (A); Changan forest, prov. Whanghai, 10 viii 1937, *Smith* s.n. (US); from Taeseong to Mt Seseog-bong, Chirisan, prov. Kyungsangnam, *Ueda et al.* 1154 (HUK); Chirisan Keisyonando, *Uno* 23298 (A, NY); Ka-zan, near Suigen, prov. Keiki, *Wilson* 8472 (A); Taiyudo, prov. N Heian, *Wilson* 8603 (A); Shenkori to Eiko, prov. S Kankyo, *Wilson* 9201 (A); near Yeiko, prov. S Kankyo, *Wilson* 9223 (A, US); Kongo-san, prov. Kogen, *Wilson* 10493 (A).

Rhododendron quinquefolium

Representative specimens. **Japan**. Honshu: Nikko (16 v 1877), *Bisset* 1122 (E); Kintoki, Hakone (v 1887), *Bisset* 3916 (E); Chinsenji (viii 1887), *Bisset* 4300 (E); Mt Togatake, Nishihatano-mura, prov. Sagami, *Furuse* 2768 (A); Mt Tenshigatake, Shiraito-mura, Fuji-gun, prov. Suruga, *Furuse* 2804 (A); Mt San'noshuku, Nikko, *Furuse* 2816 (A); Mt Temshiga-take, Shiraito-mura, Fuji-gun, prov. Suruga, *Furuse* 18657 (A); Mt Gozaisyo, Mie County, pref. Mie, *Hiroe* 12943 (UC), 12944 (UC); Mt Kama-ga-take, Mie County, pref. Mie, *Hiroe* 13073 (UC); Mt Gyojagaeri, Tenkawa-mura, Yoshino-gun, pref. Nara, 1 vi 1970, *Hotta et al.* s.n. (A, UC); Chanokidaira, on Lake Chuzenji, Nikko-city, *Idzumi & Togashi* 387 (A, NCU, NY, UC); Chuzenji-ko, Chanoki-daira, Nikko, 20 ix 1976, *Idzumi & Togashi* s.n. (TI); near Hosoo pass, Nikko, pref. Tochigi, *Kanai* 6150 (A); Mt Kumabushi, Hiraokamura, Shimoinagun, prov. Shinano, *Katsumata* 15657 (TI); Nikko, Shimotsuke, *Kubota* 522 (A, E, NY, UC, US); Nikko, Kwanto Dist., pref. Tochigi, v 1952, *Kubota* s.n. (A); Mt Rokkosan, Koube City, pref. Hyogo, *Makino* 101898 (E); Mt Kintoki, Hakone, prov. Sagami, *Mizushima* 1554 (A); Iodo, Miyama-mura, Yamagata-gun, pref. Gifu, *Murata & Togashi* 226 (UC); Nikko-shi, near Umagaeshi, pref. Tochigi, *Murata* 1776 (A, NCU, TI); Abe-gun, Umegashima-mura, Umegashima-spa–Abe-tooge, pref. Shizuoka, *Murata & Chen* 9699 (A); Kanakuso-toge in Hira Mts, pref. Shiga, *Murata* 44451 (A); Hirakura Experimental Forest of Mie Univ., Misugicho, Ichisigun, pref. Mie, 16 v 1963,

Murata & Fukuoka (E, NY, TI, UC); Mt Rokko, Kobe, *Muroi* 208 (A); Mt Hayachine, pref. Iwate, *Muroi* 410 (A); Arima, pref. Hyogo, *Muroi* 2116 (A); Mt Rokko, pref. Hyogo, *Muroi* 6019 (A); Miyagi-gun, Jogi, pref. Miyagi, 15 v 1973, *Ohba & Otomo* s.n. (A, E, NCU, TI); Mt Kintoki, Hakone, pref. Kanagawa, *Sawada* 841 (NCU, TI, UC); Myozindake, Hakone, pref. Kanagawa, *Sawada* 842 (NCU); prov. Mino, *Shiota* 5824 (A); Mt Chmine in Yamato, *Togasi & Togasi* 483 (A, E, NY, UC, US); Nikko region, prov. Shimotsuke, *Wilson* 7676A (A), 6683 (A, GH, US); Ohdaigahara, pref. Nara, *Yamazaki et al.* 892 (NCU, TI); Izugatake, prov. Musasi, *Yamazaki* 3901 (A). Shikoku: Kito-mura, Ishidate-Yama, pref. Tokushima, *Yamazaki* 1040 (A).

Rhododendron pentaphyllum

Representative specimens. **Japan**. Honshu: Horai area, NE of Toyohashi, 35°00′N, 137°35′E, pref. Aichi, prov. Mikawa, *Doleshy & Doleshy* 834 (E); upper stream of Daiya River, Umagaeshi National Park, Nikko, prov. Shimotsuke, pref. Tochigi, 14 v 1957, *Furuse* s.n. (A); Mt Gozaisyo, Mie County, pref. Mie, *Hiroe* 12952 (UC); Mt Kama-ga-take, Mie County, pref. Mie, *Hiroe* 13076 (UC); Chanokidaira, on Lake Chuzenji, Nikko-city, pref. Tochigi, 19 ix 1976, *Idzumi & Togashi* s.n. (E); Yunoko, Nikko, pref. Tochigi, *Kanai* 6886 (A); Nikko in Shimotsuke, *Kubota & Okamoto* 446 (A, E, NY, UC); Bubasami, Iamichi City, pref. Tochigi, *Makino* 101880 (E); Mt Kogashiyama, Ustunomuya City, pref. Tochigi, *Makino* 102300 (E); Uramitaki trail, Nikko, prov. Shimotsuke, *Mizushima* 11355 (A); Mt Iwatake, Haruno-cho, Syuchi-gun, pref. Shizuoka, *Murata et al.* 109 (A); Mt Izugatake, Tokyo, *Muroi* 483 (A); Mt Akagi, prov. Kotsukei, 13 vi 1911, *Sakurai* s.n. (A); Mt Ryogami-san, Chichibr-gun, prov. Musashi, 18 v 1968, *Togashi* s.n. (A); on the Ashio, side of Hiashi Pass, Nikko-city, 11 v 1976, *Togashi* s.n. (A, E, NY, UC); Hashimoto Tea House, near Lake Chuzenji, Nikko region, *Wilson* 6698 (A, US); Ohdaigahara, pref. Nara, *Yamazaki et al.* 891 (TI); Idzugatake, prov. Musashi, *Yamagaki* 6048 (A). Kyushiu: Mt Ichifusa, prov. Higo, *Hitusima* 14230 (A); from Sisigawa-zigyosho to Ishizuka, Kita-kata-mura, Higashiusuki-gun, pref. Miyazaki, *Hotta* 6364 (TI); Mt Takakuma-yama, prov. Ohsumi, 17 v 1977, *Idzumi & Togashi* s.n. (TI); Tarumizu-village, prov. Osumi, iv–v 1911, *Kawagoe* s.n. (A); Mt Ichifusa, pref. Kumamoto, *Makino* 101882 (E); Mt Shiraga, pref. Kouchi, *Makino* 102297 (E); Mt Sasagamine, pref. Kouchi, *Makino* 102303 (E); Mt Takakuma, prov. Osumi, 7 iv 1923, *Masamune* s.n. (NY); Mayazaki Experimental Forest, pref. Miyazaki, *Sather & Caddell* 2209 (NCU). Shikoku: Mt Ishizuchi, 33°45′N, 133°07′E, pref. Ehime, *Doleshy & Doleshy* 49 (A); Shikoku-karst, from Tengu-rodge to Oohikiwari-pass, Yusuhara-cho, Takaoka-gun, pref. Kochi, *Fujita & Miki* 96 (TI); Kamiukena-gun, Mts Ishizuchi, pref. Ehime, *Murata* 3744 (TI).

Rhododendron albrechtii

Representative specimens. **Japan**. Hokkaido: Sapporo-city, *Kuma* [*Uno#*] 2597 (A); Moiwa-dake, prov. Ishikari, 15 vi 1885, *Miyabe* s.n. (A); Kakumi Hot Springs, 29 ix 1892, *Sargent* s.n. (A); Moiwa-dake, near Sapporo, 23 vi 1891, *Tokubuchi* s.n. (A); Sapporo, prov. Tshikari, *Tokubuchi* s.n., 10 vi 1893 (UC), 29 v 1890 (NY), vi 1890 (A); Yubaridake, *Uno* 2596 (A); Nobori-betsu, prov. Iburi, 2 vii 1914, *Wilson* s.n. (A). Honshu: Mts Hirosaki, prov. Mutsu, *Faurie* 640 (UC); Mts Mizosaki, *Faurie* 6785 (A); Mt Norikura-dake, pref. Nagano, *Furuse* 74 (A); Tenjin pass, Mt Tani-gawa, pref. Gunma, *Idzumi & Togashi* 375 (E, NY, UC); foot of Mt Shirane, Yumoto, Nikko-city, *Idzumi & Togashi* 376 (E, NY, UC); Mt Hakkai, Kita-uwonuma, Niigata, *Ikegami* 11065 (A); Akatani, Kita-kambara, Niigata, *Ikegami* 10227 (A); between Dake and Fuenuk-i waterfall, foot of Mt Hayachine, pref. Iwate, *Kanai* 6235 (TI); Mt Iwasuge, Shimotakai-gun, Nagano-ken, 24 vii 1925, *Kume* s.n. (A); prov. Kozuke, 3 vii 1926, *Masamune* s.n. (NY); Ofunato-shi, S side of Mt Goyozan, around the Shakunagesou, pref. Iwate, *Mieno* 210 (TI); Mt Tanigawa, prov.

Kozuke, *Mizushima* 101 (A); Ohshimizu-Sampei pass, prov. Kozuke, *Mizushima* 1124 (A); Sampei pass, prov. Kozuke, *Mizuskima* 1141 (A); Mt Hakkoda, prov. Mutsu, *Mizushima* 1997 (A); Mt Iwaki, prov. Mutsu, *Mizushima* 2137 (A); Mt Shirane, Nikko, prov. Shimotsuke, *Mizushima* 2181 (A); Kaida-mura, Nishichikuma-gun, prov. Shinano, *Mizushima* 2394 (A); Oshirakawa, Shirakawa-mura, pref. Gihu, *Murata et al.* 980 (E, NY, UC); near Komado-toge, Tajima-machi, Minamiaizu-gun, pref. Fukushima, *Murata et al.* 15184 (TI); Mt Kasaga-dake, Yamada pasture, Takayama-mura, Kamitakai-gun, pref. Nagano, *Murata et al.* 30363 (NCU); Mt Hayachine, pref. Iwate, *Muroi* 414 (A); Mt Yakedake, pref. Gifu, *Muroi* 3395 (A); Sugayu, pref. Aomori, *Muroi* 4438 (A); Mt Hokkado, 2 x 1892, *Sargent* s.n. (A); between Kamikochi and Mt Hodakka, North Alps National Park, pref. Nagano, *Sather & Caddell* 2693 (NCU); between Kamikochi and Mt Hodakka, North Alps National Park, pref. Nagano, *Sather & Caddell* 2724 (NCU); NE of Lake Chusenjiko on National Rd 120, Nikko National Park, pref. Tochigi, *Sather & Caddell* 4654 (NCU); Mt Hayachine, Hayachine National Park, pref. Iwate, *Sather & Caddell* 4932 (NCU); Echizen, *Shiota* 2495 (A); prov. Mino, *Shiota* 2518 (A); Mt Zaosan in Yechigo, *Togasi & Togasi* 467 (A, E, NY, UC); Mt Shirane-san, Nikko, Yumoto, 11 vi 1976, *Togashi* s.n. (TI); prov. Senano, *Tschonoski* s.n. 1864 (NY); Mt Azumo, Tamagateken, *Uno* 2612 (A); Nikko region, prov. Shimotsuke, *Wilson* 6858 (A); Hakkoda-yama, prov. Mutsu, *Wilson* 7083 (A); Adzuma-sam, prov. Uzen, *Wilson* 7208 (A), 7721 (A).

Rhododendron nipponicum

Representative specimens. **Japan.** Honshu: Mt Kasa-dake, Minakami-machi, Tone-gun, prov. Koodzuke, 12 viii 1956, *Furuse* s.n. (UC); Mt Yakeishi-dake, Wakayanagi-mura, prov. Isawa-gun, Rikuchyuu, pref. Iwate, 24 vii 1958, *Furuse* s.n. (A); Mt Tateyama, Nakaniikawa-gun, pref. Toyama, *Makino* 101830 (E); Mt Tateyama, prov. Etchu, 23 vii 1883, *Matsumura* s.n. (paratype, TI); Mt Tanigawa, prov. Kozuke, *Mizushima* 245 (A); Mt Shibutsu, prov. Kozuke, *Mizushima* 413 (A), *Mizushima* 605 (A); prov. Mino, *Shiota* 2515 (A); Shimizu-pass, Minakami-cho, Tone-gun, pref. Gunma, *Togashi* MT7043 (A, E, NY, UC); Shimizu-toge, pref. Gunma, 16 ix 1970, *Togashi* s.n. (TI); near Toge, prov. Uzen, *Wilson* 7191 (A), 7219 (A, GH); Mt Shirouma, between Yari-onsen and Sarukura, pref. Nagano, *Yamazaki* 2501 (TI).

Rhododendron vaseyi

Representative specimens. **United States. North Carolina:** Avery Co.: Grandfather Mt, near Linville, 23 v 1888, *Kelsey* s.n. (NY, US). Haywood Co.: Blue Ridge Parkway, between mile markers 419 and 420, c.7.6mi SE of jct. with US Rte 276, John Rock View, *Judd* 3138 (FLAS); Mt Pisgah, *Maxon* 6299 (GH, US); Art Loeb trail, 31 v 1978, *Jenkins* s.n. (NY). Jackson Co.: Cashier's Valley, ix 1911, *Ashe* s.n. (NCU); S of Cashiers, *Boufford et al.* 22027 (GH); Chimney Top Gap, Cashier's Valley, 14 v 1883, *Kelsey* s.n. (GH, NY, US); Jones Knob, *Ramseur* 52 (NCU); Waterrock Knob, *Ramseur* 152 (NCU). Macon Co.: Kenonah Lodge, Highlands, 11 vi 1937, *Coker* s.n. (NCU). Mitchell Co.: without definite locality, 30 vi 1893, *Ashe* s.n. (NCU). Transylvania Co.: below Beech Gap, *Bozeman et al.* 9117 (E, FLAS, GH, NCU, NY, TOR, UC); Blue Ridge Parkway, between Wagon Road Gap and Beech Gap, *Freeman* 57312 (NCU); Devil's Court House on Transylvania–Haywood Co. line, *Leonard* 1472 (NCU); US Rte 276, 1.8mi below jct with Blue Ridge Parkway at Pisgah Ridge, *Roberts & Keil* 7424 (Q); 6.3mi N of jct of Co. Rd 1321 on NC Rte 251, N of Balsam Grove, *Sponberg & Boufford* 1763 (NY). Watauga Co.: Grandfather Mt, 6 viii 1891, *Small & Heller* s.n. (E, GH, NY, TOR, UC, US).

Rhododendron canadense

Representative specimens. **Canada. New Brunswick:** Albert Co.: Nixon, *Smith et al.* 18639 (ACA). Charlotte Co.: Kent Island, *Gleason* 35 (NY); 6.5mi N of St Andrews, near Chamcook Lake, *Schueler* 363 (TRT). Gloucester Co.: Bathurst, *Blake* 5423 (GH, US). Kent Co.: Bass River, 15 viii 1874, *Fowler* s.n. (E); St Ignace, *Smith et al.* 18830 (ACA). Kings Co.: Berwick, *Smith et al.* 18769 (ACA). Northumberland Co.: Rte 8(11), c.30mi N of lower Miramichi River, *Rossbach* 4299b (ACA). Queens Co.: Watervale, Grand Lake, *Smith et al.* 15835 (ACA). St John Co.: without definite locality, *Fowler* s.n. 1877 (E). Westmorland Co.: between Wood Point and Upper Rockport, *Roberts & Bateman* 64-2436 (ACA). York Co.: Keswick Valley, *Roberts* 59-441 (QFA). **Newfoundland:** Gros Morne National Park, Bonne Bay, *Bishop* 467 (A); Guards Lake, Milltown, 4 vii 1961, *Damman* s.n. (ACA); Avalon Peninsula, Butter Pot Pond, Holyrood, *Erskine* 3012 (ACA); region of Humber Arm, Bay of Islands, Silurian hills back of Birchy Cove, Curling, *Fernald et al.* 3821 (GH, NY); eastern drainage-area of the Humber River system, Goose Pond, *Fernald & Wiegand* 3820 (GH); Laurentian area at head of Exploits River System, Millerton Junction, *Fernald et al.* 6013 (GH); Avalon Peninsula, shores of Conception Bay, Avalon Peninsula, Carbonear, *Fernald & Wiegand* 6014 (GH); Exploits River Valley, W of Rushy Pond, *Fernald & Wiegand* 6015 (A, GH); N shores of Notre Dame Bay, Tilt Cove, *Fernald et al.* 6016 (GH); Avalon Peninsula, Quidi Vidi Trail, Pippy Park, St John's, *Fife* 16 (ACA); Gander Air Base, Gander, *Fosberg* 29925 (NY); St John's Bay, near Yellow Marsh, near Bard Harbor, *Gilbert & Hotchkiss* 28824 (A, GH); White Bay North Dist., Cat Arm River, 25km NNW of Jackson's Arm (town) and 24km WSW of the mouth of Great Cat Arm Bay, 50°04′N, 56°57′W, *Gray & Graham* 2838 (TRT); Avalon Peninsula, near Queen Pond, St John's, *Lear* 11990 (ACA); Foggo Dist., Fredericton, *Ludlow* 163 (ACA); near Balena, Hermitage Bay, *Palmer* 1348 (A, GH, NY); Ferryland Dist., Witless Bay Line, c.0.1mi W of Rte 5, *Rouleau* 5369 (US); Placenta West Dist., Winterland, *Rouleau* 6597 (US); White Bay South Dist., Flatwater Pond, near highway to Baie Verte, 49°48′N, 56°19′W, *Shchepanek & White* 2792 (ACA); Avalon Peninsula, Trinity Bay, Old Perlican, *Torrey* 24 (GH). **Nova Scotia:** Annapolis Co.: Karsdale, 22 vii 1962, *Johnson* s.n. (ACA). Antigonish Co.: Linwood, *Smith et al.* 10747 (ACA, TRT). Cape Breton Co.: Scatari Island, *Smith et al.* 8395 (TRT); Sydney, 18 viii 1902, *Fernald* s.n. (GH). Colchester Co.: near Stewiacke, *Dore & Roland* 45-39 (ACA, E). Cumberland Co.: Amherst, *Read* 12306 (ACA). Digby Co.: Weymouth Falls, *Smith et al.* 15515 (ACA). Guysborough Co.: 5mi S of Lincolnville, *Smith et al.* 7438 (TRT). Halifax Co.: West Quoddy, *Smith et al.* 9563 (ACA, TRT); Bear Cove, near Herring Cove, *Smith et al.* 9901 (ACA, TRT). Hants Co.: Cambridge, *Smith et al.* 9077 (ACA). Inverness Co.: North Mountain, *Smith et al.* 11273 (ACA). Kings Co.: Cambridge Sta., *Webster* 39 (TRT). Lunenburg Co.: East River Point, *Smith et al.* 15167 (ACA). Pictou Co.: Westville, *Sampson* 9 (ACA). Queens Co.: Central Port Mouton, *Fernald et al.* 22148 (GH). Richmond Co.: Poulamon, *Smith et al.* 15144 (ACA). Shelburne Co.: Courtney Lake, *Smith et al.* 12253 (ACA). Victoria Co.: Gray Glen Brook, *Smith et al.* 4424 (ACA). Yarmouth Co.: Wellington, *Smith et al.* 15551 (ACA). **Prince Edward Island:** Kings Co.: St Peter's Bay, *Fernald & St John* 11147 (A, GH, US); Connaught, N of Souris, *Smith* 96 (ACA). Prince Co.: Bloomfield, *Fernald et al.* 4897 (A, GH, UC). **Quebec:** Arthabaska: Pacage SS., *Allyre* 1279 (QFA). Cté Bellechasse Co.: St-Joseph, 24 ix 1970, *Goulet* s.n. (QFA). Berthier: Lanoraie, *Roy* 4354 (ACA, E, NY, TRT). Bonaventure Co.: 0.3mi E of St Godefroi, *Massey* 4476 (NCU). Brome Co.: Bolton, 27 v 1923, *Knowlton* s.n. (GH). Cté Chambly: St-Bruno, *Boivin* 994 (NY, UC). Compton Co.: Newport, 9 x 1955, *Louis-Marie* s.n. (QFA). Cté Dorchester: Ste-Justine, vallée du St-Jean, *Lorenzo* 35762 (NY). Drummondville, 45°54′N, 72°29′30″W, 17 v 1977, *Dubé* s.n. (QFA). Cté Gaspe: Chandler,

Marie-Victorin et al. 44868 (GH, TRT, UC). Gaspé-sud Co.: Barachois-nord, 49°38′N, 64°17′E, *Grandtner et al.* 8159 (QFA). Iles de la Madeleine: Portage du Cap, 30 vi 1974, *Chevrier* s.n. (QFA). Kamouraska Co.: Rivière-Ouelle, *Hamel* 108 (QFA). Lac St-Francois, 45°55′50′N, 71°08′30″W, 22 v 1977, *Dubé* s.n. (QFA). Lévis Co.: St-Jean-Chrysostôme, Rang St-Louis, *Cayouette & Dubois* 73-81 (ACA, QFA, TRT, UC). Long Point, Mingan, 50°18′N, 64°01′W, *Gillett* 4994 (ACA, GH, NY, US). Lotbinière Co.: Parisville, 12 vi 1947, *Beauchesne* s.n. (QFA). Mégamtic Co.: Vimy Ridge, Mont Caribou, Canton Ireland, *Blais et al.* 10043 (ACA, QFA, TRT, UC). Missisquoi Co.: Farnham, *Marie-Victorin et al.* 6331 (ACA). Cté Nicolet: Lemieux, *Cinq-Mars & Brault* 64-169 (ACA, GH, QFA, TRT, UC). Québec Co.: Les Saules, *Cayouette & Gervais* 10354 (TRT). Rimouski Co.: St-Simon, *Lepage* 17138 (QFA). Riviere du Loup Co.: near Riviere du Loup, *Soper & Fraser* 3669 (TRT). Riviere Mingan, Cte-Nord, *Desroches* 429 (QFA). Romaine, *Marie-Victorin & Rolland-Germain* 20975 (GH). Rouville Co.: Rougemont, 2 vi 1959, *Gervais & Lavigne* s.n. (QFA). Cté Saguenay: Mutton Bay, *Fernald & Long* 28825 (GH). Sherbrooke Co.: Lac Bowker, Canton Oxford, *Legault* 2059 (ACA, QFA, TRT). St-Hyacinthe: St-Damase, 15 vii 1955, *Martin* s.n. (QFA). Temiscouata, Notre-Dame-du-Lac–St-Eusèbe, 47°36′N, 68°49′W, *Lavoie* 712 (QFA). Cté Terrebonne: New-Glasgow, *Lamarre* 54-3 (ACA). Verchères Co.: St-Amable, *Marie-Victorin & Rolland-Germain* 24 (ACA, QFA, TRT). Cté Wolfe: Lac Aylmer, Canton de Garthby, *Brisson & Hamel* 12893 (ACA, TRT). **United States. Connecticut:** Hartford Co.: South Windsor, *Weatherby* D2102 (NEBC). Middlesex Co.: Cromwell, *Harger* 6915 (NEBC). New Haven Co.: Waterbury, *Blewitt* 4506 (NEBC). Tolland Co.: Willington, *Bissell & Weatherby* 1783 (NEBC). Windham Co.: Thompson, *Weatherby* 4609 (NEBC). **Maine:** Androscoggin Co.: Lewiston, *Hill* 751 (NY). Aroostook Co.: Ashland, *Chamberlain* 218 (UC). Cumberland Co.: Raymond, *Rehder* 1062 (A). Franklin Co.: Kingfield, 9 vii 1919, *Bean* s.n. (NEBC). Hancock Co.: Brooksville, *Maxon* 6974 (NEBC); Naskeag Point, Brooklin, *Hill* 1410 (NEBC). Kennebec Co.: Sydney, 19 viii 1931, *Bean* s.n. (NEBC). Knox Co.: Glencove, *Friesner* 7722 (DUKE). Lincoln Co.: Havener Pond, SE Waldoboro, *Rossbach* 2009 (ACA). Oxford Co.: Greenwood, 20 viii 1952, *Pease* s.n. (NEBC). Penobscot Co.: Bangor, 27 v, 9 x 1905, *Knight* s.n. (E); Milford, *Fernald & Long* 14301 (NEBC). Piscataquis Co.: Mt Katahdin, *Walker* 1927 (NY). Sagadahoc Co.: Five Islands, *Rehder* 1019 (A). Somerset Co.: Squaretown, *Fassett* 3934 (DUKE, WIS). Waldo Co.: Lincolnville, *Rossbach* 1221 (NEBC). Washington Co.: Cherryfield, *Blake* 3914 (NEBC). York Co.: 2.5mi S of Sanford, *True* 185 (A, UC). **Massachusetts:** Barnstable Co.: East Falmouth, *Fernald & Svenson* 1005 (GH, NEBC, UC). Bristol Co.: Raynham, *Seymour* 19180 (NY). Essex Co.: Marblehead, 23 v 1893, *Gilbert* s.n. (GH); without definite locality, *Oakes* s.n (GH, NY, UC, WIS). Hampden Co.: Springfield, Bradley's Swamp, *Clark & Seymour* 691 (DUKE, GH, NY). Hampshire Co.: Pelham, *Goodale & Seymour* 2855 (DUKE). Middlesex Co.: Stoneham, *Cheever* 3472 (NEBC); Westford, *Smith et al.* 1082 (DUKE, E, GH, NCU, NY, QFA, TRT, UC). Norfolk Co.: Ponkapoag, Canton, 19 v 1899, *Kennedy* s.n. (GH); Dover, 20 v 1885, *Seymour* s.n. (DUKE). Suffolk Co.: Boston, 1830, *Boot* s.n. (E, US). Worcester Co.: Lancaster, *Seymour* 5810 (DUKE). **New Jersey:** Sussex Co.: S of Long Pond, 29 v 1929, *Mackenzie* s.n. (NY). Middlesex Co.: Newmarket, 14 v 1933, *Chrysler* s.n. (NY). Morris Co.: N of Ironia, *Pretz* 2445 (NY). **New Hampshire:** Belknap Co.: Gilmanton, 22 v 1937, *Weatherby & Smith* s.n. (NEBC). Carroll Co.: Cherry Mt, v 1932, *Reed* s.n. (DUKE); Intervale, Bartlett Mt, 6 viii 1921, *Rehder* s.n. (A). Cheshire Co.: Richmond, 18 v 1918, *Batchelder* s.n. (NEBC); Woodmere, 12 viii 1912, *Seymour* s.n. (DUKE). Coos Co.: summit of Mt Washington, 16 viii 1895, *Harper* s.n. (A); Jefferson, *Pease* 17507 (NEBC). Grafton Co.: Newfound Lake, Wellington Beach, *Correll & Schweinfurth* 11332 (DUKE). Hillsboro Co.: Greenfield, *Hodgdon & Steele* 4676 (NEBC). Merrimack Co.:

Wilmot, Mt Kearsarge, *Hodgdon & Steele* 9959 (NEBC). Rockingham Co.: near Rockingham Park, Salem Depot, *Hodgdon* 17835 (NEBC). Strafford Co.: Barrington, *Hodgdon* 3555 (NEBC). **New York:** Herdimer Co.: Wilmurt, 20 vii 1901, *House* s.n. (NY). Ulster Co.: near Mud Pond, Shawangunk Mts., *Moldenke* 11134 (NY). **Pennsylvania:** Carbon Co.: Wernett's Corners, near Albrightsville, *Loughridge* 3290 (GH). Monroe Co.: Pocono Mt, 20 viii 1887, *Britton* s.n. (NY); Stillwater Lake, 14 v 1938, *Freeman* s.n. (UC); Youngs Pond, *Pennell* 13224 (NY). Wayne Co.: W shore of Lehigh Pond, 2mi NE of Gouldsboro, *Adams* 3739 (A, GH). **Rhode Island:** Providence Co.: Burrilville, 9 v 1903, *Collins* s.n. (NEBC, NY). **Vermont:** Caledonia Co.: Owl's Head, Peacham, *Seymour* 18792 (NEBC). Chittenden Co.: Colchester Bog, W of Rte 127, Colchester, *Hill* 10214 (GH, NY). Essex Co.: Brunswick, *Eggleston* 1443 (GH). Franklin Co.: Berkshire, 15 vii 1916, *Knowlton* s.n. (NEBC). Lamoille Co.: Belvidere, 5 viii 1923, *Knowlton* s.n. (NEBC). Orange Co.: Bradford, xi 1905, *Bacon* s.n. (GH). Windham Co.: Grafton, 20 v 1910, *Wheeler* s.n. (NEBC).

Specimen identifications

This list includes the identifications of all herbarium specimens studied during the preparation of this revision.

Abbe, E. C. 1182 canadense; 1197 canadense
Adams, J. W. 3739 canadense
Adrien, F. 1613 canadense
Ahles, H. E. 76382 canadense
Allyre, Fr. 1279 canadense; 1721 canadense
Ames, C. B. 1046 canadense
Andrews, L. s.n., 14 v 1898 canadense
Arsène, L. 378 canadense
Ashe, W. W. s.n., 30 vi 1893 vaseyi; s.n., 18 viii 1895 vaseyi; s.n., ix 1911 vaseyi; s.n., 20 x 1912 vaseyi; s.n., 13 v 1923 vaseyi; s.n. vaseyi
Asselin, A. 72-115 canadense
Ayotte, G. 195 canadense

Bacigalupi, R. 1955 canadense
Bacon, A. E. s.n., xi 1905 canadense
Baenitz, C. 18 v and 20 viii 1909 canadense
Balfour, B. s.n., 1909 quinquefolium
Barabé, R. & N. Chabot s.n., 11 vi 1940 canadense
Bartlett, H. H. 3031 vaseyi
Bartow s.n., 28 v 1885 canadense
Bartram, E. B. s.n., 21 viii 1908 canadense
Batchelder, C. F. s.n., 10 v 1913 canadense; s.n., 3 vii 1913 canadense; s.n., 28 v 1914 canadense; s.n., 4 vi 1917 canadense; s.n., 18 v 1918 canadense; s.n., 15 v 1921 canadense; s.n., 29 v 1922 canadense; s.n., 6 ix 1931 canadense
Batchelder, S. C. 243 canadense
Beadle, C. D. AzG-2108 vaseyi; AzG-2963 vaseyi
Bean, R. C. s.n., 25 v 1905 canadense; s.n., 16 vii 1911 canadense; s.n., 11 vii 1912 canadense; s.n., 7 viii 1914 canadense; s.n., 18 viii 1914 canadense; s.n., 7 vii 1915 canadense; s.n., 12 viii 1915 canadense; s.n., 9 vii 1919 canadense; s.n., 19 viii 1931 canadense; s.n., 20 v 1933 canadense; s.n., 15 viii 1933 canadense; s.n., 21 viii 1933 canadense; s.n., 28 vi 1934 canadense; s.n., 21 vi 1960 canadense
Bean, W. J. s.n., 1921 vaseyi

Beauchesne, A. s.n., 12 vi 1947 canadense
Beers, A. s.n., 23 vi 1947 canadense
Beers, A. & D. Beers s.n., 13 vi 1948 canadense
Beil, C. E. et al. s.n., 18 viii 1970 canadense
Belzile, A. & C. Gervais s.n., 25 viii 1958 canadense
Benoit, G. s.n., 25 ii 1935 canadense
Bentley, P. A. 23 canadense
Bernard, J.-P. B77-581 canadense; B77-833 canadense
Bigelow s.n. canadense
Biltmore Herb. 1376 vaseyi; 1376b vaseyi
Birrell, W. et al. s.n., 23 v 1936 canadense
Bishop, H. 467 canadense
Bishop, H. & L. B. Smith 1057 canadense
Bishop, J. N. s.n., 189? canadense
Bissell, C. G. 394 canadense
Bissell, C. H. 44 canadense; s.n., 14 v and 22 vi 1897 canadense; s.n., 13 vii 1913 canadense;
Bissell, C. H. & B. Long 22147 canadense
Bisset, J. 253 quinquefolium; 1122 quinquefolium; 3916 quinquefolium; 4300 quinquefolium
Blais, V. et al. 10043 canadense; s.n., 2 vi 1969 canadense
Blake s.n., 1849 canadense
Blake, J. s.n. canadense; s.n., v [no year] canadense
Blake, S. F. 2486 canadense; 3914 canadense; 5423 canadense; s.n., 31 v 1909 canadense
Blanchett, P. Y. 24 canadense
Blewitt, A. E. 886 canadense; 890 canadense; 4506 canadense
Blouin, J. L. et al. 7436 canadense
BM (NH) staff 778 pentaphyllum
Boehmer, L. s.n.. 1885 [Bisset, J. 3801] quinquefolium
Boivin, B. 994 canadense
Boot, F. s.n., 1816 canadense; Boot, s.n., 1830 canadense
Boufford, D. E. 8018 canadense
Boufford, D. E. et al. 22027 vaseyi
Bowman, P. W. 53 canadense; 235 canadense
Bozeman, J. R. et al. 9117 vaseyi
Brandegee, T. S. s.n., v 1876 canadense
Braun, E. L. s.n., 29 vii 1956 canadense
Briggs 1941 canadense; 5578 canadense
Brisson, S. & A. Demers 74-071 canadense
Brisson, S. & C. Hamel 11152 canadense; 12893 canadense
Brisson, S. et al. 11784 canadense
Britton, D. M. 2121 canadense
Britton, N. L. s.n., 24 viii 1883 canadense; s.n., 20 viii 1887 canadense; s.n., 7–10 vi 1889 canadense; s.n., 4–7 vii 1907 canadense
Brodeur, D. 43 canadense; 250 canadense
Brooks, A. A. s.n., 3 vi 1900 canadense
Brooks, B. W. s.n., 22 vi 1937 canadense
Brooks, S. C. s.n., 30 iv 1910 canadense; s.n., 30 v 1910 canadense
Brooks, W. P. 737 canadense
Brown, H. L. s.n., v 1883 canadense
Brown, W. V. s.n., 29 vi 1939 canadense
Bruce, J. M. s.n., 25 v 1949 canadense

Brumbach, W. C. 7919 schlippenbachii
Brydon, P. H. s.n., 26 iii 1936 pentaphyllum
Buck, H. H. s.n., 31 viii 1896 canadense
Bunker, F. S. s.n., 1873–1878 canadense
Burgess, E. S. s.n., 1889 canadense; s.n., 1891 canadense
Burgess, T. J. W. s.n., 11 vi 1883 canadense; s.n., 25 vii and 11 vi 1883 canadense
Buser, F. B. 11554 canadense; 11653 canadense
Butler s.n. canadense
Byhouwer, J. T. P. & C. E. Kobuski 8 canadense; 225 canadense

Cain, S. A. s.n., 24 vii 1930 vaseyi
Campbell, R. s.n., vi [no year] canadense
Canby, W. M. et al. 137 vaseyi
Cauboue, M. 704 canadense
Cayouette, J. 74-414 canadense
Cayouette, R. & J. Cayouette 54-81 canadense
Cayouette, J. & J.-D. Dubois 73-81 canadense
Cayouette, R. & C. Gervais 10354 canadense
Chamberlain, E. B. 335 canadense; s.n., 6 vii 1900 canadense
Chamberlain, G. D. 218 canadense; 1717 canadense
Chamberlain, G. D. & R. E. Delano 772 canadense
Chapin, E. 376 schlippenbachii
Cheever, C. A. 3472 canadense
Cheever, C. A. & A. W. Cheever s.n., 14 v 1910 canadense
Chevrier, H. s.n., 30 vi 1974 canadense
Chickering, J. W. s.n., 1859 canadense; s.n., 8 viii 1878 canadense
Child, C. M. s.n., 25 v 1888 canadense
Chrysler, M. A. 5978 canadense; s.n., 14 v 1933 canadense
Chung, I-C. 2055 schlippenbachii
Churchill, J. R. s.n., 20 v 1921 canadense
Churchill, J. R. & C. A. Weatherby s.n., 30 v 1914 canadense
Churchill, J. R. & R. W. Woodward s.n., 20 v 1916 canadense
Cinq-Mars, L. 442 canadense
Cinq-Mars, L. & G. Brault 64-169 canadense
Cinq-Mars, L. & M. Raymond s.n., 17 vi 1951 canadense
Cinq-Mars, L. et al. 63-106 canadense
Clark, R. A. & F. C. Seymour 691 canadense
Clausen, K. et al. 79-126 schlippenbachii
Clute, W. N. s.n., 1895 canadense
Coker, W. C. s.n., 17 viii 1910 vaseyi; s.n., 19 iv 1936 vaseyi; s.n., 27 viii 1932 vaseyi
Cole, E. N. s.n., 4 vi 1861 canadense
Coleman, A. P. s.n., 23 vii 1915 canadense
Coleman, S. D. s.n., 20 xii 1945 vaseyi
Collins, F. S. s.n., 13 v 1886 canadense
Collins, J. F. s.n., 18 v 1895 canadense; s.n., 9 v 1903 canadense
Collins, J. F. & R. F. Collins s.n., 9 v 1903 canadense
Congdon, J. W. s.n., 1873 canadense; s.n., 9 v 1878 canadense
Coolidge, T. s.n., v 1883 canadense
Correll, D. S. & C. Schweinfurth 11332 canadense
Coville, F. V. s.n., 4 viii 1909 vaseyi
Cowgill, W. H. 1843 canadense

Curtis, C. C. s.n., 19 viii 1902 canadense; s.n., 28 viii 1904 canadense
Cuthbert, A. s.n., 12 ix 1908 vaseyi

Damman, A. W. H. s.n., 4 vii 1961 canadense
Darlington, W. W375 canadense
Davenport, G. E. s.n., 1874 canadense
Davis, S. et al. 80-192 schlippenbachii; 80-259 schlippenbachii; 80-291 schlippenbachii
Deane, W. s.n., 17 viii 1895 canadense; s.n., 7 vii 1896 canadense
Delevoryas, T. s.n., 23 v 1948 canadense
Demone, G. 23584A canadense
Denton, D. & J. O'Brien 13261 canadense
Desmarais, Y. 736 canadense; 1427 canadense; 1886 canadense
Desroches, P. 429 canadense; 445 canadense
Doleshy, F. L. & C. D. Doleshy 49 pentaphyllum; 834 pentaphyllum
Donly, J. F. 583 canadense; 1126 canadense
Dore, W. G. & A. E. Roland 45.39 canadense
Dorsett, P. H. & W. J. Morse 418 albrechtii
Downs, A. s.n., vii 1888 canadense
Driggs, A. W. s.n., 13 v 1899 canadense; vii–viii 1911 canadense
Drouin, L. 73-26 canadense
Dubé, M. s.n., 17 v 1977 canadense
Dubois, A. s.n., 30 v 1930 canadense; s.n., 16 v 1936 canadense
Dudley T. R. s.n., 5 xi 1963 schlippenbachii; s.n., 23 viii 1963 vaseyi; s.n., 25 viii 1965 schlippenbachii
Dunbar, J. s.n., 18 xii 1920 vaseyi; s.n., 18 xii 1920 canadense

E.J.P. s.n., 11 v 1936 vaseyi; s.n., 18 v 1936 vaseyi; s.n., 10 v 1937 schlippenbachii; s.n., 19 v 1938 vaseyi; s.n., 31 v 1939 canadense; s.n., 5 v 1936 canadense
Eames, A. J. s.n., 28 vi 1914 canadense
Eaton, R. J. 5340 canadense; 5777 canadense
Edmondson, T. W. 817 canadense; 6610 canadense
Eggers-Ware, D. M. & J. White 3000 vaseyi
Eggleston, W. W. 1443 canadense; s.n., 11 v 1889 canadense; s.n., 30 ix 1893 canadense; s.n., ix 1893 canadense; s.n., 2–12 viii 1899 canadense; s.n., 26 v 1896 canadense
Emer, S. J. 176 canadense; 193 canadense
Emerton J. H. & C. H. Knowlton s.n., 30 v 1914 canadense
Erskine, D. 3012 canadense
Erskine, D. & W. G. Dore 1078 canadense
Erskine, J. S. 51.1067 canadense; 54.1128 canadense

Fabius, Fr. 177 canadense
Fairbanks, A. 5757 canadense
Fassett, N. C. 862 canadense; 873 canadense; 3934 canadense
Faurie, U. 640 albrechtii; 665 schlippenbachii; 668 schlippenbachii; 6785 albrechtii
Faxon, C. E. s.n., v 1873 canadense; s.n., 18 vii 1888 canadense
Ferguson, W. C. s.n., 25 viii 1926 canadense
Fernald, G. B. 8 canadense; 29 canadense
Fernald, M. L. 15339 canadense; 2046 canadense; 2047 canadense; s.n., 19 ix 1892 canadense; s.n., 1 viii 1894 canadense; s.n., 13 vii 1900 canadense; s.n., 16 viii 1900 canadense; s.n., 18 viii 1902 canadense
Fernald, M. L. & E. B. Bartram 24280 canadense
Fernald, M. L. & F. W. Hunnewell s.n., 16 v 1913 canadense

Fernald, M. L. & H. B. Jackson 12134 canadense
Fernald, M. L. & B. Long 14300 canadense; 18825 canadense; 22149 canadense; 22150 canadense
Fernald, M. L. & F. J. Smiley 11837 canadense
Fernald, M. L. & H. St John 7897 canadense; 11147 canadense
Fernald, M. L. & H. K. Svenson 1005 canadense
Fernald, M. L. & K. M. Wiegand 3820 canadense; 3821 canadense; 6613 canadense
Fernald, M. L. et al. 355 canadense; 6012 canadense; 6013 canadense; 6014 canadense; 6015 canadense; 6016 canadense; 7897 canadense; 14302 canadense; 22148 canadense; 26917 canadense
Fife, A. J. 16 canadense
Filteau, P. s.n., 22 vi 1934 canadense
Flint, W. F. s.n., 21 v 1881 canadense
Floyd, F. C. 634 canadense; 772 canadense; 985 canadense
Fogg, J. M., Jr s.n., 20 iv 1968 schlippenbachii; s.n., 27 iv 1970 pentaphyllum; s.n., 21 iv 1972 pentaphyllum
Forbes, F. F. s.n., 9 vi 1907 canadense; s.n., 30 v 1912 canadense; s.n., 26 vi 1912 canadense
Forbes, F. F. & E. J. Winslow s.n., 30 v 1914 canadense
Forbes, W. D. 460 canadense
Forest, F. 16051 canadense; 16105 canadense
Fosberg, F. R. 29925 canadense
Fowler, J. s.n., 1865 canadense; s.n., 4 vi 1867 canadense; s.n., 15 viii 1874 canadense; s.n., 30 v 1877 canadense; s.n., 1877 canadense; s.n., 15 vi 1897 canadense; s.n., 9 vi 1900 canadense; s.n., 7 viii 1900 canadense; s.n., 6 vii 1901 canadense; s.n., 18 vii 1901 canadense
Freeman, O. M. 57312 vaseyi; s.n., 14 v 1938 canadense
Fretz, C. D. s.n., 1867 canadense
Friesner, R. C. 6272 canadense; 7722 canadense; 10171 canadense
Fujita, N. & E. Miki 96 pentaphyllum
Furbish, K. s.n., 1880 canadense; s.n., 1893 canadense; s.n., 6 vi 1902 canadense; s.n., 11 viii 1909 canadense; s.n., viii 1910 canadense; s.n., 1 viii 1913 canadense
Furuse, M. 18657 quinquefolium; 2768 quinquefolium; 2804 quinquefolium; 2816 quinquefolium; s.n., 1 vi 1954 quinquefolium; s.n., 14 v 1957 pentaphyllum; s.n., 12 viii 1956 nipponicum; s.n., 24 vii 1958 nipponicum
Furuya, M. 74 albrechtii

Gagnon, A. 1015 canadense; 2929 canadense; 3409 canadense; 8085 canadense; s.n., 21 v 1959 canadense
Galis, B. N. 27136 canadense
Gates 20199 canadense; 26250 canadense
Gauthier, R. 65-48 canadense; 65-79 canadense; 65-95 canadense; 65-299 canadense
Gauthier, R. et al. s.n., 16 ix 1973 canadense
Gervais, C. & P. Lavigne s.n., 2 vi 1959 canadense
Gibson, A. C. & R. S. Hebb 655 vaseyi
Gilbert, F. A. & N. Hotchkiss 28824 canadense
Gilbert, G. s.n., 23 v 1893 canadense
Gillett, J. M. 4994 canadense
Gillis, W. T. 14581 canadense
Gleason, H. A. 35 canadense
Goodale, A. S. 50927a canadense; 55455 canadense
Goodale, A. S. & F. C. Seymour 2855 canadense

Goode, G. B. s.n., 1872 canadense
Gorovoi, P. 5036 schlippenbachii
Goulet, L. s.n., 24 ix 1970 canadense
Grandtner, M. et al. 8159 canadense
Gray, A. s.n., 1846 canadense
Gray, S. L. & J. E. Haynes-Graham 2838 canadense
Green, T. s.n., 30 v 1865 canadense
Greenleaf et al. s.n., 6 vi 1888 canadense
Greenman, J. M. 3479 canadense
Griffin, D. & K. Griffin s.n., 22 vii 1972 canadense
Griggs, A. s.n., 1903 canadense; s.n., 27 viii 1908 canadense
Griscom, L. 9468 canadense
Grout, A. J. s.n., 13 v 1895 canadense

H.L.B. 4465 vaseyi
Hainal, J. 3484 canadense
Hainault et al. 3484 canadense
Haley, C. L. 12756 canadense
Hamel, A. 108 canadense
Hamel, C. 12392 canadense; 14057 canadense
Hamel, C. & S. Brisson 14122 canadense; 14168 canadense; 14402 canadense; 15336 canadense; 18076 canadense
Harbison, T. G. s.n., 13 vii 1901 vaseyi
Harger, E. B. 6915 canadense; s.n., 21 v and 9 ix 1900 canadense
Harper, E. T. s.n., 1882 canadense
Harper, E. T. & S. A. Harper s.n., 16 viii 1895 canadense
Harris, S. K. 443 canadense; s.n., 10 v 1876 canadense; s.n., 21 vi 1893 canadense; s.n., 10 v 1896 canadense
Harris, S. K. & A. R. Hodgdon 17835 canadense
Harris, S. K. et al. s.n., 23 v 1936 canadense; s.n., 24 v 1936 canadense
Harshberger, J. W. s.n., vii–viii 1904 canadense
Hartmann, E. G. 206 canadense
Hatusima, S. 14230 pentaphyllum; 14353 pentaphyllum
Hay, G. U. 171 canadense; s.n., viii 1877 canadense
Heller, A. A. s.n., 11 viii 1890 vaseyi
Hende, R. V. D. 36-69 vaseyi
Hervey, E. W. s.n., 25 v 1894 canadense
Hill, A. F. 786 canadense; 932 canadense; 1216 canadense; 1410 canadense; s.n., 25 viii 1912 canadense
Hill, S. R. 715 canadense; 10214 canadense; 17309 canadense
Hiroe, M. 12943 quinquefolium; 12944 quinquefolium; 12952 pentaphyllum; 13073 quinquefolium; 13076 pentaphyllum
Hoar, E. S. s.n., 24 v 1858 canadense; s.n., 1885 canadense
Hodgdon, A. R. 3555 canadense; 6298 canadense
Hodgdon, A. R. & H. A. Giddings 4813 canadense
Hodgdon, A. R. & J. Naghski 2302 canadense
Hodgdon, A. R. & F. Steele 4676 canadense; 9959 canadense
Hodgdon, A. R. et al. 3554 canadense
Holmes s.n. canadense
Hope, T. s.n., 6 ix 1909 canadense; s.n., 14 ix 1909 canadense; s.n., 31 v 1919 canadense
Horner, C. N. S. s.n. canadense

Hotta, M. 6364 pentaphyllum
Hotta, M. et al. 1045 quinquefolium
House, H. D. 4120 vaseyi; 4144 vaseyi; 5144 vaseyi; s.n., 29 vii 1901 canadense
Howe, C. D. & W. F. Lang 340 canadense; 429 canadense; 430 canadense; 431 canadense; 831 canadense; 1585 canadense
Hubbard, F. T. s.n., 24 v 1902 canadense; s.n., 3 vii 1914 canadense
Huger, A. M. s.n., 2 vii 1897 vaseyi
Hume, H. H. s.n., 16 iv 1949 vaseyi
Hunnewell, F. W. 6016 canadense; 9152 canadense; 15388 canadense; 16217 canadense; 17537 canadense; 17977 canadense; 18560 canadense; s.n., vi 1897 canadense

Idzumi, H. & T. Togashi 375 albrechtii; 376 albrechtii; 387 quinquefolium (A) or quinquefolium & pentaphyllum (E); s.n., 20 ix 1976 quinquefolium; s.n., 17 v 1977 pentaphyllum
Ikegami, Y. 10227 albrechtii; 11065 albrechtii
Imbeault, M. 71-006 schlippenbachii; 71-007 vaseyi

Jack, J. G. 608 canadense; 608 canadense; 653 canadense; 3173 canadense; 3346 canadense; 3346a canadense; 3752 canadense; 3755 canadense; 7258 schlippenbachii; s.n., 27 viii 1895 canadense; s.n., 28 viii 1895 canadense; s.n., 11 viii 1905 quinquefolium; s.n., 22 viii 1905 albrechtii; s.n., 25 x 1905 quinquefolium; s.n., 11 ix 1905 schlippenbachii; s.n., 24 ix 1905 schlippenbachii; s.n., 2 vi 1914 canadense; s.n., 28 x 1917 canadense; s.n., 25 v 1923 schlippenbachii
Jenkins, A. s.n., 31 v 1978 vaseyi
Jenks, C. W. s.n., 25 v & 26 iv 1894 canadense
Jenney, C. F. et al. 3261 canadense; s.n., 1 vii 1919 canadense
Jesup, H. G. 15 v & viii 1889 canadense
Johnson, J. W. s.n., 22 vii 1962 canadense; s.n., 29 v 1962 canadense
Jones, L. R. s.n., 22 v 1897 canadense; s.n., 22 v 1899 canadense
Jotcham, J. R. et al. 80-41 canadense; 80-92 canadense
Judd, W. S. 795 canadense; 3138 vaseyi

Kache, P. s.n., 1910–1912 pentaphyllum; s.n., 1910–1912 schlippenbachii; s.n., 1910–1912 canadense; s.n., 1910–1912 vaseyi; s.n., x 1911 canadense
Kanai, H. 6150 quinquefolium; 6235 albrechtii; 6886 pentaphyllum
Katsumata, K. 15657 quinquefolium
Keeping, F. & R. MacFarland 13226 canadense
Kelsey, S. T. 37 schlippenbachii; s.n., 14 v 1883 vaseyi; s.n., 1886 vaseyi; s.n., 22 iv 1888 vaseyi; s.n., 23 v 1888 vaseyi; s.n., 24 iv 1888 vaseyi
Kennedy, G. G. 3472 canadense; s.n., 16 ix 1887 canadense; s.n., 14 ix 1893 canadense; s.n., 17 v 1896 canadense; s.n., 21 vii 1898 canadense; s.n., 24 ix 1900 canadense; s.n., 26 v 1901 canadense; s.n., 7 vii 1902, s.n., 5 vii 1902 canadense; s.n., 20 ix 1910 canadense
Kidder, N. T. s.n., 29 v 1885 canadense; s.n., 19 v 1921 vaseyi; s.n., 4 v 1925 schlippenbachii
Killam, C. 16489 canadense
Kimura, F. s.n., 16 v 1954 albrechtii
Klawe, W. K. 881 canadense
Knight, E. G. s.n., 12 vii 1879 canadense
Knight, O. W. s.n., 27 v & 9 x 1905 canadense
Knowlton, C. H. s.n., 3 vi 1893 canadense; s.n., 28 viii 1894 canadense; s.n., 18 vii 1913 canadense; s.n., 23 vii 1915 canadense; s.n., 15 vii 1916 canadense; s.n., 4 viii 1916 canadense; s.n., 15 viii 1917 canadense; s.n., 27 v 1923 canadense; s.n., 5 viii 1923

canadense; s.n., 13 viii 1924 canadense; s.n., 22 viii 1924 canadense; s.n., 30 vii 1925 canadense; s.n., 5 viii 1940 canadense; s.n., 5 viii 1941 canadense; s.n., 13 viii 1941 canadense
Koelz, W. 2 canadense
Kubota, H. 522 quinquefolium; s.n., v 1952 quinquefolium
Kubota, H. & K. Okamoto 446 pentaphyllum
Kume, M. s.n., 24 vii 1925 albrechtii; s.n., 30 viii 1937 (2597) albrechtii

Lamarre, G. 54-3 canadense; 839 canadense; s.n., 18 v 1953 canadense; s.n., 30 v 1954 canadense
Lambert, M. s.n., viii 1932 canadense
Lane s.n., 1843 canadense
Lane, W. C. s.n., 27 v 1877 canadense
Larsen s.n., 1952 canadense
Lavoie, G. 712 canadense
Lawton s.n., 1909 canadense
Lear, E. 11990 canadense
Lechevalier, G. s.n., 24 v 1945 canadense
Lechevalier, H. 14 canadense
Lefor, M. W. GH528 vaseyi
Legault, A. 2059 canadense
Leland, G. H. s.n., 16 v 1880 canadense
Lemieux, G. 9824 canadense; 10961 canadense
Leonard 1472 vaseyi
Lepage, E. 16686 canadense; 17138 canadense
Lincoln, A. s.n., 16 v 1934 canadense
Litch s.n., 1938 canadense
Livingston s.n., vi 1899 vaseyi
Lokubuchi, E. s.n., 29 v 1890 albrechtii
Longley, A. E. s.n., 1 vi 1919 canadense
Lorenzo, Fr. 35762 canadense
Loughridge, G. A. 3290 canadense
Louis-Marie, P. 6 canadense; s.n., 5 vi 1925 canadense; s.n., 2 vi 1931 canadense; s.n., 22 v 1934 canadense; s.n., 9 viii 1955 canadense; s.n., 28 vii 1958 canadense
Loveland, M. A. s.n., 12 v 1880 canadense
Lowry, J. s.n., 28 vii 1977 canadense
Ludlow, N. O. 130 canadense; 163 canadense

Macfarlane, J. M. & W. R. Taylor s.n., 5 viii 1915 canadense
Mackenzie, K. K. s.n., 4 vii 1908 canadense; s.n., 30 v 1916 canadense; s.n., 29 v 1920 canadense
Mackenzie, K. K. & L. Griscom 10380 canadense
Maclagan s.n., 4 vi 1842 canadense
MacMasters, M. M. s.n., 17 vi 1924 canadense
Macoun, J. 68571 canadense; 81379 canadense; 81380 canadense
Macpherson s.n., vi 1928 canadense
Makino, T. 101830 nipponicum; 101880 pentaphyllum; 101882 pentaphyllum; 101895 quinquefolium; 101898 quinquefolium; 101971 schlippenbachii; 101972 schlippenbachii; 102297 pentaphyllum; 102300 pentaphyllum; 102303 pentaphyllum
Mann, H. s.n., 1862 canadense

Manning, W. H. s.n., 22 v 1881 canadense; s.n., 17 v 1937 canadense; s.n., 10 vii 1937 canadense
March, S. G. s.n., 29 iv 1966 schlippenbachii
Marie-Victorin, Fr. 183 canadense; 4236 canadense; s.n., vi 1912 canadense; s.n., vi 1915 canadense
Marie-Victorin, Fr. & Fr. Rolland-Germain 24 canadense; 724 canadense; 725 canadense; 18343 canadense; 49324 canadense; 20975 canadense; 29048 canadense; 44868 canadense; s.n., 17 v 1931 canadense
Marie-Victorin, Fr. et al. 6331 canadense; 44868 canadense
Martin, P. s.n., 15 vii 1955 canadense
Masamune, G. s.n., 7 iv 1923 pentaphyllum; s.n., 3 vii 1926 albrechtii
Massey, J. R. & D. E. Boufford 4094 canadense; 4122 canadense; 4476 canadense
Mathias, M. E. 164 canadense
Matsumura s.n., 23 vii 1882 nipponicum; s.n., 24 vii 1887 [115] nipponicum
Matteson, C. A. s.n., 11 v 1894 canadense
Maximowicz s.n., 1860 schlippenbachii
Maxon, W. R. 6299 vaseyi
Meilleur, R. 1342 canadense
Merrill, E. D. 9464 canadense
Merrill, W. W. s.n., 1850 canadense
Meyer, F. G. s.n., 5 v 1965 schlippenbachii
Meyer, F. G. & P. Mazzeo 1941 schlippenbachii; 12739 vaseyi
Mieno, M. 210 albrechtii
Miyabe, K. s.n., 15 vi 1885 albrechtii
Mizushima, M. 101 albrechtii; 245 nipponicum; 413 nipponicum; 605 nipponicum; 1124 albrechtii; 1141 albrechtii; 2181 albrechtii; 2394 albrechtii; 11355 pentaphyllum
Mizushima, M. & U. Mizushima 990 pentaphyllum
Mizushima, U. 1997 albrechtii; 2138 albrechtii
Mochizuki, N. s.n., v 1910 pentaphyllum; s.n., x 1910 albrechtii
Moldenke, C. E. 1594 canadense
Moldenke, H. N. 11134 canadense; 18260 canadense
Mondor, J. s.n., 6 vi 1943 canadense
Moore, A. H. 819 canadense; 1049 canadense; 1082 canadense; 3332 canadense; 3456 canadense; 3798 canadense; 4109 canadense
Moore, H. E. 321 canadense
Moran, R. 5166 schlippenbachii; 5170 schlippenbachii
Morong, T. s.n., 29 viii 1872 canadense; s.n., 188? canadense
Morss, C. H. s.n., 26 v 1900 canadense; s.n., 1 vi 1901 canadense
Muenscher, W. C. & R. T. Clausen s.n., 30 vi 1934 canadense
Munro, D. 250 canadense; 449 canadense; 1896 canadense
Murata, G. 44451 quinquefolium
Murata, G. & N. Fukuoka 37 quinquefolium
Murata, G. & M. Togashi 226 quinquefolium
Murata, G. et al. 980 albrechtii; 1131 pentaphyllum; 30363 albrechtii
Murata, J. 1776 quinquefolium; 3744 pentaphyllum
Murata, J. & T. T. Chen 9699 quinquefolium
Murata, J. et al. 15184 albrechtii
Murdoch, J. & C. Schweinfurth s.n., 17 v 1913 canadense
Muroi, H. 208 quinquefolium; 221 quinquefolium; 410 quinquefolium; 414 albrechtii; 483 pentaphyllum; 2116 quinquefolium; 3395 albrechtii; 4438 albrechtii; 6019 quinquefolium
Muzushima, M. 1554 quinquefolium

Nakai, T. 11960 schlippenbachii; 11961 schlippenbachii
Neff, E. C. s.n., 27 viii 1948 canadense
Nichols, G. E. 1413 canadense
Nolen, W. W. s.n., v 1886 canadense
Nolin, M. 65 canadense
Norton, J. B. 102 canadense

Oakes s.n. canadense
Ogden, E. C. et al. s.n., 22 v 1936 canadense
Ohba, H. & S. Akiyama 1173 schlippenbachii
Ohba, H. & K. Otomo s.n., 15 v 1973 quinquefolium
Okamoto, K. 1316 albrechtii
Oldham, R. 510 schlippenbachii
Olney, S. T. s.n. canadense

Palfrey, G. D. 342 canadense
Palmer, W. 1348 canadense
Parent, L. s.n., 25 v 1957 canadense
Parker, C. F. s.n., 17 viii 1868 canadense
Parlin, J. s.n., v 1892 canadense; s.n., 30 v 1893 canadense; s.n., 31 vii 1895 canadense
Parsons, A. & F. C. Seymour 2894 canadense
Payne, M. s.n. canadense
Peabody, F. H. s.n. canadense
Pease, A. S. 2528 canadense; 4028 canadense; 9998 vaseyi; 10235 canadense; 10245 canadense; 11207 canadense; 11215 canadense; 11252 canadense; 11720 canadense; 11754 canadense; 12237 canadense; 13518 canadense; 14141 canadense; 14294 canadense; 16039 canadense; 16212 canadense; 16420 canadense; 16557 canadense; 16760 canadense; 17507 canadense; 18134 canadense; 18154 canadense; 24033 canadense; 24101 canadense; 24127 canadense; 24242 canadense; 24243 canadense; 24253 canadense; 25757 canadense; 27286 canadense; 27344 canadense; 27987 canadense; 28252 canadense; 28793 canadense; 30859 canadense; 33393 canadense; 33397 canadense; 36499 canadense; 36855 canadense; 38330 canadense; 38353 canadense
Pease, A. S. & S. K. Harris 25790 canadense
Pennell, F. W. 13224 canadense; 13235 canadense
Perry, H. G. s.n., 18 v 1912 canadense; s.n., 23 v 1913 canadense; s.n., 30 v 1932 canadense
Perry, H. G. et al. 10309 canadense
Pimlott 248 canadense
Poland, R. G. s.n., 8 ix 1954 canadense
Poole, S. F. 317 canadense
Porter, T. C. s.n., 25 vii 1881 canadense; s.n., 22 v 1889 canadense; s.n., 26 v 1891 canadense; s.n., 23 v 1900 canadense
Potter, D. s.n., 16 v 1934 canadense
Potter, D. & W. B. Brierly 3270 canadense
Potter, D. & W. J. Langenheim 7061 canadense
Pretz, H. W. J845 canadense; 2445 canadense
Pride s.n., 1948 canadense
Pringle, C. G. s.n., 4 vi 1878 canadense
Purpus, A. s.n., 1920 pentaphyllum

Racine, P. 46 canadense
Radford, R. E. et al. 9117 vaseyi
Ramseur, G. S. 52 vaseyi; 152 vaseyi

Rand, E. L. s.n., 14 vi 1890 canadense; s.n., 16 vi 1890 canadense; s.n., 20 vi 1890 canadense
Rand, E. L. & J. H. Redfield s.n., 13 vi 1889 canadense
Rand, E. L. & B. L. Robinson 106 canadense; s.n., 7 vi 1896 canadense
Read, C. H. 12306 canadense
Redfield, J. H. s.n., 4 viii 1886 canadense; s.n., 27 v and 30 vi 1887 canadense; s.n., 27 v and 5 vii 1887 canadense; s.n., 27 v and 27 vii 1887 canadense
Reed, J. F. s.n., v 1932 canadense
Rehder, A. 1019 canadense; 1062 canadense; 1284 canadense; 1343 canadense; s.n., 15 v 1901 schlippenbachii; s.n., 6 viii 1921 canadense; s.n., 1 xi 1936 quinquefolium; s.n., 15 v 1947 albrechtii
Rioux, A. s.n., v 1958 canadense
Roberts, M. & D. Keil 7424 vaseyi
Roberts, P. R. 59-441 canadense
Roberts, P. R. & N. Bateman 64-2436 canadense
Roberts, P. R. & B. Pugh 65-24, 65-140 canadense
Robinson, B. L. s.n., 4 v 1899 canadense; s.n., 31 vii 1903
Robinson, B. L. & H. Schrenk s.n., 13 viii 1894 canadense
Robinson, C. B. 431 canadense
Roland, A. E. 17 canadense; 41604 canadense
Roland, A. E. et al. 316 canadense
Rossbach, G. B. 635 canadense; 1221 canadense; 1562 canadense; 2009 canadense; 2395 canadense; 3564 canadense; 3564 canadense; 4233 canadense; 4299b canadense; 5785 canadense; 6592 canadense; 6592 canadense
Rouleau, E. 5369 canadense; 6597 canadense
Roy, Fr. E. 4354 canadense; s.n., 10 vi 1934 canadense
Rudkin, W. H. s.n., vi [no year] canadense
Ruth, A. 195 vaseyi

S. W. s.n., 22 v 1887 pentaphyllum
Sakurai, H. s.n., 16 v 1901 schlippenbachii; s.n., 25 v 1912 pentaphyllum
Sakurai, K. s.n., 15 vi 1903 schlippenbachii; s.n., 13 vi 1911 pentaphyllum; s.n., 17 v 1912 pentaphyllum
Sampson, D. R. 9 canadense
Sandercock, F. K. s.n., 31 v 1959 canadense
Sanford, S. N. F. 10079 canadense
Sargent, C. S. s.n., 24 ix 1886 vaseyi; s.n., 27 viii 1892 schlippenbachii; s.n., 29 ix 1892 albrechtii; s.n., 3 xi 1892 pentaphyllum; s.n., 17 viii 1895 canadense; s.n., 26 ix 1898 vaseyi; s.n., 5 ix 1903 schlippenbachii
Sather, D. & G. Caddell 2209 pentaphyllum; 2693 albrechtii; 2724 albrechtii; 4654 albrechtii; 4932 albrechtii
Sawada, T. 841 quinquefolium; 842 quinquefolium; 2311 quinquefolium
Scamman, E. 4400 canadense
Schlippenbach s.n., 1854 schlippenbachii
Schofield, W. B. 3188 canadense; 4144 canadense; 4544 canadense
Schueler, F. W. 363 canadense
Scoggan, H. J. 12255 canadense
Scott, W. s.n., 12 vii 1892 canadense
Scribner, F. L. s.n. canadense
Sears, J. H. s.n. canadense
Segal, L. & A. Thompson 35 schlippenbachii; 161 vaseyi; 242 canadense; 250 vaseyi

Seymour, A. B. s.n., 20 v 1885 canadense; s.n., 20 viii 1888 canadense
Seymour, F. C. 2738 canadense; 5636 canadense; 5810 canadense; 17855 canadense; 18792 canadense; 19180 canadense; 23180 canadense; s.n., 12 viii 1912 canadense
Shaw, M. P. s.n., 2 vi [no year] canadense
Shchepanek, M. J. 1986 canadense
Shchepanek, M. J. & D. White 2792 canadense
Shepardson, W. M. s.n., 18 v and 15 viii 1897 canadense
Shiota, K. 2495 albrechtii; 2515 nipponicum; 2518 albrechtii; 5824 quinquefolium; 6475 quinquefolium
Shirley, W. J. s.n., 14 v 1921 canadense
Shurtleff s.n., 1853 canadense
Small, J. K. s.n., 7–10 vi 1889 canadense
Small, J. K. & A. A. Heller s.n., 6 viii 1891 vaseyi
Smith, A. J. 96 canadense
Smith, B. H. s.n., 26 v 1891 canadense
Smith, E. C. 12284 canadense; 13409 canadense; 13437 canadense; 15391 canadense; 16959 canadense; 20453 canadense
Smith, E. C. et al. 3157 canadense; 3480 canadense; 4424 canadense; 5341 canadense; 6101 canadense; 6296 canadense; 7438 canadense; 8395 canadense; 8772 canadense; 8929 canadense; 9077 canadense; 9563 canadense; 9901 canadense; 10200 canadense; 10747 canadense; 10747 canadense; 11273 canadense; 12253 canadense; 12857 canadense; 13661 canadense; 15120 canadense; 15144 canadense; 15167 canadense; 15279 canadense; 15407 canadense; 15417 canadense; 15428 canadense; 15455 canadense; 15515 canadense; 15551 canadense; 15835 canadense; 16398 canadense; 16564 canadense; 17330 canadense; 17403 canadense; 17451 canadense; 17603 canadense; 18639 canadense; 18697 canadense; 18769 canadense; 18820 canadense; 18830 canadense; 18844 canadense; 18870 canadense; 20612 canadense; 21090 canadense; 21614 canadense; 21620 canadense; 21764 canadense; 22484 canadense; 22487 canadense
Smith, J. D. s.n., 18 viii 1882 vaseyi; s.n., 19 viii 1882 vaseyi; s.n., 1882 vaseyi; s.n., viii 1896 vaseyi
Smith, L. B. 942 canadense
Smith, L. B. et al. 1082 canadense
Smith, R. K. s.n., 13 v 1934 schlippenbachii; s.n., 10 viii 1937 schlippenbachii
Smith, S. I. s.n. canadense
Soper, J. H. s.n., 27 v 1945 canadense
Soper, J. H. & D. A. Fraser 3669 canadense
Sornborger, J. D. s.n., 8 vii 1902 canadense; s.n., ix 1902 canadense
Spongberg, S. A. & D. E. Boufford 1763 vaseyi
St John, H. 90648 canadense; 90649 canadense
St John, H. & G. E. Nichols 2429 canadense
Steele, F. L. s.n., 22 vi 1947 canadense
Stewart, C. C. 5158 canadense
Stone, G. E. s.n., 21 v 1904 canadense
Sudworth, G. B. 120 vaseyi; 124 vaseyi; 125 vaseyi; 129 vaseyi
Svenson, H. A. & J. Hay 664 canadense

Taché, P. B. & A. Lepage 1440 canadense
Takeda, H. s.n., 1 June 1906 quinquefolium; s.n., 15 vi 1908 albrechtii
Taylor, T. M. C. 6006 quinquefolium
Thayer, N. F. s.n., 16 v 1904 canadense
Thurber, G. s.n., v 1846 canadense; s.n., 1846 canadense

Tigerstedt, P. M. A. s.n., 23 vi 1963 schlippenbachii
Togashi, M. 386 pentaphyllum; 483 quinquefolium; 7043 nipponicum; s.n., 7 viii 1938 nipponicum; s.n., 18 v 1968 pentaphyllum; s.n., 16 ix 1970 nipponicum; s.n., 11 vi 1976 albrechtii
Togasi, M. 483 quinquefolium
Togasi, M. & S. Togasi 467 albrechtii
Tokubuchi, E. s.n., 10 vi 1893 albrechtii
Torrey, G. S. 24 canadense
Totton, A. W. s.n., 24 vi 1940 canadense
Townsend, C. W. s.n., 20 vi 1909 canadense
True, R. H. 185 canadense
Tschonoski s.n., 1864 [for Maxim.] albrechtii
Tuckerman s.n. canadense
Tyler, A. A. s.n., 4 vii 1896 canadense
Tyler, W. A. 155 canadense

Uchiyama, T. s.n., 2 viii 1902 schlippenbachii
Ueda, K. et al. 1154 schlippenbachii
Uno, K. 17376 albrechtii; 17377 albrechtii; 17475 albrechtii; 17495 albrechtii; 23298 schlippenbachii; s.n., 2 iv 1951 schlippenbachii; s.n., 2 viii 1952 (2612) albrechtii

Vasey, G. R. s.n., 3 vi 1878 vaseyi
Vézina, A. s.n., 10 vi 1968 canadense

Waghorne, A. C. s.n., 21 iv 1893 canadense
Walker, E. H. 1927 canadense
Walton, J. s.n., 10 viii 1949 canadense
Ware, R. A. 2254 canadense
Watanabe, K. s.n., 13 v 1888 quinquefolium
Weatherby, C. A. D2102 canadense; 4609 canadense; 6986 canadense; s.n., 7 vii 1914 canadense
Weatherby, C. A. & C. H. Bissell s.n., 13 vi 1906 canadense
Weatherby, C. A. & W. R. Maxon 6974 canadense
Weatherby, C. A. & L. B. Smith s.n., 22 v 1937 canadense
Weatherby, C. A. & U. F. Weatherby 5706 canadense; 5707 canadense
Weatherby, C. A. et al. s.n., 12 vi 1932 canadense
Webster, D. H. 39 canadense
Wetmore, R. H. s.n., 18 vi 1919 canadense
Wheeler, A. W. s.n., 20 v 1910 canadense
Wheeler, L. A. s.n., 28 vi 1923 canadense; s.n., 20 viii 1926 canadense; s.n., 31 v 1937 canadense
White, T. G. s.n., 5 ix 1891 canadense
Whitney, E. G. 4837 canadense
Wiegand, K. M. & F. W. Hunnewell s.n., 2 vi 1912 canadense
Williams, E. F. 2 canadense; s.n., 15 vii 1899 canadense; s.n., 11 vii 1897 canadense; s.n., 11 vii 1897 canadense; s.n., 14 v 1899 canadense; s.n., 16 vi 1899 canadense; s.n., 17 v 1896 canadense; s.n., 2 vii 1898 canadense; s.n., 21 vii 1910 canadense; s.n., 31 vii 1903 canadense
Williams, E. F. & M. L. Fernald s.n., 29 vii 1902 canadense
Williams, J. & E. Williams 573 canadense
Willis, O.R. s.n., viii 1885 canadense
Wilson, E. H. 6396 pentaphyllum; 6683 quinquefolium; 6683A quinquefolium; 6698

pentaphyllum; 6858 albrechtii; 7083 albrechtii; 7191 nipponicum; 7208 albrechtii; 7219 nipponicum; 7638 albrechtii; 7676 quinquefolium; 7676A quinquefolium; 7683 pentaphyllum; 7721 albrechtii; 8431 schlippenbachii; 8472 schlippenbachii; 8603 schlippenbachii; 9201 schlippenbachii; 9223 schlippenbachii; 9592 schlippenbachii; 10493 schlippenbachii; s.n., 2 vii 1914 albrechtii

Wilson, P. s.n., 29 viii 1906 canadense; s.n., 22 vii 1917 canadense
Winslow, E. J. et al. s.n., 31 v 1914 canadense
Wood, A. s.n. canadense
Wood, E. W. & D. E. Boufford 1350 canadense
Wright, S. W. s.n., 1877 canadense
Wyman, D. s.n., 30 xii 1945 vaseyi

Yahara, T. et al. 6879 albrechtii
Yamazaki, T. 1040 quinquefolium; 2501 nipponicum; 3901 quinquefolium; 6048 pentaphyllum
Yamazaki, T. et al. 891 pentaphyllum; 892 quinquefolium
Yokubuchi, Y. s.n., vi 1890 albrechtii; s.n., 23 vi 1891 albrechtii

Zabel, H. 39 vaseyi; 135 vaseyi
Zinck 310 canadense

INDEX