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A REVISION OF *RHODODENDRON* SECTION *PENTANTHERA*

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Rhododendron sect. *Pentanthera* G. Don (Ericaceae) comprises a group of closely related, highly ornamental plants which are commonly called 'azaleas'. Thirteen of the fifteen species recognized in this section are indigenous to North America. One species (*R. molle*) is native to Japan and China, and one species (*R. luteum*) is indigenous to the Caucasus region. Phylogenetic analysis of the species within the section indicates that *R. molle* is the sister to the rest of the section. It is the sole member of *R.* subsect. *Sinensia.* The remaining species form a monophyletic group recognized as *R.* subsect. *Pentanthera.* Within this subsection the presence of a blotch on the upper corolla lobe defines two primarily orange to red-flowered groups. The first group has a Tertiary Period disjunct distribution and comprises *R. luteum*, *R. austrinum* and *R. occidentale*. The second group is indigenous to eastern North America and comprises *R. calendulaceum*, *R. cumberlandense*, *R. flammeum*, *R. prunifolium* and *R. alabamense*. In both groups the cladistically basal species has white flowers with a yellow blotch on the upper corolla lobe (*R. occidentale*, *R. alabamense*, respectively). The pink to white early flowering species *R. canescens*, *R. periclymenoides* and *R. prinophyllum* do not form a monophyletic group.

Phenetic analyses indicate that the eastern Asian taxon, *R. molle*, is best recognized as one species with two geographical subspecies; *Rhododendron prinophyllum* is quite distinct from *R. canescens* and *R. periclymenoides*. The latter two species are very similar morphologically, but their similarities are due to the retention of primitive characters and they should be recognized as distinct species. *Rhododendron calendulaceum* can be distinguished from *R. cumberlandense* using a combination of morphological and phenological characters. The various taxa previously segregated out of *R. viscosum* are merely extreme forms of a widespread and variable species and are not given any formal rank. No subspecific taxa are recognized for *R. occidentale*. Distribution maps, keys to the species, species descriptions and specimen citations are included.

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INTRODUCTION

The species within *Rhododendron* sect. *Pentanthera* G. Don have long been considered to be closely related, based on their overall morphological similarity and their ability to readily hybridize and produce fertile progeny. Balfour's system (see Cullen, 1980) used the series as the major level of grouping, and recognized series *Azalea* subseries *Luteum* to include most of what is currently placed in *R.* sect. *Pentanthera*. However, the 'series' of Balfour were not hierarchical, were often based on a typological impression of the group, and in most cases were not validly published. According to Cullen (1980), Balfour's system was an *ad hoc* method of classifying the enormous number of *Rhododendron* species which came into Edinburgh from collectors in Asia at the turn of the century. This *ad hoc* method was deliberately not validated nomenclaturally.

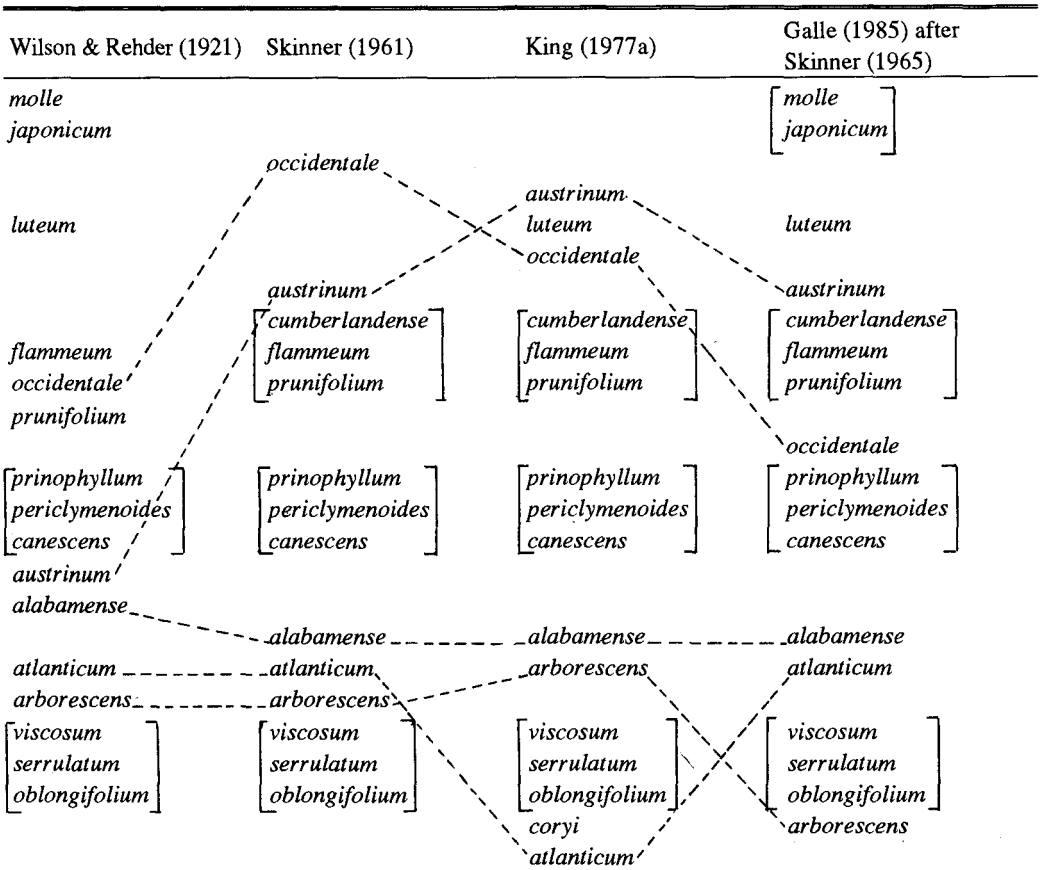
The last monograph was published in 1921 by E. H. Wilson and A. Rehder. While Wilson and Rehder thoroughly addressed the nomenclatural and taxonomic history of *R.* sect. *Pentanthera*, their treatment was highly influenced by the typological philosophy and taxonomic methods of their era. Several attempts were subsequently made to sort out the taxonomic problems within *Rhododendron* sect. *Pentanthera* (Skinner, 1952, 1955, 1959, 1961, 1971; Galle, 1968, 1985; Solymosy, 1974, 1976; Willingham, 1973, 1974, 1975, 1976; King, 1977a, b, 1980). However, many questions still remained concerning species delimitation, evolutionary relationships and the extent of hybridization within the section. These questions have been considered from various perspectives, ranging from classical, morphological approaches (Skinner, 1961) to phenetic methods (King, 1977a, 1980). However, the group still lacks a comprehensive treatment which incorporates modern philosophical and methodological approaches in species delimitation and in construction of phylogenetic relationships. In addition, since 1921, information from many new sources has become available. Flavonoid chemistry (Harborne & Williams, 1971; King, 1977a, b, 1980; Evans et al., 1980; Spethmann, 1980), indumentum development and differentiation (Seithe-von Hoff, 1960, 1980), anatomical and cotyledonary characters (Philipson & Philipson, 1968; M. N. Philipson, 1980) and chromosomal information (Sax, 1930; Nakamura, 1931; Janaki-Ammal et al., 1950; Li, 1957) have all been studied since the last monograph of the section.

This study was undertaken in order to clarify the species limits, evolutionary relationships and extent of hybridization within *Rhododendron* sect. *Pentanthera*. The typological view of a species is discarded because it does not adequately deal with variation within and among natural populations. Phenetic approaches (Sneath & Sokal, 1973; Wishart, 1975) are used in species delimitation and cladistic approaches in the development of hypothetical evolutionary relationships. With these approaches in mind it has been possible to take advantage of the vast amount of information available from herbarium material and from the literature. These sources were supplemented by extensive field-work that was concentrated in areas where species problems were particularly difficult. Population variation was considered important, especially in taxa where hybridization had frequently been cited as common (e.g. *R. calendulaceum*, *R. cumberlandense*, *R. canescens*, *R. flammeum*).

While the status of all the taxa within the section was re-evaluated, particular emphasis was placed on the following problems: delimitation of *R. cumberlandense* and *R. calendulaceum*, delimitation and rank of *R. periclymenoides* and *R. canescens* and their circumscription as related to *R. prinophyllum*, delimitation of entities within the *R. viscosum* complex (including

R. serrulatum, *R. oblongifolium* and *R. coryi*), delimitation of subspecific and varietal entities within *R. occidentale*, and delimitation and rank of *R. molle* and *R. japonicum*. In addition, the phylogenetic relationships of all species were addressed, especially the placement of the eastern Asian species *R. molle* with regard to the rest of the species in the section.

TABLE 1. Comparison of previously recognized species groups within *Rhododendron* sect. *Pentanthera*.



Evolutionary relationships within sect. *Pentanthera* have been discussed by Rehder (1921), Skinner (1955, 1961), Galle (1968, 1985), Solymosy (1974, 1976) and King (1977a, b, 1980), and groupings of related species differ from author to author (Table 1). In the last revision of the group, Wilson (1921) treated three Old World species separately from the remaining North American species in the section. He recognized two closely related species, *R. molle* and *R. japonicum*. *Rhododendron luteum* was treated in isolation, and no discussion of its relationships to other species was included in the monograph. Rehder (1921) recognized four groups of related North American species. He considered *R. calendulaceum*, *R. occidentale* and *R. flammeum* to be closely related because of the orange-yellow blotch on the upper corolla lobe. *Rhododendron prunifolium* was considered an isolated relict species not closely related to any other species within the section. A group of pink to white early flowering species was

recognized by Rehder (1921). This included *R. canescens*, *R. prinophyllum* and *R. periclymenoides*. He also included the yellow-orange *R. austrinum* and the white species *R. alabamense* in this group because of the similarity in flower morphology, indumentum characters and early flowering time. The fourth group of species which Rehder recognized as closely related included *R. viscosum*, *R. oblongifolium*, *R. serrulatum*, *R. atlanticum* and *R. arborescens*. This group was based on the glandular outer surface and white colour of the corolla.

Skinner (1955, 1961) made extensive collections of the native azaleas in eastern North America. In his treatments (1955, 1961) he discussed informally three groups of species, and recognized subgroups based on phenology. Skinner recognized a red–orange group of species which included *R. calendulaceum*, *R. austrinum*, *R. bakeri* (= *R. cumberlandense*), *R. flammeum* and *R. prunifolium*. He recognized two distinct phases of *R. calendulaceum*, an early blooming phase and a late phase. However, Willingham (1973) showed that at least in North Carolina there is no gap in the flowering time of *R. calendulaceum* but rather a continuous flowering from early spring at lower elevations to early summer at higher elevations. Skinner considered *R. bakeri* to be the same as *R. cumberlandense* and to be restricted to the Cumberland Plateau. Like Rehder, Skinner recognized an early flowering, pink to white group of species, including *R. canescens*, *R. prinophyllum* and *R. periclymenoides*. The third group of closely related species recognized by Skinner was based on the presence of a white, abaxially glandular corolla, and included the following species: *R. alabamense*, *R. atlanticum*, *R. arborescens*, *R. viscosum*, *R. serrulatum*, *R. oblongifolium*. Several varieties of *R. viscosum*, recognized by Rehder (1921), were recognized by Skinner (1961) as well. Skinner emphasized what he considered the reticulate nature of the relationships within the section, and postulated hybridization as the primary cause of blurred specific boundaries and evolutionary relationships. Later, Skinner (Skinner, 1965) recognized *R. occidentale* as a member of the pink–white group of species, and considered *R. alabamense* and *R. atlanticum* to be more closely related to each other than to other members of his previously recognized white-flowered group. This is the classification currently recognized by Galle (1985).

Using a phenetic approach, King (1977a, 1980) recognized five groups of related species based on chemical characters (foliar flavonoids) in sect. *Pentanthera*. The red–orange-flowered group, consisting of *R. bakeri*, *R. calendulaceum*, *R. flammeum* and *R. prunifolium*, possesses farrerol and its glycoside except for *R. calendulaceum*, which instead contains asebotin. *Rhododendron canescens*, *R. periclymenoides* and *R. prinophyllum* are recognized as a group of very closely related species by King (1977a). These species are characterized by the possession of eriodictyol, asebotin and 2′, 6′, 4-trihydroxy-4′-methoxydihydrochalcone. Chemical differences among the species are very slight. King hints at the possible merging of these three species because of their extreme morphological and chemical similarity. King recognized two white-flowered alliances. In the *R. arborescens* and *R. alabamense* group both species are allied by the possession of flavonol glycosides. In *R. arborescens* they occur in greater quantities than in *R. alabamense* where they are minor compounds. The second alliance of white-flowered species recognized by King (1977a, b, 1980) includes *R. atlanticum*, *R. viscosum*, *R. serrulatum*, *R. oblongifolium* and *R. coryi*. These species are morphologically similar. In addition, they all share the same myricetin 3-*O*-monoglycosides, and lack flavanones and dihydrochalcones. Lastly, King recognized a new group of related species based on the

presence of 5-*O*-methoxylated flavonols as major compounds in *R. luteum*, *R. austrinum* and *R. occidentale*. These compounds also occur in gymnosperms and ferns (Harborne, 1980), and King considers them highly primitive. Furthermore, King regards the large number of compounds present in *R. austrinum* and *R. occidentale* as an indication of the primitive nature of these species. He also cites *R. prunifolium* as possessing a large number of compounds and recognizes it as a primitive member of the red–orange-flowered group.

PHYLOGENETIC ANALYSIS

In order to begin to understand the phylogenetic relationships within sect. *Pentanthera*, a cladistic (parsimony) analysis was performed. Twenty-six morphological, phenological and chemical characters (Table 2) were polarized using *R.* sect. *Rhodora* (which is most likely a sister group to the section; Judd & Kron, in prep.) as an outgroup (Table 3) (Stevens, 1980a; Watrous & Wheeler, 1981; Wiley, 1981; Donoghue & Cantino, 1984; Maddison et al., 1984). Autapomorphies were not included in the analysis since they do not indicate relationships. Some indumentum characters were interpreted as transformation series (Table 2). Using the computer program PAUP version 3.1.1 (Swofford, 1993), the branch-and-bound option was used to obtain the most parsimonious tree(s) (Hendy & Penny, 1982). Sixteen trees were found of 54 steps each (C.I. = 0.46, R.I. = 0.60). The strict consensus tree (Fig. 1) and two examples of the 16 shortest trees (Fig. 2) are shown. The trees were rooted with *R.* sect. *Rhodora*.

Most of the characters used in the analysis were consistent within a species. However, in the case of *R. viscosum* the indumentum on the abaxial surface of the floral bud scales (characters 17 and 18) can be either glabrous or densely pubescent and this species was scored as apomorphic for both characters. In *R. canescens* variation in an otherwise stable character (character 11) arises only in a few populations in southern Georgia. In the remaining 98% of the specimens examined *R. canescens* possesses unicellular ciliate bud-scale margins. Therefore, *R. canescens* was scored as possessing this apomorphic character.

RESULTS

The strict consensus tree (Fig. 1) indicates that *R. molle* is the sister taxon to the remaining members of the section. Phenetically, this species is also distinctive and here is recognized as belonging to a distinct subsection: *R.* subsect. *Sinensia* (see Taxonomic Account for citation of basionym). The remaining taxa are placed in *R.* subsect. *Pentanthera*. The relationships among the five clades in this subsection are not resolvable and are depicted as a polytomy. However, three of these clades give insight into relationships among smaller groups of species. Two clades are defined by the presence of an orange or yellow blotch on the upper corolla lobe, and thus *R. calendulaceum*, *R. cumberlandense*, *R. flammeum*, *R. prunifolium* and *R. alabamense* form one monophyletic group. All of these species are red–orange flowered, except *R. alabamense* which is white. The other clade defined by the orange or yellow blotch includes *R. occidentale*, *R. luteum* and *R. austrinum*. The geographic distribution of these three species makes this clade particularly interesting since these taxa exhibit a Tertiary disjunct pattern: *R. occidentale* occurs along the Pacific coast of North America from southern Oregon to southern California, *R. luteum* occurs along the coast of the Black Sea and the Caucasus region, and *R. austrinum* is native to the

TABLE 2. Characters used in the cladistic analysis of the species of *Rhododendron* sect. *Pentanthera*.

Plesiomorphic state	Apomorphic state
1. No blotch on upper corolla lobe	Blotch present on upper corolla lobe
2. Separate spots of colour on upper 3 corolla lobes	Spots lacking on upper corolla lobe
3. Corolla white to pink	Corolla yellow, red or orange
4. Outer surface of corolla glabrous	Outer surface of corolla with unicellular hairs
5. Outer surface of corolla with only unicellular hairs	Outer surface of corolla with unicellular and multicellular hairs
6. Outer surface of corolla with both multicellular gland-headed and eglandular hairs	Outer surface of corolla with multicellular gland-headed hairs
7. Outer surface of corolla with both multicellular gland-headed and eglandular hairs	Outer surface of corolla with multicellular eglandular hairs
8. Corolla with very short, wide tube	Corolla with long tube
9. Corolla gradually expanded	Corolla abruptly expanded
10. Margin of corolla lobes plane	Margin of corolla lobes crisped-undulate
11. Floral bud-scale margin glandular and unicellular-ciliate	Floral bud-scale margin unicellular-ciliate
12. Floral bud-scale margin glandular and unicellular ciliate	Floral bud-scale margin glandular
13. Cotyledons with few hairs on the margins	Cotyledons lacking hairs on the margins
14. Seeds with a tight testa	Seeds with a loose testa
15. Leaf margin with multicellular gland-headed and eglandular hairs	Leaf margin with only multicellular eglandular hairs
16. Stamens exserted less than 8mm beyond corolla lobes	Stamens exserted 1.2cm or more beyond corolla lobes
17. Floral bud scale only sparsely covered with unicellular hairs on the abaxial surface	Floral bud scale densely covered with unicellular hairs on the abaxial surface
18. Floral bud scale only sparsely covered with unicellular hairs on the abaxial surface	Floral bud scale glabrous on the abaxial surface
19. Sepal margin glandular-fimbriate	Sepal margin setose
20. Pedicel with multicellular gland-headed hairs	Pedicel with multicellular eglandular hairs
21. Capsule sparsely covered with unicellular hairs or glabrous	Capsule densely covered with unicellular hairs
22. Fragrance sweet	Fragrance not sweet
23. Flowers appear before or with the leaves	Flowers appear after the leaves have expanded
24. Stems with multicellular gland-headed hairs	Stems with multicellular eglandular hairs or glabrous
25. 5-*O*-methoxylated flavonols present	5-*O*-methoxylated flavonols absent
26. Capsule with multicellular gland-headed hairs	Capsule with multicellular eglandular hairs

pan-handle of Florida. The grouping of these three species was suggested by King (1977a) due to their flavonoid similarity.

Three species that have consistently been regarded as forming a group are the pink to white-flowered *R. canescens*, *R. periclymenoides* and *R. prinophyllum*. This analysis indicates that these three taxa do not form a monophyletic group, but rather they are paraphyletic. Their similarity of appearance is based on the retention of plesiomorphic characters (Table 2).

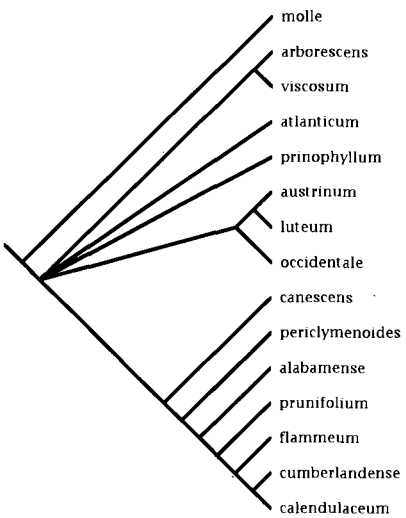


FIG. 1. Strict consensus tree of 16 most parsimonious trees (L = 54, C.I. = 0.46, R.I. = 0.60) resulting from the analysis of *Rhododendron* sect. *Pentanthera*.

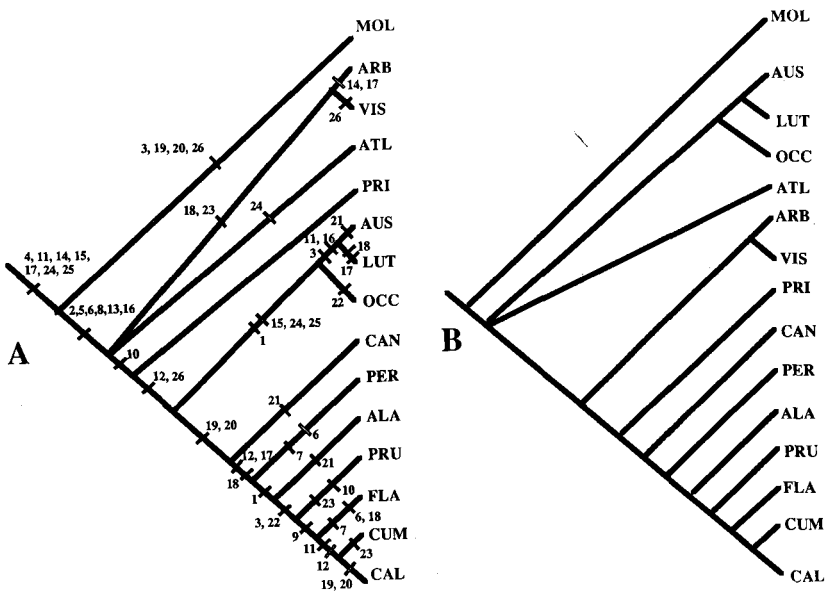


FIG. 2. Cladograms representing 2 of the 16 shortest trees found in the branch-and-bound analysis of *Rhododendron* sect. *Pentanthera*. Numbers correspond to the characters in Table 2. Open dashes represent character reversals or losses.

TABLE 3. Character states of taxa in the cladistic analysis of *Rhododendron* sect. *Pentanthera* (0, plesiomorphic state; 1, apomorphic state; 2, missing data).

	Characters																								
Taxon	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
alabamense	1	1	0	1	1	1	0	1	0	1	1	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1
arborescens	0	1	0	1	1	1	0	1	0	0	1	0	1	0	1	1	0	1	0	0	0	0	1	1	1	0
atlanticum	0	1	0	1	1	1	0	1	0	0	1	0	1	1	1	1	1	0	0	0	0	0	0	0	1	0
austrinum	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	1	1	0	0	0	1	0	0	0	0	0
calendulaceum	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	1	0	0	0	1	0	1	1	1
canescens	0	1	0	1	1	1	0	1	0	1	1	1	1	1	1	1	1	0	1	1	1	0	0	1	1	1
cumberlandense	1	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1	0	1	1	1	0	1	1	1	1	1
flammeum	1	1	1	1	1	0	1	1	1	1	1	0	1	1	1	1	0	0	1	1	0	1	0	1	1	1
luteum	1	1	1	1	1	1	0	1	0	1	0	1	1	1	0	1	0	1	0	0	0	0	0	0	0	0
molle	0	0	1	1	0	0	0	0	0	0	1	0	0	1	1	0	1	0	1	1	0	2	0	1	1	1
occidentale	1	1	0	1	1	1	0	1	0	1	1	1	1	1	0	1	1	0	0	0	0	1	0	0	0	1
periclymenoides	0	1	0	1	1	0	1	1	0	1	1	0	1	1	1	1	0	1	1	1	0	0	0	1	1	1
prinophyllum	0	1	0	1	1	1	0	1	0	1	1	0	1	1	1	1	1	0	0	0	0	0	0	1	1	0
prunifolium	1	1	1	1	1	1	0	1	0	0	1	0	1	1	1	1	0	1	1	1	0	1	1	1	1	1
viscosum	0	1	0	1	1	1	0	1	0	0	1	0	1	1	1	1	1	1	0	0	0	0	1	1	1	1

In conclusion, the species relationships in sect. *Pentanthera* can be resolved in part by the use of morphological characters. Despite the fact that this group presents the often common problem of great amounts of infra- and interspecific variation and high levels of homoplasy, relationships of the red to orange-flowered species and the pink to white-flowered species, and the position of *R. molle* can be resolved.

DISTRIBUTION AND ECOLOGY

Rhododendron sect. *Pentanthera* exhibits a Tertiary Period distribution, occurring in eastern Asia (1 sp.), eastern North America (12 spp.), western North America (1 sp.) and the Caucasus (1 sp.), and therefore most likely comprises an ancient group of species (Li, 1952). This pattern of disjunct distribution is also found in *R.* sect. *Ponticum*, and is common in other ericads as well as in numerous other woody and herbaceous angiosperms (Wood, 1970). One monophyletic group within the section (*R. luteum-austrinum-occidentale*) is responsible for this geographic distribution. Of these three species two are North American, but *R. occidentale* occurs from southern Oregon to southern California and *R. austrinum* is restricted to the north-western region of Florida and contiguous counties of Alabama and Georgia. *Rhododendron luteum* is native to the Caucasus and Ukraine, and the Turkish coast of the Black Sea. It also has disjunct populations in former Yugoslavia and Poland (Szafer, 1975). Of these three taxa, *R. luteum* and *R. austrinum* are likely sister taxa, and *R. occidentale* is the basal member of the group (see Phylogenetic Analysis).

Rhododendron molle is found throughout central China and on the major islands of Japan. It is the most distinctive species in the section and is placed in subsect. *Sinensia*. Two geographical subspecies are recognized, one in China and one in Japan. The Japanese taxon may have been derived from peripheral populations isolated during the Quaternary when the Sea of Japan stabilized at its present height (Hsü, 1983).

Among the North American taxa, three of the four red–orange species are allopatric: *R. prunifolium*, *R. flammeum* and *R. cumberlandense*. *Rhododendron prunifolium* is restricted to the Chattahoochee River gorge along the Georgia–Alabama border, and is under consideration for designation as an endangered species (Federal Register, 1980). *Rhododendron flammeum* is usually found along the bluffs of rivers, particularly the Flint River gorge area in Georgia, and the bluffs of the Savannah River. *Rhododendron cumberlandense* occurs primarily on the Cumberland Plateau and Cumberland Mountains, from eastern Kentucky and western Virginia south to Talladega County, Alabama. It skips the Tennessee River Valley and is found again in the Blue Ridge Mountains along the Tennessee–North Carolina border, south to northern Georgia. The fourth species, *R. calendulaceum*, has a larger, more continuous distribution than the other three species, occurring from northern Georgia to southern Pennsylvania in the Blue Ridge Mountains, and Ridge and Valley, and Piedmont Provinces. Occasionally, *R. calendulaceum* is found in the Cumberland Plateau and Mountains, where it is isolated from *R. cumberlandense* by elevational and phenological differences. *Rhododendron calendulaceum* blooms before the leaves are fully expanded and generally has more glandular pedicels and sepal margins than *R. cumberlandense*. *Rhododendron cumberlandense* is usually found at higher elevations than *R. calendulaceum* (above 900m), has more consistently eglandular pedicels and sepal margins, and flowers well after the leaves have expanded. The distributional patterns of *R. cumberlandense* and *R. calendulaceum* are similar to those of *Tsuga canadensis*

and *T. caroliniana* (Little, 1970). However, unlike *R. calendulaceum*, *T. caroliniana* does not occur north of western Virginia, and *T. canadensis* extends much further north than *R. cumberlandense*.

The three pink to white species in sect. *Pentanthera* (*R. prinophyllum*, *R. periclymenoides*, *R. canescens*) all flower before the leaves expand, and are morphologically quite similar in appearance (see species descriptions and keys). *Rhododendron prinophyllum* has a disjunct distribution with populations occurring from New England south to Virginia, and again in eastern Oklahoma, southern Arkansas and western Tennessee. This pattern of distribution can also be seen in *Robinia pseudoacacia* and other woody angiosperms (Little, 1970). Isolated populations in Kentucky indicate that this species may have had a much wider distribution in the past. *Rhododendron periclymenoides* and *R. canescens* are partially sympatric, with *R. periclymenoides* occurring in the Piedmont and *R. canescens* in the Atlantic and Gulf Coastal Plain. However, their ranges overlap in North and South Carolina and Georgia.

Rhododendron viscosum is the most widespread (and variable) species of the section in North America. It occurs from Maine south to peninsular Florida, west to eastern Texas and from eastern Oklahoma and southern Arkansas east to the Atlantic coast. Its sister species, *R. arborescens*, has a much more restricted range, occurring from north-western Alabama and Georgia north to Virginia at higher elevations in the mountains. *Rhododendron atlanticum* is native from Delaware to South Carolina along the Atlantic Coastal Plain.

All of the species in the section occur on acid, relatively open sites and are often near water, but usually on well-drained soils. However, they may also occur on poorly drained sites. *Rhododendron canescens* and *R. atlanticum* are often found in very wet soils or in standing water. *Rhododendron viscosum* is also a species of wet habitats. In the northern part of its range it often occurs in sphagnum bogs and it is common in swampy situations and along stream banks in the Atlantic and Gulf Coastal Plains. Other species occur near water-courses but are usually on well-drained soils: *R. arborescens*, *R. flammeum* and *R. periclymenoides*. However, *R. flammeum* also occurs in sandhills. *Rhododendron calendulaceum* is characteristically found on well-drained sites where the forest canopy is not very dense. Its diploid relative *R. cumberlandense* occurs typically on the tops of sandstone ridges. Most sympatric species are separated by flowering time and/or habitat preference, e.g. *R. viscosum* and *R. atlanticum* are separated by flowering times, whereas *R. canescens* and *R. austrinum* are isolated by habitat preferences. However, this is not the case with sympatric populations of *R. viscosum* and *R. arborescens*. Pollinator differences may play some role in isolating mechanisms between these two closely related species, since the floral fragrance of *R. arborescens* is quite different from that of *R. viscosum*. However, isolating mechanisms in this section are far from complete and both hybrids and hybrid swarms occur (see Hybridization and Allopolyploid Speciation, and discussions after species descriptions).

TAXONOMIC CHARACTERS

TAXONOMIC PHILOSOPHY

Determination of species in sect. *Pentanthera* is based on the presence of morphological gaps using a complex of characters (taxonomic or phenetic species concept; see Judd, 1981; Stevens, 1980b). Taxa below the rank of species (i.e. subspecies) are recognized when variation in one or a few characters correlates with a distinct geographic subunit of the species range (Fernald,

1940; Clausen, 1941; Mayr, 1969). However, cladistic relationships are also considered in species determination (see Donoghue, 1985; Mishler, 1985; deQueiroz & Donoghue, 1988, 1990) so that presumed paraphyletic species are not recognized.

Higher taxa are strictly monophyletic, historical groups (Hennig, 1966; Wiley, 1981) and are given formal recognition when the divergent clades are sufficiently supported by unique characters that exhibit little or no polymorphism.

HABIT

The species of sect. *Pentanthera* vary from low (less than 1m), strongly rhizomatous (*R. atlanticum*) to tall (8–10m), almost tree-like (*R. arborescens*) non-rhizomatous shrubs. In the past the habit of many of the species in this group has been described as non-rhizomatous (Wilson & Rehder, 1921; Skinner, 1961; Galle, 1968). However, Solymosy (1976) found that the habit of most of the species varies from non-rhizomatous to rhizomatous or stoloniferous. Field-work by the present author supports Solymosy's observations as most species are at least occasionally rhizomatous.

The twigs are lens-shaped to terete in cross-section. Shoots or young twigs are reddish brown in most of the species, but are yellow-brown in *R. arborescens*. They may be glabrous or densely covered with unicellular hairs and/or multicellular hairs. The multicellular hairs may be glandular or eglandular. Mature twigs and branches are usually brownish grey with the indumentum much reduced in density compared with the younger growth.

The growth architecture in sect. *Pentanthera* fits Leeuwenberg's model (Hallé et al., 1978), with all shoots equivalent and orthotropic, terminating in an inflorescence, and with sympodial growth. The branching pattern of the species of sect. *Pentanthera* is pseudo-verticillate. The leaves often appear to be whorled at the tips of the branches, especially on the slower-growing shoots, but are actually alternate on the stem, with very short internodes. This pseudo-verticillate leaf arrangement and subsequent branching is least common in *R. atlanticum*, where the leaves are usually alternately scattered along the short, often unbranched stems.

INDUMENTUM

Two basic types of hairs can be found in sect. *Pentanthera*: unicellular and multicellular. The multicellular hairs may be gland-tipped or eglandular. These types of hairs are found throughout the genus *Rhododendron* (Seithe-von Hoff, 1960, 1980; Hedegaard, 1980) as well as in other ericaceous genera (Drude, 1889; Wood, 1961).

Unicellular hairs may be found on all parts of the plant and their presence and density are taxonomically useful (see keys). Unicellular hairs are most dense on the fruits and abaxial surface of the leaves of *R. canescens*. By contrast, *R. prunifolium* essentially lacks unicellular hairs on all parts of the plant. However, there is tremendous variation throughout the section in the density of unicellular hairs, and this character is often continuous—from essentially glabrous to densely pubescent, e.g. the leaves and fruits of *R. molle*. However, some species can be distinguished by the density of unicellular hairs (in conjunction with other morphological characters); for example, *R. prinophyllum* and *R. periclymenoides* can be distinguished by the presence of densely unicellular pubescent leaves in *R. prinophyllum* and essentially glabrous leaves in *R. periclymenoides*.

The density of multicellular hairs is also variable but not to as great an extent as that of unicellular hairs. Taxonomically, the presence or absence of these hairs and whether or not they are gland-tipped is very useful. *Rhododendron viscosum*, *R. arborescens* and *R. atlanticum* all possess corollas densely covered on the outer surface with multicellular gland-tipped hairs that continue in distinct lines along the lobes of the corolla. The remaining species, with multicellular gland-tipped hairs on the corolla tube, lack the glandular hairs continuing up the corolla lobes, or else the glandular hairs are much less dense and not in distinct lines. Conversely, *R. flammeum* and most populations of *R. periclymenoides* are characterized by multicellular eglandular hairs on the corolla. In *R. molle* multicellular hairs are completely absent on the outer surface of the corolla. Gland-headed multicellular hairs are ancestral in the section (determined by outgroup analysis). The glandular head has been lost repeatedly, thus the eglandular nature of the only distantly related *R. flammeum* and *R. periclymenoides* is a result of parallel evolution and is not due to a recent common ancestor.

LEAVES

Some characters of the leaf have been surveyed in other members of the genus *Rhododendron* by Cowan (1950). Within sect. *Pentanthera* the size and shape of the leaves varies from ovate to elliptic to obovate. The base is acute and the apex may be acute to obtuse; often it is also mucronate. All of the leaves in this section possess revolute ptyxis and brochidodromous venation. The margins are either entire or very slightly serrulate, as in some populations of *R. viscosum*, and ciliate with multicellular hairs. In *R. luteum*, *R. austrinum* and *R. occidentale* the leaves are ciliate with multicellular gland-tipped hairs as well. The petiole ranges from 0.1 to 1cm in length and is quite variable on an individual plant. The leaf blade varies from 3.1 to 15.2cm in length and from 0.8 to 4.2cm in width. *Rhododendron prunifolium* and *R. luteum* tend to have larger leaves than most of the other species in the section. The leaves of *R. atlanticum* tend to be narrower than is typical for the section. However, the size and shape of the leaves are quite variable within a species and even within an individual, and are generally of little taxonomic importance.

BUD SCALES

Vegetative and floral bud scales are taxonomically important in sect. *Pentanthera* (see key). The scales of the floral buds are ovate to spatulate and chestnut brown. In some areas along the Gulf Coastal Plain, populations of *R. viscosum* have a dark brown band along the margin at the apex of the floral bud scale. All species have a dense patch of unicellular hairs on the adaxial surface towards the distal end of the scale, the remainder of which is glabrous. The abaxial surface varies from glabrous, smooth and shining, to densely covered with unicellular hairs (Fig. 3). Usually this character is fairly constant within a species, but bud scales in *R. viscosum* vary from glabrous to densely pubescent and in *R. periclymenoides* from glabrous to slightly pubescent. However, even in those species that are generally consistent there are occasional exceptions so that this character should be used in conjunction with others. Some species, however, possess consistently glabrous floral bud scales, e.g. *R. arborescens* and *R. prunifolium*, while others, such as *R. prinophyllum* and *R. canescens*, are consistently pubescent.

The margins of the floral bud scales may be ciliate, with unicellular hairs, or glandular with multicellular hairs (Fig. 3). Often the apex of the scale has a few unicellular hairs as well. When

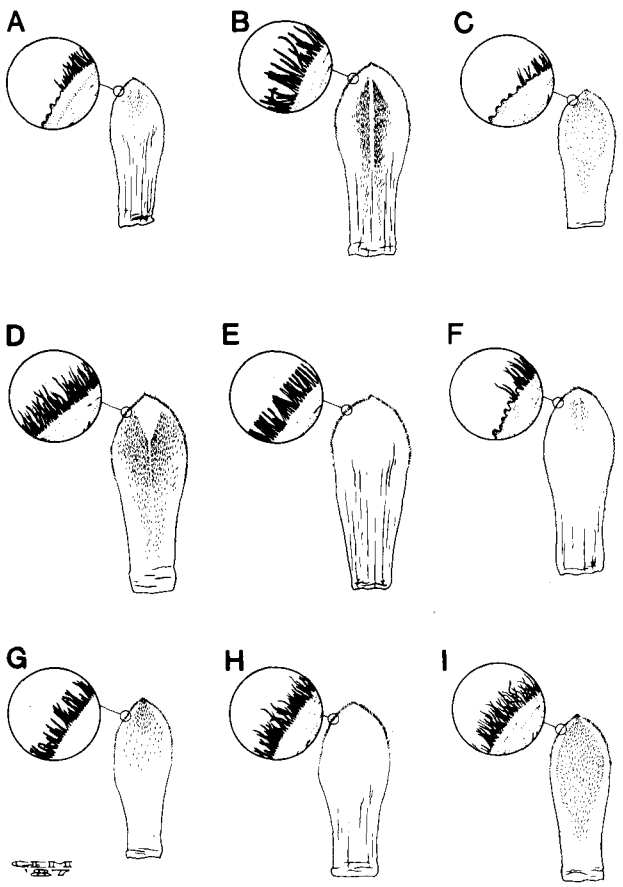


FIG. 3. Diversity in floral bud-scale margin and abaxial surface pubescence in some members of *Rhododendron* sect. *Pentanthera*. A, *R. cumberlandense*; B, *R. flammeum*; C, *R. viscosum*; D, *R. occidentale*; E, *R. prunifolium*; F, *R. luteum*; G, *R. prinophyllum*; H, *R. alabamense*; I, *R. atlanticum*. All 3.5×.

glands along the margin of the bud scale are present, they are usually sessile and sometimes fused together forming a crenate-glandular margin, as in *R. calendulaceum* [a similar fusion forming a glandular margin is taxonomically important in *Cavendishia* (Luteyn, 1983)]. The characters of bud-scale margin and pubescence of the abaxial surface of the bud scale are taxonomically useful when used in combination, e.g. *R. cumberlandense* and *R. calendulaceum* are the only species with red flowers that possess glabrous, glandular-margined bud scales, while the yellow–orange-flowered *R. austrinum* possesses densely pubescent, glandular-margined bud scales. In *R. prinophyllum* the floral bud scales often fall away from the inflorescence much sooner than is typical for the section. However, this character is not consistent enough to be of much taxonomic importance.

The characteristics of vegetative bud scales generally correlate with those of the flower bud scales, except that when glands are present they usually possess short to long multicellular stalks and the scales always lack the tuft of unicellular hairs at the apex. However, in *R. cumberlandense* and *R. calendulaceum* the margins of the flower bud scales are glandular, but

the margins of the vegetative bud scales are unicellular-ciliate. The outermost scale of the vegetative buds usually possesses an apical awn. This awn ranges in length from less than one, to three or more times longer than the length of the body of the scale, and may or may not possess multicellular eglandular hairs on the abaxial surface.

FLOWERS

Flowers provide some of the primary characters of taxonomic value within the section, and have been used by previous authors (Wilson & Rehder, 1921; Skinner, 1955, 1961; Galle, 1968, 1985; Solymosy, 1974, 1976; King, 1977a, b, 1980). Their shape and colour are important, as is the presence or absence of a darker-coloured blotch on the upper corolla lobe (see numerous examples in key). However, these characters are often obscured or lost upon pressing and drying and most labels are sorely lacking in information concerning flower colour.

All of the species in sect. *Pentanthera* have perfect, sympetalous, slightly zygomorphic flowers. They are borne in shortened racemes and are horizontally to almost vertically oriented. A number of organisms have been reported as visiting the flowers. Kellner (1978) reported bumble-bees, butterflies and other insects, as well as hummingbirds, visiting flowers of *R. arborescens*, *R. viscosum* and *R. cumberlandense* on Gregory Bald in Tennessee. Moths and bumble-bees have been observed by the present author as regular visitors of *R. canescens*, and swallowtail butterflies as visitors of *R. calendulaceum*. Floral fragrances have not been analysed by the author but there appear to be two basic types upon general inspection: the sweet and/or musky fragrance found in *R. canescens*, *R. arborescens*, *R. viscosum*, etc., and the more acrid, unpleasant fragrance of *R. calendulaceum* and *R. flammeum*. This acrid fragrance is not very noticeable and often these species are reported as lacking any fragrance (Galle, 1968).

The pedicel varies from 0.3 to 3cm in length. *Rhododendron molle* subsp. *molle* has the longest pedicels and *R. flammeum* and *R. cumberlandense* tend to have the shortest. The pedicel is subtended by a spatulate bract and two basal elongate-spatulate bracteoles. The size and shape of the bracteoles are uniform throughout the section and are thus of little taxonomic importance. The bracts are similar in size and shape to the outer flower bud scales. The margins of the bracts and bracteoles are the same as those of the outer flower bud scales, but the abaxial surfaces of the bracts and bracteoles are usually glabrous.

The calyx is very slightly synsepalous, actinomorphic to very slightly zygomorphic, and irregularly persistent. The lobes are triangular to lingulate with obtuse apices. The width of the base of the lobes is essentially uniform throughout the section. Although sometimes used by earlier workers (Wilson & Rehder, 1921), the length of the calyx lobes is not taxonomically important as there is a great deal of variation in length even on one flower. The calyx has five unequal lobes that vary from 0.03 to 1cm in length. The length of the calyx lobes can be very unequal on an individual flower, but in all species the lobe apices are blunt and the lobes are scarcely 1mm in width at the base.

The corolla may be broadly funnelform, as in *R. molle*, or narrowly funnelform as in subsect. *Pentanthera*. The corolla tube may gradually expand into the limb as in *R. prinophyllum*, *R. periclymenoides* and *R. molle*, or may very abruptly expand as in *R. flammeum*, *R. cumberlandense* and *R. calendulaceum*. There are always five lobes and the upper lobe is broader than the other four. The margins of the lobes may be plane as in *R. arborescens* or crisped-undulate as in *R. calendulaceum*. The apices of the lobes are usually acute (except in *R. molle*) although

this is not always noticeable, especially in the uppermost lobe, due to the recurvature of the apex.

The colour of the corolla ranges from white and/or pink, through yellow and orange, to red. The upper lobe of the corolla has a darker yellow, orange or red-coloured blotch in *R. luteum*, *R. austrinum*, *R. cumberlandense* and *R. prunifolium*. In these species the blotch may be rather obscure, depending on the density of the corolla colour, but in *R. calendulaceum*, *R. occidentale*, *R. flammeum* and *R. alabamense* the blotch is orange to yellow and quite noticeable. In *R. molle* the upper corolla lobe has green or yellowish green spots rather than a solid blotch. There is no distinguishing blotch on *R. canescens*, *R. periclymenoides*, *R. prinophyllum*, *R. viscosum*, *R. atlanticum* or *R. arborescens*. Corolla colour is also extremely valuable in the detection of hybrid individuals (see discussions after species descriptions for descriptions of hybrids).

All species within the section have five stamens. The stamens are declinate and are exserted beyond the corolla except in *R. molle*. The stamens are from 2.1 to 8.4cm long. The anthers lack appendages and have two pores at the apex. Pollen is shed in tetrads with viscin threads. The androecium is not very useful taxonomically due to its uniformity throughout the section. An exception is *R. arborescens* which can be distinguished from the other white-flowered species by the consistently red or dark pink filaments. The rest of the species have filaments that are more or less the same colour as the corolla.

The gynoecium is composed of five carpels with axile placentation. The stigma is very shallowly five-lobed and becomes receptive after the pollen is shed. The stigma ranges in width from 0.05 to 0.35cm and is of little or no taxonomic importance due to its uniformity throughout the section. The style is also of little taxonomic usefulness. It is declinate and exserted beyond the corolla. Usually it is exserted beyond the anthers as well. While the style varies from 2.2 to 8.8cm in length, there is such infraspecific variation that it does not provide any taxonomic information. The ovary is superior and ovate to ovoid-cylindric in shape. It is shallowly five-lobed with a slight depression at the apex where the style is articulated. The base of the ovary is nectariferous and in dried herbarium specimens appears black and shiny. In live plants this nectariferous area is green and glistening.

FRUITS AND SEEDS

Fruits of sect. *Pentanthera* are ovoid to cylindric, five-valved septicidal capsules that are light to dark chestnut brown. In *R. canescens* the fruit is usually cylindric, whereas in *R. calendulaceum*, *R. flammeum* and other members of the red-flowered group the fruit tends to be ovate. Fruit length varies from 0.7 to 3.6cm and width from 0.3 to 1.4cm. *Rhododendron viscosum* tends to have smaller fruits than the rest of the species in the section. Characters of the fruit are generally of only limited taxonomic usefulness (Radford et al., 1968).

The seeds are borne on placentae which are elongate relative to the long axis of the fruit. The seeds vary from 0.8 to 5.5mm in length and from 0.35 to 3mm in width. *Rhododendron molle* has the largest seeds in the section. Seed size is quite variable within a species. In fact, the variation in seed length within a single capsule can be greater than the variation observed between species. Therefore its taxonomic usefulness is not great. However, characteristics of the testa are taxonomically valuable (see keys). These characters have been used to some extent in other members of the genus *Rhododendron* (Kingdon-Ward, 1935; Hedegaard, 1980). The

testa is expanded and somewhat dorsiventrally flattened in all the species except *R. arborescens* and *R. periclymenoides* (Figs 4–11). In the latter two species the testa is not expanded or only slightly so, and is not dorsiventrally flattened. The shape of the testa cells is also taxonomically useful (Stevens, 1970). They vary in shape from essentially isodiametric, e.g. *R. occidentale*, to short (less than three times as long as broad), e.g. *R. austrinum*, to elongate (greater than three times as long as broad), e.g. *R. luteum*. In addition, there is variation in the end-walls, which are either transverse or tapered. *Rhododendron prinophyllum* and *R. luteum* possess seeds with elongate testa cells with tapered end-walls, while *R. austrinum* and *R. cumberlandense* possess shorter testa cells with transverse end-walls. In some species, such as *R. atlanticum* and *R. viscosum*, the testa cells over the body of the seed are distinctly elongate, while those in the expanded portion of the testa are short, or they may be essentially isodiametric. In *R. canescens* both elongate and short cells occur throughout the testa, whereas in *R. prinophyllum* and *R. austrinum* the testa cells are essentially the same length (e.g. short) throughout the testa (Figs 4–11).

VEGETATIVE ANATOMY

Various aspects of stem and leaf anatomy have been surveyed in *Rhododendron* (Hayes et al., 1951) and in other ericads (Watson, 1964, 1965). Stem and leaf anatomy in sect. *Pentanthera* was surveyed to see if there were any taxonomically useful characters. Serial sections of the stems and leaves of each species were made by hand with a razor blade. The sections were treated with phloroglucinol and concentrated hydrochloric acid.

For the most part, uniformity characterizes the section. The upper epidermis of the leaf is composed uniformly of a single layer of more or less isodiametric cells. The pith is homogeneous throughout. Nodal anatomy is unilacunar with a single trace in all species (Philipson & Philipson, 1968). The vascular tissue of the petiole and midvein of the lamina is arcuate to bifacial, but this is of little taxonomic use. In this section there is variation with respect to the fibre sheath associated with the vascular bundle of the midvein of the leaf and this is of some taxonomic use (Table 4, Fig. 12). In *R. molle*, *R. prinophyllum*, *R. periclymenoides*, *R. luteum* and *R. alabamense* the fibre sheath is absent. It is rather poorly developed in *R. flammeum* and *R. cumberlandense*, but very well developed in the remaining species. The only species that shows variation in this character is *R. viscosum*. It has a rather poorly developed fibre sheath in the more northern part of its range and a very prominent fibre sheath in some of the more southern populations.

PHENOLOGY

Flowering time in the section is taxonomically significant and has been used by most of the previous workers in the section (Wilson & Rehder, 1921; Skinner, 1961; Galle, 1968, 1985; Solymosy, 1976). However, it is most useful within a restricted geographic range, as latitude and elevation greatly affect the time of anthesis.

Most of the species flower in the spring and early summer before the leaves appear, or as they unfold. By contrast, four species (*R. prunifolium*, *R. cumberlandense*, *R. viscosum* and *R. arborescens*) are later blooming and anthesis occurs after the leaves have expanded. In the higher elevations of the Appalachians there is some overlap between these two states in species such as *R. viscosum* which may flower as the leaves unfold or after they have expanded to some degree.

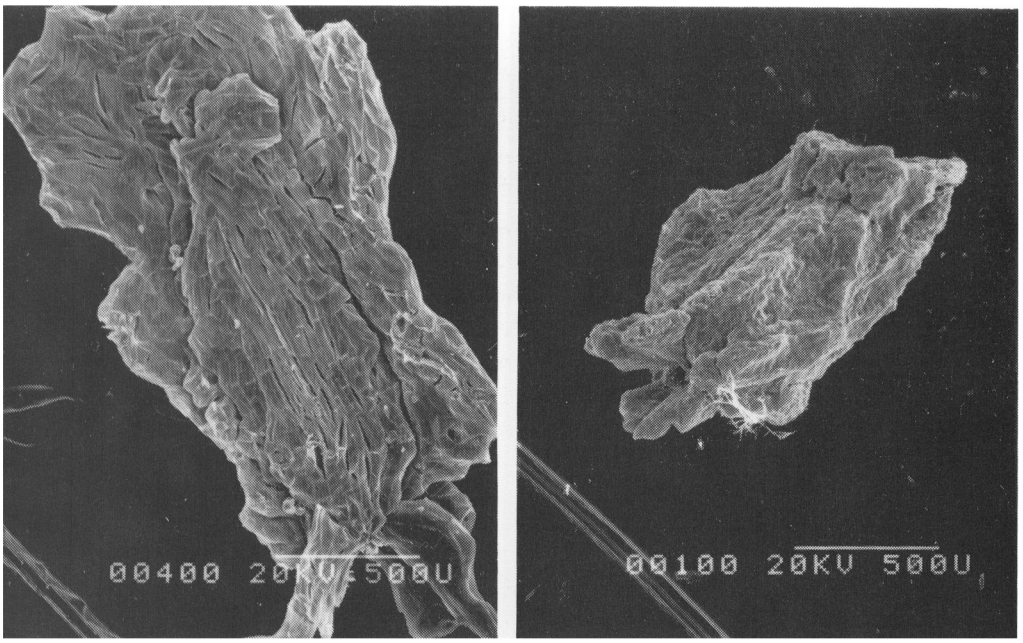


FIG. 4. Scanning electron micrographs of the testa of the seed in *Rhododendron calendulaceum* (left) and *R. cumberlandense* (right).

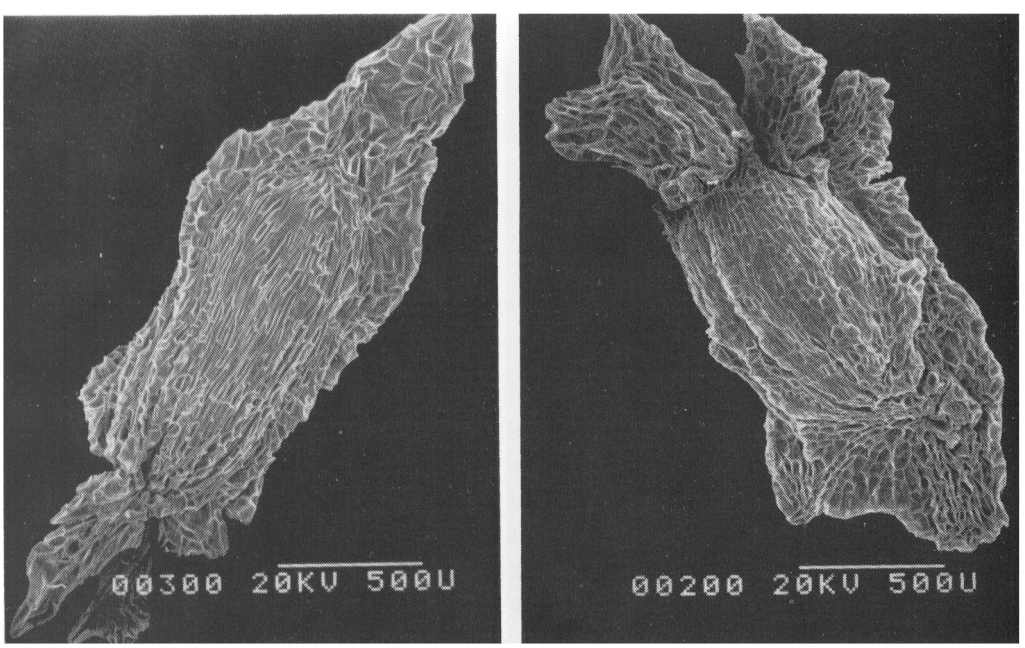


FIG. 5. Scanning electron micrographs of the testa of the seed in *Rhododendron flammeum* (left) and *R. prunifolium* (right).

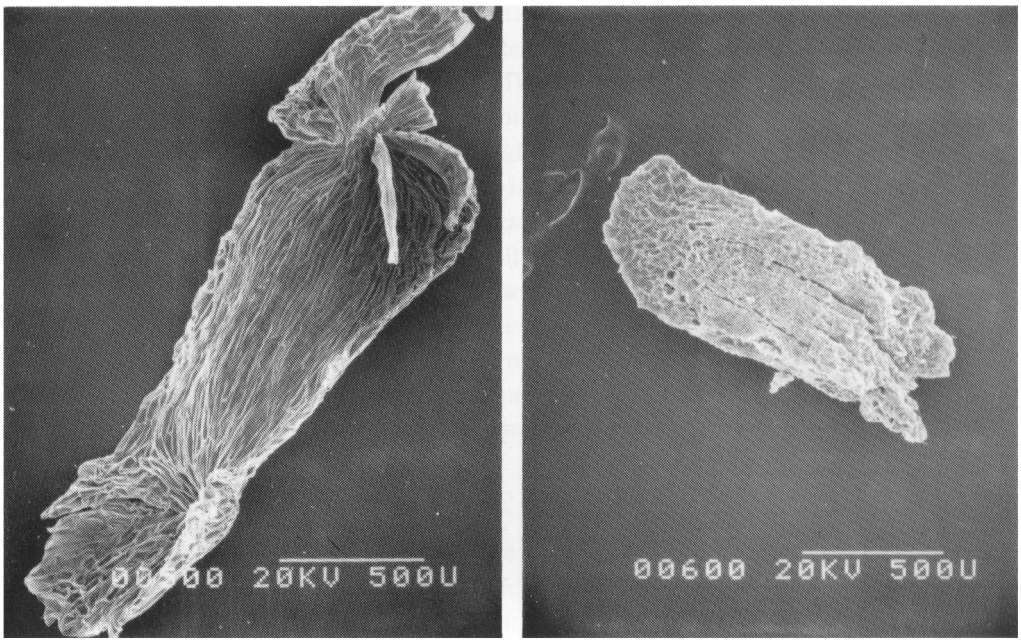


FIG. 6. Scanning electron micrographs of the testa of the seed in *Rhododendron alabamense* (left) and *R. periclymenoides* (right).

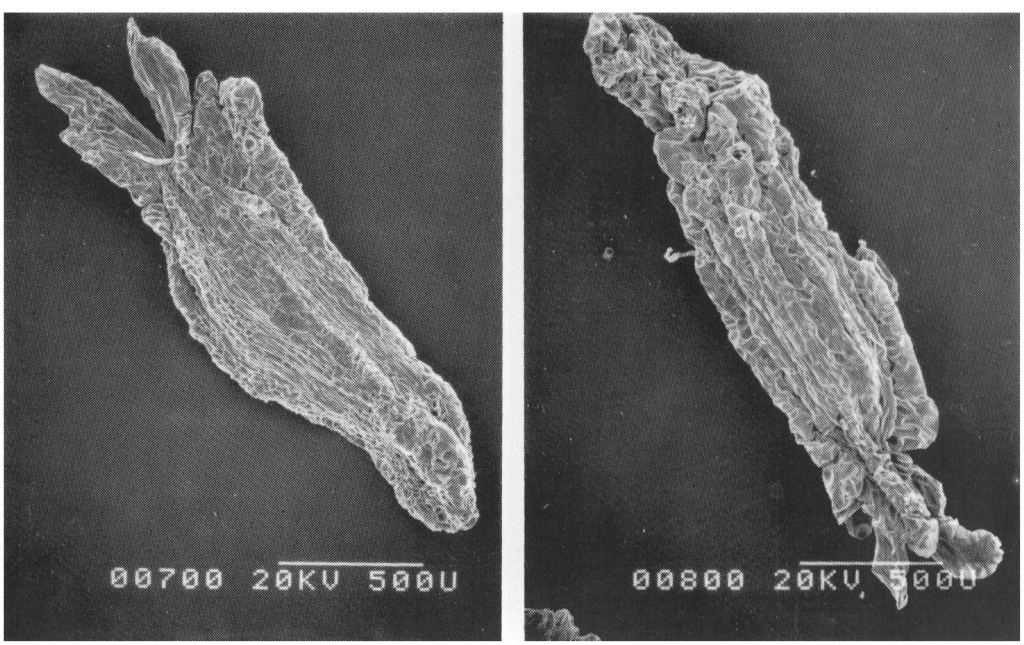


FIG. 7. Scanning electron micrographs of the testa of the seed in *Rhododendron canescens* (left) and *R. occidentale* (right).

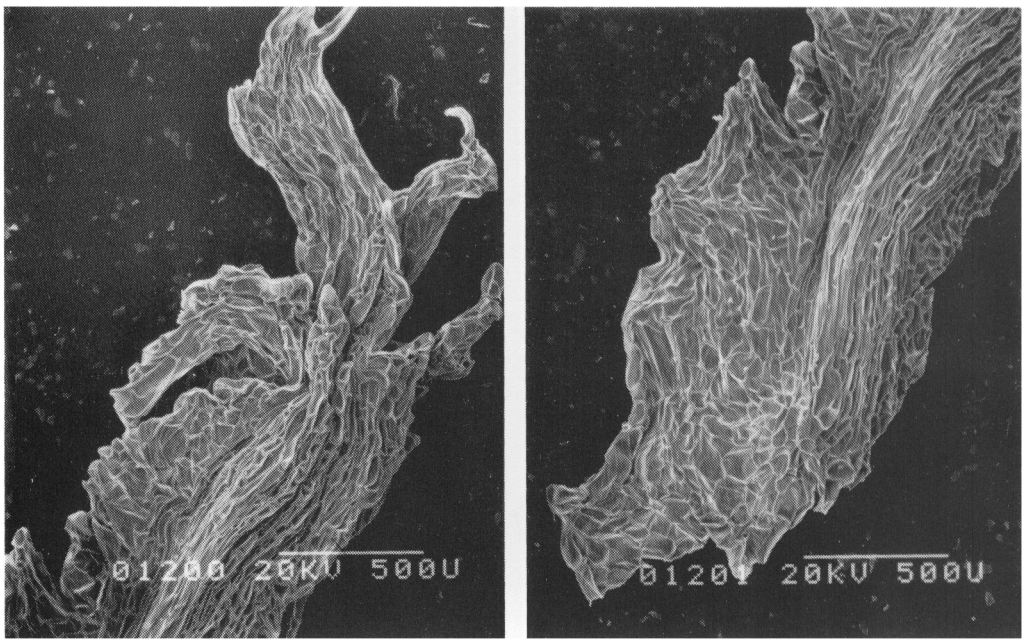


FIG. 8. Scanning electron micrographs of the testa of the seed in *Rhododendron austrinum* (left) and *R. luteum* (right).

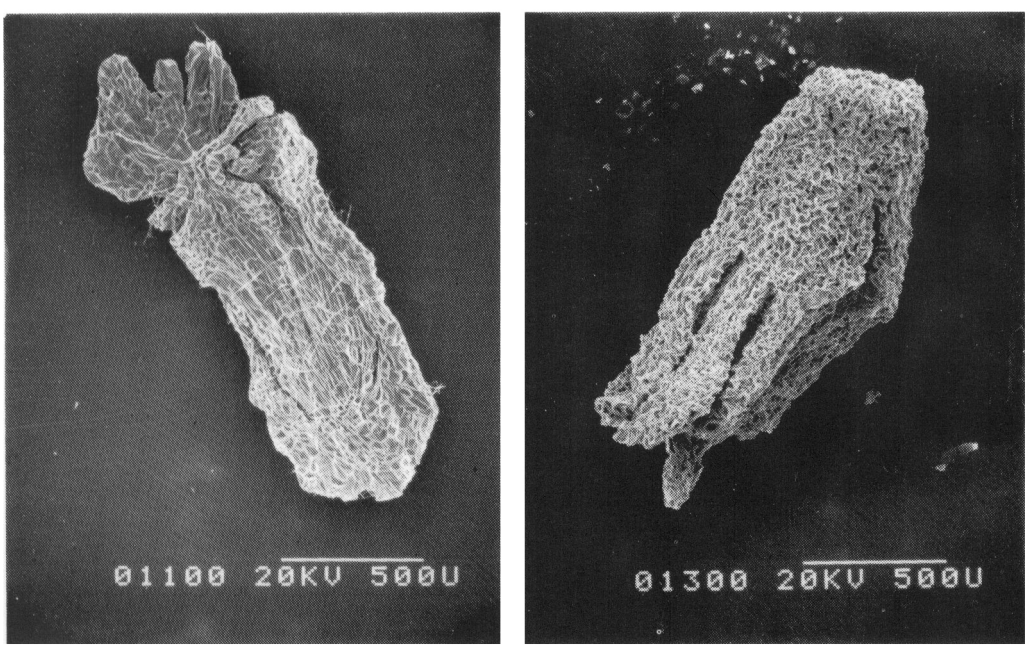


FIG. 9. Scanning electron micrographs of the testa of the seed in *Rhododendron atlanticum* (left) and *R. arborescens* (right).

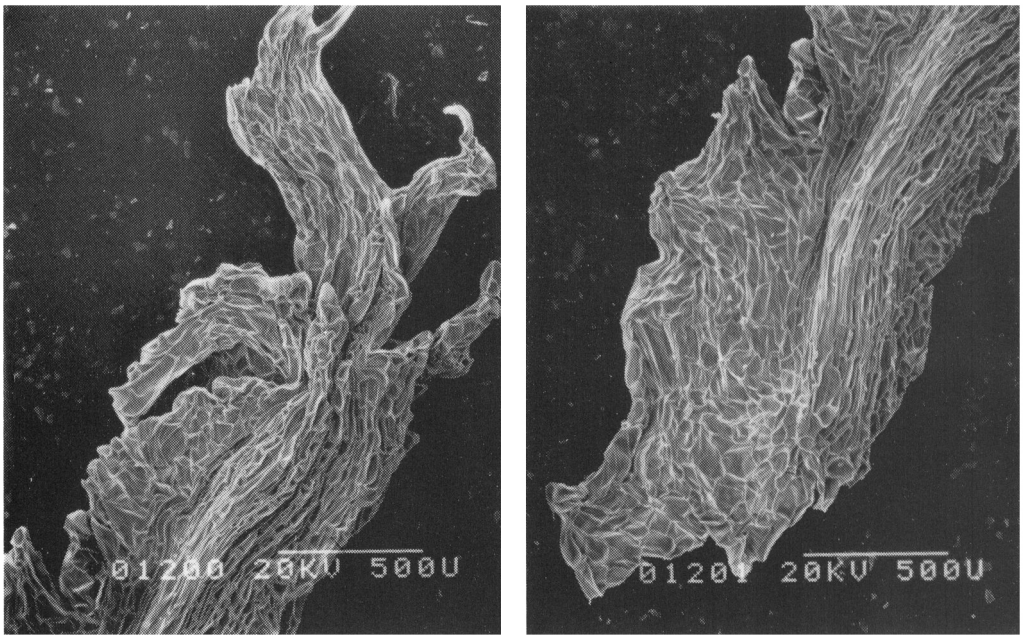


FIG. 10. Scanning electron micrographs of the testa of the seed in *Rhododendron viscosum*. Left: micropylar end; right: chalazal end.

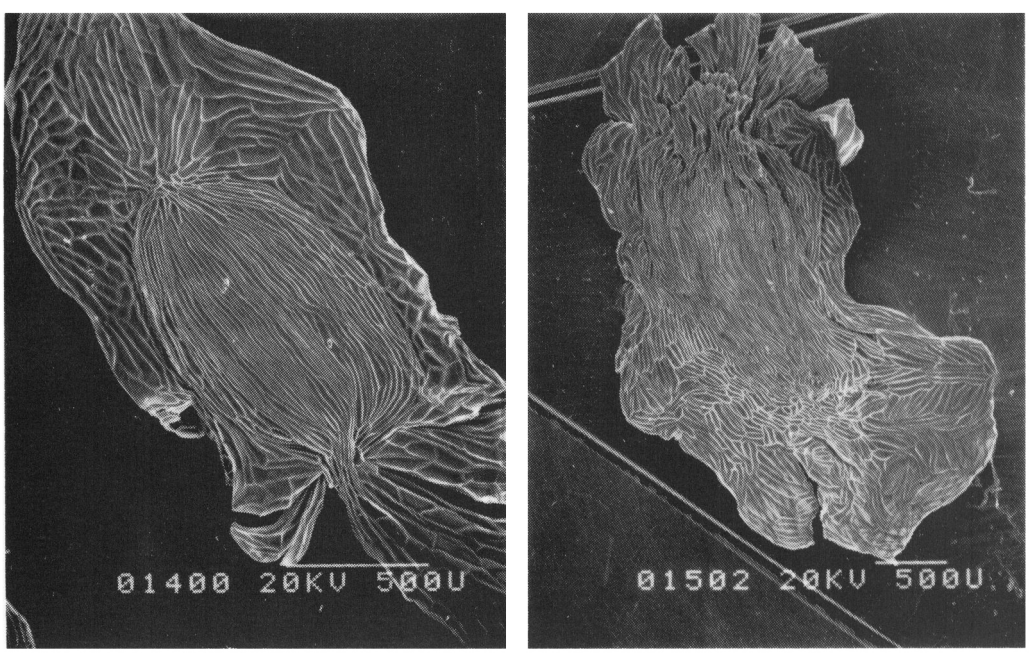


FIG. 11. Scanning electron micrographs of the testa of the seed in *Rhododendron prinophyllum* (left) and *R. molle* (right).

TABLE 4. Variation in the anatomy of the primary vein of the leaf in members of *Rhododendron* sect. *Pentanthera*.

	Fibre sheath	
Taxon	Petiole	Lamina
alabamense	absent	absent
arborescens	present	present
atlanticum	present but not well developed	present
austrinum	present	present
calendulaceum	absent	present
canescens	absent	present
cumberlandense	absent	present but not well developed
flammeum	absent	present but not well developed
luteum	absent	absent
molle	absent	absent
occidentale	present but not well developed	present
periclymenoides	absent	absent
prinophyllum	absent	absent
prunifolium	present but not well developed	present
viscosum	present but not well developed	present but not well developed

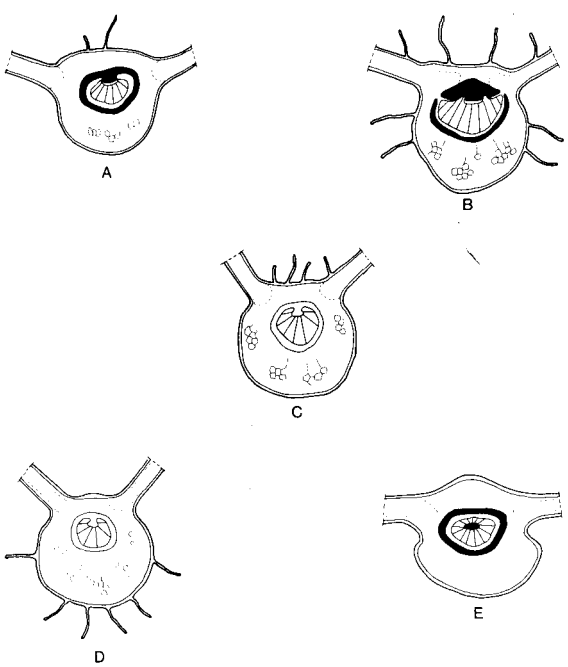


FIG. 12. Semi-diagrammatic representation of vascular bundle patterns in leaves of some members of *Rhododendron* sect. *Pentanthera* (17.5×). A, *R. atlanticum*; B, *R. austrinum*; C, *R. molle*; D, *R. periclymenoides*; E, *R. prunifolium*. Solid black: phloem fibres; solid white: phloem; vertical lines: xylem.

Rhododendron prunifolium flowers late in the summer well after the leaves have expanded, and *R. arborescens*, *R. viscosum* and *R. cumberlandense* generally flower after the leaves have expanded. In *R. cumberlandense* the flowers usually appear after next year's vegetative buds have formed, while in the closely related *R. calendulaceum* the flowers appear before or as the leaves expand, and usually before the new vegetative buds have formed.

CYTOGENETICS

All of the taxa in the section are diploid ($2n = 26$) (Sax, 1930; Janaki-Ammal et al., 1950; Li, 1957; Willingham, 1973), except *R. calendulaceum* which is tetraploid ($2n = 52$) (Li, 1957; Willingham, 1973). The chromosomes are all extremely small. Raven (1975) suggested that the basic number is most likely x = 12 in the Ericaceae. Sax (1930) documented that chromosome stability in *Rhododendron* is very high, even in widely geographically isolated species.

Li (1957) studied the cytology of some collections of the American azaleas which were obtained through Skinner (1955). From somatic and meiotic counts he documented the chromosome numbers of all the species in the section except *R. molle*, *R. luteum* and *R. occidentale*. He reported natural triploids as occurring in some plants of *R. calendulaceum* on Wayah Bald, Macon County, North Carolina and in an individual of *R. atlanticum*. He also noted that the red–orange azalea on Gregory Bald was diploid and, therefore, not *R. calendulaceum*. *Rhododendron calendulaceum* and *R. atlanticum* both exhibit a wide range of variation in the size of the mature pollen grains and have chromosomes of unequal sizes. However, the pollen of *R. calendulaceum* shows almost no abortion, while the percentage of abortive pollen grains ranges from 25 to 100% in some individuals of *R. atlanticum*. Chromosome counts of putative hybrids between *R. canescens* and other sympatric species show that all are diploid ($2n = 26$) and exhibit relatively complete compatibility and low levels of pollen abortion. According to Li, polyploidy is not a prominent factor in the systematics of this section and the presence of a few triploids is due to unreduced gametes or to autotriploidy (e.g. *R. atlanticum*). Li also suggested that the two distinct sizes of chromosomes in *R. calendulaceum* indicated that it is most likely an allotetraploid, with one parent being the diploid *R. cumberlandense*.

HYBRIDIZATION

The species within sect. *Pentanthera* have been known to hybridize freely in the garden for many years (see Wilson & Rehder, 1921). Even today the Mollis and Ghent azaleas, which are descended from crosses between *R. molle* subsp. *molle* and *R. molle* subsp. *japonicum*, and between *R. luteum* and the North American species, respectively, are horticulturally important (Bowers, 1927, 1936, 1954).

In natural populations of the eastern North American species, the extent of hybridization has been suggested as extremely widespread (Skinner, 1955, 1961; King 1977a, b, 1980). Herbarium specimens reflect this attitude and a hybrid designation is often suggested for specimens where identification is particularly difficult. However, field studies and careful examination of dried specimens show that most species are phenologically and/or ecologically isolated within any local geographic area, and that only occasionally does habitat or flowering time overlap. An example may be seen in *R. canescens* and *R. austrinum* (see discussions after species descriptions for other examples of hybridization). These two species appear sympatric when

plotted county by county on a map, but *R. canescens* is usually a plant of wet bottomlands and stream banks, while *R. austrinum* is found most commonly in upland woods on well-drained soils. In addition *R. canescens* begins to flower slightly earlier than *R. austrinum* and in some years *R. canescens* has almost finished flowering by the time *R. austrinum* begins. Therefore, while hybridization can and does occur between these two species, preferential collecting has overemphasized its actual frequency. The restricted nature of hybridization between *R. austrinum* and *R. canescens* is important because it also precludes the invocation of long-distance introgressive hybridization to explain morphological character variation within either species (see Skinner, 1961). Specimens from some populations of *R. canescens* in Georgia have mixed glandular and unicellular-ciliate bud-scale margins and this departure from the more prevalent unicellular-ciliate condition has been regarded as a result of hybridization and subsequent introgression between *R. austrinum* and *R. canescens*. Actually, this character varies in populations where there are no sympatric species with glandular bud-scale margins, or in populations that are too geographically removed from species that do have glandular bud scales for introgression to occur (see Heiser, 1973 for discussion and review of introgression). The variation in the condition of the bud-scale margin in *R. canescens* is more likely to be due to natural infraspecific variation than hybridization.

Skinner (1961) particularly emphasized hybridization as a major factor in the blurring of species boundaries. He explained variation in flower colour, leaf surface and indumentum all as a result of one or more hybridization events. This is probably a natural outcome of a typological species concept, which leads to difficulty in explaining interpopulation variation. By invoking hybridization or introgression to explain even minor morphological variation, the problem of species identification and the detection of true hybrid populations has been exacerbated.

Natural hybrids and hybrid swarms can however occur when sympatric species overlap in flowering times and habitats. These hybrid populations are most easily identified by flower colour and thus seeing the plants in the field (or having excellent label data) is necessary. In his analysis of leaf flavonoids of morphologically determined hybrids, King (1977b) found that the progeny often do not exhibit the addition of compounds of both parents, but rather display a loss of compounds. Chromosome studies of known hybrids (Li, 1957) show that the hybrids are usually diploid and that there is almost complete compatibility during meiosis.

ALLOPOLYPLOID SPECIATION

The only example of allopolyploid speciation in sect. *Pentanthera* is found in *R. calendulaceum*. This species is the only tetraploid in the section and is geographically the most widespread red–orange species. It has long been noted for its variation in flower size and colour, blooming time and leaf indumentum (Bartram, 1791; Rehder, 1921; Skinner, 1955, 1961; Galle, 1968, 1985; Willingham, 1973, 1976). In Li's (1957) study of chromosomes of *R. calendulaceum*, he found that they were of unequal sizes; this was later confirmed by Willingham (1973). Li postulated that *R. calendulaceum* was an allotetraploid based on the two different chromosome sizes and that the diploid, *R. cumberlandense*, was probably one of the parent species. Willingham (1976) considered *R. calendulaceum* to be an autotetraploid and suggested that the diploid and tetraploid be recognized as a single species. However, King's (1977a, 1980) study supported Li and suggested

that *R. calendulaceum* was an allotetraploid, based on leaf flavonoid analysis. Ferrerol and its glycoside are common to *R. flammeum*, *R. prunifolium* and *R. cumberlandense*; however, *R. calendulaceum* lacks these compounds and asebotin is present instead. Only three species in the section contain the latter compound: *R. prinophyllum*, *R. canescens* and *R. periclymenoides*. Therefore, King hypothesized that the parents of the ancestor to *R. calendulaceum* were most likely *R. cumberlandense* and a member of the pink–white-flowered group. From a detailed morphological study of *R. calendulaceum* (including its inter- and intrapopulation variation), it seems likely that the parents were similar to the extant species, *R. cumberlandense* and *R. prinophyllum*. *Rhododendron periclymenoides* usually has eglandular corollas, pedicels and sepal margins, and *R. canescens* also usually has eglandular pedicels. The highly glandular nature of *R. calendulaceum* and its corolla shape suggest that an entity ancestral to *R. prinophyllum* is a more likely candidate than either *R. periclymenoides* or *R. canescens*. Furthermore, the geographical ranges of *R. prinophyllum* and *R. cumberlandense* are marginally sympatric, with their distributions overlapping in the Cumberland Plateau and Cumberland Mountains. The polymorphic nature of *R. calendulaceum* has been attributed not only to its polyploid condition, but also to introgression with *R. cumberlandense* (Skinner, 1961). This hypothesis was rejected by Willingham (1973) who suggested that introgression with *R. cumberlandense* was not a major factor in the variability of the tetraploid.

The occurrence of polyhaploidy (Willingham, 1973) and complement fractionation (Widrlechner et al., 1984) in *R. calendulaceum* have been suggested as two alternative causes in the formation of *R. cumberlandense*. This would make *R. calendulaceum* a direct ancestor of the diploid *R. cumberlandense*. The occurrence of either of these phenomena seems to require unnecessarily complex explanations. In addition, the suggestion that *R. calendulaceum* is ancestral to *R. cumberlandense* is not supported by cladistic analysis.

TAXONOMIC ACCOUNT

MEASUREMENTS AND TERMINOLOGY

All measurements were taken directly from dried herbarium material. Length and width were measured at the longest and widest points, respectively. Information that could not be directly observed from dried material (e.g. plant height, flower colour) was recorded in the field or from herbarium labels.

SPECIMENS EXAMINED

In the specimen citations standard herbarium acronyms are used following Index Herbariorum (Holmgren et al., 1981). One specimen is cited for each county. The citations are arranged alphabetically by state, and within each state alphabetically by county. For specimens from China and Japan, eastern Europe and the Caucasus, the citations are arranged alphabetically by country and by province.

Rhododendron L. sect. **Pentanthera** G. Don, Gen. Syst. 3: 846 (1834).

Syn.: See Judd & Kron (in prep.).

Deciduous shrubs, non-rhizomatous to strongly rhizomatous or stoloniferous. Branches terete to lens-shaped, reddish brown to yellow-brown, becoming grey with age, the branching often pseudo-verticillate. Leaves alternate, chartaceous; ovate to elliptic to obovate, base acute; apex acute to obtuse often also mucronate; covered with unicellular hairs and/or multicellular glandular and/or eglandular hairs; margins entire to slightly serrulate, ciliate with multicellular glandular or eglandular hairs, occasionally with both types of multicellular hairs. Indumentum of unicellular hairs and multicellular glandular or eglandular hairs. Buds ovoid; chestnut brown in colour, occasionally with a darker line along the distal margin; outermost scale mucronate or often with an awn one to three or more times longer than the width of the body of the scale, the remaining scales 0.6–1.9cm × 0.2–1.1cm; adaxial surface with a dense patch of unicellular hairs distally; abaxial surface glabrous to densely covered with unicellular hairs; margins unicellular-ciliate or glandular or occasionally mixed unicellular-ciliate and glandular. Inflorescence a shortened raceme, terminal on the preceding year's shoots. Flowers appearing before, with or after the leaves expand, each flower subtended by one basal spatulate bract and two basal linear-spatulate bracteoles; adaxial and abaxial surfaces glabrous; margins unicellular-ciliate or glandular. Calyx of five lobes, very slightly fused at the base; triangular to oblong, the apex obtuse, 0.1–1.0cm long and often varying in length on the same flower, and 0.1–0.2cm wide; adaxial surface glabrous; abaxial surface glabrous or sparsely to densely covered with unicellular hairs and/or multicellular glandular or eglandular hairs; margins setose with multicellular eglandular hairs or glandular-fimbriate with multicellular glandular hairs, occasionally with all three types of hairs. Corolla white, pink-white, pink or yellow and orange to red; slightly zygomorphic, broadly to narrowly funnel-form, the tube gradually to abruptly expanding into the limb; lobes 5, apex obtuse to acute, the uppermost lobe usually with the apex recurved and often with a darker-coloured or contrasting blotch, rarely spotted, or the uppermost lobe the same colour as the other lobes; margins plane to crisped-undulate; adaxial (inner) surface glabrous or sparsely to densely covered with unicellular hairs; abaxial (outer) surface essentially glabrous or sparsely to densely covered with unicellular hairs and sparsely to densely covered with multicellular glandular or eglandular hairs, rarely only with unicellular hairs. Stamens 5, declinate, slightly unequal, inserted at the base of the ovary and corolla, included or only slightly exserted to much exserted beyond the corolla; filaments glabrous or densely covered with flattened or terete unicellular hairs proximally; anthers yellow to yellow-brown, unappendaged, opening by two terminal pores, 0.2–0.4cm × 0.1–0.2cm; pollen shed in tetrads with viscin threads. Stigma wet, shallowly 5-lobed; style declinate, exserted slightly beyond the anthers, included or only slightly exserted to much exserted beyond the corolla, glabrous to densely covered with unicellular hairs proximally, inserted in a slight depression at the apex of the ovary. Ovary superior, slightly 5-lobed, nectariferous at the base; carpels 5; locules 5, the placentation axile; placenta elongate parallel to the long axis of the ovary. Fruit a septicidal capsule, dehiscing from the apex, placenta 5-lobed in cross-section. Seeds dry; testa expanded and dorsiventrally flattened into a wing-like structure surrounding the body of the seed, or closely fitted around the body of the seed and not expanded or dorsiventrally flattened; testa cells

isodiametric, short (less than three times longer than broad), or elongate (greater than three times longer than broad), with tapering or transverse end-walls.

The type species of the section has been designated historically as *R. luteum* Sweet. In 1980, Sleumer indicated *R. nudiflorum* (= *R. periclymenoides*) as the type species. Since there was no explanation for this departure from nomenclatural tradition in Sleumer (1980), and since the majority of authors have considered *R. luteum* to be the type species of the section, it is recognized as such in this treatment.

KEY TO THE SUBSECTIONS OF *RHODODENDRON* SECT. *PENTANTHERA*

1a. Flowers broadly funnelform, possessing only unicellular hairs on outer (abaxial) surface of the corolla, the upper corolla lobe spotted; stamens not exserted or only slightly exserted; cotyledons c.5.2–5.7mm long ____ **R.** subsect. **Sinensia** (1 sp., *R. molle*)

1b. Flowers narrowly funnelform, possessing both unicellular and multicellular hairs on the outer (abaxial) surface of the corolla, the upper corolla lobe lacking spots — either with a blotch or the upper corolla lobe the same colour as the rest of the lobes; stamens much exserted, cotyledons c.1.5–3.5mm long **R.** subsect. **Pentanthera** (14 spp.)

KEY TO THE SPECIES OF *RHODODENDRON* SECT. *PENTANTHERA* USING FLORAL, FRUIT AND VEGETATIVE CHARACTERS

1a. Flowers appearing before or with the leaves (at least some of the leaves still folded or the vegetative bud scales still present) ____ 2

1b. Flowers appearing after the leaves have expanded (essentially all of the leaves unfolded, and the vegetative bud scales absent) ____ 13

2a. Upper corolla lobe with contrasting blotch or spots, the blotch often appearing as a darker-coloured area at the base of the upper corolla lobe ____ 3

2b. Upper corolla lobe the same colour as the other lobes, without a visible contrasting or darker-coloured blotch ____ 9

3a. Corolla lacking multicellular hairs and only possessing unicellular hairs, the corolla broadly funnelform; stamens not exserted beyond the corolla, or only slightly so; upper corolla lobe spotted with numerous greenish yellow punctate dots; flowers yellow to orange-red ____ **R. molle**

3b. Corolla possessing multicellular hairs (either glandular or eglandular) and unicellular hairs, the corolla narrowly funnelform; stamens much exserted beyond the corolla; upper corolla lobe with a contrasting or darker-coloured blotch, flowers white or yellow, to red ____ 4

4a. Corolla limb nearly as broad as the tube is long, the tube abruptly expanding into the limb; flowers yellow to orange, or red ____ 5

4b. Corolla limb shorter than the length of the tube, the tube gradually expanding into the limb; flowers white or yellow to orange ____ 6

5a. Floral bud scales with glandular margins, the abaxial surface glabrous; corolla tube densely covered with multicellular glandular hairs ____ **R. calendulaceum**

5b. Floral bud scales with ciliate margins, the abaxial surface glabrous to sparsely unicellular pubescent; corolla tube covered with multicellular eglandular hairs, occasionally very weakly glandular ____ **R. flammeum**

6a. Flowers white, with a contrasting yellow blotch on the upper corolla lobe ____ 7

6b. Flowers yellow to orange, sometimes with dark pink or red colours as well; floral bud-scale margins glandular ____ 8

7a. Fruits densely covered with unicellular hairs, floral bud scales glabrous or only slightly pubescent, the margins ciliate ____ **R. alabamense**

7b. Fruits sparsely covered with unicellular hairs or glabrous; floral bud scales sparsely to densely covered with unicellular hairs, the margins ciliate or with glands and cilia mixed, or with only glands ____ **R. occidentale**

8a. Abaxial surface of floral bud scales densely unicellular pubescent; testa cells short, with transverse end-walls ____ **R. austrinum**

8b. Abaxial surface of floral bud scales glabrous, rarely densely unicellular pubescent; testa cells elongate with tapering end-walls ____ **R. luteum**

9a. Multicellular glandular hairs forming lines that continue along the abaxial surface of the corolla lobes; flowers white, the length of the tube equal to or longer than the distance that the stamens are exserted beyond the corolla; plants low-growing and strongly rhizomatous ____ **R. atlanticum**

9b. Multicellular glandular or eglandular hairs scattered on the abaxial surface of the corolla tube, not forming distinct lines that continue up the corolla lobes; flowers pink to white, the corolla tube shorter than the distance that the stamens are exserted beyond the corolla; plants usually tall and not strongly rhizomatous ____ 10

10a. Corolla covered with multicellular eglandular hairs; flowers pink; floral bud scales glabrous, occasionally moderately covered with unicellular hairs; leaves glabrous or nearly so ____ **R. periclymenoides**

10b. Corolla covered with multicellular glandular hairs; flowers pink or pink and white; floral bud scales glabrous or densely covered with unicellular hairs ____ 11

11a. Floral bud scales glabrous; pedicels and sepal margins usually eglandular with the pedicels often lacking unicellular hairs or only sparsely covered with them; leaves glabrous or only sparsely unicellular pubescent ____ **R. periclymenoides**

11b. Floral bud scales densely covered with unicellular hairs; pedicels and sepal margins eglandular or glandular, pedicels usually with dense unicellular hairs; abaxial surface of leaves moderately to densely covered with unicellular hairs ____ 12

12a. Corolla tube narrow and somewhat abruptly expanding into the lobes; pedicels usually eglandular and relatively short, occasionally glandular; leaves inconspicuously ciliate, the cilia appressed to the margin of the leaf; fruits densely covered with unicellular hairs ____ **R. canescens**

12b. Corolla tube broader, and gradually expanding into the limb; pedicels usually glandular and relatively long; leaves conspicuously ciliate, the cilia ascending away from the margin of the leaf, fruits glabrous or nearly so ____ **R. prinophyllum**

13a. Stems glabrous; abaxial surface of leaves glabrous or nearly so _____ 14
13b. Stems with multicellular hairs (glandular or eglandular) and/or unicellular hairs _____ 15

14a. Flowers deep yellow to red; fruits lacking multicellular glandular hairs; seeds with an expanded and dorsiventrally flattened testa, the cells short and/or elongate, with transverse end-walls _____ **R. prunifolium**
14b. Flowers white with dark pink to red filaments and style; fruits covered with multicellular glandular hairs; seeds with the testa closely fitted around the body of the seed, the cells short to essentially isodiametric, with transverse end-walls _____ **R. arborescens**

15a. Flowers yellow to orange and red, with a blotch or darker-coloured spot on the upper corolla lobe, the tube abruptly expanding into the limb; floral bud-scale margins glandular, the abaxial surface glabrous _____ **R. cumberlandense**
15b. Flowers white, the style and filaments white or greenish white; upper corolla lobe the same colour as the rest of the lobes, without a blotch (flowers occasionally pink, but still lacking a blotch on the upper corolla lobe), the tube gradually expanding into the lobes; floral bud-scale margins usually ciliate, occasionally with glands and unicellular hairs mixed along the proximal margins, the abaxial surface glabrous to densely unicellular pubescent _____ **R. viscosum**

Rhododendron subsect. **Sinensia** (Nakai) K. Kron, **comb. et stat. nov.**

Syn.: *Rhododendron* sect. *Sinenses* Nakai, Trees and Shrubs Japan 1: 43 (1922). Type: *Rhododendron molle* (Blume) G. Don.

Deciduous shrub; leaves alternate, entire, ciliate with multicellular eglandular hairs; secondary veins raised and prominent abaxially. Indumentum of unicellular hairs and multicellular eglandular hairs. Corolla yellow or orange to red; funnelform, with the tube gradually expanding into the limb; lobes 5, the margins plane, apex obtuse, the uppermost lobe slightly broader and spotted; abaxial surface with unicellular hairs only. Stamens 5, declinate, slightly unequal, included or only slightly exserted beyond the corolla. Style declinate, included or only slightly exserted beyond the corolla. Cotyledons c.5.2–5.7mm long, slightly reticulate veined (M. N. Philipson, 1980).

DISTRIBUTION: China and Japan (see Fig. 13).

1. Rhododendron molle (Blume) G. Don, Gen. Syst. 3: 846 (1834).

Shrub or small tree to 2m tall, usually non-rhizomatous; young twigs red-brown, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally with multicellular eglandular hairs, rarely glabrous. Vegetative bud scales glabrous or sparsely to densely covered with unicellular hairs, rarely also with multicellular eglandular hairs abaxially; margin unicellular ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, the veins raised

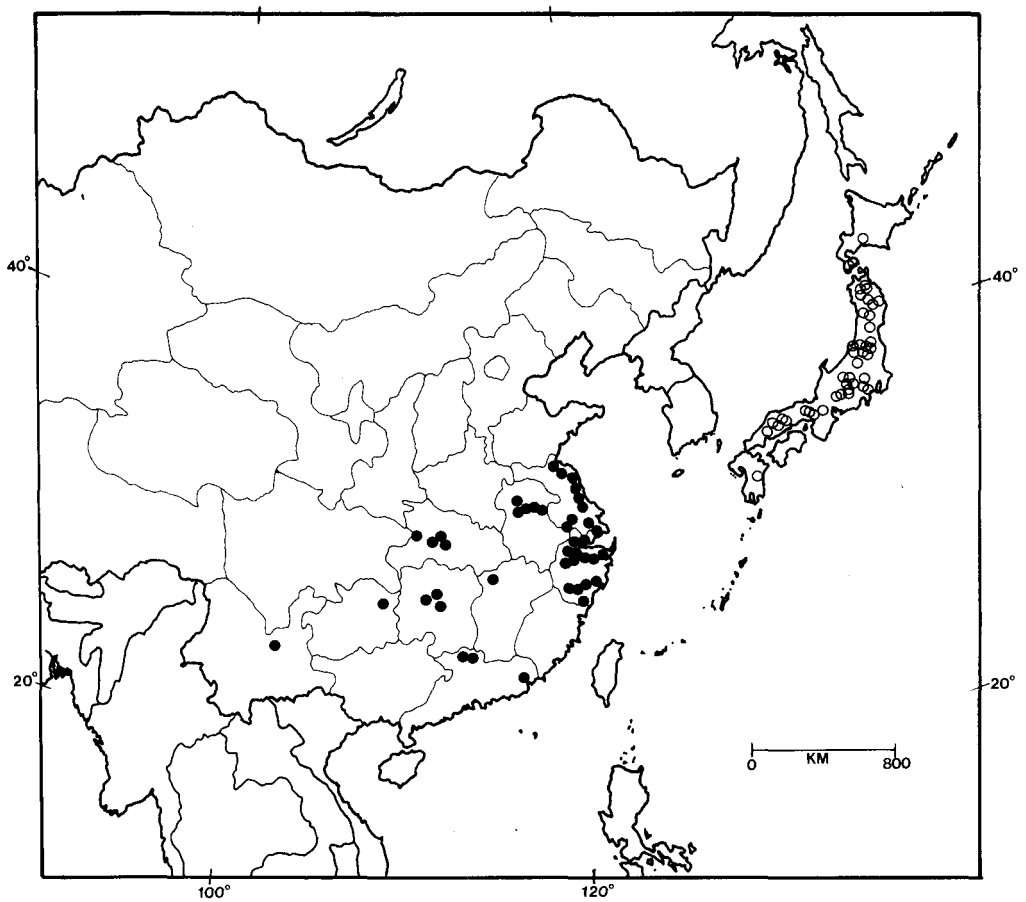


FIG. 13. Distribution of *Rhododendron molle*. *R. molle* subsp. *molle*: closed circles; *R. molle* subsp. *japonicum*: open circles.

and prominent below (4.1–)4.9–9.5(–13.2) × (1.7–)1.8–2.9(–4.3)cm, base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally with only multicellular eglandular hairs, or only unicellular hairs or glabrous, the midvein densely covered with unicellular hairs; abaxial surface glabrous, glaucous, or sparsely to densely covered with unicellular hairs, the midvein sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally with only multicellular eglandular hairs; margin entire, ciliate with multicellular eglandular hairs; petiole 0.2–0.4(–0.6)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely with only multicellular eglandular hairs. Flower bud scales chestnut brown; abaxial surface sparsely to densely covered with unicellular hairs, rarely glabrous; margin unicellular-ciliate. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 3 to 13 flowers. Pedicels (0.4–)1.0–2.5(–3.0)cm long, densely covered with unicellular hairs and multicellular eglandular hairs. Sepals less than 0.1–0.3(–0.4)cm long, varying in length on the same flower; margins setose; abaxial surface sparsely to densely covered with unicellular hairs

or densely covered with unicellular hairs and sparsely covered with multicellular eglandular hairs. Corolla yellow, golden-yellow, orange-yellow or yellow-orange; flame-red, orange-red or red; with spots on the upper corolla lobe; fragrance sweet, the tube shorter than the limb and broadly expanding into it; upper corolla lobe (1.5–)2.0–2.8(–3.4) × (1.3–)1.7–2.9(–3.5)cm; lateral lobes (1.6–)2.1–3.4(–4.1) × (0.7–)1.3–2.2(–2.9)cm; corolla tube (1.2–)1.5–2.8(–3.0)cm long, 0.3–0.6 (–0.7)cm wide at base; outer surface of corolla sparsely to densely covered with unicellular hairs; inner surface of corolla sparsely to densely covered with unicellular hairs, rarely glabrous. Stamens (3.3–)3.6–5.4(–5.6)cm long, with dense terete or flattened unicellular hairs on proximal (1.1–)1.3–2.5(–2.6)cm of filament, exserted 0.0–0.4(–0.7)cm beyond throat of corolla. Style (3.0–)4.8–6.1 (–6.7)cm long, exserted (0.0–)0.2–1.3(–1.5)cm beyond throat of corolla, with dense unicellular hairs on proximal 0.0–1.8(–2.9)cm, stigma less than 0.1–0.2cm wide. Ovary 0.3–0.5(–0.6)cm long, 0.2–0.3cm wide at the base, densely covered with unicellular hairs and sparsely to densely covered with multicellular hairs on the ribs, or evenly covered with unicellular hairs, with a dense crown of unicellular hairs along the nectary. Capsules (1.3–)1.6–3.0(–3.6) × (0.5–)0.7–1.2 (–1.4)cm, sparsely to moderately covered with unicellular hairs, and sparsely covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (2–)2.5–4.7(–5.5) × 0.9–2.4(–3.0)mm, body (1.1–)1.2–2.1(–2.3) × (0.3–)0.5–0.9mm; testa expanded and dorsiventrally flattened surrounding the body, the cells elongate, with tapering end-walls (Fig. 11).

DISTRIBUTION AND ECOLOGY: China and Japan (Fig. 13). Exposed grassy hillsides and meadows, open thickets and moors, open woods. Elevation: sea level to 2500m. Flowering from April to July.

KEY TO SUBSPECIES OF *RHODODENDRON MOLLE* (BLUME) G. DON

1. Fruits covered with usually 1–4 unicellular hairs per mm^2, flowers yellow, plants from China _____ 1a. **R. molle** subsp. **molle**

1. Fruits covered with usually 5–60 unicellular hairs per mm^2, flowers yellow to orange-red, plants from Japan _____ 1b. **R. molle** subsp. **japonicum**

1a. Rhododendron molle (Blume) G. Don subsp. **molle**.

Syn.: *Azalea mollis* Blume, Cat. Gewass. Buitz. 44 (1823). Type: cultivated, probably L, n.v.

Leaves 5.9–13.2 × 2.0–4.3cm, the abaxial surface glabrous to very densely covered with unicellular hairs (0–60 hairs per mm^2). Flowers yellow. Style glabrous or covered with dense unicellular hairs on proximal 0.1cm. Fruits sparsely covered with unicellular hairs (1.7–3.4 per mm^2) and with multicellular eglandular hairs (0–24 per mm^2). Chromosome number: $2n = 26$ (Sax, 1930; Nakamura, 1931). Figure 14; see additional figure in Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Widely distributed throughout the People's Republic of China, from Jiangsu province south to Guangdong and west to eastern Sichuan and Yunnan provinces. Found on exposed grassy hillsides, dry meadows, brushy slopes, stoney hills with *Pinus*, and open pine forests. From sea level to 2500m elevation. Flowering from April to June, occasionally as early as February and as late as July.

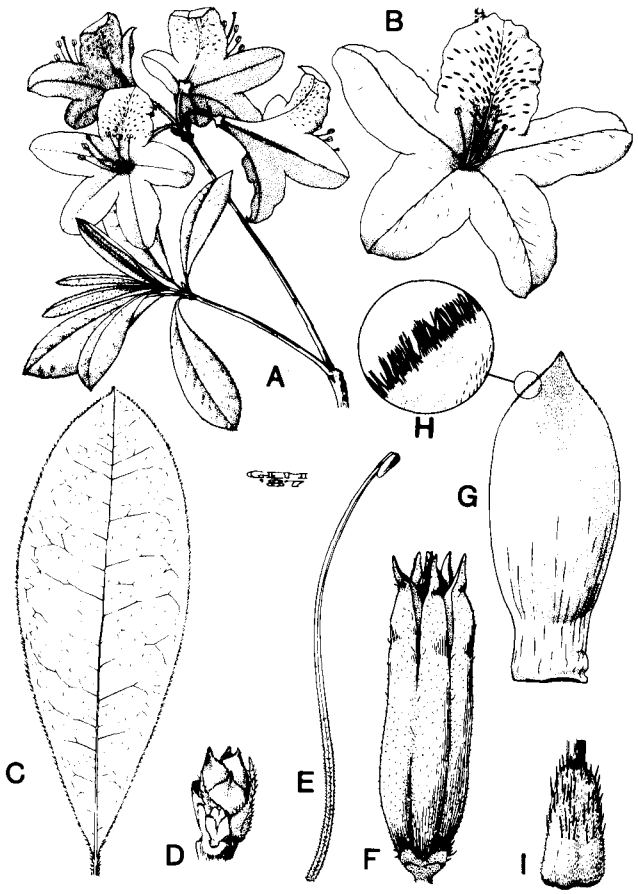


FIG. 14. *Rhododendron molle*. A, habit (0.35×); B, flower (0.7×); C, leaf (0.7×); D, winter flower bud (1.4×); E, stamen (1.05×); F, fruit (1.4×); G, floral bud scale (3.5×); H, close-up of floral bud-scale margin (7×); I, ovary (3.5×).

1b. Rhododendron molle (Blume) G. Don subsp. **japonicum** (A. Gray) K. Kron, **comb. et stat. nov.**

Syn.: *Azalea japonica* A. Gray, Mem. Am. Acad. n.s. 6: 400 (1859). *Rhododendron japonicum* (A. Gray) Valcken., Gartenflora 57: 517 (1908). *R. molle* var. *japonicum* (A. Gray) Makino, Illus. Fl. Japan 252 (1956). Type: Japan, Hakodadi, in gardens, 1853–1856. *C. Wright* s.n. (holo. GH).

Azalea mollis (Blume) var. *glabrior* Miquel ex Regel, Gartenflora 16: 289, pl. 536 (1867). *A. sinensis* var. *glabrior* (Miquel) Maxim., Ind. Sem. Petrop. 1870. *Rhododendron glabrius* (Regel) Nakai, Trees and Shrubs Japan 1: 64 (1922). Type: Japan, Wiko. in montibus altioribus Kiso, *Seibold* s.n. or *Burger* s.n. (syntypes n.v.).

Rhododendron japonicum (A. Gray) Valcken. f. *aureum* Wilson, Monogr. Azaleas 102 (1921). *R. glabrius* (Regel) Nakai var. *aureum* (Wilson) Nakai, Trees and Shrubs Japan 1: 66 (1922). Type: cultivated, Japan, Hondo. prov. Musashi, brought from Chichibu Mts, 11 v 1917, *E. H. Wilson* 8414 (holo. A).

Rhododendron japonicum (A. Gray) Valcken. var. *canescens* Sugimoto, J. Geobot. 378 (1972). *R. japonicum* (A. Gray) Valcken. f. *canescens* (Sugimoto) Sugimoto, J. Geobot. 22: 52 (1975). Type: Japan, Honshu. prov. Shinano, Komoro, 1940, *T. Makino* s.n. (holo. MAK).

Azalea sinensis Lodd., Bot. Cab. 9: t. 885 (1824). *Rhododendron sinense* (Lodd.) Sweet, Brit. Fl. Gard. t. 290 (1826). *Azalea pontica* var. *sinensis* (Lodd.) Lindley, Edward's Bot. Reg. 15: t. 1253 (1829). Type: China [sic], probably from northern or central Japan (holo.: illus. in Bot. Cab. 9: t. 885; IDC #5312. 48: I.5.).

Rhododendron sinense (Lodd.) Sweet var. *rosea* Ito, Icones. Pl. Jap. 17: t. 2 (1913). Type: Japan, Honzo Dsufu, *I. Tsunemasa* s.n. (holo. n.v.)

Leaves 4.1–11.6 × 1.7–3.7cm, the abaxial surface glabrous to densely covered with unicellular hairs (0–19 per mm^2). Flowers yellow to orange-red. Style, rarely glabrous, usually densely covered with unicellular hairs on proximal 2.9cm. Fruits sparsely to densely covered with unicellular hairs (5–60 per mm^2) and with multicellular eglandular hairs (0–3 per mm^2). (For illustrations of this taxon see André, 1871; Nakai, 1922; Makino, 1956; Steward, 1958.)

DISTRIBUTION AND ECOLOGY: Japan. From southern Hokkaido, south throughout Honshu, to Shikoku and Kyushu in open situations in thickets, woods, moors and hillsides, also on volcanic ash. Elevation 100–2100m. Flowering from May to July. Chromosome number: $2n = 26$ (Sax, 1930).

Rhododendron molle is the basal member of the section and retains several plesiomorphic characters: a broad funnelform corolla, stamens included to only very slightly exserted beyond the corolla, and greenish yellow spots on the upper corolla lobe (see Phylogenetic Analysis). This species is quite variable in its leaf pubescence and in the pubescence of the abaxial surface of the floral bud scales. In general, it appears to be a coarser plant with larger flowers, fruits and seeds than any other members of the section. However, it is not larger in height. Creech (1962) stated that Japanese populations of this species vary from yellow to orange-red in Kyushu to exclusively orange-red in the northern part of Japan, or Honshu. He also noted that both colour forms occur in the same population and are not really separable into distinct entities. Plants of *R. molle* in China are exclusively yellow.

Early collectors tended to regard plants from China and Japan as one species (*R. sinense* Sweet), while later authors such as Valckenier-Suringar (1904, 1908) and Wilson (1921) considered the plants from China to be a distinct species from those in Japan. These later authors used vegetative characters primarily to distinguish between the two taxa. Wilson (1921) stressed the importance of leaf characters in differentiating the Chinese and Japanese plants. He distinguished between *R. molle* and *R. japonicum* by leaf size and the presence or absence of long unicellular hairs which densely covered the abaxial surface of the leaf. In addition, the hardiness of the plant was used as a character; plants from China were less hardy than plants from Japan. Flower colour was also used as a distinguishing character. Initially only the red–orange or flame-coloured end of the spectrum of flower colour was known for the Japanese plant, further strengthening the distinction between these two geographically separated taxa.

Although Wilson acknowledged that the habit and general appearance of the Japanese and Chinese plants were very similar, he considered them to be distinct species. He stated that the Chinese plants had smaller, less bristly calyces, flower stalks which lacked or had just a few

bristles, stamens as long or longer than the corolla, and winter buds which were pubescent with short, very dense, nearly white hairs. But he consistently stressed the importance of the leaf characters, stating that the Chinese plants had leaves which were densely clothed on the lower surface with soft, nearly white, matted pubescence, which persisted throughout the life of the leaf. Wilson (1921) also considered the leaves of the Chinese plants to be larger and more 'decidedly' oblong-lanceolate than the leaves of the Japanese azalea.

By contrast, the Japanese plants were described by Wilson as possessing leaves which were 'decidedly' glabrous, except for appressed bristles and cilia on the veins and the margins, respectively. The winter buds on the Japanese plants were described as very slightly puberulous.

Sleumer (1966) described the Chinese plants as more variable than did authors of earlier accounts. In his description Sleumer describes *R. molle* as having leaves which become glaucous or as having hairs which sometimes are confined to the veins in later stages [sic]. He also described more variability in the pubescence of the winter bud scales of *R. molle*, from densely grey-pubescent or velutinous to sometimes glabrescent.

Principal component analysis of 32 Operational Taxonomic Units (OTUs) and 9 vegetative characters (Table 5, Fig. 15) indicates that there is no morphological gap which correlates with geographical subdivisions. There is a tendency for plants from Japan to be glabrous more often than those from China, but evidently the only consistent difference in the pattern of variation in the Chinese and Japanese plants is the number of unicellular eglandular hairs per square millimetre on the fruits, and then the taxa may differ by only one hair per square millimetre (1–4 unicellular hairs per mm^2 in *R. molle* subsp. *molle* and 5–60 unicellular hairs per mm^2 in *R. molle* subsp. *japonicum*). Because there is no distinct morphological gap, but rather a series of correlated clines, only one species, *R. molle*, is recognized with two geographical subspecies.

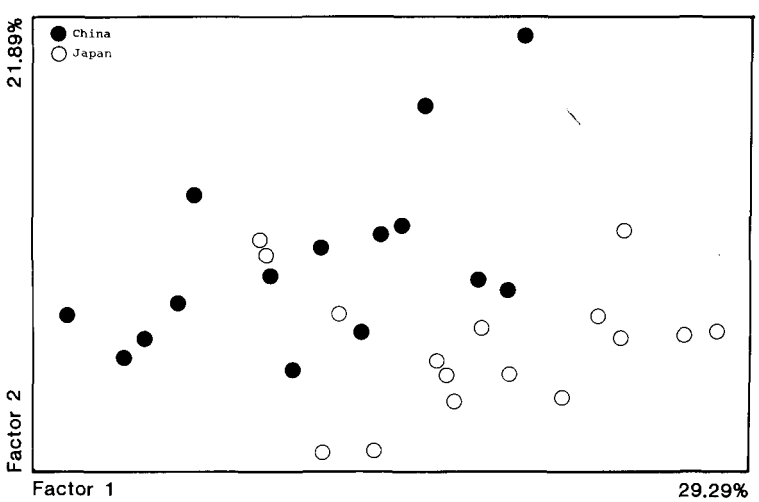


FIG. 15. Plot of the first two principal components resulting from the analysis of 9 vegetative characters in *Rhododendron molle*. Closed circles: China; open circles: Japan.

TABLE 5. Characters used in principal component analyses of *Rhododendron* sect. *Pentanthera*.

Character	Analysis*					
	cal	can1	can2	pri	vis	mol
1. Upper corolla lobe length		x	x		x	
2. Upper corolla lobe width	x	x	x		x	
3. Lateral corolla lobe length		x	x		x	
4. Lateral corolla lobe width		x	x		x	
5. Corolla tube length		x	x		x	
6. Corolla tube width at base	x	x	x		x	
7. Corolla pubescence: abaxial (outer) surface		x	x		x	
8. Corolla pubescence: adaxial (inner) surface		x	x		x	
9. Sepal length		x	x		x	
10. Sepal pubescence: abaxial surface		x	x		x	
11. Sepal margin	x	x	x		x	
12. Stamen length		x	x		x	
13. Stamen length: exsertion beyond corolla		x	x		x	
14. Anther length		x	x		x	
15. Anther width		x	x		x	
16. Filament pubescence: proximal distance up filament		x	x		x	
17. Style length		x	x		x	
18. Style length: exsertion beyond corolla		x	x		x	
19. Style pubescence: proximal distance up filament		x	x		x	
20. Stigma width		x	x		x	
21. Ovary length	x	x	x		x	
22. Ovary width		x	x		x	
23. Ovary pubescence		x	x		x	
24. Floral bud-scale length			x			
25. Floral bud-scale width			x			
26. Floral bud-scale pubescence: abaxial surface			x			
27. Floral bud-scale margin			x			
28. Pedicel length (in flower)		x	x		x	
29. Pedicel pubescence	x	x	x		x	

TABLE 5. (Contd)

	cal	can1	can2	pri	vis	mol
30. No. of flowers per inflorescence		x	x		x	
31. Leaf length (unfolded at time of flowering)					x	
32. Leaf width (unfolded at time of flowering)					x	
33. Leaf length/width						x
34. Leaf apex						x
35. Leaf margin						x
36. Leaf pubescence: adaxial surface						x
37. Leaf pubescence: abaxial surface	x					x
38. Petiole length						x
39. Petiole pubescence						x
40. Fruit length				x		
41. Fruit width				x		
42. Fruit length/width				x		
43. Fruit pubescence: no. of unicellular hairs/mm^2				x		
44. Fruit pubescence: no. of multicellular eglandular hairs/mm^2				x		
45. Fruit pubescence: no. of multicellular glandular hairs/mm^2				x		
46. Pedicel length (in fruit)				x		
47. Seed length/width				x		
48. Body of seed length/width				x		
49. Leaf length (mature)				x		
50. Leaf width (mature)				x		
51. Leaf length/width (mature)				x		
52. Leaf pubescence, abaxial: midvein				x		
53. Leaf pubescence, abaxial: no. of unicellular hairs/mm^2				x		
54. Leaf pubescence, abaxial: no. of multicellular eglandular hairs/mm^2				x		
55. Leaf pubescence, abaxial: no. of multicellular glandular hairs/mm^2				x		

*cal: see Fig. 25; can1: see Fig. 28; can2: see Fig. 29; pri: see Fig. 38; vis: see Fig. 41; mol:see Fig. 15.

Rhododendron L. subsect. **Pentanthera**

Deciduous shrubs; leaves alternate, entire to slightly serrulate; ciliate with multicellular glandular and/or eglandular hairs; secondary veins raised and prominent or essentially flush with the abaxial surface of the leaf. Indumentum of unicellular hairs and multicellular glandular and eglandular hairs. Corolla white, pink-white, pink or yellow to orange to red; narrowly funnelform, the tube gradually to abruptly expanded into the limb; lobes 5, the margins plane or crisped-undulate, the apex acute and often reflexed; uppermost lobe usually slightly broader, the same colour as the other lobes or with a darker-coloured or contrasting blotch; abaxial surface essentially glabrous to densely covered with unicellular hairs and with multicellular glandular or eglandular hairs. Stamens 5, declinate, much exserted beyond the corolla. Style declinate, much exserted beyond the corolla. Cotyledons c.1.5–3.5mm long, slightly reticulate-veined (M. N. Philipson, 1980).

DISTRIBUTION: Europe, Asia and North America.

2. Rhododendron alabamense Rehder, Monogr. Azaleas 141–142 (1921).

Syn.: *Azalea alabamense* (Rehder) Small, Man. S.E. US Fl. 996 (1933). Type: Alabama, Cullman Co.: without definite locality, *T. G. Harbison* 6292 (holo. US).

Shrub or small tree to 3(–5)m tall, usually non-rhizomatous; young twigs red- or yellow-brown, sparsely to densely covered with unicellular and multicellular eglandular hairs, occasionally only multicellular eglandular hairs present, rarely with both unicellular and multicellular gland-tipped hairs. Vegetative bud scales glabrous to sparsely unicellular pubescent abaxially; margin unicellular-ciliate, rarely ciliate and glandular. Leaf blade membranaceous, ovate or obovate to elliptic, 6.1–7.7(–9.4) × 1.9–2.3(–2.4)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely to densely covered with unicellular and multicellular eglandular hairs, the young unfolding leaves rarely with multicellular gland-tipped hairs, occasionally glabrous to sparsely covered with only unicellular hairs, rarely only with scattered multicellular eglandular hairs, the midvein sparsely to densely covered with unicellular hairs; abaxial surface sparsely to densely covered with unicellular hairs, rarely glabrous, the midvein and secondary veins densely covered with unicellular and multicellular eglandular hairs, rarely with multicellular gland-tipped hairs; margin entire, ciliate with multicellular eglandular hairs; petiole 0.2–0.5(–0.8)cm long. Flower bud scales chestnut brown; abaxial surface glabrous to very sparsely covered with unicellular hairs; margin unicellular ciliate. Flowers appearing before or as the leaves expand; inflorescence a shortened raceme of 6 to 12 flowers. Pedicels (0.4–)0.6–0.9(–1.2)cm long; usually sparsely to densely covered with unicellular, multicellular eglandular and gland-tipped hairs, but occasionally lacking unicellular or multicellular gland-tipped hairs. Sepals less than 0.1–0.2 (–1.0)mm long, often varying in length on the same flower; margins setose with multicellular eglandular hairs, rarely glandular-fimbriate; abaxial surface sparsely to densely covered with unicellular and multicellular eglandular hairs, occasionally only with unicellular hairs, or with unicellular and multicellular gland-tipped hairs, or with unicellular, multicellular eglandular and gland-tipped hairs. Corolla white with a yellow blotch on the upper corolla lobe, fragrance sweet and delicate, the tube longer than the limb and gradually expanding into it; upper corolla lobe 0.9–1.4(–1.5) × (0.7–)0.8–1.2(–1.3)cm; lateral lobes (1.0–)1.1–1.7(–1.9)×(0.5–)0.6–1.0(–1.2)cm;

corolla tube (1.6–)1.7–2.4(–2.8) × 0.1–0.3(–0.4)cm wide at base; outer surface of corolla sparsely to densely covered with unicellular and multicellular gland-tipped hairs, the gland-tipped hairs often continuing in lines up the corolla lobes; inner surface of corolla densely covered with unicellular hairs. Stamens (3.7–)4.5–6.1(–6.6)cm long, with dense terete or flattened unicellular hairs on proximal 2.3–3.4(–3.8)cm of filament, exserted (1.7–)2.5–3.9(–4.5)cm beyond throat of corolla. Style (3.5–)4.4–6.4(–7.4)cm long, with dense unicelluar hairs on proximal (0.0–)0.4–1.3(–1.7)cm, exserted (1.7–)2.7–4.3(–5.2)cm beyond throat of corolla, stigma (0.15–)0.12–0.2 (–0.3)cm wide. Ovary 0.2–0.4cm long, 0.1–0.2cm wide at the base, densely covered with multicellular eglandular hairs over unicellular hairs, rarely with multicellular gland-tipped hairs or with both eglandular and gland-tipped hairs. Capsules (1.4–)1.5–2.1(–2.2) × 0.3–0.4cm, narrowly ovate to cylindric, moderately to densely covered with unicellular hairs and sparsely to moderately covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.8–)2.1–3.2(–3.8) × 0.4–0.8(–1.0)mm, body (0.9–)1.1–1.8(–1.9) × 0.2–

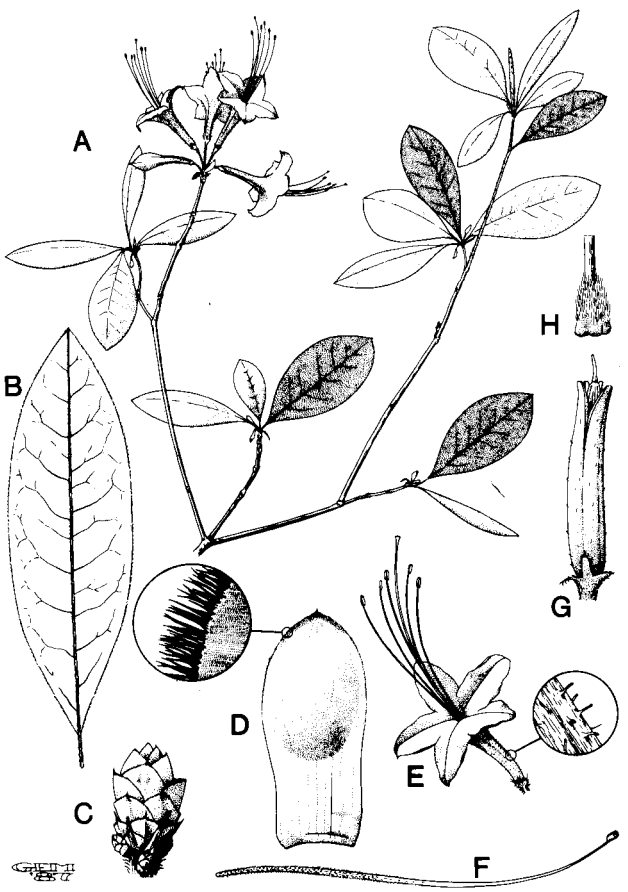


FIG. 16. *Rhododendron alabamense*. A, habit (0.35×); B, leaf (0.7×); C, winter flower bud (1.4×); D, floral bud scale (3.5×); E, flower (0.7×); F, stamen (1.05×); G, fruit (1.4×); H, ovary (3.5×); I, close-up of floral bud-scale margin (7×); J, close-up of corolla tube showing unicellular hairs (7×).

0.5mm; testa expanded and dorsiventrally flattened surrounding the body, the cells elongate, with tapering end-walls (Fig. 6). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). Figure 16; see additional illustration of this species in Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Alabama and adjacent Tennessee, Georgia and Florida (Fig. 17). Upland woods, bluffs and hillsides along water-courses, stream bottoms. Elevation: nearly sea level to 500m. Flowering primarily in April and May, but occasionally as early as March or as late as June.

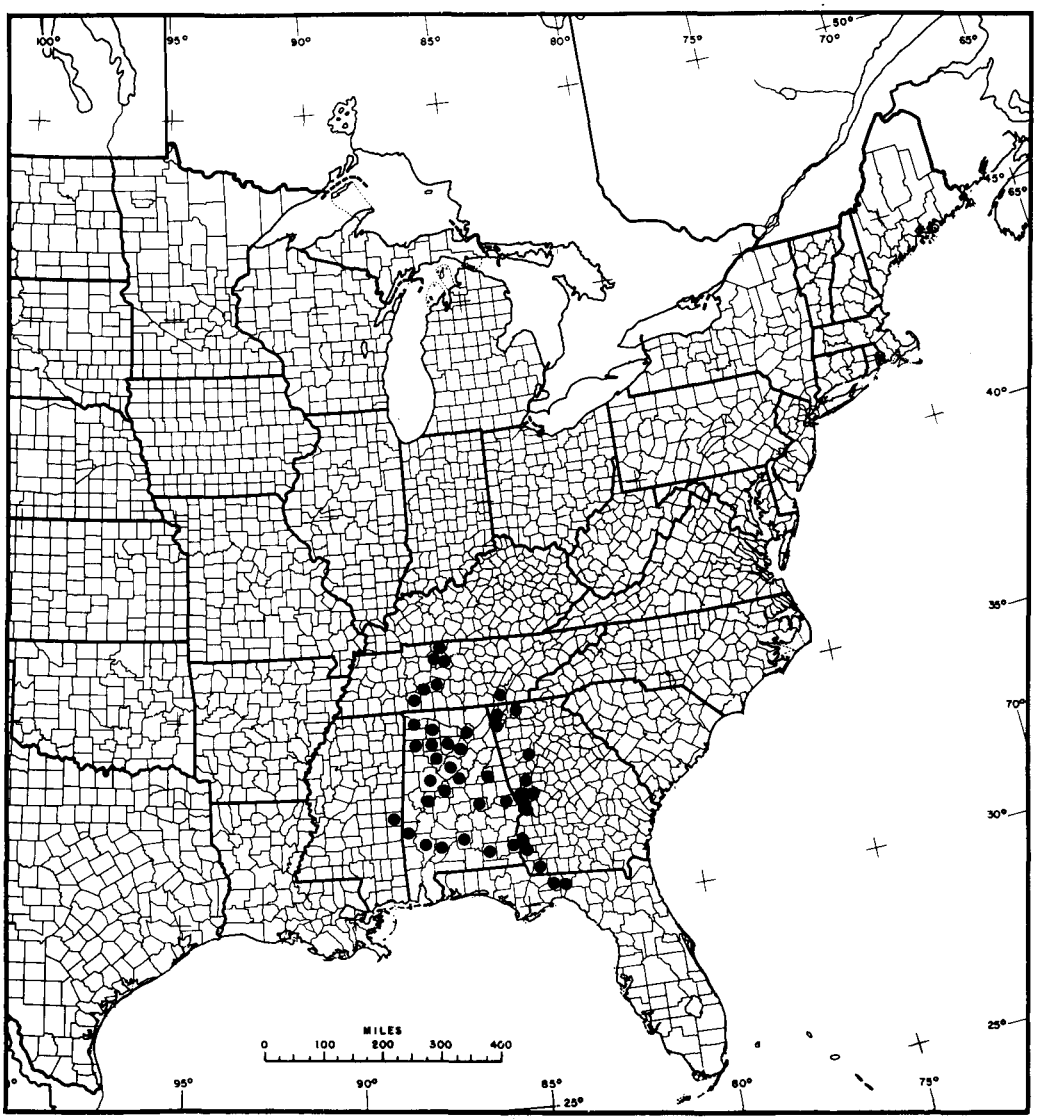


FIG. 17. Distribution of *Rhododendron alabamense*.

This species is more common in north-central Alabama, especially in Winston, Cullman and Tuscaloosa counties, than in other parts of its range where it has a rather discontinuous distribution. The yellow blotch on the upper corolla lobe distinguishes *R. alabamense* from the other white-flowered species in eastern North America. It is isolated from the sympatric *R. viscosum* and *R. arborescens* by flowering time. Without flower colour *R. alabamense* is often difficult to distinguish from *R. canescens*. In general *R. alabamense* has much less unicellular pubescent corollas and the floral bud scales are glabrous or only slightly unicellular pubescent. In addition, these two species are often ecologically isolated as *R. alabamense* occurs in dry woods and *R. canescens* usually occurs in bottom-lands and along stream banks.

The variation in flower colour from all white to tinged with pink has been suggested to be a result of hybridization and subsequent introgression with *R. canescens* (Skinner, 1955, 1961). In addition, the slightly pubescent bud scales of some individuals have also been considered as evidence of widespread hybridization (Skinner, 1961). While hybrids between *R. alabamense* and *R. canescens* do occur (see below), pink-tinged corollas also occur in otherwise all white populations of *R. viscosum*, *R. atlanticum* and *R. arborescens*. Therefore the pink blush on an otherwise white corolla does not necessarily imply the historical occurrence of hybridization with a pink-flowered species. Likewise, the variation in pubescence on the floral bud scales does not always require the occurrence of hybridization with *R. canescens*. Pubescent bud scales are found scattered throughout the range of *R. alabamense* and do not seem to be more common in the southern part of this species' range as suggested by Skinner (1961).

Hybrids between *R. alabamense* and *R. canescens* are known to occur in Harris Co., Early Co. and Clarke Co., Georgia; Tishomingo Co., Mississippi; and Leon Co., Florida. These plants generally possess glabrous bud scales, and pink corollas with a yellow blotch on the upper corolla lobe. See Appendix for citation of representative specimens of these hybrids.

3. Rhododendron arborescens (Pursh) Torr., Fl. U.S. 425 (1824).

Syn.: *Azalea viscosa* Marshall, Arbust. Amer. 15 (1785) non L. Type: n.v.
Azalea arborescens Pursh, Fl. Am. Septentr. 152 (1814). Type: n.v.
Azalea fragrans Raf., Ann. Nat. 12 (1820). Type: n.v.
Rhododendron arborescens (Pursh) Torr. var. *richardsonii* Rehder, Monogr. Azaleas 168–169 (1921). *Azalea arborescens* Pursh var. *richardsonii* (Rehder) Ashe, J. Elisha Mitchell Sci. Soc. 38: 91 (1922). Type: North Carolina, Macon Co.: on Wayoh [sic] Bald, alt. 5200 ft, *T. G. Harbison* 170 (holo. A).

Shrub or small tree to 6m tall, usually non-rhizomatous; young twigs yellow-brown or rarely red-brown, glabrous or rarely very sparsely covered with unicellular hairs. Vegetative bud scales glabrous abaxially; margin unicellular-ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (4.5–)4.8–7.8(–10.5)×(1.6–)1.9–2.6(–3.0)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface glabrous, the midvein sparsely to densely covered with unicellular hairs; abaxial surface glabrous, sometimes also glaucous, the midvein sparsely covered with multicellular eglandular hairs, occasionally glabrous; margin entire, ciliate with multicellular eglandular hairs; petiole (0.2–)0.4–0.9(–1.6)cm long; glabrous or sparsely covered with multicellular eglandular hairs. Flower bud scales chestnut brown; abaxial surface glabrous or rarely with

very sparse unicellular hairs; margin unicellular ciliate. Flowers appearing with the leaves or after they have expanded; inflorescence a shortened raceme of 3 to 7 flowers. Pedicels (0.6–)1.0–1.6 (–2.1)cm long, sparsely to densely covered with unicellular and multicellular gland-tipped hairs, occasionally only with multicellular eglandular or gland-tipped hairs, rarely glabrous. Sepals less than 0.1–0.5(–0.8)cm long, often varying in length on the same flower; margins glandular-fimbriate and setose or only glandular-fimbriate, rarely only setose; abaxial surface glabrous to sparsely covered with multicellular gland-tipped hairs, eglandular hairs or with both, rarely additionally covered with unicellular hairs. Corolla white, fragrance sweet, with a cinnamon quality, the tube longer than the limb and gradually expanding into it; upper corolla lobe (1.0–)1.3–1.9(–2.1) × (0.7–)0.9–1.4(–1.8)cm; lateral lobes (1.2–)1.4–2.0(–2.4) × (0.5–)0.6–0.9 (–1.2)cm; corolla tube (2.0–)2.3–2.9(–3.3)cm long, 0.2–0.5(–0.6)cm wide at base; outer surface of corolla sparsely covered with unicellular hairs and multicellular gland-tipped hairs that continue

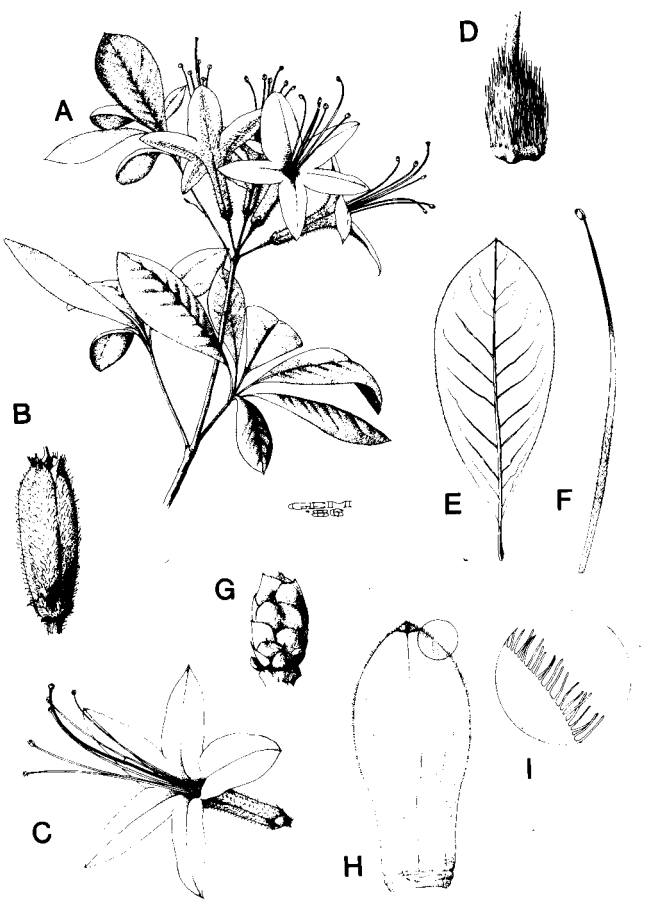


FIG. 18. *Rhododendron arborescens*. A, habit (0.35×); B, fruit (1.4×); C, flower (0.7×); D, ovary (3.5×); E, leaf (0.7×); F, stamen (1.05×); G, winter flower bud (1.4×); H, floral bud scale (3.5×); I, close-up of floral bud-scale margin (7×).

in lines up the corolla lobes; inner surface of corolla sparsely to densely covered with unicellular hairs. Stamens (4.4–)5.3–6.9(–8.2)cm long, with dense terete or flattened unicellular hairs on proximal (2.7–)3.0–3.8(–4.5)cm of filament, exserted (2.3–)2.9–4.3(–5.0)cm beyond throat of corolla. Style (5.3–)5.6–6.9(–7.5)cm long, exserted (3.2–)3.6–4.7(–5.4)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.0–)0.2–1.4(–2.6)cm; stigma 0.1–0.3cm wide. Ovary (0.2–)0.3–0.4cm long, 0.1–0.3cm wide at the base, densely covered with multicellular gland-tipped hairs and unicellular hairs. Capsules (1.1–)1.2–1.7 × 0.5–0.8cm, ovate, sparsely covered with unicellular hairs and moderately covered with multicellular gland-tipped hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (0.8–)1.1–1.6(–2.0) × (0.4–)0.6–1.0 (–1.1)mm, body (0.7–)0.8–1.1(–1.2)×(0.3–)0.4–0.6(–0.7)mm; testa closely fitted around the body of the seed, the cells short with transverse end-walls or isodiametric (Fig. 9). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). Figure 18; see additional figures in Alexander, 1935; Prince, 1978 (photo); Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: West Virginia to Tennessee, North Carolina, Georgia and adjacent Alabama (Fig. 19). Along mountain streams, shrub balds and moist woods. Elevation 300–1500m. Flowering from May to August, occasionally as early as April or as late as September.

Rhododendron arborescens is quite uniform morphologically throughout its range. The most noticeable variation occurs in leaf size and glaucousness which appear to be a function of habitat. Rehder (1921) described one form as a variety (*R. arborescens* var. *richardsonii*) which is a small-leaved, compact form found in exposed situations on the tops of balds or mountains in the Appalachians.

Rhododendron arborescens is most closely related to *R. viscosum*, and can be distinguished from it by the glabrous, yellow-brown branchlets, the red style and filaments which contrast with the white corolla and the distinctive seeds that lack a loose, expanded testa. *Rhododendron arborescens* is sympatric with *R. viscosum* and blooms during the same time of year. Both species are often found growing in close proximity to each other and hybridize occasionally, although these hybrids are sometimes difficult to detect. Reproductive isolation may be related to pollinators as the fragrance of the two species is quite different and the flowers of *R. viscosum* have concolorous styles and filaments.

Rhododendron arborescens also hybridizes with *R. cumberlandense* and hybrids have been collected especially on Gregory Bald, Blount Co., Tennessee and in Jackson Co., Alabama. These hybrids vary considerably in morphology, from glabrous, white-flowered plants with unicellular-ciliate bud-scale margins to pubescent, pink or reddish-flowered plants with glandular bud-scale margins. Putative hybrids also occur between *R. arborescens* and *R. cumberlandense* in Morgan County, Tennessee and in Union and Walker Counties, Georgia. Possible hybrids between *R. arborescens*, *R. viscosum* and *R. cumberlandense* occur on Gregory Bald, Blount Co., Tennessee. See Appendix for citations of hybrid specimens.

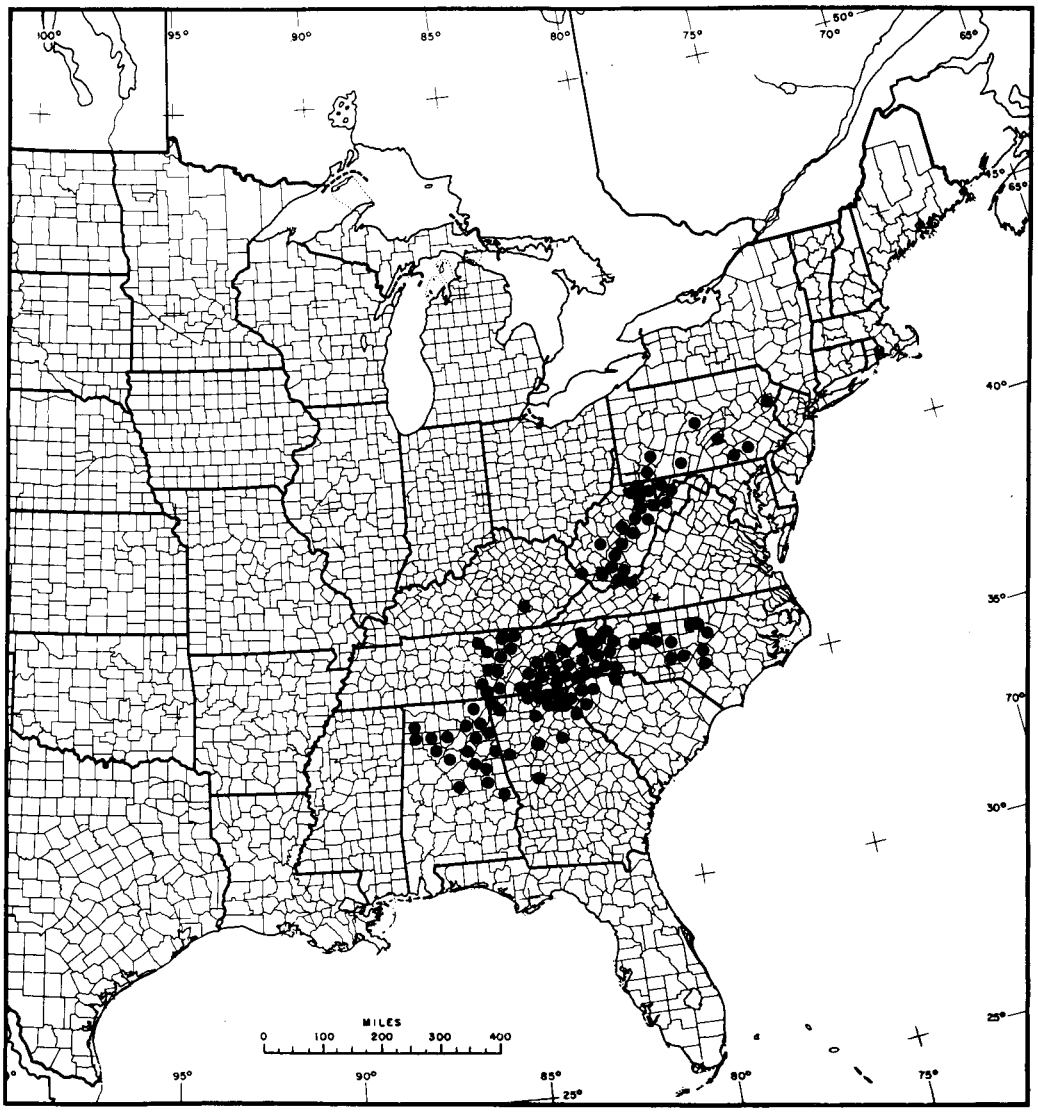


FIG. 19. Distribution of *Rhododendron arborescens*.

4. Rhododendron atlanticum (Ashe) Rehder, Monogr. Azaleas 147 (1921).

Syn.: *Azalea atlantica* Ashe, Bull. Charles. Mus. 13: 26 (1917). Type: South Carolina, Georgetown Co.: moist pine woods, Kinlock, 1 v 1916, *W. W. Ashe* s.n. (lecto., designated here, GH).

Azalea atlantica Ashe var. *luteo-alba* Coker, J. Elisha Mitchell Sci. Soc. 36: 98, pl. 1 (1920).

Rhododendron atlanticum (Ashe) Rehder var. *luteo-album* (Coker) Rehder, Monogr. Azaleas, 150 (1921). *R. atlanticum* (Ashe) Rehder f. *luteo-album* (Coker) Fern. Rhodora 43: 622

(1941).Type: South Carolina, Darlington Co.: flatwoods, Hartsville, 4 iv 1918, *J. L. Coker, Jr* s.n. (lecto., designated here, NCU).

Azalea neglecta Ashe, Bull. Torrey Bot. Club 47: 581 (1920). *Rhododendron neglectum* (Ashe) Ashe, Rhodora 23: 179 (1921). *R. atlanticum* (Ashe) Rehder f. *neglectum* (Ashe) Rehder, Monogr. Azaleas, 149–150 (1921). Type: South Carolina, Darlington Co.: moist pine woods, Kinlock, Georgetown, 1 v 1916, *W. W. Ashe* s.n. (holo. GH).

Rhododendron atlanticum (Ashe) Rehder f. *confusum* Fern., Rhodora 43: 622 (1941). Type: Virginia, Princess Anne Co.: dry oak thicket, Virginia Beach, 4 v 1935, *Fernald & Griscom* 4479 (holo. GH).

Rhododendron atlanticum (Ashe) Rehder f. *tomolobum* Fern., Rhodora 43: 622 (1941). Type: Virginia, Nansemond Co.: a considerable colony, 6–9dm high, in dry white sand of pineland, south west of Marsh Hill School, south of South Quay, 10 v 1940, *Fernald & Long* 11881 (holo. GH; iso. GH, NY, PH).

Shrub or small tree usually less than 1(–3)m tall, very strongly rhizomatous; young twigs red-brown, rarely yellow-brown, sparsely to densely covered with multicellular eglandular hairs or with multicellular gland-tipped hairs, occasionally also with unicellular hairs, rarely with unicellular and multicellular eglandular and gland-tipped hairs. Vegetative bud scales sparsely to densely covered with unicellular hairs or glabrous abaxially; margin unicellular-ciliate, occasionally ciliate and glandular, rarely completely glandular. Leaf blade membranaceous, ovate or obovate to elliptic, (3.2–)3.4–4.7(–5.2) × (0.8–)1.1–1.9(–2.0)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface glabrous, occasionally sparsely covered with unicellular and multicellular gland-tipped hairs, or with only multicellular gland-tipped hairs, rarely densely covered with only unicellular hairs, the midvein densely covered with unicellular hairs; abaxial surface glabrous, often paler than the adaxial surface, rarely also glaucous, occasionally with scattered multicellular gland-tipped hairs, rarely with scattered multicellular gland-tipped hairs and unicellular hairs or scattered multicellular eglandular hairs, or densely covered with unicellular hairs, the midvein with multicellular eglandular or gland-tipped hairs, occasionally also with unicellular hairs, rarely with multicellular eglandular and gland-tipped hairs; margin entire, ciliate with multicellular eglandular hairs; petiole 0.1–0.4(–0.5)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, or with unicellular hairs and multicellular gland-tipped hairs, or with only multicellular eglandular and gland-tipped hairs, rarely with all three types of hairs. Flower bud scales chestnut brown; abaxial surface sparsely to densely covered with unicellular hairs, frequently glabrous; margin unicellular-ciliate, rarely unicellular above and glandular below. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 4 to 13 flowers. Pedicels (0.4–)0.7–1.4(–2.0)cm long, sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs, or only with multicellular gland-tipped hairs, rarely with multicellular eglandular and gland-tipped hairs or with unicellular and multicellular eglandular hairs. Sepals less than 0.1–0.3(–1.0)cm long, often varying in length on the same flower; margins glandular-fimbriate, occasionally setose or with both gland-tipped and eglandular multicellular hairs; abaxial surface sparsely to densely covered with unicellular and multicellular gland-tipped hairs or with only multicellular gland-tipped hairs, occasionally with unicellular and multicellular eglandular hairs, rarely with all three types of hairs or glabrous. Corolla white, or white and tinged with pink or lilac, occasionally yellowish, fragrance sweet,

musky and heavy, the tube longer than the limb and gradually expanding into it; upper corolla lobe (0.8–)1.0–1.8(–2.2) × (0.6–)0.7–1.2(–1.6)cm; lateral lobes (1.0–)1.2–2.0(–2.4) × (0.4–)0.5–0.9(–1.3)cm; corolla tube (1.6–)1.9–2.6(–3.1)cm long, (0.1–)0.2–0.4(–0.5)cm wide at base; outer surface of corolla densely covered with unicellular and multicellular gland-tipped hairs, the gland-tipped hairs continuing in distinct lines up the corolla lobes, occasionally lacking unicellular hairs; inner surface of corolla sparsely to densely covered with unicellular hairs or glabrous. Stamens (3.2–)4.1–5.4(–6.3)cm long, with dense terete or flattened unicellular hairs on proximal (1.8–)2.4–3.3(–3.8)cm of filament, exserted (1.4–)2.0–3.0(–3.4)cm beyond throat of corolla. Style (3.0–)4.2–5.7(–6.3)cm long, exserted (1.7–)2.4–3.8(–4.3)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.3–)0.6–1.7(–2.6)cm; stigma 0.1–0.2(–0.3)cm wide. Ovary 0.2–0.4(–0.6)cm long, 0.1–0.2(–0.3)cm wide at the base, sparsely to densely covered with multicellular gland-tipped hairs and unicellular hairs, occasionally with multicellular eglandular hairs and unicellular hairs, or eglandular, gland-tipped hairs, unicellular hairs, rarely with only multicellular gland-tipped hairs. Capsules (1.0–)1.2–1.8(–2.4) × 0.4–0.6(–0.8)cm, ovate to narrowly ovate, sparsely covered with unicellular hairs and moderately to densely covered with multicellular gland-tipped hairs, often glaucous. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.2–)1.9–3.4(–3.5)×(0.6–)0.7–1.1(–1.2)mm, body (0.7–)1.0–1.5(–1.7)×(0.3–)0.4–0.5mm; testa expanded and dorsiventrally flattened surrounding the body, the cells elongate over the body of the seed, becoming shorter in the expanded portion of the testa, with transverse end-walls (Fig. 9). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). See illustrations of this species in Ashe, 1921 (photo); Harkness, 1932; Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Delaware to south-eastern Georgia along the Atlantic Coastal Plain (Fig. 20). Sandy pinelands, swamps, shrub bogs, or along streams. Fernald (1942) cites this species as 'thoroughly distinctive' of the Coastal Plain. Elevation: sea level to 150m. Flowering primarily in April and May; however, this species may flower as early as March and intermittently flower as late as November in the southern part of its range.

The relationship of *Rhododendron atlanticum* to the other white-flowered unblotched species, *R. viscosum* and *R. arborescens*, is not resolvable at present (see Phylogenetic Analysis). It is distinct from both of these species by its flowering before or as the leaves expand. While *R. atlanticum* is isolated geographically from *R. arborescens*, it is entirely sympatric with *R. viscosum* and is very similar to it morphologically. *Rhododendron atlanticum* is quite variable in pubescence, flower colour and leaf size. Generally, however, it is more glabrous than *R. viscosum*, and has smaller leaves, which usually differ in length-to-width ratio from those of *R. viscosum*. In Virginia the leaves of *R. atlanticum* tend to be larger than the leaves of individuals throughout the rest of the species' geographic range. Flower colour in *R. atlanticum* varies from white to pink (Weatherby & Griscom, 1934; personal observation) to white with a yellowish tinge (Fernald, 1941). These forms have been formally recognized by Fernald (1941) and by Ashe (1921) and Coker (1920), but in this treatment are not recognized because variation in corolla colour shows no correlation with other morphological characters or geographical distribution. Usually *R. atlanticum* is a low-growing, strongly rhizomatous species that has less well-developed branching than *R. viscosum* (which often can also be rhizomatous). However, sterile specimens of rhizomatous *R.*

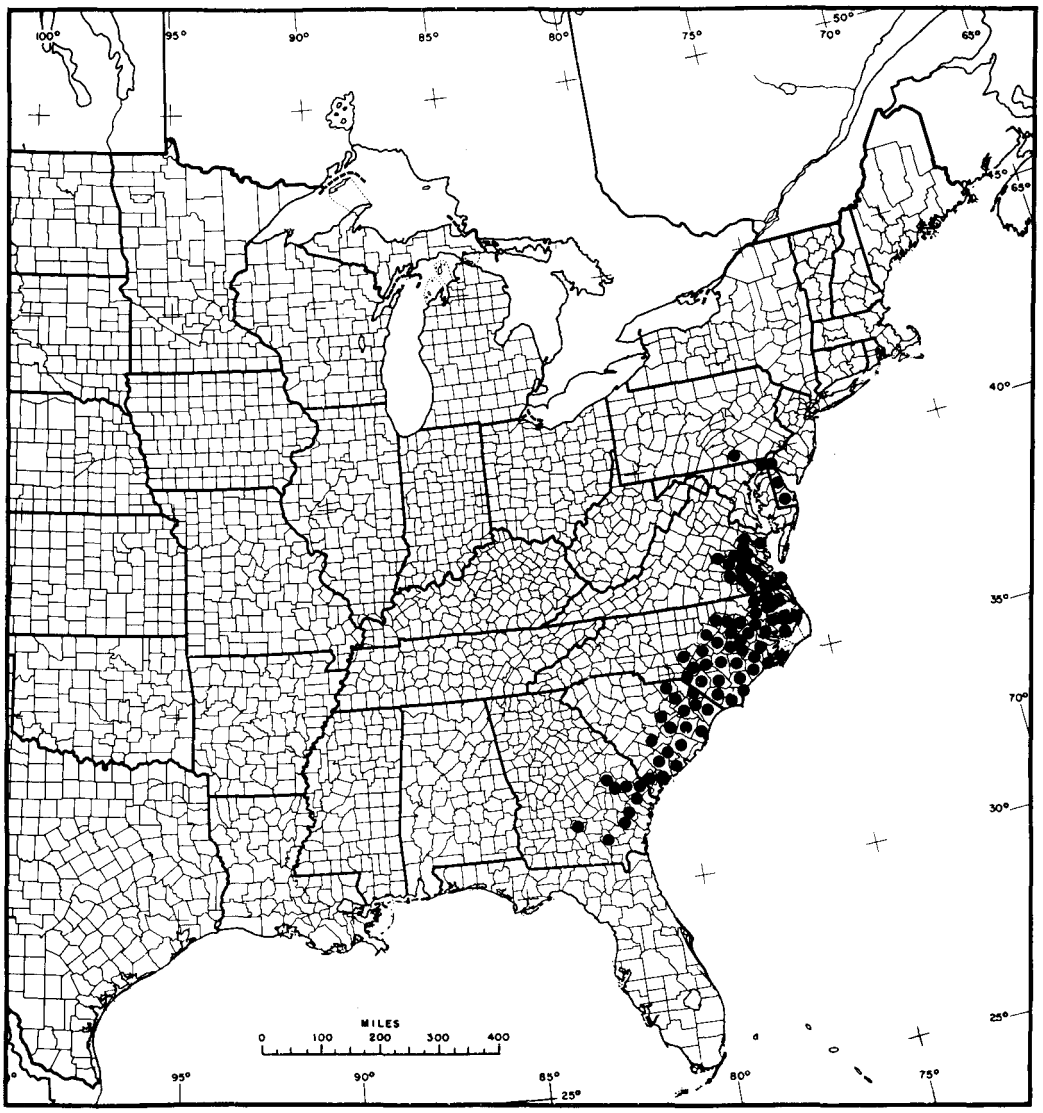


FIG. 20. Distribution of *Rhododendron atlanticum*.

atlanticum and of glabrous, rhizomatous forms of *R. viscosum* can be nearly indistinguishable because of the natural variation within populations of *R. atlanticum* and *R. viscosum*.

Hybrids between *R. atlanticum* and *R. canescens*, and *R. periclymenoides* are discussed under species descriptions of *R. canescens* and *R. periclymenoides*, respectively.

5. Rhododendron austrinum (Small) Rehder in Bailey, Stand. Cycl. Hort. 6: 3571 (1917).

Syn.: *Azalea austrina* Small, Fl. S.E. US ed. 2. 1356, 1375 (1913). Type: Wooded hillsides, Chattahoochee, Florida, iv and x, *Curtiss* 1718* (holo. NY).

Rhododendron roseum (Loisel.) Rehder f. *lutescens* Rehder, Contr. Gray Herb. 165: 9 (1947). Type: Pennsylvania: J. P. Gable, Stewartstown, *Rehder* s.n. (holo. A).

Shrub or small tree to 5m tall, usually non-rhizomatous; young twigs red-brown, densely covered with unicellular hairs and multicellular gland-tipped hairs. Vegetative bud scales densely covered with unicellular hairs abaxially; margin glandular. Leaf blade membranaceous, ovate or obovate to elliptic, (4.7–)5.4–8.8(–10.0) × (2.1–)2.2–3.2(–3.9)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface densely covered with unicellular hairs, or with unicellular hairs and multicellular gland-tipped hairs, the midvein densely covered with unicellular hairs; abaxial surface densely covered with unicellular hairs, the midvein densely covered with unicellular hairs and multicellular gland-tipped hairs; margin entire, ciliate with multicellular eglandular and gland-tipped hairs; petiole 0.2–0.5cm long, densely covered with unicellular hairs and multicellular gland-tipped hairs. Flower bud scales chestnut brown; abaxial surface densely covered with unicellular hairs; margin glandular. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 10 to 24 flowers. Pedicels (0.5–)0.6–1.1(–1.7)cm long, densely covered with unicellular hairs and multicellular gland-tipped hairs. Sepals less than 0.1–0.2cm long, often varying in length on the same flower; margins glandular-fimbriate; abaxial

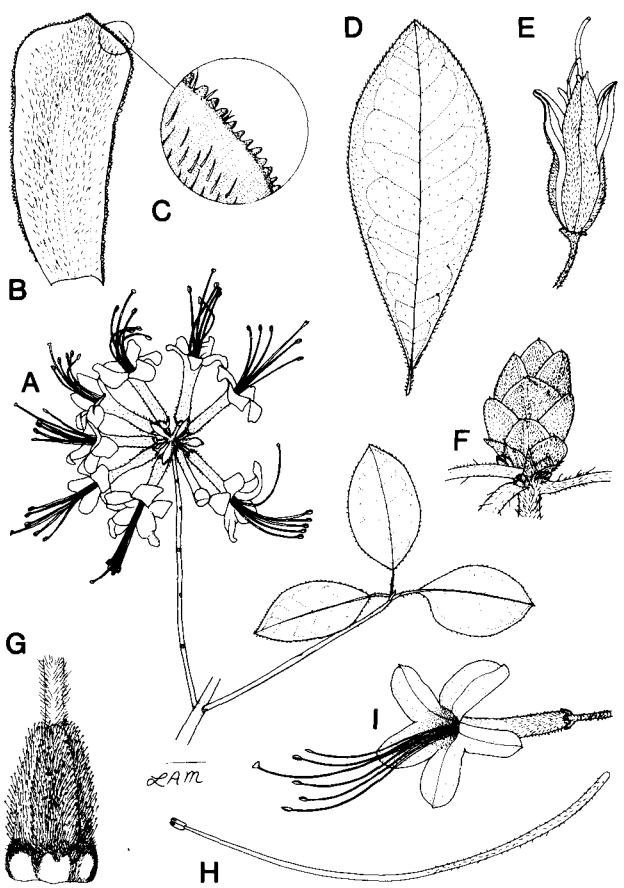


FIG. 21. *Rhododendron austrinum*. A, habit (0.35×); B, floral bud scale (3.5×); C, close-up of floral bud-scale margin (7×); D, leaf (0.7×); E, fruit (1.4×); F, winter flower bud (1.4×); G, ovary (3.5×); H, stamen (1.05×); I, flower (0.7×).

surface densely covered with unicellular hairs and multicellular gland-tipped hairs. Corolla yellow, apricot or orange to red-orange, fragrance musky-sweet, the tube longer than the limb and gradually expanding into it; upper corolla lobe 0.9–1.4(–1.8) × 0.6–1.2(–1.4)cm; lateral lobes (1.1–)1.2–1.7(–2.0) × 0.5–0.9(–1.1)cm; corolla tube 1.8–2.3(–2.4)cm long, 0.2–0.4(–0.5)cm wide at base; outer surface of corolla sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs; inner surface of corolla sparsely to densely covered with unicellular hairs. Stamens (5.2–)5.4–6.8(–7.7)cm long, with dense terete or flattened unicellular hairs on proximal (2.5–)2.8–3.6(–3.7)cm of filament, exserted (3.3–)3.5–4.8(–5.7)cm beyond throat of corolla. Style (5.4–)5.5–6.8(–7.5)cm long, exserted (3.2–)3.6–4.9(–5.5)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.3–)0.5–1.7(–2.2)cm; stigma 0.1–0.2(–0.3)cm wide. Ovary 0.3–0.5(–0.6)cm long, 0.1–0.2cm wide at the base, densely covered with multicellular gland-tipped hairs and unicellular hairs, or also with multicellular eglandular hairs. Capsules (1.4–)1.6–2.3 (–2.5) × (0.3–)0.4–0.5cm, narrowly ovate, moderately to densely covered with unicellular hairs and sparsely to moderately densely covered with multicellular gland-tipped hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.1–)1.7–2.8(–2.9) × 0.7–0.9(–1.0)mm, body 1.0–1.5(–1.7) × (0.2–)0.3–0.5(–0.6)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells short throughout, with transverse end-walls (Fig. 8). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). Figure 21; see additional figure in Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Florida pan-handle and adjacent Georgia, Alabama and Mississippi (Fig. 22). Upland mixed mesic hardwoods, bluffs of rivers or stream banks, river bottoms, swamps. Elevation: sea level to 100m. Flowering from March to April; occasionally as late as May.

Rhododendron austrinum is most closely related to *R. luteum* and *R. occidentale*. It is quite variable in flower colour, ranging from yellow to orange with a dark pink to red tube. Morphologically, it resembles *R. canescens* but can be distinguished from it by the consistently glandular nature of the bud-scale margins, pedicels, petioles and leaf margins. It is interesting to note that while the bud-scale margins of *R. canescens* can be mixed glandular and unicellular-ciliate in some populations, this character state is restricted to populations in central Georgia where *R. austrinum* does not occur. In areas where *R. canescens* is sympatric with *R. austrinum* the bud-scale margins of the former are consistently eglandular, as are the pedicels, petioles and leaf margins. These two species are usually isolated ecologically: *R. canescens* usually occurs in stream bottoms or low areas, and *R. austrinum* in upland woods. Hybrids do occur, however, and these usually appear intermediate in flower colour, but retain the eglandular nature of *R. canescens*. Specimens from Jackson Co., Mississippi are apparently *R. austrinum*, but those from neighbouring George Co. are entirely like *R. canescens* except for the orange-red flower colour noted on the label. Whether these specimens represent natural hybrids or whether they are cultivated hybrids is not possible to determine without further information. For citations of putative hybrids, see Appendix.

Rehder (1947) described a new form of *R. roseum* (= *R. prinophyllum*) from Stewartstown, Pennsylvania, but the type specimen is indistinguishable from *R. austrinum*. Rehder states that the plant grew in the woods near Gable's home in Stewartstown, although it is most likely an escape from cultivation.

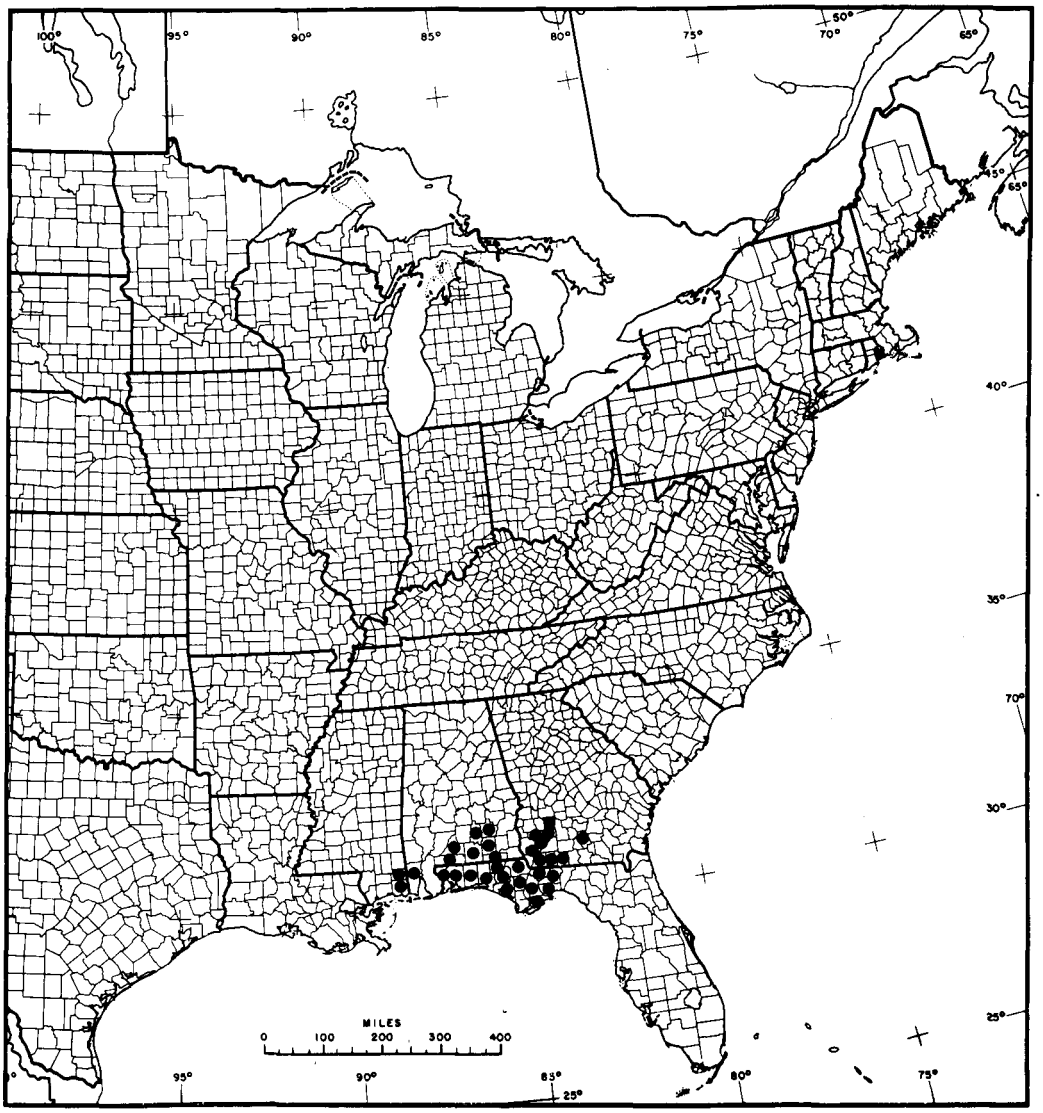


FIG. 22. Distribution of *Rhododendron austrinum.*

6. Rhododendron calendulaceum (Michx.) Torrey, Fl. N. Middle United States 1: 425 (1824).

Syn.: *Azalea calendulacea* Michaux, Fl. Bor.-Amer. 1: 151 (1803). Type: in summis montibus Carolinae, *A. Michaux* s.n. (lecto. P-MICHX; IDC 6411, 36.III.1).

Azalea speciosa Willd., Berl. Baum. ed. 2, 49 (1811). nom. illeg. *Rhododendron speciosum* (Willd.) Sweet, Hort. Brit. ed. 2, 343 (1830). nom. illeg. Type: as for *Azalea calendulacea* Michaux.

Azalea calendulacea var. *crocea* Michaux, Fl. Bor.-Amer. 1: 151 (1803). *Rhododendron calendulaceum* f. *croceum* (Michaux) Rehder, in Mitt. Deutsch Dendr. Gesell. 24: 225 (1915). Type: n.v.

Azalea aurantiaca Dietrich, Darst. Vorz. Zierpfl. 4 t. 1 (1803). *Rhododendron calendulaceum* var. *aurantiacum* (Dietrich) Zabel in Beissner, Schelle & Zabel, Handb. der Laubholz. 380 (1903). *R. calendulaceum* f. *aurantiacum* (Dietrich) Rehder, Monogr. Azaleas 130 (1921). Type: n.v.

Azalea coccinea Lodd., Bot. Cab. 7: 624 (1822), as '*A. coccinea* var. major'. *A. speciosa* var. *coccinea* (Lodd.) DC., Prodr. 7: 717 (1834), nom. illeg. Type: illustr. in Bot. Cab. 7, pl. 624 (lecto. designated here; IDC 5312, 34:I.5).

Azalea crocea Hoffsgg., Verz. Pflanzen. Suppl. 3: 22 (1826), nom. nov. Type: n.v.

Azalea speciosa var. *major* Sweet, Hort. Brit. ed. 2, 343 (1830); *A. coccinea* var. *major* Lodd., Bot. Cab. 7: 624 (1822), nom. inval. Type: as for *A. coccinea*.

Azalea speciosa var. *aurantia* Lodd., Bot. Cab. 13: 1255 (1827). Type: illus. pl. 1255, Lodd., Bot. Cab. 13: 1255 (lecto. designated here; IDC #5312, 69:IV.1).

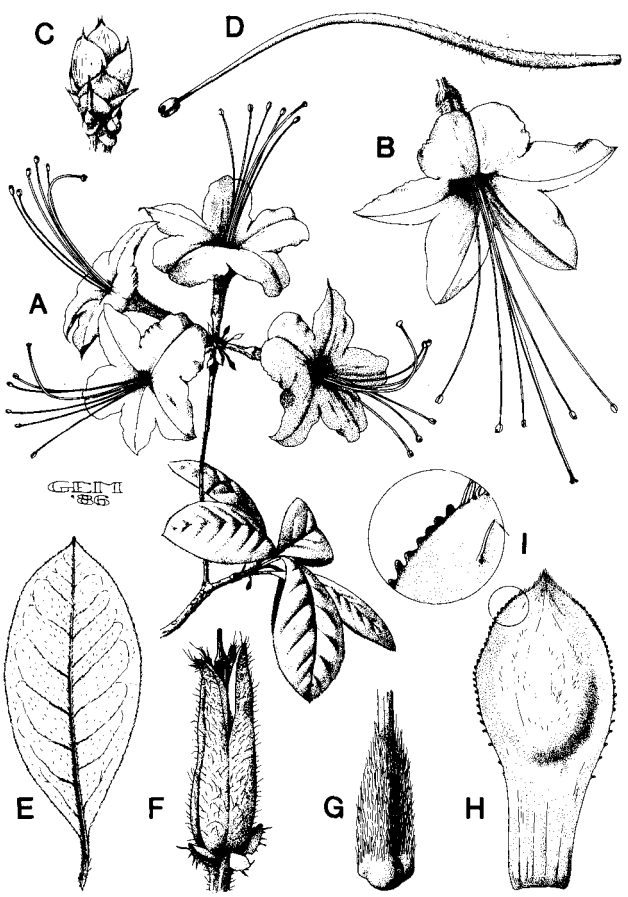


FIG. 23. *Rhododendron calendulaceum*. A, habit (0.35×); B, flower (0.7×); C, winter flower bud (1.4×); D, stamen (1×); E, leaf (0.7×); F, fruit (1.4×); G, ovary (3.5×); H, floral bud scale (3.5×); I, close-up of floral bud-scale margin (7×).

Shrub or small tree to 10m tall, usually non-rhizomatous; young twigs reddish brown, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs. Vegetative bud scales glabrous abaxially; margin unicellular-ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (4.5–)5.6–7.7(–9.1) × (1.3–)1.8–2.6(–3.3)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely covered with multicellular eglandular and unicellular hairs or with only multicellular eglandular hairs, or glabrous; the midvein densely covered with unicellular hairs; abaxial surface sparsely to densely covered with multicellular eglandular hairs or glabrous; the midvein densely covered with unicellular and multicellular eglandular hairs, rarely densely covered with unicellular hairs and multicellular eglandular hairs, or with only unicellular hairs; margin entire, ciliate with multicellular eglandular hairs; petiole 0.3–0.6(–0.7)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs. Flower bud scales chestnut brown; abaxial surface glabrous, rarely very sparsely covered with unicellular hairs; margin glandular. Flowers appearing before or as the leaves expand; inflorescence a shortened raceme of 5 to 9 flowers. Pedicels (0.7–)0.8–1.2(–1.4)cm long, sparsely to densely covered with unicellular hairs and densely covered with multicellular gland-tipped hairs, or with multicellular eglandular hairs, or both. Sepals (0.1–)0.2–0.3cm long, often varying in length on the same flower; margins glandular-fimbriate, frequently setose; abaxial surface sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs, rarely with unicellular hairs and multicellular eglandular hairs or with only unicellular hairs. Corolla orange to flame-coloured, fragrance acrid, the tube longer than the limb and abruptly expanding into it; upper corolla lobe (1.4–)1.6–2.2(–2.3) × (1.2–)1.5–2.2(–2.5)cm; lateral lobes 1.8–2.6(–3.0) × (0.9–)1.0–1.4(–1.5)cm; corolla tube (1.6–)1.8–2.2(–2.4)cm long, (0.2–)0.3–0.4(–0.5)cm wide at base; outer surface of corolla sparsely to densely covered with unicellular hairs and densely covered with multicellular gland-tipped hairs which often continue up the corolla lobes; inner surface of corolla sparsely to densely covered with unicellular hairs. Stamens (5.2–)5.7–6.7(–7.2)cm long, with dense terete or flattened unicellular hairs on proximal (1.9–)2.3–3.1(–3.2)cm of filament, exserted (3.4–)3.7–4.8(–5.4)cm beyond throat of corolla. Style (5.5–)5.9–6.8(–7.2)cm long, exserted (3.8–)4.2–5.3(–6.0)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.0–)0.3–1.3(–1.7)cm; stigma 0.1–0.2(–0.3)cm wide. Ovary 0.3–0.4(–0.5)cm long, (0.1–)0.2–0.3cm wide at the base, densely covered with multicellular eglandular hairs and dense unicellular hairs, rarely with multicellular gland-tipped hairs and unicellular hairs, or with all three types of hairs. Capsules (1.5–)1.8–2.6(–2.9) × (0.5–)0.6–0.8(–0.9)cm, ovate, sparsely covered with unicellular hairs and sparsely to moderately covered with either multicellular eglandular hairs or less often eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.7–)2.4–3.9(–4.2) × (0.6–)0.9–1.5(–1.9)mm, body (0.8–)1.1–1.7(–2.1) × (0.2–)0.4–0.7(–0.8)mm, the testa expanded and dorsiventrally flattened, surrounding the body, the cells elongate, with transverse end-walls (Fig. 4). Chromosome number: $2n = 52$ (Sax, 1930; Janaki-Ammal et al., 1950; Li, 1957). Figure 23; see additional figures of this species in Sims, 1815; Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Northern West Virginia, south through the mountains of Virginia, North Carolina, Tennessee and Georgia. Generally restricted to the Ridge and Valley Province and Southern Appalachians, with occasional populations in the Cumberland Mountains and in the eastern edge of the Cumberland Plateau in Ohio and Kentucky. Not known west of the Tennessee River Valley in Tennessee. Extending into the upper Piedmont in North and South Carolina and

as far south as Meriwether Co., Georgia (Fig. 24). Collections from Tarrytown, New York that are *R. calendulaceum* have been suggested as native in the past (Barnhart, 1895). However, all of the collections are nearly a century old and this is well north of the range of the species. Most likely these were cultivated plants that had persisted. Found in open, dry sites on southern and western exposures of hills and mountain-sides. Elevation: 180 to 1000m. Flowering from May to July.

The tetraploid flame azalea, *R. calendulaceum*, has long been noted for its morphological variation (Bartram, 1791; Rehder, 1921; Skinner, 1955, 1961; Galle, 1968, 1985). This species is found throughout the Blue Ridge and into the Ridge and Valley and Piedmont provinces. The closely

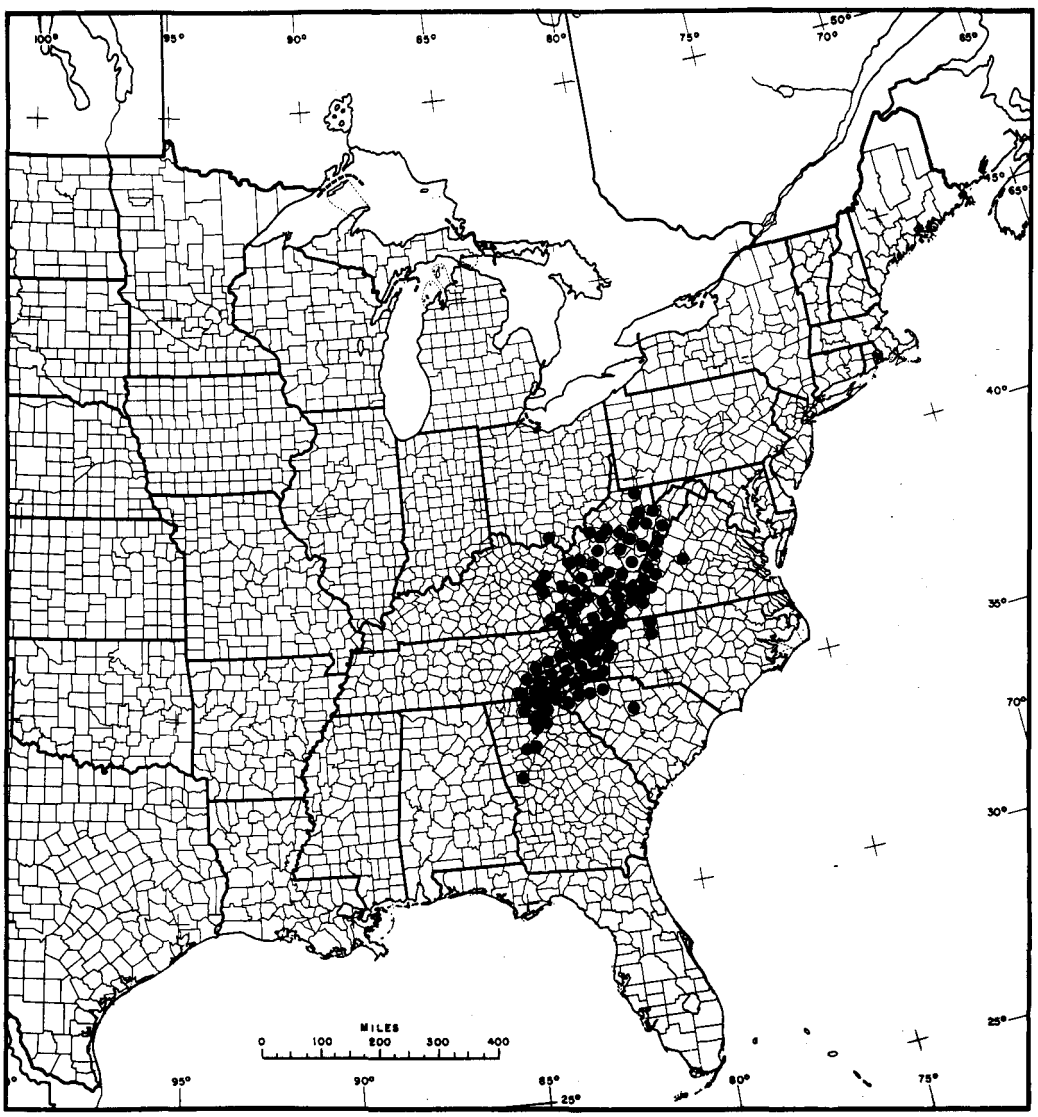


FIG. 24. Distribution of *Rhododendron calendulaceum*.

related *R. cumberlandense* is diploid and has a more discontinuous occurrence within its geographic range than the tetraploid, occurring primarily in the Cumberland Plateau and Mountains. While these two taxa are distinct biological entities, they are often very difficult to separate on the basis of morphology. This is due to the great range of morphological variation in *R. calendulaceum* (Willingham, 1973; personal observation) and also in part to the natural variation found in populations of *R. cumberlandense*. The characters which have been used to distinguish between these two species (besides chromosome number) include flavonoid chemistry (King, 1977a, 1980), flowering time and leaf expansion (Lemmon, 1938; Braun, 1941; Skinner, 1955, 1961; Galle, 1968, 1985), size of the corolla (Braun, 1941; Skinner, 1955, 1961; Galle, 1968, 1985), pubescence of the abaxial surface of the leaves (Skinner, 1955, 1961; Galle, 1968, 1985), and habit (Braun, 1941; Skinner, 1955, 1961; Galle, 1968, 1985). *Rhododendron calendulaceum* is characterized in the literature as tall usually non-stoloniferous shrubs possessing flowers which open before or as the leaves expand, and are up to 4cm across. In addition, *R. calendulaceum* is cited as possessing unicellular pubescent abaxial leaf surfaces (Rehder, 1921; Braun, 1941; Skinner, 1955, 1961; Galle 1968, 1985). By contrast, *R. cumberlandense* has been described as a low-growing stoloniferous shrub, with smaller, redder flowers, and more glabrous leaves than *R. calendulaceum* (Braun, 1941; Skinner, 1961). The primary difference which has been emphasized in the literature has been the flowering of *R. cumberlandense* after the leaves have fully expanded. Difficulties in identification arise because there are no gaps in the flower size and colour or in leaf size or pubescence, and the phenological differences are sometimes difficult to discern from herbarium material. Both *R. cumberlandense* and the 'early' and 'late'-blooming forms of *R. calendulaceum* have been studied in the Nantahala Mountains and nearby areas in North Carolina and Georgia by Willingham (1973, 1974, 1975, 1976). No morphological or phenological gaps were found between the early and late forms of *R. calendulaceum*. To distinguish between the two species Willingham used the following characters: growth habit, leaf expansion, flower colour, flower size, presence or absence of a blotch, pollen size (tetrad), pollen viability, cuticular ridging of the epidermis, stomata size and flavonoid compounds. Of these characters, only flavonoid compounds, pollen size and pollen viability were considered reliable characters in distinguishing between the two species by Willingham. He did note the difficulty in distinguishing the later-blooming individuals of *R. calendulaceum* from individuals of *R. cumberlandense*, as late-blooming *R. calendulaceum* often has most of its leaves unfolded (however, there are usually some vegetative bud scales remaining on the plant). These late-blooming individuals almost always possess multicellular gland-tipped hairs on the pedicels and the sepal margins, whereas *R. cumberlandense* has eglandular pedicels and sepal margins. Earlier-blooming individuals of *R. calendulaceum* appear to be more variable in pedicel and sepal margin condition, with either the pedicel or sepal margins being eglandular. Plants of *R. calendulaceum* with both eglandular pedicels and sepal margins are usually clearly blooming before or with the expansion of the leaves. In Kentucky the pedicels and sepal margins of *R. calendulaceum* are more often eglandular than in West Virginia where they are usually glandular.

Principal component analysis of 39 OTUs and up to 40 floral, bud-scale and vegetative characters were performed. Most of the characters were so variable that they only resulted in adding a great amount of 'noise' to an already complex problem. Therefore a series of analyses was performed, and from these, six characters (see Table 5) were chosen for an additional

analysis. These six characters consistently recurred in each of the previous analyses as characters which were heavily weighted in the first and second principal components. The results of this analysis, using 39 OTUs and six characters, are shown in Fig. 25. Some definite trends are evident. Using the character of flowering time (which was not used in the principal component analysis) tentative assignment of specimens to either *R. cumberlandense* or *R. calendulaceum* was made. There is a trend towards increasing floral size from the diploids to the tetraploids. However, there is no morphological gap in corolla size. The variation in the indumentum of the pedicels and in the sepal margins from eglandular to glandular is an important trend. In the *R. cumberlandense* specimens, the pedicels and sepal margins are usually both eglandular, while in most specimens of *R. calendulaceum* the pedicels and sepals are glandular. Leaf pubescence appears to be highly variable. There is only a weakly defined trend towards densely unicellular pubescent leaves in *R. calendulaceum.*

Several specimens previously classified as 'intermediates' fit best into the natural range of variation of *R. calendulaceum* and are best classified as the tetraploid, based upon morphological information. *Rhododendron cumberlandense* is less morphologically variable than *R. calendulaceum,* in that the pedicels and sepal margins are almost always eglandular, and only occasionally one or the other will be somewhat glandular. From the *R. cumberlandense* populations examined, the only individuals with both completely glandular pedicels and sepal margins occurred in Alabama, in a population of hybrids between *R. arborescens* and *R. cumberlandense.* By contrast, this character combination occurs frequently in *R. calendulaceum.* Field-work in Virginia and North Carolina confirms the generally eglandular nature of *R. cumberlandense* and the glandular nature of *R. calendulaceum.*

The morphological characters which are the most useful in distinguishing *R. cumberlandense* from *R. calendulaceum* are outlined in Table 6. These characters are most useful in the field. Identification can be made with much more confidence when a population is investigated, as opposed to an isolated specimen. Individuals may be further identified by taking into consider-

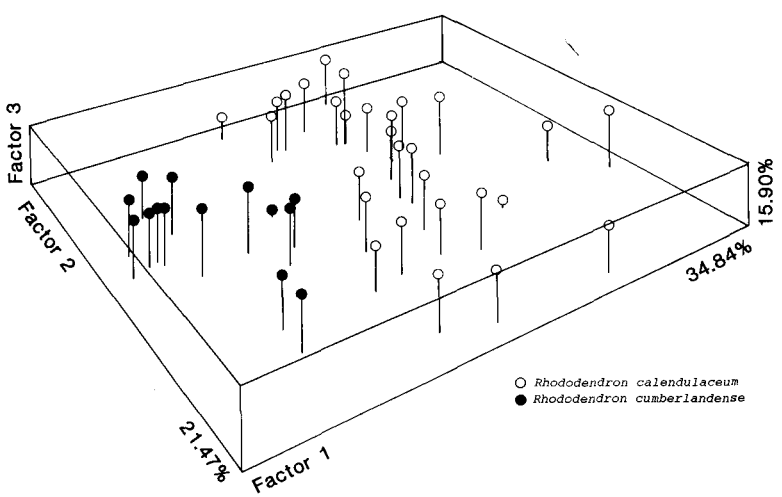


FIG. 25. Plot of the first three principal components resulting from the analysis of six floral and leaf characters in *Rhododendron calendulaceum* (open circles) and *R. cumberlandense* (closed circles).

TABLE 6. Distinguishing characters of *Rhododendron calendulaceum* and *R. cumberlandense*.

Taxon	Flowering	Pedicel pubescence	Sepal margin	Abaxial leaf surface
calendulaceum	before or with the expansion of the leaves	glandular to eglandular	glandular to eglandular	rarely if ever glaucous
cumberlandense	after the leaves have expanded	eglandular, rarely glandular	eglandular, rarely glandular	often glaucous
		(never with both the pedicel and sepal margins glandular)		

ation the geographic location and the altitude in combination with the height and habit of the plant. *Rhododendron cumberlandense* is primarily a plant of the higher elevations of the Cumberland Plateau and Mountains where it flowers well after the leaves have expanded (this is one of the most useful characters). It is usually of smaller stature and glaucous leaves are much more common in populations of *R. cumberlandense* than in *R. calendulaceum.*

The results of this study show that *R. calendulaceum* is morphologically separable from *R. cumberlandense* when a combination of characters is used in conjunction with geographic location. These two species can be most easily identified in the field where populations can be examined for variability in pedicel indumentum and sepal margin condition, and where phenological conditions can be clearly discerned. It is still difficult to identify some individual specimens because the range of morphological variation in *R. calendulaceum* may occasionally obscure the differences between the two species. However, difficulty in identification is not necessarily a valid reason to consider *R. cumberlandense* as conspecific with *R. calendulaceum* (Willingham, 1973).

Rhododendron calendulaceum was once thought to be the red–orange-flowered taxon in the hybrid swarm on Gregory Bald, Blount Co., Tennessee. However, Li (1957) showed that all individuals sampled from that locality were diploid, and thus the red–orange species is the diploid, *R. cumberlandense*. However, a few specimens from Gregory Bald are indistinguishable morphologically from *R. calendulaceum*, and this species likely occurs on the bald in small populations. Although of low probability, hybrids with the tetraploid are not impossible since unreduced gametes are fairly frequent in the Ericaceae (Li, 1957; Goldy & Lyrene, 1984). The putative hybrids listed in the Appendix exhibit a combination of characters that occur where *R. cumberlandense* is not known to occur, and with species whose blooming times overlap with that of *R. calendulaceum*, but not *R. cumberlandense*. As such, these plants are most likely the result of hybridization by unreduced gametes.

7. Rhododendron canescens (Michaux) Sweet, Hort. Brit. ed. 2, 343 (1830).

Syn.: *Azalea canescens* Michaux, Fl. Bor.-Amer. 1: 150 (1803). Type: juxta rivulos Carolinae inferioris. *A. Michaux* s.n. (lecto. designated here, P-MICHX; IDC #6411, 36.I.4).

Azalea nudiflora var. *bicolor* Aiton, Hort. Kew. 1: 203 (1789). *A. bicolor* (Aiton) Pursh, Fl. Am. Septentr. 1: 153 (1814). *Rhododendron bicolor* (Aiton) Sweet, Hort. Brit. 344 (1830). Type: n.v.

Azalea rosea Lois. in Duhamel, Traite Arb. Arbust. ed. 2, 224: 64 (1812), nom. illeg.; *Rhododendron roseum* (Lois.) Rehder, Monogr. Azaleas 138–139 (1921), nom. illeg.; *R. nudiflorum* (L.) Torr. var. *roseum* (Lois.) Weigand in Rhodora 26: 1–5 (1924), nom. illeg. Type: as for *A. canescens* Michaux.

Azalea candida Small in Bull. Torrey Bot. Club. 28: 360 (1901). *Rhododendron candidum* (Small) Rehder, in Bailey, Stand. Cycl. Hort. 5: 2945 (1916). *R. canescens* (Michaux) Sweet var. *candidum* (Small) Rehder, Monogr. Azaleas. 146 (1921). *Azalea canescens* var. *candida* (Small) Ashe in J. Elisha Mitchell Sci. Soc. 38: 91 (1922). Type: Georgia, Lowndes Co.: along Withlacoochee River, about Valdosta. 6–12 vi 1895. *J. K. Small* s.n. (holo. NY; iso. A, NY).

Rhododendron canescens f. *subglabrum* Rehder, Monogr. Azaleas 145 (1921). Type: Mississippi, Hinds Co.: Jackson, 15 iv 1915. *T. G. Harbison* 16 (lecto. A; isolecto. NCU).

Shrub or small tree to 6m tall, usually non-rhizomatous; young twigs red-brown, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally with only unicellular hairs, or with unicellular hairs and multicellular gland-tipped hairs, rarely glabrous. Vegetative bud scales densely covered with unicellular hairs abaxially; margin unicellular-ciliate or glandular. Leaf blade membranaceous, ovate or obovate to elliptic, (4.7–)5.9–8.5(–9.8) × (1.4–)1.9–2.8(–3.6)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely to densely covered with unicellular hairs, or also with multicellular eglandular hairs, occasionally only with multicellular eglandular hairs, rarely with unicellular hairs and multicellular gland-tipped hairs, the midvein densely covered with unicellular hairs; abaxial surface sparsely to densely covered with unicellular hairs, rarely also with multicellular eglandular hairs, or glabrous, the midvein densely covered with unicellular hairs and multicellular eglandular hairs, or rarely with multicellular gland-tipped hairs or only unicellular hairs; margin entire, rarely minutely serrulate, ciliate with multicellular eglandular hairs, rarely with a few multicellular gland-tipped hairs at the base of the blade; petiole (0.1–)0.2–0.4(–0.5)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally with unicellular hairs and multicellular gland-tipped hairs, rarely with only unicellular hairs. Flower bud scales chestnut brown; abaxial surface densely covered with unicellular hairs; margin unicellular-ciliate, occasionally with both unicellular hairs and glands. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 6 to 19 flowers. Pedicels (0.4–)0.5–1.0(–1.3)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally with unicellular hairs and multicellular gland-tipped hairs, rarely with all three types of hairs. Sepals less than 0.1–0.2(–0.4)cm long, often varying in length on the same flower; margins setose, occasionally also with multicellular gland-tipped hairs, or only glandular-fimbriate; abaxial surface densely covered with unicellular hairs, or also with multicellular eglandular hairs, occasionally with unicellular hairs and multicellular gland-tipped hairs, rarely with all three types of hairs. Corolla pink, or the tube pale to deep pink and the lobes pale pink to white, occasionally white or rose to deep pink throughout, fragrance musky-sweet, the tube longer than the limb and gradually expanding into it; upper corolla lobe (0.7–)0.8–1.3(–1.5) × (0.6–)0.7–1.0(–1.4)cm wide; lateral lobes (0.8–)1.0–1.5(–2.0) × (0.3–)0.5–0.8(–1.0)cm; corolla tube (1.3–)1.5–2.0(–2.6) long, (0.1–)0.2–0.3(–0.4)cm wide at base; outer surface of corolla densely covered with unicellular hairs and sparsely to densely covered with multicellular gland-tipped hairs that occasionally continue up the corolla lobes; inner surface of corolla sparsely to densely covered with terete or rarely

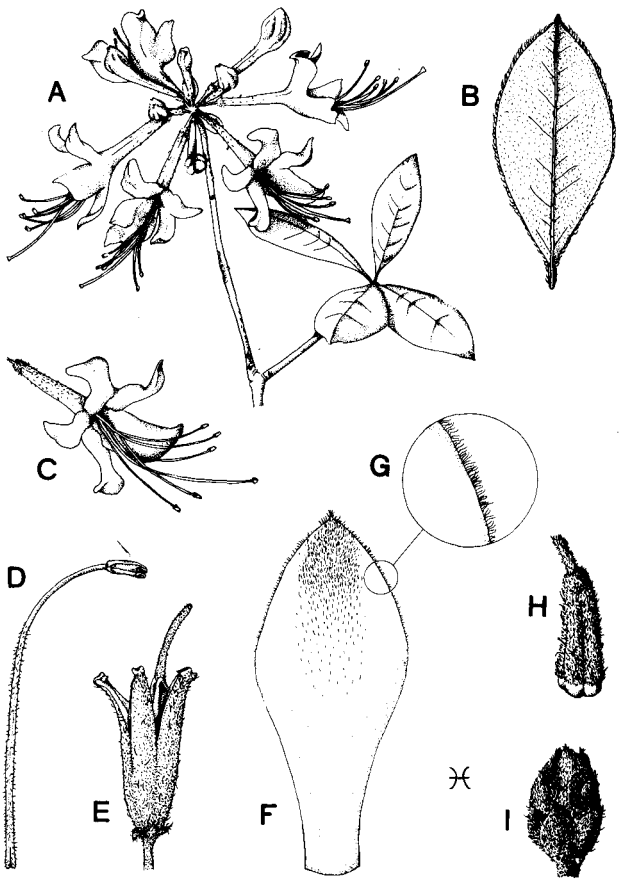


FIG. 26. *Rhododendron canescens*. A, habit (0.35×); B, leaf (0.7×); C, flower (0.7×); D, stamen (1×); E, fruit (1.4×); F, floral bud scale (3.5×); G, close-up of floral bud scale (7×); H, ovary (3.5×); I, winter flower bud (1.4×).

flattened unicellular hairs. Stamens (3.1–)4.4–5.7(–6.4)cm long, with dense terete or flattened unicellular hairs on proximal (0.0–)2.0–3.1(–4.1)cm of filament, exserted (1.7–)2.5–3.6(–4.5)cm beyond throat of corolla. Style (3.7–)4.4–5.7(–6.8)cm long, exserted (2.0–)2.7–3.9(–4.8)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.0–)0.7–2.0(–3.3)cm; stigma 0.1–0.2cm wide. Ovary 0.3–0.4(–0.5)cm long, 0.1–0.2(–0.3)cm wide at the base, densely covered with unicellular hairs and multicellular eglandular hairs, occasionally also with multicellular gland-tipped hairs, or with unicellular hairs and multicellular gland-tipped hairs; the multicellular hairs may cover the unicellular hairs or may only occur on the ribs of the ovary; the nectary is crowned with a dense ring of unicellular hairs. Capsules (1.2–)1.5–2.1(–2.5) × 0.3–0.5cm wide, narrowly ovate to cylindric, moderately to densely covered with unicellular hairs and sparsely to moderately covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.2–)1.6–2.5(–3.0) × (0.3–)0.5–0.8(–1.1)mm, body (0.6–)0.8–1.2(–1.4) × (0.1–)0.3–0.5(–0.6)mm; testa expanded and dorsiventrally flattened, surrounding the body, with both elongate and short cells scattered throughout the testa, the short cells more common in the

expanded portion of the testa, with tapering end-walls (Fig. 7). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). Figure 26; see additional figure of this species in Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Tennessee and southern North Carolina, south along the Coastal Plain and Piedmont to peninsular Florida, west to eastern Texas and Oklahoma, north to Union Co., Illinois (Fig. 27). River bottoms and stream banks, low flatwoods, dry clearings and open woods. Elevation: sea level to 500m. Flowering from March to April; occasionally as late as June or July.

Rhododendron canescens is similar morphologically to *R. prinophyllum* and *R. periclymenoides*, and these three variable species have been considered difficult to identify by previous workers (Rehder, 1921; Skinner, 1955, 1961; King, 1977a, b, 1980; Galle, 1985). In addition, hybridization can occur where the habitats and geographic ranges of these species overlap.

All three species have pink–white corollas, and flower before or with the leaves in the spring. In general, the corolla tube expands gradually into the limb, but in *R. canescens* the limb is slightly more abruptly expanded than in *R. periclymenoides* or *R. prinophyllum*. This character is difficult to measure on herbarium material, and, in this group, is continuously variable. In the past, the characters used to distinguish *R. canescens* from *R. periclymenoides* were primarily those of the indumentum of the corolla tube (Rehder, 1921; Skinner, 1955, 1961). *Rhododendron canescens* has multicellular gland-tipped hairs on the outer surface of the corolla tube, whereas most populations of *R. periclymenoides* have multicellular eglandular hairs. However, there are glandular forms of *R. periclymenoides*. These were attributed to hybridization by Skinner (1961). Other characters used to distinguish *R. canescens* from *R. periclymenoides* include the following: dense unicellular pubescence of the abaxial surface of the leaves (Porter, 1889a; Rehder, 1921; Skinner, 1961) and dense unicellular pubescence of the abaxial surface of the bud scales (Rehder, 1921; Lawrence, 1954; Skinner, 1961; Galle, 1968). Galle (1968) noted that *R. periclymenoides* is rarely white, while *R. canescens* often has at least some white on the corolla limb, if not also on the corolla tube.

The gradually expanding corolla tube and the less dense unicellular pubescent condition of the leaves of some individuals of *R. prinophyllum* have led to some confusion in separating it from *R. periclymenoides*. These two species are more northern in their distribution than *R. canescens* and are sympatric throughout much of their range. Although Rehder (1921) recognized these as distinct species, Weigand (1924) commented that one species graded into the other, and thus recognized *R. prinophyllum* as a variety of *R. periclymenoides* [*R. nudiflorum* (L.) Torrey var. *roseum* (Lois.) Weigand]. Lawrence (1954) discussed the differences between the two species, and distinguished *R. prinophyllum* from *R. periclymenoides* on the following characters: unicellular pubescent bud scales vs. usually glabrous bud scales, blue-green adaxial leaf surface vs. bright green surface, 'spicy' fragrance vs. sweet fragrance, multicellular gland-tipped hairs on the surface of the corolla vs. multicellular eglandular hairs, shorter stamens and the fruit with multicellular glandular hairs vs. longer stamens and the fruit with multicellular eglandular hairs. Skinner (1961) also reported that plants of *R. prinophyllum* were generally non-stoloniferous, whereas those of *R. periclymenoides* were often stoloniferous.

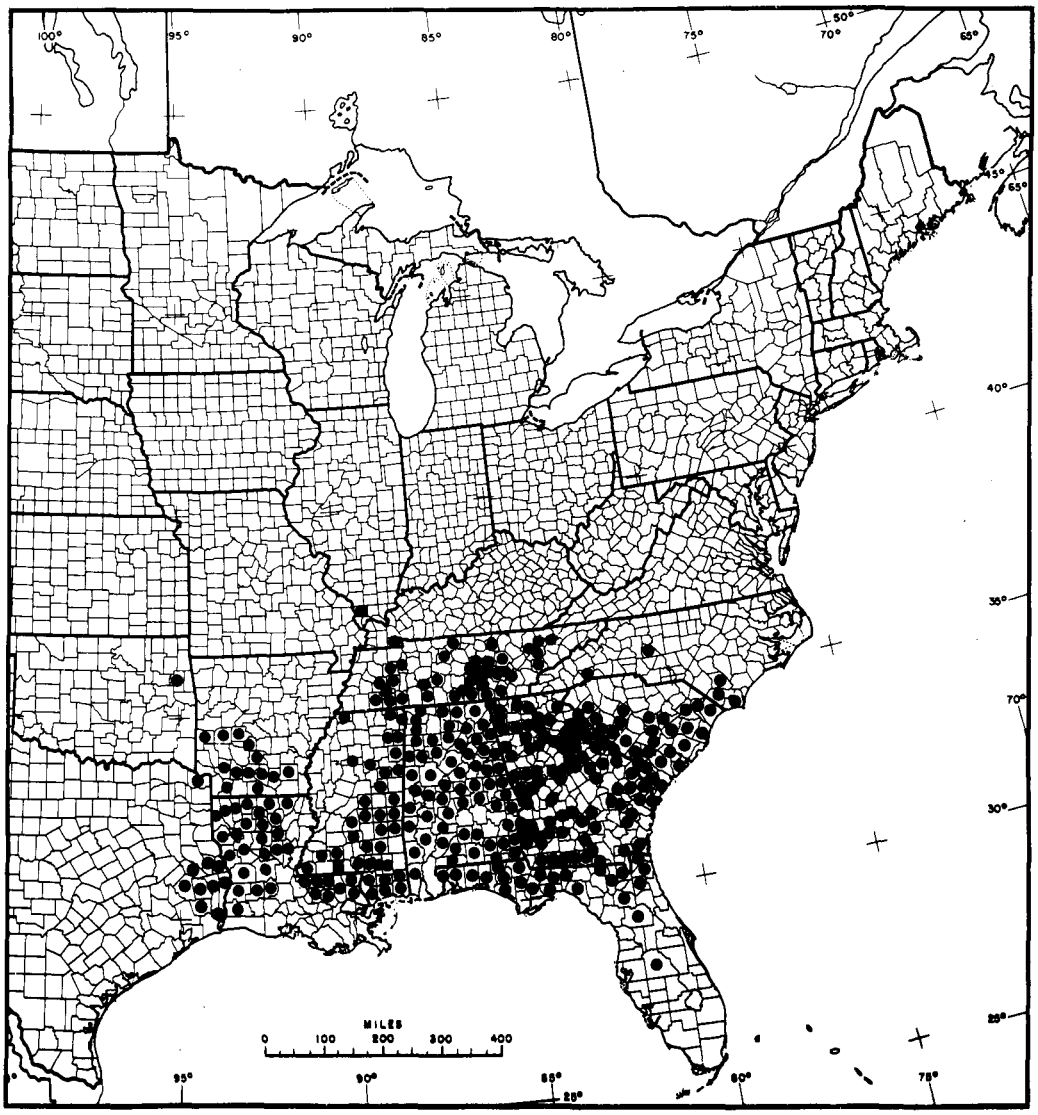


FIG. 27. Distribution of *Rhododendron canescens*.

The results of principal component analysis of 117 OTUs using 26 floral characters (see Table 5, Fig. 28) show that *R. prinophyllum* is morphologically the most distinctive of the three pink to white early flowering species. The characters which influenced the first principal component were primarily those of floral indumentum and size. Among the floral characters influencing the first component, sepal margin and pedicel pubescence were the most heavily factored. In *R. canescens* and *R. periclymenoides* the sepal margin is usually setose, whereas the sepals of *R. prinophyllum* usually have at least some multicellular gland-tipped hairs along the margin. In addition, the pedicels of *R. prinophyllum* are more often glandular than those of *R. canescens* or *R. periclymenoides*. It is interesting to note that when these indumentum

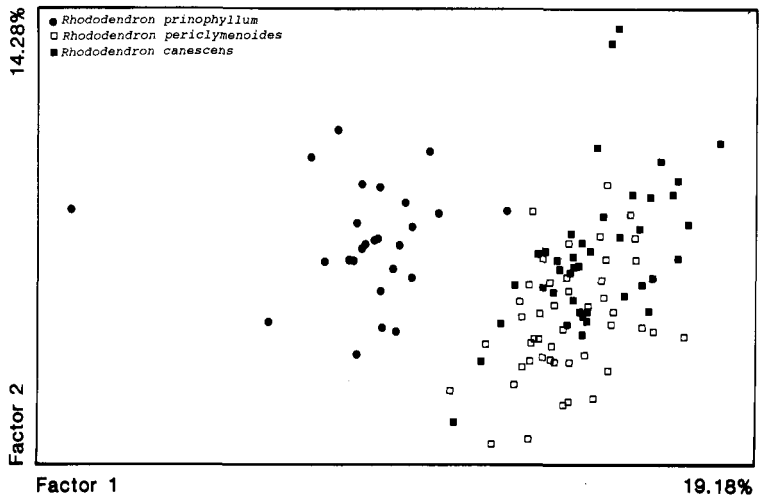


FIG. 28. Plot of the first two principal components resulting from the analysis of 26 floral characters in *Rhododendron prinophyllum* (closed circles), *R. periclymenoides* (open squares) and *R. canescens* (closed squares).

characters are considered individually, *R. prinophyllum* is usually more distinct from *R. periclymenoides*, with which it is often sympatric, than it is from the allopatric *R. canescens*. Even though the range of morphological variation within each species overlaps to some extent, the overlap is consistently less between *R. prinophyllum* and *R. periclymenoides* than between *R. prinophyllum* and *R. canescens*. The delimitation of *R. periclymenoides* and *R. canescens* is less definite. These two species are generally allopatric but their geographic ranges overlap as *R. canescens* extends into the Piedmont and *R. periclymenoides* is found on the northern Atlantic Coastal Plain.

The results of principal component analysis of 88 OTUs using 30 floral and bud-scale characters (see Table 5, Fig. 29) show that these two species are indeed very similar morphologically. The first component is most heavily influenced by corolla size, while the second is influenced most by the stamen length and sepal margin. *Rhododendron periclymenoides* has a greater percentage of individuals with pedicels lacking unicellular hairs than *R. canescens*, which always has pedicels with unicellular hairs. While the pedicels of *R. canescens* and *R. periclymenoides* usually have multicelluar eglandular hairs, *R. canescens* also often possesses at least some multicellular gland-tipped hairs on the pedicel. Since the indumentum of the corolla tube has been stressed in previous treatments this character was investigated with respect to its geographical distribution and its occurrence in the principal component analysis plot. The occasional glandular condition of the corolla tube of *R. periclymenoides* does not correlate with overlap of the geographic ranges of *R. canescens* and *R. periclymenoides*. Instead, it occurs sporadically in populations throughout the range of *R. periclymenoides*, often where *R. canescens* does not occur. Therefore the glandular condition of some individuals of *R. periclymenoides* reflects natural variation within the species, and usually does not indicate hybridization with *R. canescens*. However, the morphological similarity between these two species, whose ranges are primarily allopatric, raises the question of whether they should be

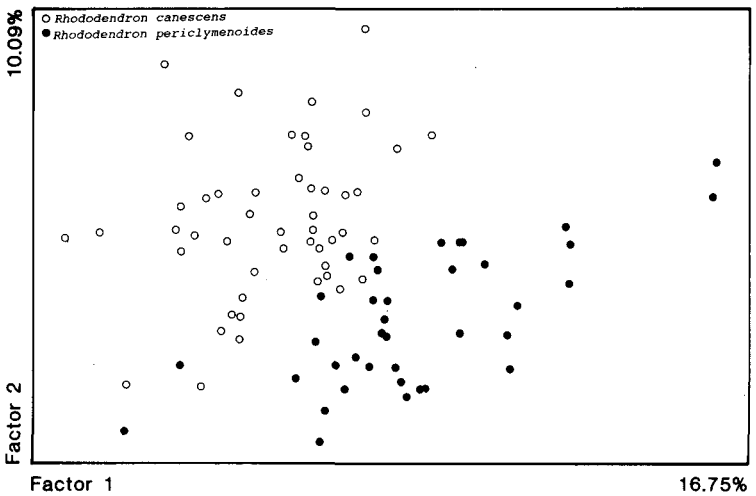


FIG. 29. Plot of the first two principal components resulting from the analysis of 30 floral and bud-scale characters in *Rhododendron periclymenoides* (closed circles) and *R. canescens* (open circles).

considered to be geographical subspecies. This can best be answered by the results of the cladistic analysis (see Phylogenetic Analysis). *Rhododendron periclymenoides* and *R. canescens* form a paraphyletic group and therefore it would be phylogenetically misleading to lump both taxa into a single species. Therefore two partially sympatric species are recognized: *Rhododendron periclymenoides* and *R. canescens*. Table 7 shows the characters best separating these species.

The most variable characters of *R. canescens* are the density of the pubescence of the leaves, flower colour, and, to a lesser extent, bud-scale margins. Plants in southern Georgia, Arkansas and Oklahoma tend to be very densely unicellular pubescent, whereas those individuals in

TABLE 7. Distinguishing characters of *Rhododendron prinophyllum*, *R. periclymenoides* and *R. canescens*.

Taxon	Pedicel pubescence and sepal margin	Floral bud-scale pubescence: abaxial surface	Outer surface of corolla pubescence	Fruit pubescence
prinophyllum	glandular, rarely eglandular	densely unicellular pubescent	densely unicellular pubescent, and glandular	glandular
periclymenoides	eglandular, rarely glandular	glabrous to sparsely unicellular pubescent	sparsely unicellular pubescent and eglandular, occasionally glandular	eglandular
canescens	eglandular, occasionally glandular	densely unicellular pubescent	densely unicellular pubescent and glandular	eglandular, occasionally glandular; densely unicellular pubescent

Louisiana and Mississippi tend to be more sparsely unicellular pubescent. The flower colour varies from completely white to dark pink, but these variations do not show any geographical or ecological pattern. The margin of the bud scales is almost always ciliate, except for some populations in central Georgia and South Carolina. In these populations the bud-scale margins are mixed unicellular-ciliate and glandular.

Whereas *R. canescens* and *R. prinophyllum* are almost completely allopatric, the geographic range of *R. canescens* overlaps with that of *R. periclymenoides*. *Rhododendron canescens* is generally found in wetter habitats than *R. periclymenoides*, but this is not always the case, especially in the upper Piedmont.

Rhododendron canescens hybridizes with several species that occur within its geographic range. Putative hybrids are listed in the Appendix.

8. Rhododendron cumberlandense E. L. Braun, Rhodora 43: 33 (1941).

Syn.: *Azalea cumberlandense* (E. L. Braun) Copeland, Am. Midl. Nat. 30: 533–625 (1943). Type: Kentucky, McCreary Co.: Yahoo Ridge, 15 vi 1935, *E. L. Braun* 971 (holo. Herb. Braun, n.v.; iso. A).

Shrub or small tree to 2m tall, usually rhizomatous; young twigs reddish brown, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely glabrous or with only multicellular eglandular hairs. Vegetative bud scales glabrous abaxially; margin unicellular-ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (3.1–)4.6–7.0(–8.1) × (1.3–)1.8–2.9(–3.5)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface glabrous, occasionally with sparse multicellular eglandular hairs, the midvein densely covered with unicellular hairs; abaxial surface glabrous, or very sparsely covered with multicellular eglandular hairs usually also glaucous, the midrib sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely with only multicellular eglandular hairs; margin entire, ciliate with multicellular eglandular hairs; petiole (0.2–)0.3–0.5cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely with only unicellular hairs. Flower bud scales chestnut brown; abaxial surface glabrous; margin ciliate at the apex and glandular below, rarely glandular to the apex. Flowers appearing after the leaves have expanded; inflorescence a shortened raceme of 3 to 7 flowers. Pedicels (0.4–)0.5–0.7(–0.9)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely with multicellular gland-tipped hairs and then the sepals eglandular. Sepals less than 0.1–0.2(–0.3)cm long, often varying in length on the same flower; margins setose with multicellular eglandular hairs, rarely with multicellular gland-tipped hairs and then the pedicels eglandular; abaxial surface sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely with only multicellular eglandular hairs. Corolla red, fragrance acrid, the tube longer than the limb and abruptly expanding into it; upper corolla lobe 1.3–1.8(–2.1) × 1.1–1.6(–2.0)cm; lateral lobes 1.4–1.9(–2.5) × 0.7–1.2cm; corolla tube (1.4–)1.6–2.1(–2.4)cm long, 0.2–0.3cm wide at base; outer surface of corolla densely covered with unicellular hairs and sparsely covered with multicellular gland-tipped hairs that continue up the corolla lobes; inner surface of corolla densely covered with unicellular hairs. Stamens (4.2–)4.9–6.1(–6.2)cm long, with dense terete or flattened unicellular hairs on proximal (1.7–)2.3–3.0(–3.1)cm of filament, exserted (2.7–)3.1–4.1(–4.3)cm

beyond throat of corolla. Style (3.9–)4.5–6.5(–7.2)cm long, exserted (2.8–)3.0–4.9(–5.5)cm beyond throat of corolla, densely covered with unicellular hairs on proximal 0.1–1.7(–2.8)cm; stigma 0.1–0.2cm wide. Ovary 0.2–0.3(–0.4)cm long, 0.1–0.2cm wide at the base, densely covered with multicellular eglandular hairs over dense unicellular hairs, nectary with a crown of dense unicellular hairs. Capsules (1.2–)1.4–2.3(–2.8) × 0.5–0.7(–0.8)cm, ovate to broadly ovate, sparsely to moderately covered with unicellular hairs and sparsely to densely covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.8–)2.1–3.4 (–4.5) × (0.5–)0.7–1.1(–1.4)mm, body (0.8–)1.1–1.6(–1.9) × (0.2–)0.4–0.6(–0.8)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells short, end-walls transverse (Fig. 4). Chromosome number: $2n = 26$ (Li, 1957; Willingham, 1973). See illustration in Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Westernmost Virginia and eastern Kentucky in the Cumberland Mountains and Plateau, south through Tennessee to northern Alabama, and east of the Tennessee River Valley in the southern Blue Ridge, along the border of Tennessee and North Carolina, south to northern Georgia. Isolated populations occur in Talladega, Cleburne and Randolph counties in Alabama (Fig. 30). Ridge-tops above 900m, but also occasionally at lower elevations, in mixed mesophytic forests.

Rhododendron cumberlandense is most closely related to *R. calendulaceum* (see Phylogenetic Analysis) and can be distinguished from the latter by its flowering well after the leaves have expanded, and by the eglandular condition of the pedicel and sepal margins. In addition, the leaves are very glaucous abaxially, and often are bluish green to dark olive-green in colour, especially upon drying. This species is primarily restricted to the Cumberland Mountains and Plateau, where it is morphologically and phenologically distinct from *R. calendulaceum*. In the southern Blue Ridge, however, *R. cumberlandense* can hybridize with *R. arborescens* or *R. viscosum*. It can also occupy the same kinds of habitats as high-altitude late-flowering individuals of *R. calendulaceum*. In these areas it is more difficult to distinguish *R. cumberlandense* from *R. calendulaceum* (see discussion under *R. calendulaceum*). See Appendix for citation of representative hybrid specimens.

The name *R. bakeri* (Lemmon, 1938) has been used for this diploid flame azalea since Skinner (1955) considered *R. bakeri* to be the same taxon as *R. cumberlandense*. Since *R. bakeri*, was an earlier name, it was properly used over *R. cumberlandense*. However, the type specimen of *Azalea bakeri* (= *R. bakeri*) is not at all similar to the type of *R. cumberlandense*. The specimen, which is labelled *Azalea bakeri* by Lemmon, has young expanding leaves, which are densely pubescent on the abaxial surface. In addition, the margins of the floral bud scales are all unicellular-ciliate, and the corolla possesses both glandular and eglandular multicellular hairs. None of the above characters is found in *R. cumberlandense*, which flowers well after the leaves have expanded and usually has glabrous leaves (never densely pubescent). In addition, the floral bud-scale margins and the outer surface of the corolla are consistently glandular in *R. cumberlandense*. Therefore Lemmon's specimen is probably a hybrid between *R. flammeum* and *R. canescens* (see hybrid names, p. 362). Thus, the correct name for the diploid flame azalea is *Rhododendron cumberlandense*.

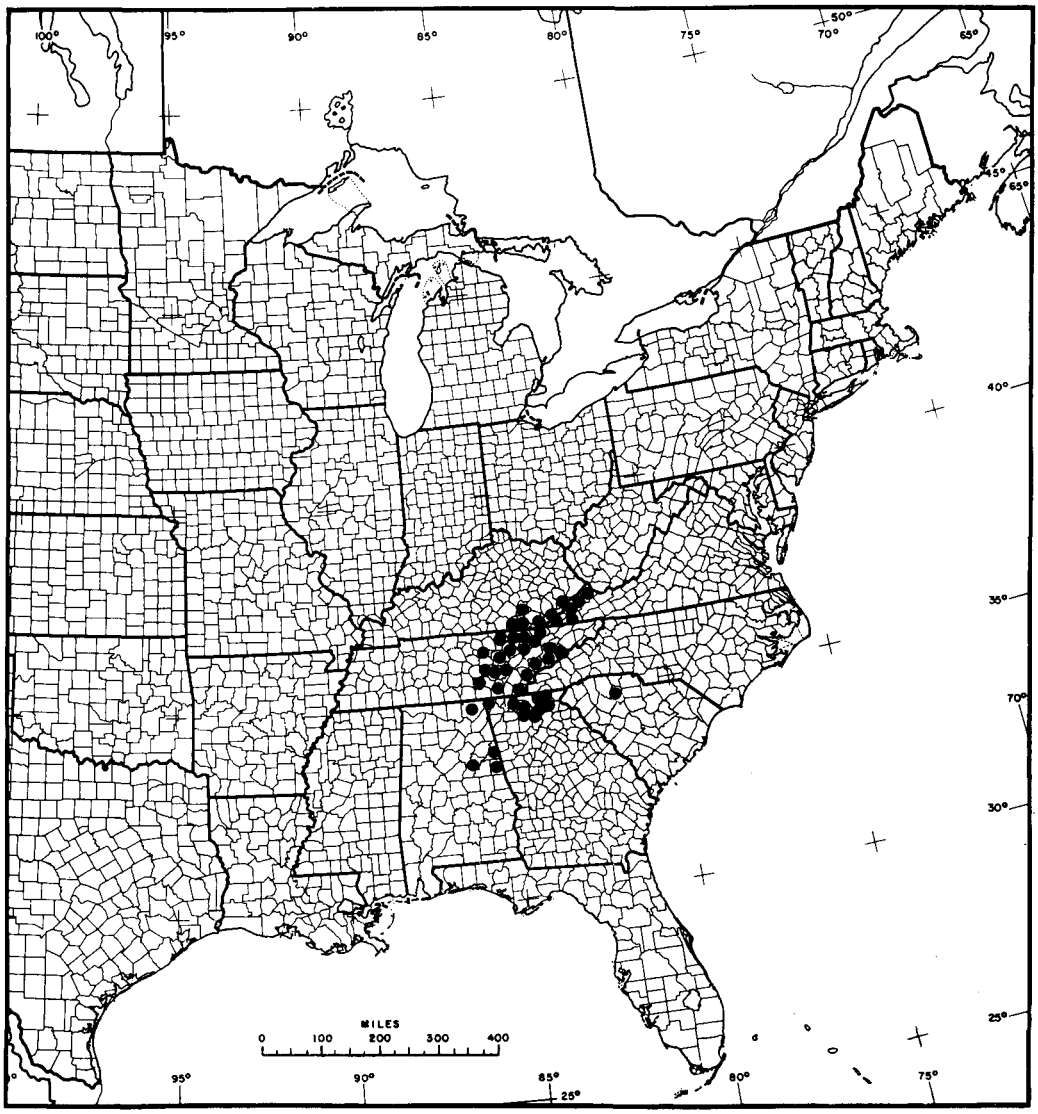


FIG. 30. Distribution of *Rhododendron cumberlandense*.

9. Rhododendron flammeum (Michx.) Sargent, Rhodo. Soc. Notes 1: 120 (1917).

Syn.: *Azalea calendulacea* Michx. var. *flammea* Michx., Fl. Bor.-Amer. 1: 151 (1803). Type: Georgia: Savannah River, Two Sisters Ferry. 26–27 iv 1787, *A. Michaux* s.n. (lecto. P-MICHX; photo of holo. A).

Azalea nudiflora var. *coccinea* Aiton, Hort. Kew. 1: 202 (1787). *A. periclymenoides* var. *coccinea* (Aiton) Pursh, Fl. Am. Septentr. 1: 152 (1814). *Rhododendron nudiflorum* var. *coccineum* (Aiton) Sweet, Hort. Brit. ed. 2, 343 (1830). Type: n.v.

Shrub or small tree to 2.5m tall, usually non-rhizomatous; young twigs red-brown, densely covered with unicellular and multicellular eglandular hairs. Vegetative bud scales glabrous,

to densely covered with unicellular hairs abaxially; margin unicellular-ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (2.9–)3.9–6.3(–8.2) × (1.3–)1.5–2.4(–2.7)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface glabrous or sparsely covered with multicellular eglandular hairs or with unicellular hairs, the midvein densely covered with unicellular hairs; abaxial surface densely covered with unicellular or multicellular eglandular hairs, or with both, or glabrous, the midvein sparsely to densely covered with unicellular hairs and multicellular eglandular hairs; margin entire, ciliate with multicellular eglandular hairs; petiole 0.2–0.6cm long, sparsely to densely covered with unicellular and multicellular eglandular hairs. Flower bud scales chestnut brown; abaxial surface sparsely to densely covered with unicellular hairs, rarely completely glabrous; margin unicellular-ciliate. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 6 to 11 flowers. Pedicels (0.3–)0.5–0.9(–1.0)cm long, sparsely to densely covered with unicellular and multicellular eglandular hairs. Sepals less than 0.1–0.3(–0.5)cm long, often varying in length on the same flower; margins setose with multicellular eglandular hairs; abaxial surface sparsely covered with unicellular and multicellular

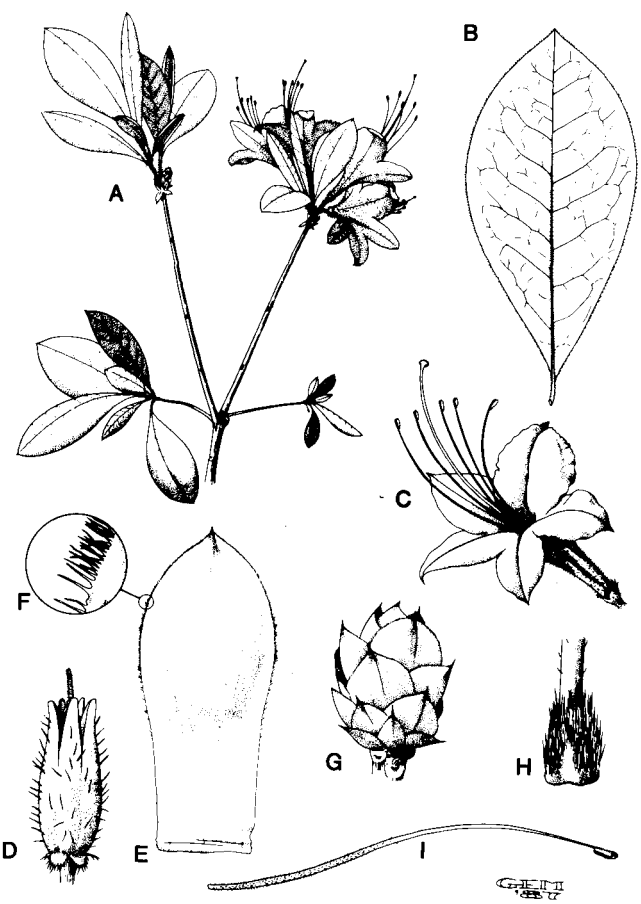


FIG. 31. *Rhododendron flammeum*. A, habit (0.35×); B, leaf (0.7×); C, flower (0.7×); D, fruit (1.4×); E, floral bud scale (3.5×); F, close-up of floral bud-scale margin (7×); G, winter flower bud (1.4×); H, ovary (3.5×); I, stamen (1.05×).

eglandular hairs. Corolla scarlet, reddish orange to orange, fragrance acrid, the tube longer than the limb and abruptly expanding into it; upper corolla lobe 0.8–1.7(–2.2) × (0.7–)0.8–1.6(–1.9)cm wide; lateral lobes (1.0–)1.1–1.8(–2.1) × (0.5–)0.6–1.0(–1.1)cm; corolla tube (1.7–)1.8–2.3 (–2.5)cm long, 0.2–0.3(–0.4)cm wide at base; outer surface of corolla sparsely covered with unicellular and multicellular eglandular hairs, the multicellular hairs continuing up the corolla lobes, rarely with unicellular and multicellular gland-tipped hairs (glands of hairs minute, poorly developed); inner surface of corolla densely covered with unicellular hairs. Stamens (4.0–)4.3–6.3(–7.3)cm long, with dense terete or flattened unicellular hairs on proximal (2.0–)2.1–2.8 (–3.3)cm of filament, exserted (2.4–)2.5–3.9(–5.0)cm beyond throat of corolla. Style (4.5–)4.9–6.8(–7.4)cm long, exserted (3.1–)3.3–5.0(–5.4)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.0–)0.1–1.4(–2.2)cm; stigma 0.1–0.2(–0.4)cm wide. Ovary 0.3–0.4(–0.5)cm long, 0.1–0.2(–0.3)cm wide at the base, densely covered with multicellular eglandular hairs over unicellular hairs. Capsules 1.5–2.3(–2.6) × 0.5–0.7(–0.8)cm, ovate, sparsely covered with unicellular hairs and moderately to densely covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.8–)2.0–2.7(–2.8) × 0.7–1.1(–1.2)mm, body 0.9–1.3 × 0.4–0.7(–0.8)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells elongate over the body of the seed, short in the expanded portion of the testa, with transverse end-walls (Fig. 5). Chromosome number: $2n = 26$ (Li, 1957). Figure 31; see additional illustrations in Prince, 1978 (photo) and Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Georgia and South Carolina (Fig. 32). Upland woods, dry slopes and ridges, bluffs of rivers or stream banks, sandhills. Elevation: sea level to 500m. Flowering in April.

Rhododendron flammeum, a species that is rather variable in corolla colour and in the pubescence of the floral bud scales, is related to *R. prunifolium* and *R. cumberlandense* (see Phylogenetic Analysis). These three red to orange-flowered species are isolated geographically. *Rhododendron flammeum* can be distinguished from both by its flowering before or with the expansion of the leaves. While it is marginally sympatric with *R. calendulaceum*, *R. flammeum* is reproductively isolated from it by the tetraploid condition of *R. calendulaceum* and the discontinuous distribution of *R. flammeum*. Although the flower colour is similar between *R. calendulaceum* and *R. flammeum*, they can be distinguished from one another by the eglandular corolla tube and the unicellular-ciliate floral bud-scale margins in *R. flammeum* vs. the densely glandular corolla tube and the glandular floral bud-scale margins in *R. calendulaceum*.

Hybrids between *R. flammeum* and *R. canescens* have been studied by the present author at Stone Mountain, Georgia (Kron et al., 1993). This population is most likely the same as T. G. Harbison's #900 collection noted by Rehder (1921). The hybrids at Stone Mountain are intermediate in flower colour (pink with a yellow blotch on the upper corolla lobe), in floral bud-scale pubescence (the population of the probable *R. flammeum* parent possesses glabrate bud scales, and those of the probable *R. canescens* parent possess densely unicellular pubescent bud scales), and in plant height (see Appendix under hybrids of *R. canescens*).

Although the name *Rhododendron speciosum* (Willd.) Sweet is often used for the Oconee azalea, it is not the correct one. Willdenow (1811) cites Michaux's (1803) *Azalea calendulacea* in his description of *Azalea speciosa*. In doing this Willdenow thus included the type of a

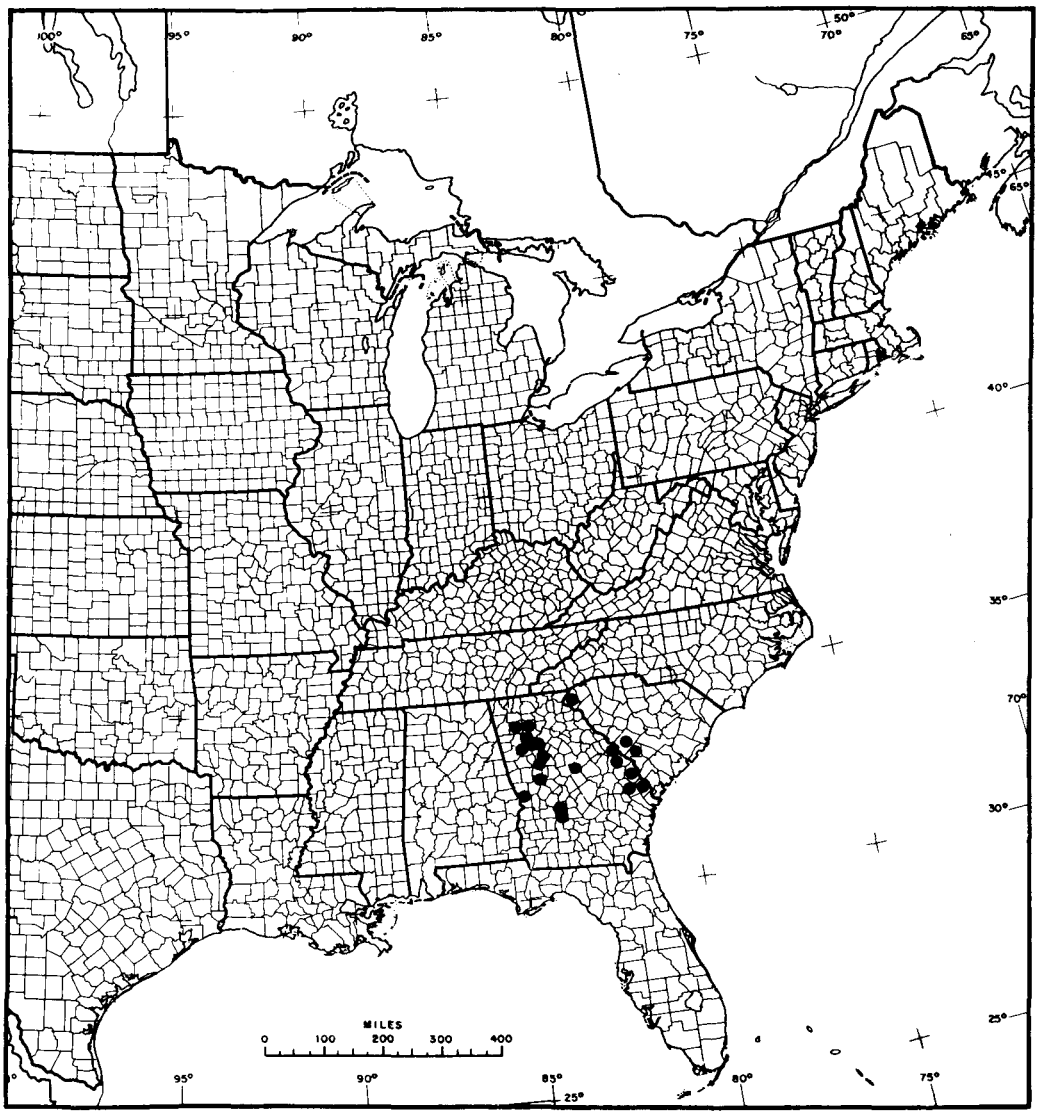


FIG. 32. Distribution of *Rhododendron flammeum*.

previously validly published name (*Azalea calendulacea* Michaux) making *Azalea speciosa* Willd. superfluous (International Code of Botanical Nomenclature, 1981, Art. 63.2). The correct name for the Oconee azalea is *Rhododendron flammeum* (Michaux) Sargent since Sargent (1917) raised Michaux's *A. calendulacea* var. *flammea* to specific rank.

10. Rhododendron luteum Sweet, Hort. Brit. ed. 2, 343 (1830), non *Azalea lutea* L., Sp. Pl. ed. 1, 1: 150 (1753); based on *Azalea pontica* L. (1753), q.v.

Syn.: *Azalea pontica* L., Sp. Pl. ed. 1, 1: 150 (1753). *Anthodendron ponticum* (L.) Rchb. in Mossler, Handb. Gewachsk. 1: 309 (1827). *Rhododendron ponticum* (L.) Schreb. ex DC., Prodr. 7: 718

(1839), non L., Sp. Pl. ed. 1, 1: 154 (1753). Type: illus. in Buxbaum, Plant. Minus Cogni. Cent. 5: 36, fig. 69 (1740).

Rhododendron flavum G. Don, Gen. Syst. 3: 847 (1834), nom. illeg.; based on *Azalea pontica* L. (1753) [= *R. luteum* Sweet (1830)].

Azalea flava Hoffmanzegg, Verz. Pflanzenkult. Nachtr. 2: 62 (1826). Type: n.v.

Azalea pontica L. var. *autumnalis* C. Koch, Linnaea 17: 281 (1843). Type: n.v.

Rhododendron flavum G. Don var. *macranthum* Bean, Trees and Shrubs Brit. Isles 2: 357 (1914). *R. luteum* Sweet var. *macranthum* Wilson, Monogr. Azaleas 105 (1921). Type: n.v.

Shrub or small tree to 2m tall, usually non-rhizomatous; young twigs red-brown, rarely yellow-brown, densely covered with unicellular hairs and multicellular gland-tipped hairs, rarely also with multicellular eglandular hairs, or with only multicellular gland-tipped and eglandular hairs. Vegetative bud scales glabrous, rarely sparsely covered with unicellular hairs abaxially; margin glandular ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (6.4–)7.6–12.0(–14.6) × (1.6–)2.1–3.4(–4.2)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely to densely covered with multicellular gland-tipped hairs, or rarely with multicellular eglandular hairs, the midvein densely covered with unicellular hairs; abaxial surface glabrous, occasionally glaucous, the veins raised and prominent beneath, rarely sparsely to densely covered with unicellular hairs, or with multicellular gland-tipped and eglandular hairs, or all three types of hairs, the midvein sparsely to densely covered with unicellular and multicellular gland-tipped hairs, rarely lacking the unicellular hairs; margin entire, ciliate with multicellular eglandular hairs above and gland-tipped hairs below; petiole 0.3–0.6(–0.8)cm long, densely covered with unicellular hairs and multicellular gland-tipped hairs, rarely with multicellular eglandular and glandular hairs. Flower bud scales chestnut brown; abaxial surface glabrous, occasionally sparsely to densely covered with unicellular hairs; margin glandular. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 9 to 17 flowers. Pedicels (0.8–)0.9–1.8(–2.4)cm long, densely covered with multicellular gland-tipped hairs, occasionally with unicellular hairs and multicellular gland-tipped hairs. Sepals less than 0.1–0.4(–0.7)cm long, varying in length on the same flower; margins glandular-fimbriate; abaxial surface sparsely covered with multicellular gland-tipped hairs, occasionally with unicellular hairs, rarely glabrous. Corolla yellow with a darker yellow blotch on the upper corolla lobe, fragrance sweet, the tube longer than the limb and gradually expanding into it; upper corolla lobe (1.3–)1.4–2.0(–2.4) × (0.8–)0.9–1.5(–2.0)cm wide; lateral lobes (1.3–)1.6–2.2(–2.5) × (0.5–)0.7–1.1(–1.2)cm; corolla tube (1.2–)1.3–2.0(–2.4)cm long, 0.2–0.4(–0.5)cm wide at base; outer surface of corolla sparsely to densely covered with multicellular gland-tipped hairs, or also with unicellular hairs, the gland-tipped hairs continuing up the corolla lobes; inner surface of corolla glabrous, rarely sparsely covered with unicellular hairs. Stamens (3.2–)3.4–4.4(–5.0)cm long, with dense terete or flattened unicellular hairs on proximal (1.6–)1.7–2.3(–2.5)cm of filament, exserted (1.4–)1.8–2.7(–3.0)cm beyond throat of corolla. Style (3.5–)3.7–5.0(–5.4)cm long, exserted (2.2–)2.4–3.8(–4.2)cm beyond throat of corolla, with dense unicellular hairs on proximal 0.2–0.6(–1.0)cm of style; stigma 0.1–0.2cm wide. Ovary (0.2–)0.3–0.4cm long, (0.1–)0.2–0.3cm wide at the base, sparsely covered with multicellular hairs, often with flattened or terete unicellular hairs in a tuft at the apex. Capsules (1.3–)1.5–2.1(–2.2) × 0.4–0.7(–0.8)cm, broadly ovate, sparsely covered with unicellular hairs and sparsely to moderately covered with multicellular gland-tipped hairs. Seeds pale to dark chestnut

brown, ovate or elliptic to fusiform, (2.4–)2.8–3.8(–4.8) × (0.5–)0.7–1.2(–1.5)mm, body (1.1–)1.3–1.8(–2.0) × (0.3–)0.4–0.6(–0.7)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells elongate, with tapered end-walls (Fig. 8). Chromosome number: $2n = 26$ (Sax, 1930; Janaki-Ammal et al., 1950). See figures in Duhamel de Monceau, 1812; Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Caucasus: Former Soviet Union, Turkey, and isolated populations in Poland and former Yugoslavia. Open wooded slopes, along streams and in swampy areas, shores of the Black Sea (Fig. 33). Elevation: sea level to 2300m.

Rhododendron luteum is most closely related to *R. austrinum* from which it can be distinguished by its broader, more glabrous fruits and its entirely yellow corolla with a deeper yellow blotch on the upper corolla lobe. The most noticeable difference between *R. luteum* and *R. austrinum* is the shape of the testa cells (Fig. 8). *Rhododendron luteum* possesses seeds with elongate testa cells with tapered end-walls, whereas *R. austrinum* possesses seeds with short testa cells with transverse end-walls.

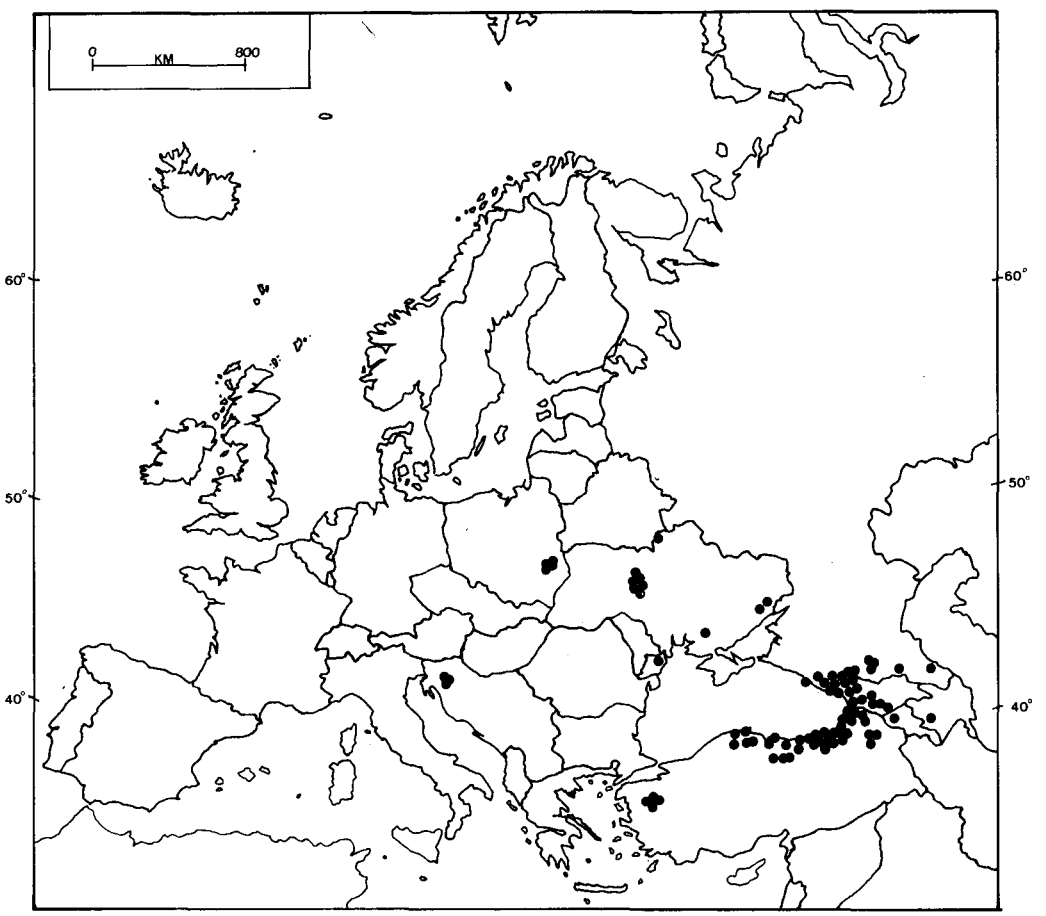


FIG. 33. Distribution of *Rhododendron luteum*.

Rhododendron luteum exhibits a typical Tertiary relict distribution in Europe (Szafer, 1975). It is variable primarily in leaf shape and unicellular indumentum of the floral bud scales.

The name *R. luteum* Sweet has priority over *Azalea pontica* L. since Linnaeus (1753) recognized the deciduous species of *Rhododendron* as a distinct genus (*Azalea*) from the evergreen species (*Rhododendron*). Transfer of the epithet '*pontica*' to *Rhododendron* would result in a later homonym, since Linnaeus described the evergreen *R. ponticum* L. from the Caucasus in 1753.

11. Rhododendron occidentale (Torr. & A. Gray) A. Gray, Bot. Calif. 1: 458 (1876).

Syn.: *Azalea occidentalis* Torr. & A. Gray, Pac. R. R. Rep. 4: 116 (1856). Type: California, Sonoma Co.: Laguna de Santa Rosa, 1 v 1856, *Bigelow* s.n. (lecto., designated here, NY; isolecto. NY).

Azalea californica Torr. & A. Gray ex Durand, in J. Acad. Phil. ser. 2, 3: 94 (1855). Type: California, Nevada Co.: shady hills along Deer Creek, *H. Pratten* s.n. (holo. P-DU).

Azalea nudiflora L. var. *ciliata* Kellogg, Proc. Calif. Acad. Sci. 1: 60 (1855). Type: (probably destroyed).

Rhododendron sonomense Greene, Pittonia 2: 172 (1891). *R. occidentale* (Torr. & A. Gray) A. Gray var. *sonomense* (Greene) Rehder, Monogr. Azaleas 127 (1921) (holo. ND-G, n.v.).

Rhododendron occidentale (Torr. & A. Gray) A. Gray var. *paludosum* Jepson, Man. Fl. Pl. Calif. 741 (1925). Type: California, Fortuna, 1916, *Jepson* s.n. (holo. n.v.).

Shrub or small tree to 8(–10)m tall, usually non-rhizomatous; young twigs red-brown, rarely yellow-brown, grey or glaucous, sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs or glabrous, occasionally sparsely to densely covered with only unicellular hairs. Vegetative bud scales glabrous or sparsely covered with unicellular hairs and multicellular eglandular hairs abaxially; margin unicellular-ciliate or glandular. Leaf blade membranaceous, ovate or obovate to elliptic, (2.5–)3.5–8.2(–10.8) × (0.8–)1.2–2.9(–3.6)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely covered with unicellular hairs and multicellular eglandular or gland-tipped hairs, with only multicellular eglandular hairs, the multicellular gland-tipped hairs, or both, or glabrous, the midvein densely covered with unicellular hairs, rarely also with multicellular gland-tipped hairs or eglandular hairs; abaxial surface glabrous, sparsely covered with unicellular hairs, multicellular gland-tipped hairs or both, rarely with multicellular eglandular and glandular hairs, midvein sparsely covered with multicellular eglandular hairs or with unicellular hairs and multicellular gland-tipped hairs, rarely with unicellular hairs and multicellular eglandular hairs or with only multicellular gland-tipped hairs; margin entire, ciliate with multicellular eglandular hairs or with multicellular eglandular and gland-tipped hairs; petiole (0.1–)0.2–0.5(–1.0)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular or gland-tipped hairs, rarely with all three types of hairs. Flower bud scales chestnut brown; abaxial surface sparsely to densely covered with unicellular hairs, rarely also with sparse multicellular eglandular or gland-tipped hairs; margin unicellular-ciliate or glandular. Flowers appearing with the leaves or after they have expanded; inflorescence a shortened raceme of 3 to 15 flowers. Pedicels (0.9–)1.1–2.0(–2.6)cm long, covered with multicellular gland-tipped hairs, occasionally with multicellular eglandular hairs. Sepals 0.1–0.4(–0.9)cm long, often varying in length on the same flower; margins glandular-fimbriate, rarely setose;

abaxial surface sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs or with only multicellular gland-tipped hairs, occasionally glabrous or with unicellular hairs and multicellular eglandular hairs, rarely with only multicellular eglandular hairs. Corolla white, with a yellow blotch on the upper corolla lobe, white and pink or salmon, or pink with an orange blotch on the upper corolla lobe, rarely white with yellow lines at the throat, or with the tube white to red, fragrance sweet or mephitic, the tube longer than the limb and gradually expanding into it; upper corolla lobe (1.3–)1.4–2.3(–2.8) × 1.2–2.1(–2.6)cm; lateral lobes (1.5–)1.7–2.4(–2.9) × (0.7–)0.9–1.4(–1.7)cm; corolla tube (1.5–)1.8–2.6(–2.9)cm long, (0.2–)0.3–0.5(–0.6)cm wide at base; outer surface of corolla sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs that continue up the corolla lobes, rarely also with multicellular eglandular hairs; inner surface of corolla sparsely to densely covered with unicellular hairs, occasionally glabrous. Stamens (4.0–)4.6–6.3(–7.5)cm long, with dense terete or flattened unicellular hairs on proximal (1.8–)2.1–3.3(–3.6)cm of filament, exserted (2.4–)3.0–4.2(–4.7)cm beyond throat of corolla. Style (4.1–)4.6–6.6(–8.2)cm long, exserted (2.6–)3.3–4.8(–5.3)cm beyond throat of

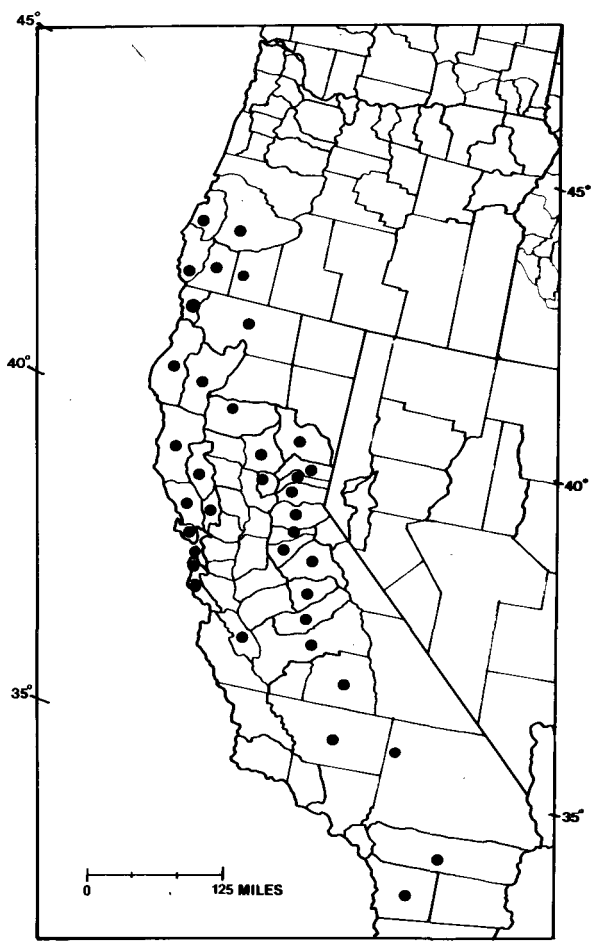


FIG. 34. Distribution of *Rhododendron occidentale*.

corolla, with dense unicellular hairs on the proximal (0.2–)0.3–1.0(–1.3)cm; stigma 0.1–0.3cm wide. Ovary 0.2–0.4(–0.5)cm long, (0.1–)0.2–0.3(–0.4)cm wide at the base, densely covered with unicellular hairs and multicellular eglandular and gland-tipped hairs, or lacking multicellular eglandular hairs, with a dense crown of unicellular hairs along the nectary, rarely with only multicellular eglandular or gland-tipped hairs or both. Capsules (1.2–)1.3–1.8(–2.2) × (0.4–)0.5–1.0(–1.4)cm, sparsely covered with unicellular hairs and with multicellular eglandular or gland-tipped hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.0–)1.5–2.3(–3.0) × (0.5–)0.7–1.1(–1.5)mm, body (0.6–)0.8–1.4(–1.6) × (0.2–)0.3–0.5(–0.7)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells essentially isodiametric, with transverse end-walls (Fig. 7). Chromosome number: $2n = 26$ (Sax, 1930; Janaki-Ammal et al., 1950). See figures in Jepson, 1939; Mossman, 1977 (photo); McCullough, 1985 (photo).

DISTRIBUTION AND ECOLOGY: South-western Oregon to southern California (Fig. 34). Moist wooded slopes and canyon bottoms, along rivers and streams, shrub thickets, *Darlingtonia* bogs, serpentine ridges, ocean bluffs. Elevation: sea level to 2700m. Flowering primarily in June and July, but occasionally as early as February or as late as November, especially in southern California.

Rhododendron occidentale is most closely related to *R. austrinum* and *R. luteum*, as suggested by King (1977a, 1980). Morphologically, it shares the characters of glandular bud-scale margins and glandular foliage with *R. austrinum* and *R. luteum*, and these three species form a monophyletic group (see Phylogenetic Analysis). However, *R. occidentale* is much more variable than either *R. austrinum* or *R. luteum*, as some individuals may possess unicellular-ciliate bud-scale margins, or have a combination of gland-tipped and unicellular cilia. Other characters such as leaf and corolla size are continuously variable throughout the range of *R. occidentale* and do not show any geographic or ecological correlation. *Rhododendron occidentale* can be distinguished from *R. luteum* and *R. austrinum* by its white corolla. Additionally, it is separated from *R. austrinum* by its broader, more ovate fruits, which are usually less densely unicellular pubescent than those of *R. austrinum*, and distinguished from *R. luteum* by the seeds with shorter testa cells and transverse end-walls.

The name *R. occidentale* (Torr. & A. Gray) A. Gray has priority since this species was first given a name in the genus *Azalea* (see synonomy). Subsequent transfer of *Azalea californica* to *Rhododendron* would create a later homonym with *R. californicum* Hooker.

12. Rhododendron periclymenoides (Michx.) Shinners, Castanea 27: 95 (1962).

Syn.: *Azalea periclymenoides* Michaux, Fl. Bor.-Amer. 1: 150 (1803). *A. periclymena* Persoon, Synop. Plant. 1: 213 (1805). *A. nudiflora* (L.) var. *periclymenoides* (Michx.) Heynhold, Nomen. Bot. 1: 108 (1840). Type: in New Jersey. *A. Michaux* s.n. (lecto., designated here, P-MICHX; IDC #6411, 36:II.2).

Azalea lutea L., Sp. Pl. ed. 1, 1: 150 (1753). *Rhododendron luteum* (L.) C. K. Schneider, Handb. Laubholsk. 2: 500 (1911), non *R. luteum* Sweet, Hort. Brit. ed. 2, 343 (1830). Type: 215.2 K[alm]. (lecto. LINN; IDC 118:III.2).

Azalea nudiflora L., Sp. Pl. ed. 2, 1: 214 (1762), nom. illeg. *Rhododendron nudiflorum* (L.) Torr., Fl. N. Middle United States 1: 424 (1824), nom. illeg. Type: as for *A. lutea* L.

Rhododendron periclymenoides (Michx.) Shinners f. *eglandulosum* Seymour, Fl. New England 429 (1969). Type: as for *A. lutea* L.

Azalea nudiflora L. var. *alba* Aiton, Hort. Kew. 1: 203 (1789). *A. periclymenoides* Michx. var. *alba* Pursh, Fl. Am. Septentr. 1: 152 (1814). *Rhododendron nudiflorum* (L.) Torr. var. *album* (Pursh) C. Mohr, Pl. Life Ala. 653 (1901). *Rhododendron nudiflorum* f. *album* Rehder, Monogr. Azaleas 137 (1921). Type: n.v.

Azalea nudiflora L. var. *carnea* Aiton, Hort. Kew. 1: 203 (1789). *A. periclymenoides* (Michx.) var. *carnea* Pursh, Fl. Am. Septentr. 1: 152 (1814). Type: n.v.

Azalea nudiflora L. var. *papilionacea* Aiton, Hort. Kew. 1: 203 (1789). *A. periclymenoides* (Michx.) var. *papilionacea* (Aiton) Pursh, Fl. Am. Septentr. 1: 152 (1814). *Rhododendron nudiflorum* (L.) Torr. var. *papilionaceum* (Aiton) Zabel, in Beissner, Schelle & Zabel, Handb. Laubholsk. 380 (1903). Type: n.v.

Azalea nudiflora L. var. *partita* Aiton, Hort. Kew. 1: 202 (1789). *A. periclymenoides* (Michx.) var. *partita* (Aiton) Pursh, Fl. Am. Septentr. 1: 152 (1814). Type: n.v.

Azalea nudiflora L. var. *rutilans* Aiton, Hort. Kew. 1: 203 (1789). *A. periclymenoides* (Michx.) var. *rutilans* (Aiton) Pursh, Fl. Am. Septentr. 1: 152 (1814). Type: n.v.

Azalea periclymenoides Michaux var. *polyandra* Pursh, Fl. Am. Septentr. 1: 152 (1814). *Rhododendron nudiflorum* (L.) Torr. var. *polyandrum* (Pursh) G. Don, Gen. Syst. 3: 847 (1834). *Azalea nudiflora* var. *polyandra* (Pursh) DC., Prodr. 7: 717 (1839). Type: n.v.

Azalea nudiflora var. *rosea* Hoffmannsegg, Verz. der Pflanz. Kult. 3rd sap. 23 (1826). Type: n.v.

Azalea nudiflora var. *calycosa* Wood, Class Book Bot. 490 (1872). Type: n.v.

Azalea nudiflora L. var. *glandifera* Porter, Bull. Torrey Bot. Club 27: 508 (1900). *Rhododendron nudiflorum* (L.) Torr. var. *glandiferum* (Porter) Rehder, Monogr. Azaleas 138 (1921). *R. nudiflorum* (L.) Torr. f. *glandiferum* (Porter) Fern., Rhodora 43: 619 (1941). *Azalea periclymenoides* f. *glandifera* (Porter) Uttal, in Sida 3: 169 (1988). Type: (Syntypes probably at PH, n.v.).

Shrub or small tree to 5m tall, usually non-rhizomatous; young twigs red-brown, sparsely covered with multicellular eglandular hairs, occasionally also sparsely to densely covered with unicellular hairs, or glabrous, rarely sparsely covered with only unicellular hairs. Vegetative bud scales glabrous, or rarely sparsely covered with unicellular hairs abaxially; margin unicellular-ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (5.2–)5.9–8.2(–10.9) × (1.4–)1.8–2.9 (–3.4)cm wide; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely covered with multicellular eglandular hairs, or glabrous, occasionally sparsely covered with unicellular hairs and multicellular eglandular hairs, rarely sparsely covered with only unicellular hairs, the midvein sparsely to densely covered with unicellular hairs; abaxial surface glabrous or sparsely to densely covered with unicellular hairs, rarely sparsely covered with only multicellular eglandular hairs, the midvein sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, occasionally only with multicellular eglandular hairs; margin entire, ciliate with multicellular eglandular hairs, these usually somewhat more conspicuous than in *Rhododendron canescens* where the hairs are appressed to the margin of the leaf; petiole 0.2–0.5(–0.6)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, the unicellular hairs sometimes restricted to the adaxial groove, rarely sparsely covered with only multicellular eglandular hairs. Flower bud scales chestnut brown; abaxial

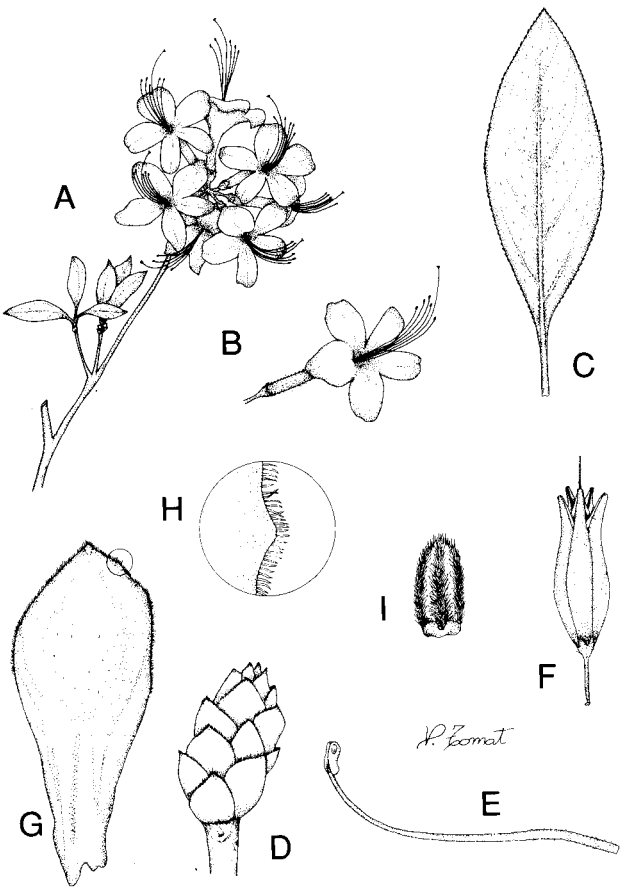


FIG. 35. *Rhododendron periclymenoides*. A, habit (0.35×); B, flower (0.7×); C, leaf (0.7×); D, winter flower bud (1.4×); E, stamen (1.05×); F, fruit (1.4×); G, floral bud scale (3.5×); H, close-up of floral bud-scale margin (7×); I, ovary (3.5×).

surface glabrous, occasionally sparsely to densely covered with unicellular hairs; margin unicellular-ciliate, rarely also glandular. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 6 to 15 flowers. Pedicels (0.4–)0.6–1.2(–1.9)cm long, sparsely covered with unicellular hairs and sparsely to densely covered with multicellular eglandular hairs, often lacking unicellular hairs. Sepals less than 0.1–0.2(–0.4)cm long, often varying in length on the same flower; margins setose, very rarely also with multicellular gland-tipped hairs; abaxial surface sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, or with only multicellular eglandular hairs, rarely with unicellular hairs and multicellular eglandular and gland-tipped hairs, glabrous, or only with unicellular hairs or multicellular gland-tipped hairs. Corolla deep pink, the tube darker pink or crimson, occasionally pink to rose pink throughout, rarely white or pale pink, fragrance sweet, the tube longer than the limb and gradually expanding into it; upper corolla lobe (0.6–)1.0–1.4(–1.6) × (0.4–)0.7–1.2(–1.4)cm; lateral lobes (0.9–)1.2–1.8(–2.5) × (0.4–)0.5–0.9(–1.4)cm; corolla tube (1.2–)1.3–1.8(–2.2)cm long, (0.1–)0.2–0.3

(–0.5)cm wide at base; outer surface of corolla sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, or multicellular gland-tipped hairs, rarely covered with all three types of hairs, or with only multicellular eglandular hairs, the multicellular hairs often continuing up the corolla lobes; inner surface of corolla sparsely to densely covered with unicellular hairs. Stamens (3.2–)4.0–5.6(–6.8)cm long, with dense terete or flattened unicellular hairs on proximal (1.4–)1.9–2.6(–3.1)cm of filament, exserted (1.9–)2.4–3.8(–5.0)cm beyond throat of corolla. Style (2.2–)4.2–5.9(–7.2)cm long, exserted (1.6–)3.0–4.5(–5.0)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.0–)0.7–2.0(–3.5)cm; stigma (less than 0.1–)0.1–0.2cm wide. Ovary (0.2–)0.3–0.5(–0.6)cm long, 0.1–0.2(–0.4)cm wide at the base, densely covered with multicellular eglandular hairs and unicellular hairs, rarely with multicellular gland-tipped hairs

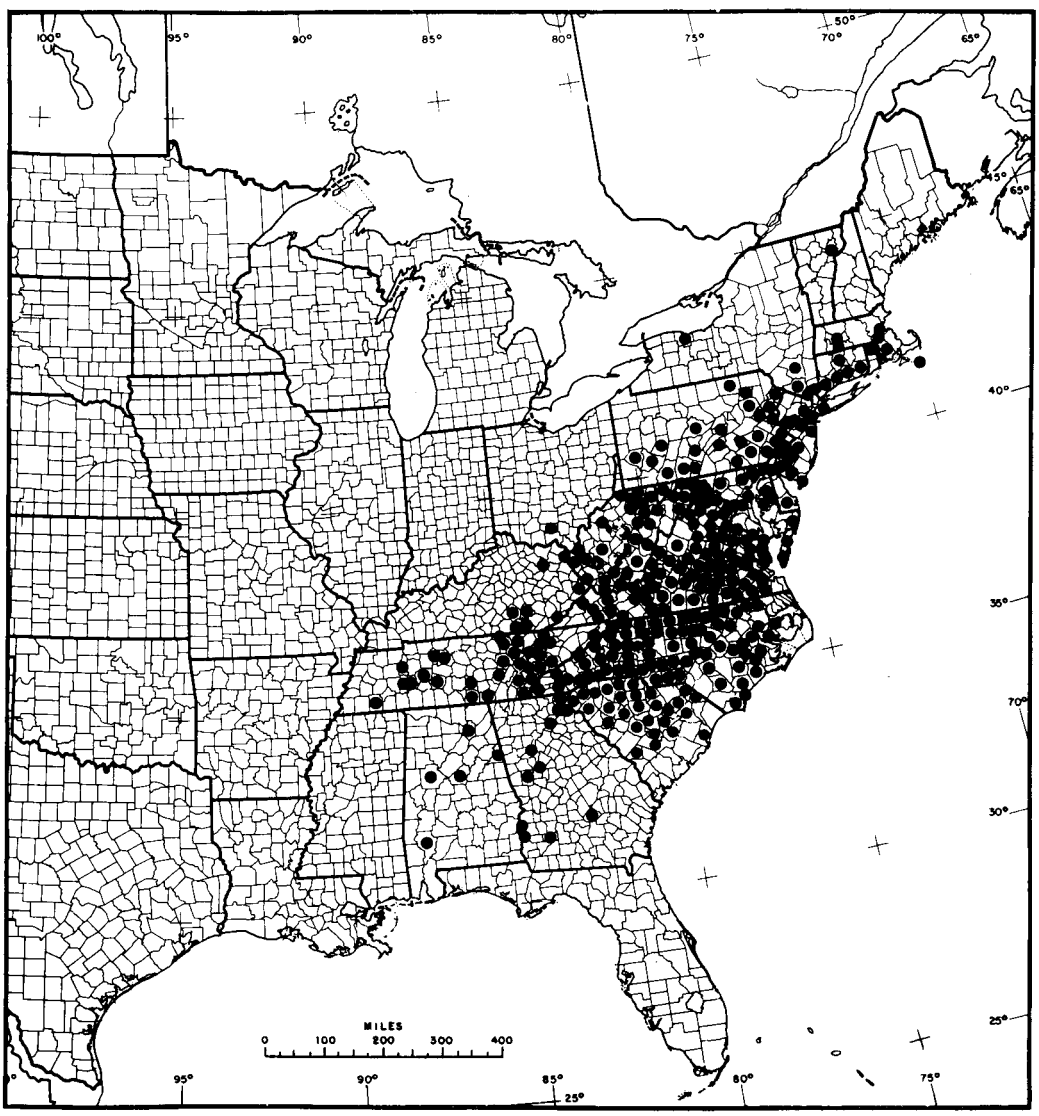


FIG. 36. Distribution of *Rhododendron periclymenoides*.

and unicellular hairs. Capsules (1.2–)1.5–2.3(–2.5) × 0.3–0.5(–0.6)cm, narrowly ovate to cylindric, sparsely covered with unicellular hairs and sparsely to moderately covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.0–)1.6–2.8 (–3.6) × 0.4–1.2(–1.3)mm, body (0.6–)0.8–1.3(–1.6)mm, (0.1–)0.2–0.5(–0.6)mm; testa rather closely fitted around the body of the seed, the cells short, with transverse end-walls, or isodiametric (Fig. 6). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). Figure 35; see additional figures in Radford et al., 1968; Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Vermont, Massachusetts and New York, south and west to western Tennessee and east to the northern Atlantic Coastal Plain, south to South Carolina. Outlying populations in Tuscaloosa, Shelby and Clarke counties, Alabama and as far south as Clay and Dougherty counties, Georgia (Fig. 36). Upland woods, bluffs and stream banks, ridge-tops, sandy open woods. Elevation: c.100 to 1000m. Flowering from March to June.

This species most closely resembles *R. canescens*, from which it can be distinguished by its more glabrous leaves and bud scales and by the more gradually expanding corolla tube (see *R. canescens* for more detailed discussion). In addition, *R. periclymenoides* usually has corolla tubes that are covered with multicellular eglandular hairs. However, glandular corolla tubes do occur scattered throughout the geographic range of this species. In most cases, the glandular corolla tube is probably not the result of hybridization with *R. canescens*, since glandular forms of *R. periclymenoides* occur in populations which are isolated geographically from *R. canescens* (see Appendix for citation of putative *R. canescens* × *R. periclymenoides* hybrid).

The name *R. periclymenoides* is the correct one for this species. The commonly used *R. nudiflorum* is incorrect because the name was superfluous when published (see also Shinners, 1962 and Wilbur, 1976). The epithet '*luteum*' cannot be used since C. K. Schneider's transfer to *Rhododendron* is a later homonym of *R. luteum* Sweet (see synonymy).

13. Rhododendron prinophyllum (Small) Millais, Rhodod. 229 (1917).

Syn.: *Rhododendron canescens* Porter, Bull. Torrey Bot. Club. 16: 220 (1889), non *R. canescens* (Michx.) Sweet, Hort. Brit. ed. 2, 343 (1830). *Azalea prinophylla* Small, N. Am. Fl. 29: 42 (1914), nomen novum. Type: Pennsylvania, Monroe Co.: Pocono Summit. 22 v & 4 ix 1889, *T. C. Porter* s.n. (lecto., designated here, 22 v 1889, NY; isolecto. NY).

Rhododendron roseum (Lois.) Rehder f. *plenum* Rehder, Contr. Gray Herb. 165: 10 (1947). Type: cultivated. Garden of R. H. P. Jacobus, originally found wild in the neighbouring woods. 23 vii 1935, *R. H. P. Jacobus* s.n. (holo. A).

Rhododendron roseum (Lois.) Rehder f. *albidum* Steyerm., Rhodora 62: 131 (1960). Type: Missouri, Ste. Genevieve Co.: sandy pine–oak woods east of Chimney Rocks, along River Aux Vases, 5 mi E of Pickle. 24 v 1933, *Steyermark* 8522 (holo. MO; iso. MINN, MO).

Shrub or small tree to 3m tall, usually non-rhizomatous; young twigs red-brown, densely covered with unicellular hairs or sparsely to densely covered with multicellular eglandular hairs, rarely with multicellular gland-tipped hairs. Vegetative bud scales densely covered with unicellular hairs, rarely very sparsely covered with unicellular hairs abaxially; margin unicellular-ciliate, rarely ciliate above and glandular below. Leaf blade membranaceous, ovate or obovate to elliptic,

(3.9–)5.0–7.3(–8.7) × (1.2–)1.8–3.0(–3.7)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface sparsely covered with unicellular hairs or sparsely to densely covered with multicellular eglandular hairs, rarely glabrous, the midvein densely covered with unicellular hairs; abaxial surface sparsely to densely covered with unicellular hairs, rarely with scattered multicellular eglandular hairs, or densely covered with unicellular hairs and multicellular eglandular hairs, or glabrous, the midvein densely covered with unicellular and multicellular eglandular hairs, rarely with unicellular hairs and multicellular gland-tipped hairs; margin entire, ciliate with multicellular eglandular hairs; petiole (0.2–)0.3–0.5(–0.7)cm long, densely covered with unicellular hairs and sparsely to densely covered with multicellular eglandular hairs, rarely with unicellular hairs and multicellular gland-tipped hairs or glabrous. Flower bud scales chestnut brown; abaxial surface densely covered with unicellular hairs, very rarely glabrous; margin unicellular-ciliate. Flowers appearing before or with the leaves; inflorescence a shortened raceme of 4 to 13 flowers. Pedicels (0.7–)1.0–1.6(–2.6)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular and gland-tipped hairs, or with unicellular and multicellular gland-tipped hairs, rarely with unicellular hairs and multicellular eglandular hairs. Sepals less than 0.1–0.2(–0.3)cm long, often varying in length on the same flower; margins glandular-fimbriate or with both glandular and eglandular multicellular hairs, rarely only setose; abaxial surface sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs, rarely with unicellular hairs and multicellular eglandular hairs, or with only unicellular hairs or glabrous. Corolla deep- to rose-pink, rarely white, fragrance spicy, the tube longer than the limb and gradually expanding into it; upper corolla lobe (1.0–)1.1–1.6(–2.0) × (0.6–)0.8–1.2(–1.5)cm; lateral lobes (1.2–)1.4–2.0(–2.3) × (0.5–)0.6–0.9(–1.1)cm; corolla tube 1.1–1.5(–1.9)cm long, (0.1–)0.2–0.3(–0.4)cm wide at base; outer surface of corolla densely covered with unicellular hairs and multicellular gland-tipped hairs, the gland-tipped hairs continuing up the corolla lobes, rarely also with multicellular eglandular hairs; inner surface of corolla densely covered with unicellular hairs. Stamens (3.2–)3.6–4.7(–5.3)cm long, with dense terete or flattened unicellular hairs on proximal 1.2–2.4(–3.1)cm of filament, exserted (1.4–)2.0–2.8(–3.5)cm beyond throat of corolla. Style (3.2–)3.9–5.2(–5.7)cm long, exserted (2.0–)2.5–3.5(–4.3)cm beyond throat of corolla, with dense unicellular hairs on the proximal (0.0–)0.6–1.7(–2.4)cm; stigma less than 0.1–0.2cm wide. Ovary 0.2–0.4(–0.5)cm long, 0.1–0.2(–0.3)cm wide at the base, densely covered with unicellular hairs and multicellular gland-tipped hairs, occasionally also with multicellular eglandular hairs, rarely with unicellular hairs and multicellular eglandular hairs, often glabrous towards apex. Capsules (1.2–)1.3–2.0(–2.8)cm × (0.3–)0.4–0.5(–0.6)cm, ovate, narrowly ovate to cylindric, sparsely covered with unicellular hairs and sparsely to moderately covered with multicellular gland-tipped hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.8–)2.3–3.2(–3.5) × (0.4–)0.6–1.1(–1.4)mm, body 1.0–1.4(–1.6)mm × (0.2–)0.3–0.6(–0.8)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells elongate, with tapering end-walls (Fig. 11). Chromosome number: $2n = 26$ (Sax, 1930; Janaki-Ammal et al., 1950; Li, 1957). See illustration in Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: New Hampshire and Vermont south to Ashe Co., North Carolina, and to eastern Kentucky; Union Co., Illinois and south-eastern Missouri, south to Arkansas and eastern Oklahoma. Isolated populations occur in Transylvania Co., North Carolina and Cherokee Co., Alabama, and western Tennessee to Arkansas and eastern Oklahoma (Fig. 37).

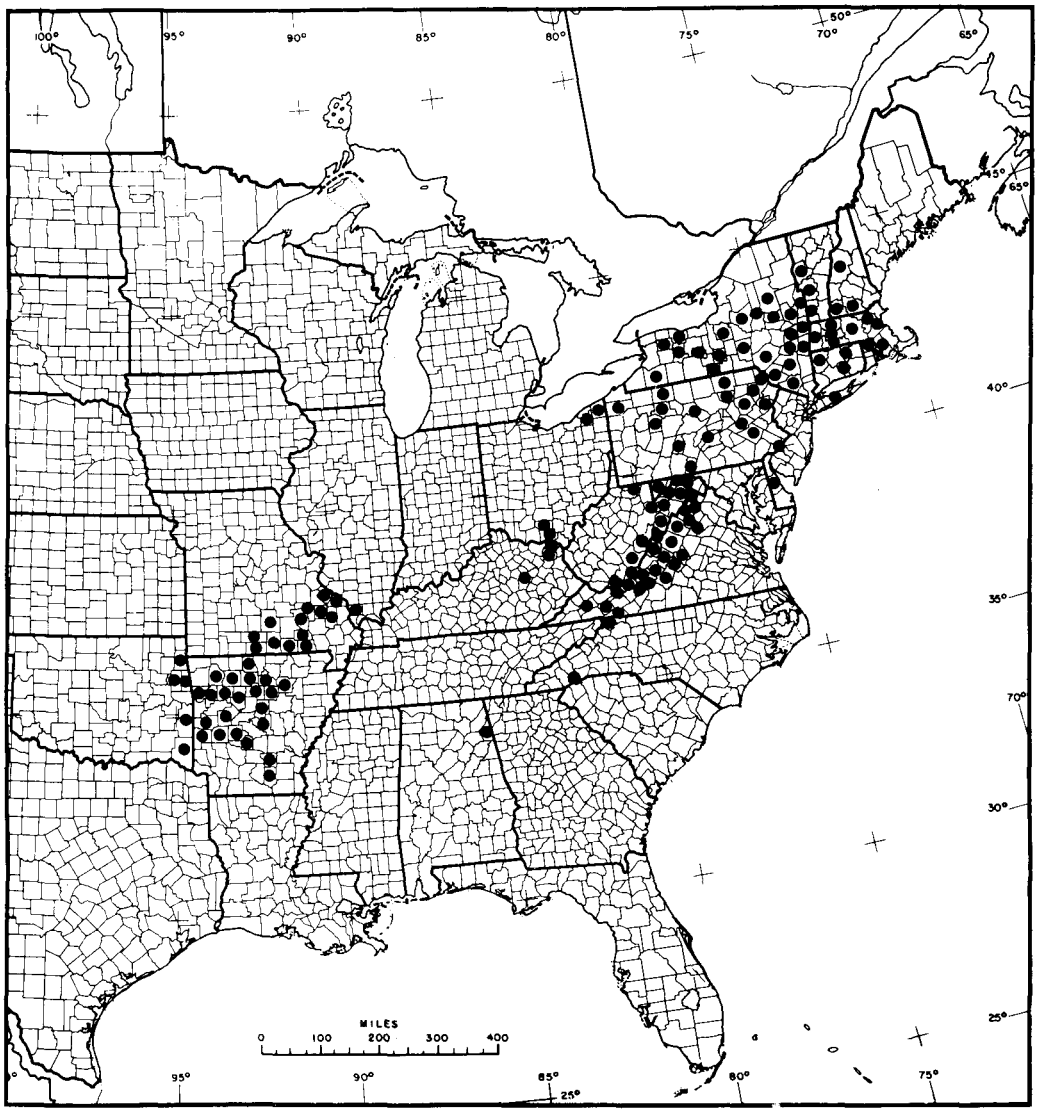


FIG. 37. Distribution of *Rhododendron prinophyllum*.

Bluffs and stream banks, open wooded slopes, acid bogs. Elevation: c.150 to 1500m. Flowering from March to June.

Rhododendron prinophyllum is unique in the section because of its strongly disjunct distribution. Plants in the western part of the range often have longer corolla tubes than those in the eastern portion of the range. However, longer corolla tubes are also found scattered throughout the eastern populations and shorter corolla tubes are also found in the western populations. Since there is no morphological gap in the pattern of variation of the plants in the two portions of the geographic range, no subspecies are recognized.

Rhododendron prinophyllum is similar morphologically to *R. periclymenoides* and *R. canescens*. It is sympatric with *R. periclymenoides*, but essentially geographically isolated from *R. canescens*. *Rhododendron prinophyllum* can be distinguished from both *R. periclymenoides* and *R. canescens* by its broader, more gradually expanded corolla tube, and its usually consistently glandular sepal margins, pedicel and ovary. It can also be distinguished from most individuals of *R. periclymenoides* by the densely pubescent abaxial leaf surface, and the densely glandular corolla tube vs. the usually eglandular condition in *R. periclymenoides*. It differs from *R. canescens* by its longer pedicels and less densely pubescent, more glandular fruits. The conspicuously ciliate margins of the leaves also distinguishes *R. prinophyllum* from *R. canescens*.

The distinctiveness of *R. prinophyllum* can also be seen in the results of principal component analysis of fruit and mature leaf characters (see Table 5, Fig. 38). Pedicel length, number of multicellular gland-tipped hairs on the fruit, and the ratio of seed length to seed body length were the factors with the heaviest weight in the first component. *Rhododendron prinophyllum* has longer pedicels than either of the other two species, although there is some overlap in the range of variation, especially between *R. prinophyllum* and *R. canescens*. The best character for distinguishing fruiting specimens of *R. prinophyllum* from *R. canescens* or *R. periclymenoides* is the presence of multicellular gland-tipped hairs on the fruit in *R. prinophyllum*. In addition, the testa of the seeds in *R. prinophyllum* is more greatly expanded beyond the body of the seed than in either *R. canescens* or *R. periclymenoides*.

While *R. prinophyllum* is clearly a distinct morphological entity, in New England it has often in the past been identified as *R. canescens* (Day, 1899; Porter, 1899b; Blanchard, 1902; Haberer, 1905; Knowlton, 1919; Knowlton & Deane, 1922). These plants differ from *R. canescens* in the conspicuously ciliate leaf margins and the shorter, more gradually expanded corolla tube. *Rhododendron prinophyllum* usually also has longer pedicels than *R. canescens*. For citations of putative hybrids, see under *R. canescens* and *R. periclymenoides* in the Appendix.

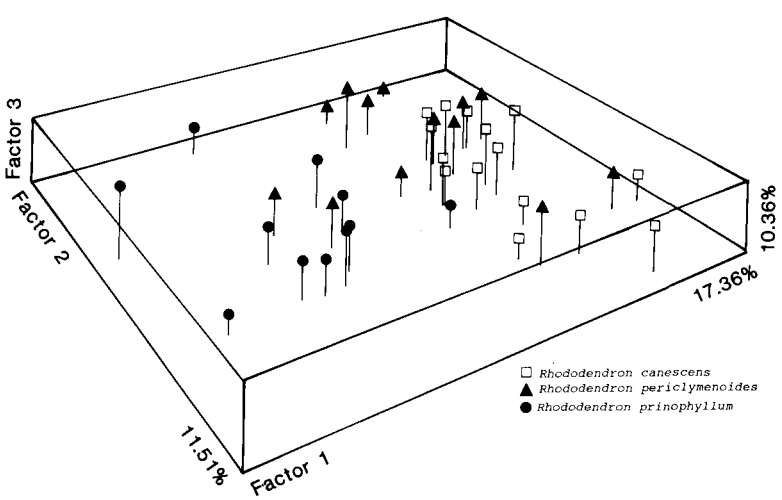


FIG. 38. Plot of the first three principal components resulting from the analysis of 17 fruit and leaf characters in *Rhododendron prinophyllum* (closed circles), *R. periclymenoides* (closed triangles) and *R. canescens* (open squares).

The name *R. prinophyllum* is the correct name for this species. It has priority over *R. canescens* Porter, since Porter's name is a later homonym of *R. canescens* (Michx.) Sweet. The name *R. roseum* (Loisel.) Rehder is illegitimate because it was superfluous when published (see Shinners, 1962; Wilbur, 1976; Kron, 1989).

14. Rhododendron prunifolium (Small) Millais, Rhodod. 230–231 (1917).

Syn.: *Azalea prunifolia* Small, Fl. S.E. U.S. ed. 2. 1356, 1375 (1913). Type: Georgia, Randolph Co.: along branch at northern base of bluff about 2 miles north-west of Cuthbert, 21 vii 1903, *R. M. Harper* 1897 (holo. NY; iso. A, F, GH, MO).

Shrub or small tree to 5m tall, usually non-rhizomatous; young twigs reddish brown, glabrous. Vegetative bud scales glabrous abaxially; margin unicellular-ciliate. Leaf blade membranaceous, ovate or obovate to elliptic, (5.4–)6.1–11.3(–15.2) × (2.5–)2.8–3.9(–4.2)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface glabrous, occasionally with a few unicellular hairs scattered on the midvein; abaxial surface essentially glabrous, except for the presence of multicellular eglandular hairs on the midvein and/or secondary veins; margin entire, ciliate with multicellular eglandular hairs; petiole (0.1–)0.4–0.8(–1.0)cm long. Flower bud scales chestnut brown; abaxial surface glabrous; margin ciliate with unicellular hairs. Flowers appearing after the leaves have fully expanded; inflorescence a shortened raceme of 4 to 7 flowers. Pedicels 0.5–0.9(–1.2)cm long, sparsely to densely covered with multicellular eglandular hairs, or sometimes glabrous. Sepals less than 0.1–0.3(–0.4)cm long, often varying in length on the same flower; margins setose with multicellular eglandular hairs; abaxial surface glabrous to sparsely covered with unicellular hairs, sometimes also with multicellular eglandular hairs. Corolla coral-orange or salmon to deep red, with an indistinct darker red blotch on upper lobe, fragrance lacking, the tube longer than the limb and abruptly expanding into it; upper corolla lobe (1.1–)1.2–1.7(–1.9) × 1.0–1.4(–1.7)cm; lateral lobes (1.4–)1.5–2.0(–2.1) × (0.5–)0.7–1.0cm; corolla tube 2.4–2.8 (–3.1)cm long, 0.1–0.4(–0.5)cm wide at base; outer surface of corolla glabrous to sparsely covered with unicellular hairs, sometimes also sparsely covered with multicellular gland-tipped hairs that continue up the corolla lobes; inner surface of corolla sparsely to densely covered with unicellular hairs. Stamens (6.4–)6.6–7.6(–8.4)cm long, with dense terete or flattened unicellular hairs on proximal (2.4–)2.7–3.6(–3.7)cm of filament, exserted (3.8–)4.1–5.1(–5.8)cm beyond throat of corolla. Style (6.5–)7.1–8.6(–8.8)cm long, exserted (4.4–)5.0–6.5(–6.6)cm beyond throat of corolla, glabrous; stigma 0.1–0.3cm wide. Ovary (0.2–)0.3–0.4cm long, 0.1–0.2(–0.3)cm wide at the base, densely covered with multicellular eglandular hairs and with a few unicellular hairs. Capsules 1.7–2.1(–2.2) × 0.5–0.7cm, ovate-cylindric, sparsely covered with multicellular eglandular hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.7–)1.8–2.9(–3.2) × 0.71–1.2(–1.3)mm, body 1.0–1.3(–1.4)mm × (0.3–)0.4–0.7mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells both elongate and short, scattered throughout the testa, with transverse end-walls (Fig. 5). Chromosome number: $2n = 26$ (Janaki-Ammal et al., 1950; Li, 1957). See figures in Millais, 1917; Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Central Georgia–Alabama line (Fig. 39). Wooded ravines along streams in mixed pine–hardwoods. Elevation: c.90 to 200m. Flowering from June to August.

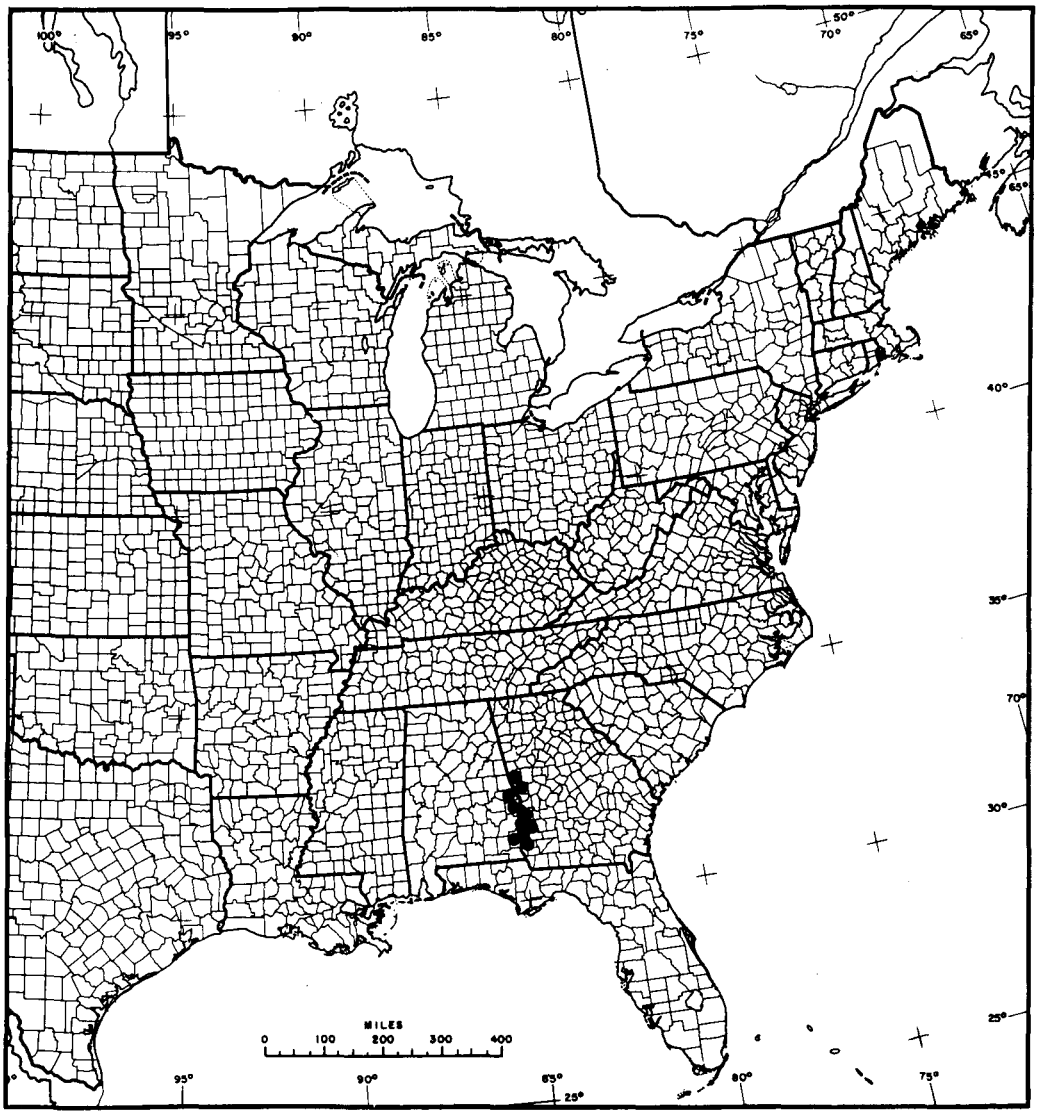


FIG. 39. Distribution of *Rhododendron prunifolium*.

Rhododendron prunifolium has the most restricted distribution of any of the species in the section. It is most closely related to *R. flammeum*, *R. cumberlandense* and *R. calendulaceum*, but falls outside the geographical range of all of these species. It can be distinguished from the other red-flowered species by its nearly glabrous and more gradually expanded corolla tube, and by the indistinct nature of the floral blotch. Like *R. cumberlandense*, *R. prunifolium* flowers after the leaves have expanded, but it can be distinguished from the former by its unicellular-ciliate bud-scale margins.

15. Rhododendron viscosum (L.) Torr., Fl. N. Middle United States 424 (1824).

Syn.: *Azalea viscosa* L., Sp. Pl. ed. 1, 1: 151 (1753). Type: in Virginia (holo. LINN; IDC 118:III.4).

Azalea glauca Lamarck, Ency. Method. 1: 340 (1783). *Rhododendron glaucum* (Lam.) Sweet, Hort. Brit. ed. 2, 344 (1830). Type: (lecto. P (n.v.); photo of lecto. GH).

Azalea viscosa var. *glauca* Aiton, Hort. Kew. 1: 204 (1789); *Rhododendron viscosum* var. *glaucum* (Aiton) Wood, Class Book Bot. 376 (1851), nom. illeg.; *Rhododendron viscosum* f. *glaucum* Fern., Rhodora 43: 623 (1941). Type: n.v.; no specimens or illustrations cited.

Azalea viscosa var. *glauca* Michaux, Fl. Bor.-Amer. 1: 151 (1803), nom. illeg.; *Rhododendron viscosum* var. *glaucum* (Michaux) Torrey, Fl. N. Middle United States 1: 425 (1824), nom. illeg. Type: in Carolina inferiore (lecto. P-MICHX; IDC 6211, 36 I.5).

Azalea viscosa Marshall var. *palustris* Marshall, Arbust. Amer. 16 (1785). Type: (probably at DWC, n.v.).

Azalea viscosa L. var. *floribunda* Aiton, Hort. Kew. 1: 203 (1789). Type: n.v.

Azalea viscosa var. *virens* Michaux, Fl. Bor.-Amer. 1: 151 (1803). Type: in Carolina inferiore (lecto. P-MICHX; IDC 6211, 36 I.6).

Azalea tomentosa Dumont de Courset, Bot. Cult. ed. 2, 3: 336 (1811). *Rhododendron viscosum* var. *tomentosum* Rehder, Monogr. Azaleas 162–163 (1921). Type: n.v.

Azalea hispida Pursh, Fl. Am. Septentr. 1: 154 (1814). *Rhododendron hispidum* (Pursh) Torr., Fl. U.S. 1: 425 (1824). *Azalea viscosa* var. *hispida* (Pursh) Hook., Comp. Bot. Mag. 1: 100 (1835). *A. glauca* Lam. var. *hispida* (Pursh) Heynhold, Nomen. Bot. 1: 108 (1840). *Rhododendron viscosum* (L.) Torr. f. *hispidum* (Pursh) Voss, in Vilm. Blumengart. 1: 588 (1894). *R. viscosum* (L.) Torr. var. *hispidum* (Pursh) Rehder, in Bailey Stan. Cycl. Hort. 121 (1900). Type: n.v.

Azalea nitida Pursh, Fl. Am. Septentr. 1: 153–154 (1814). *Rhododendron nitidum* (Pursh) Torr., Fl. U.S. 1: 425 (1824). *R. viscosum* (L.) Torr. var. *nitidum* (Pursh) A. Gray, Manual of Botany, ed. 2, 257 (1856). *Rhododendron viscosum* (L.) Torr. var. *nitidum* (Pursh) A. Gray, Synop. Fl. N. A. 1: 41 (1878). *Azalea viscosa* L. var. *nitida* (Pursh) Britton, in Mem. Torrey Bot. Club 5: 248 (1893). Type: n.v.

Azalea viscosa L. var. *pubescens* Lodd., Bot. Cab. 5: 441, (1821). Type: n.v.

Azalea viscosa L. var. *rubescens* Lodd., Bot. Cab. 16: 1518 (1829). *Rhododendron viscosum* (L.) Torr. var. *rubescens* (Lodd.) Sweet, Hort. Brit. ed. 2, 344 (1830). *R. viscosum* (L.) Torr. f. *rubescens* (Lodd.) Rehder, Monogr. Azaleas 161 (1921). Type: n.v.

Rhododendron viscosum (L.) Torr. f. *roseum* Hollick, in Bull. Torrey Bot. Club 18: 256 (1891). Type: n.v.

Azalea oblongifolia Small, Fl. S.E. U.S. 883 (1903). *Rhododendron oblongifolium* (Small) Millais, Rhodod. 219 (1917). Type: Texas, Houston Co.: Grapeland, 1879, *F. Tweedy* s.n. (holo. NY).

Azalea serrulata Small, Fl. S.E. U.S. 883 (1903). *Rhododendron serrulatum* (Small) Millais, Rhodod. 241 (1917). *R. viscosum* (L.) Torr. var. *serrulatum* (Small) Ahles, J. Elisha Mitchell Sci. Soc. 80: 173 (1964). Type: Florida, Lake Co.: vicinity of Eustis, 1–15 vi 1894, *G. V. Nash* 967 (holo. NY; photo of holo. A).

Rhododendron viscosum (L.) Torr. var. *aemulans* Rehder, Monogr. Azaleas 165 (1921). *Azalea viscosa* L. var. *aemulans* (Rehder) Ashe, J. Elisha Mitchell Sci. Soc. 38: 91 (1922). Type: Georgia, Randolph Co.: in low woods near Cuthbert, 9 v 1918, *T. G. Harbison* 39 (holo. A).

Rhododendron viscosum (L.) Torr. f. *coerulescens* Rehder, Monogr. Azaleas 165 (1921). Type: North Carolina, Macon Co.: Highlands, 9 vii 1918, *A. Rehder* 66 (lecto., designated here, A).

Rhododendron serrulatum (Small) Millais var. *georgianum* Rehder, Monogr. Azaleas 156 (1921). *Azalea serrulata* Small var. *georgiana* (Rehder) Ashe, J. Elisha Mitchell Sci. Soc. 38: 91 (1922). Type: Georgia, Charlton Co.: Folkston, 16 vii 1918, *T. G. Harbison* 68 (holo. A).

Rhododendron serrulatum (Small) Millais f. *molliculum* Rehder, Monogr. Azaleas 155 (1921). Type: Florida, Lake Co.: Eustis, 23 vi 1919, *T. G. Harbison* 17 (holo. A).

Rhododendron viscosum (L.) Torr. var. *montanum* Rehder, Monogr. Azaleas 164 (1921). *Azalea viscosa* L. var. *montana* (Rehder) Ashe, J. Elisha Mitchell Sci. Soc. 38: 91 (1922). Type: North Carolina, Macon Co.: Highlands, 9 vii and 30 ix 1918, A. Rehder 58 (lecto., designated here as 9 vii 1918, A).

Rhododendron viscosum (L.) Torr. f. *rhodantha* Rehder, Monogr. Azaleas 160 (1921). Type: Maryland, Prince Georges Co.: opposite Hyattsville, eastward. 31 v 1915, *E. S. Steele* s.n. (holo. US).

Rhododendron coryi Shinners, Castanea 26: 156–157 (1961). Type: Texas, Tyler Co.: frequent on railroad right-of-way at pitcher-plant bog, Hyatt Bog, 2 mi S of Warren, 18 iv 1930, *V. L. Cory* 57145 (iso. MINN).

Shrub or small tree to 6m tall, usually non-rhizomatous (often strongly rhizomatous on the Coastal Plain), young twigs red-brown, occasionally yellow-brown, sparsely to densely covered with unicellular and multicellular eglandular hairs or with only multicellular eglandular hairs, rarely with only unicellular hairs or with unicellular and multicellular gland-tipped hairs. Vegetative bud scales glabrous or sparsely to densely covered with unicellular hairs abaxially; margin ciliate, rarely ciliate above and glandular below or completely glandular. Leaf blade membranaceous, ovate or obovate to elliptic, (3.1–)4.0–6.0(–7.9) × (1.3–)1.5–2.3(–3.1)cm; base acute to oblique; apex acute to obtuse, often mucronate; adaxial surface glabrous, occasionally sparsely to densely covered with unicellular hairs and multicellular eglandular hairs or both, rarely with only multicellular eglandular hairs or gland-tipped hairs or both unicellular hairs and multicellular gland-tipped hairs, the midvein sparsely to densely covered with unicellular hairs; abaxial surface glabrous, sometimes also glaucous, occasionally sparsely to densely covered with unicellular hairs, the midvein sparsely to densely covered with multicellular eglandular hairs, or with unicellular hairs and multicellular eglandular hairs; margin entire, occasionally minutely serrulate, ciliate with multicellular eglandular hairs; petiole 0.1–0.4(–0.6)cm long, sparsely to densely covered with unicellular hairs and multicellular eglandular hairs, rarely with unicellular hairs and multicellular gland-tipped hairs or with all three types. Flower bud scales chestnut brown, occasionally with a darker brown band following the margin near the apex; abaxial surface sparsely to densely covered with unicellular hairs but frequently glabrous; margin unicellular-ciliate, occasionally ciliate above and glandular below, rarely completely glandular. Flowers appearing after the leaves have expanded, or sometimes as the leaves expand at higher elevations in the mountains; inflorescence a shortened raceme of 3 to 14 flowers. Pedicels (0.5–)0.7–1.4 (–2.7)cm long, sparsely to densely covered with unicellular hairs and multicellular gland-tipped hairs, occasionally with unicellular hairs and multicellular eglandular and gland-tipped hairs, rarely with unicellular hairs and multicellular eglandular hairs, or with only gland-tipped hairs.

Sepals less than 0.1–0.2(–0.5)cm long, often varying in length on the same flower; margins glandular-fimbriate, occasionally setose or with both multicellular eglandular and gland-tipped hairs; abaxial surface densely covered with unicellular hairs and sparsely to densely covered with multicellular gland-tipped hairs, occasionally sparsely to densely covered with only unicellular hairs, or with unicellular hairs and multicellular eglandular hairs. Corolla white, occasionally with a pink or purplish tinge, rarely completely pink, fragrance sweet, the tube longer than the limb and gradually expanding into it; upper corolla lobe (0.6–)0.8–1.3(–1.6) × (0.3–)0.5–0.9(–1.2)cm; lateral lobes (0.7–)1.0–1.5(–2.1) × (0.2–)0.3–0.6(–0.9)cm; corolla tube (1.3–)2.0–2.8(–3.6)cm long, (0.1–)0.2–0.3(–0.4)cm wide at base; outer surface of corolla densely covered with unicellular hairs and multicellular gland-tipped hairs, the gland-tipped hairs continuing in lines up the corolla lobes, rarely also with multicellular eglandular hairs or lacking any one of the three types of hairs;

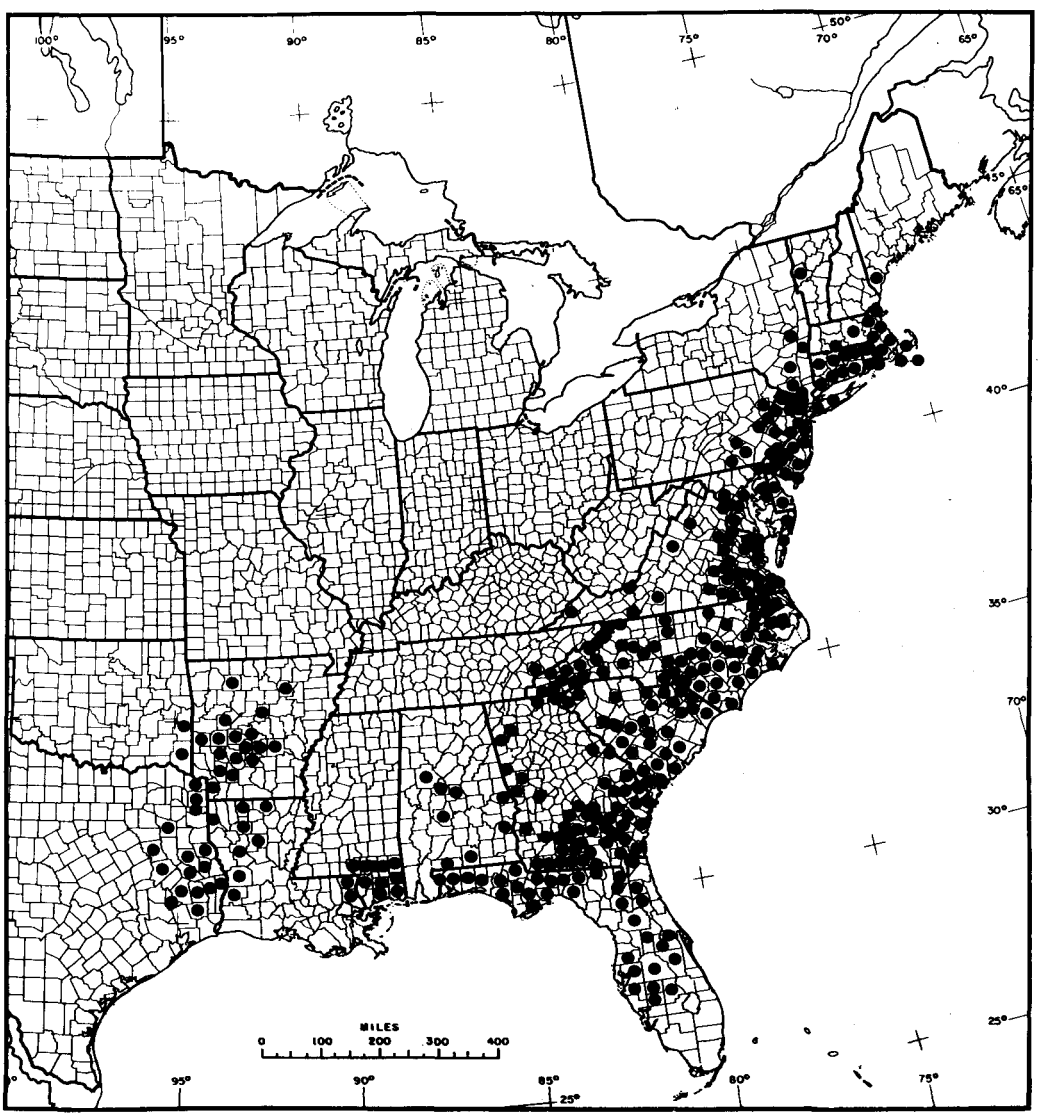


FIG. 40. Distribution of *Rhododendron viscosum*.

inner surface of corolla sparsely to densely covered with unicellular hairs or glabrous. Stamens (2.1–)3.8–5.1(–6.5)cm long, with dense terete or flattened unicellular hairs on proximal (1.9–)2.5–3.4(–4.0)cm of filament, exserted (1.2–)1.6–2.5(–5.8)cm beyond throat of corolla. Style (3.0–)4.2–5.6(–7.2)cm long, exserted (1.5–)2.0–3.5(–4.3)cm beyond throat of corolla, with dense unicellular hairs on proximal (0.0–)0.4–1.7(–2.8)cm; stigma 0.1–0.2(–0.4)cm wide. Ovary 0.2–0.4(–0.5)cm long, 0.1–0.2(–0.4)cm wide at the base, densely covered with multicellular gland-tipped hairs and unicellular hairs, occasionally also with multicellular eglandular hairs or with only multicellular eglandular hairs over unicellular hairs. Capsules (0.7–)1.0–1.5(–1.8) × (0.3–)0.4–0.6cm, ovate to ovate-cylindric, moderately densely covered with unicellular hairs and sparsely to moderately densely covered with multicellular eglandular or gland-tipped hairs. Seeds pale to dark chestnut brown, ovate or elliptic to fusiform, (1.2–)1.5–2.6(–3.2) × 0.3–1.1(–1.2)mm, body (0.6–)0.8–1.4 (–1.9) × (0.2–)0.3–0.5(–0.7)mm; testa expanded and dorsiventrally flattened, surrounding the body, the cells elongate over the body of the seed, and shorter in the expanded portion of the testa, with tapering end-walls (Fig. 10). Chromosome number: $2n = 26$ (Sax, 1930; Janaki-Ammal et al., 1950; Li, 1957). See figures in Schneider, 1969; Solymosy, 1974 (photo); Galle, 1985 (photo).

DISTRIBUTION AND ECOLOGY: Vermont and Maine to peninsular Florida, west to Texas and north to Arkansas (Fig. 40). Stream banks, moist thickets, swamps, bayheads, low flatwoods, shrub balds, acid bogs. Elevation: sea level to 1500m. Flowering primarily from May to August. However, this variable species may flower as early as March and as late as December, especially at the southern limits of its range.

Rhododendron viscosum is the most widespread and variable species in the section and has been segregated into as many as four species: *R. coryi*, *R. oblongifolium*, *R. serrulatum* and *R. viscosum* s. str. All of these previously recognized taxa are white-flowered, with conspicuous multicellular gland-tipped hairs which occur in continuous lines along the abaxial surface of the corolla lobes. They flower after the leaves have expanded, usually in the late spring or early summer. *Rhododendron viscosum* s. str. has been regarded as the more northern element (Rehder, 1921; Skinner, 1955, 1961), with smaller flowers which are often tinged with pink. Small (1903) described a distinct southern taxon, also recognized by Rehder (1921) as *R. serrulatum*, based on the longer corolla tube, and the distinctive narrow brown band which runs along the margin of the abaxial surface of the bud scales. In eastern Oklahoma, Arkansas and northern Texas, *R. oblongifolium* has been recognized as a separate species (Small, 1903; Rehder, 1921) based on the long corolla tube, the densely pubescent bud scales, and the larger and more pubescent leaves (Rehder, 1921). Shinners (1961) described *R. coryi* from eastern Texas. He considered it a distinct species because of its low, rhizomatous habit and its large flowers. This species was later submerged into *R. viscosum* by Solymosy (1974) who considered *R. coryi* a morphological variant within the natural range of variation of *R. viscosum*. King (1977a, 1980) suggested, on the basis of the great similarity of the flavonoid compounds, that all of the above-mentioned names be submerged under *R. viscosum*, as was also done by Godfrey & Wooten (1981).

The results of principal component analysis of 64 OTUs and 26 floral characters (Table 5, Fig. 41) indicate that there are no morphological gaps within this complex. The characters which most influenced the first component are style length, sepal length and upper corolla lobe length. Those which were most influential on the second component are width of the ovary,

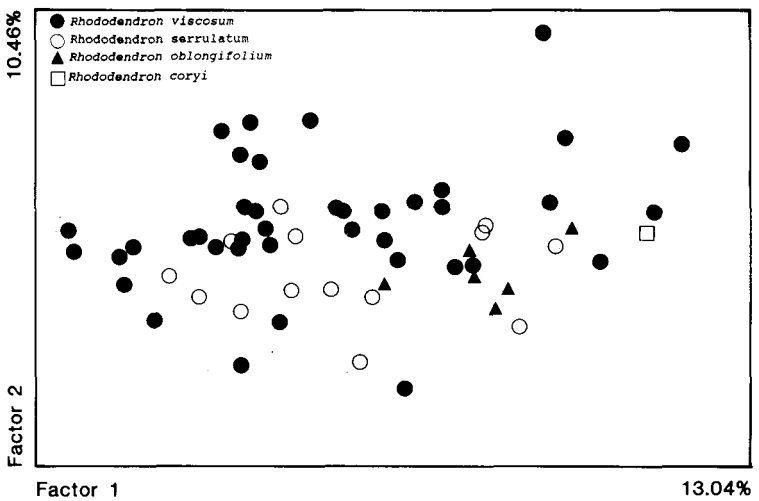


FIG. 41. Plot of the first two principal components resulting from the analysis of 26 floral characters in *R. viscosum* (closed circles), *R. serrulatum* (open circles), *R. oblongifolium* (closed triangles) and *R. coryi* (open square).

ovary length and lateral corolla lobe width. The individuals from the more northern part of the range tend to have slightly shorter sepals and styles, as well as slightly smaller ovaries. The corolla is also slightly smaller. However, these trends are not very strong because individuals of *R. serrulatum* and *R. oblongifolium* are often not only morphologically similar to each other, but also similar to the northern individuals. In addition, the morphological variation does not correlate with any geographical or ecological subdivision. Even the distinctive brown band on the bud scales of *R. serrulatum* is variable, and occasionally can be found in northern individuals, and is absent in some of the more southern populations. Bud-scale pubescence is also variable but shows no clinal pattern. Even in localized areas, in some populations the bud scales are glabrous, while in others they are densely pubescent. Since correlated or geographically coherent sets of characters (showing gaps in the pattern of variation) could not be discerned, subspecies are not recognized within this complex. Therefore *R. viscosum* is recognized as a widespread and highly variable species which includes *R. serrulatum*, *R. oblongifolium* and *R. coryi*. The entities which these names represent are morphological 'types' found at the southern and western limits of the geographic range of *R. viscosum*, and are most likely derived from different populations within the range of variability of 'typical' *R. viscosum*. Therefore, recognizing these entities at the specific level, in addition to being phenetically arbitrary and unworkable from a practical identification standpoint, would also make *R. viscosum* a paraphyletic species (Mishler & Donoghue 1982; Donoghue 1985; Mishler 1985).

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APPENDIX

SPECIMEN CITATIONS

Rhododendron molle subsp. **molle**

SPECIMENS EXAMINED: CHINA. Prov. Anhui: Chu Hwa Shan, *Steward* 1103 (A, UC), *Fan & Li* 149 (E), *Sun* 1425 (A), *Ching* s.n. (A), *Ching* 2642 (A, UC); Chien Shan Hsien, *Fan & Li* 108 (A). Prov. Guizhou: without definite loc., *Cavalerie* s.n. (A). Prov. Gwangdong: Heo-tse-ling, Lok-chong Hsien, *Ying* 1388 (A, UC); Yunan, T'ang Wan, *Tsang* 23544 (A). Prov. Hubei: Lokiashan Wuchang, *Ching* 9005 (A); without definite loc., *Henry* 268 (A, E, GH); 15mi below Ichang, *Wilson* 800 (A, E). Prov. Hunan: near Tschangscha, *Handel-Mazzetti* s.n. (A, E); San Chin San Mok, *Tsang* s.n. (A). Prov. Jiangsu: Bau Hwa Shan, *Steward* 880 (UC); I-hing, *Fang & Hsuing* 8090 (MO); Yun Dai Shan, *Tso* 31 (A); Ming Tomb, Nanjin, *Chen* 3953 (UC); Lunghai, *Hers* s.n. (A); without definite loc., *Cheng* 5905 (UC). Prov. Jiangxi: Purple Mt, *Steward* 2031 (A); Kiangyin, *Allison* s.n. (GH); near Pinghsiang, *Wang* s.n. (A). Prov. Shanghai: Shanghai, *MacGregor* s.n. (A). Prov. Sichuan: S of Kuan Hsien, *Wang* 20688 (A, E). Prov. Yunnan: Litiping Range, Mekong-Yangtze divide, E of Weitsi, *Rock* 9168 (A, E). Prov. Zhejiang: vicinity of Ningbo, *MacGregor* s.n. (A); Ta Chow, *Ching* 1301 (A, E, UC); Kwoching, Tien tai Shan, *Chiao* 1245 (A, E, UC); Hangzhou, *Allison* 51 (GH), *Chiao* 13 (A, GH, UC), *Chiao* s.n. (E, GH); Huiang Shan, *Tso* 291 (A); Mo Kan Shan, *Chao & Wilson* 191 (GH, UC); Weiping, Chun-an Hsien, *Keng* 737 (A, UC); without definite loc., *sin. coll.* s.n. (A).

Rhododendron molle subsp. **japonicum**

SPECIMENS EXAMINED: JAPAN. Aomori Pref.: Mt Hokkoda, *Mizushima* 1903 (A), *Hosoi* 2153 (A); Sai-mura, Shimokita-gun, *Mizushima* s.n. (MAK); Sugayu, *Muroi* 4425 (A). Chiba Pref.: Haniya, Sanbu-cho, *Sugimoto* s.n. (MAK). Fukushima Pref.: Ishikawa, Tomiki-cho, *Murata & Wakabayashi* s.n. (MAK); Yokata, Kanayama-machi, *Yasutomi* s.n. (MAK). Gifu Pref.: Hiwada, Takanemura, *Kanai & Ohashi* 731209 (A, E, UC); Sofudani, Sekigahara-machi, *Sugimoto* s.n. (MAK). Gunma Pref.: Kozu-bokiyo, Nishimaki-mura, *Kobayashi* s.n. (MAK); Karuizawa, *Hayata* s.n. (A). Hiroshima Pref.: Asagun, Kabemachi, *Enomoto* 11172 (A); Yahata, Itsukaichi-machi, *Sugimoto* s.n. (MAK). Hokkaido Pref.: Mayachi, *Faurie* 6784 (A); Hakodate, *Maximowicz* s.n. (GH), *Albrecht* s.n. (GH), *Wright* s.n. (GH). Hyogo Pref.: Kawakami, Ohkawachi-cho, *Hiroe* 17391 (UC); Akaho-gun, *Muroi* 1880 (A); Tentaki, Ikada, *Murata* 20897 (MAK); Mt Torokawa-yama, *Murata* s.n. (E). Iwate Pref.: Koma, *Muroi* 4071 (A). Kanagawa Pref.: Shimotsuruma, *sin. coll.* s.n. (E). Kochi Pref.: Sakawa, *Sugimoto* s.n. (MAK). Kyoto Pref.: Kyoto City, *Hiroe* 18045 (UC). Mie Pref.: Kowaura, Nanto-cho, *Sugimoto* s.n. (MAK). Nagano Pref.: Kaida-mura, Nishichikuma-gun, *Mizushima* 2400 (A); Suzugasawa, *Yamazaki* 3787 (A); Suwa City, Mt Kirigamine, *Sugimoto* s.n. (MAK); Mt Nekodake, Sugadaira, *Kobayashi* s.n. (MAK); Yatsugatake, Ooishi-tooge, *Murata & Ohba* 5337 (TI); Hirati to Nonomi Pass, Minochi-mura, *Mizushima* s.n. (MAK); Akazawa, Agematsu-machi, *Murata* 7736 (TI). Niigata Pref.: Kamo, Kamo City, *Sugimoto* s.n. (MAK); Kirita, Sakamachi, *T & Y* 6688 (A); Teradomari, Santo, *Ikegami* 8735 (A); Ojiya, *Sinada* 10205 (A); Kirita, Zaozan, *Togashi* 7146 (A). Okayama Pref.: Mituishi, *Muroi* 4813 (A); Koyama-son, *Nanba* s.n. (A); without definite loc., *Sugimoto* s.n. (MAK). Osaka Pref.: Isibasi, *Muroi* 6672 (A). Saitama Pref.: Hanno, *Suzuki* s.n. (UC). Shizuoka Pref.: Mt Fuji, *Sugimoto* s.n. (MAK), *Kasapligil* 3528 (UC), *Wurdack* s.n. (USF), *Bisset* 3975 (E), *Wilson* 6657 (A). Tochigi Pref.: Nikko City, *Sugimoto* s.n. (MAK), *Makino* s.n. (E). Nikko region, *Wilson* 6727 (A); Nasu-machi, *Sugimoto* s.n. (MAK), *Makino* s.n. (E); near Kootoku-numa, *Ohashi et al.* 1463 (TI); between Siki and Yuimoto, *Wilson* 6872 (A). Tokyo Pref.: Ohizuni-machi, Nerima-ku, *Makino* s.n. (E), *Sugimoto* s.n. (MAK). Yamagata Pref.: Tsuruoka City, *Sugimoto* s.n. (MAK); without definite loc., *sin. coll.* s.n. (A). Yamanashi Pref.: Mt Fuji, *Ohba & Hideaki* 78609 (TI); without definite loc., *Sargent* s.n. (A), *Mochizuki* s.n. (E), *Yamato* 4594 (E), *Yamato* 4544 (E), *Jack* s.n. (A).

Rhododendron alabamense

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Bibb Co.: without definite loc., *Totten* s.n. (NCU). Blount Co.: Jones Creek S, hwy 32, *Avery* s.n. (VDB). Butler Co.: 3mi W Georgiana, *Kral* 50152 (VDB). Chattooga Co.: E slope of Taylor Ridge, *Sargent* 6218 (NCSC). Choctaw Co.: without definite loc., *Mohr* s.n. (UNA). Clarke Co.: 12mi E of Grove Hill, *Davenport* 1772 (NY, UNA). Clay Co.: 8mi SE of Munford, *Williams et al.* 112 (AUA). Colbert Co.: SW side of Littleville, *Kral* 57724 (VDB). Cullman Co.: 11mi S Cullman, Shaley Ravine, *Kral* 26624 (GA, VDB). Elmore Co.: E side Wetupka on US 231, *Kral* 29920 (VDB). Henry Co.: Abbeville, *Harbison* H6112 (A, NY). Jefferson Co.: Shaley Creek Bluff head Tafford Rd, E of Warrior, *Kral* 64869 (VDB). Lawrence Co.: FS 224, 1.6mi NW of Burden Creek, *Davenport* 43 (UNA). Lee Co.: Whatley's Lake, *Harmon* 075 (SMU). Leeds Co.: 5mi W of Leeds, *Erlanson* 716 (A, NY, UNA). Marion Co.: N of Hackleburg by 17-US 43, *Kral* 66981 (VDB). Marshall Co.: Albertville, *Harbison* s.n. (NCU). Monroe Co.: just outside Haines Island Park, *Godfrey* 77564 (FSU). Talbot Co.: 4.5mi W of Manchester, *Henry*

2746 (A). Tuscaloosa Co.: Holt lock and dam at boat ramp, *Jones et al.* 22894 (GA, UNA). Winston Co.: 5mi E of Double Springs on US 278, *King* 106 (GA).

Florida. Jefferson Co.: 4.5mi W of Monticello, *Watson & Murrill* s.n. (FLAS). Leon Co.: Hammock near Indian Mound, 20mi E of Tallahassee, *Small et al.* 11186 (NY).

Georgia. Chattahoochee Co.: c.17mi NE of Columbus, Ft Benning Military Reservation, *Haynes* 7662 (NY). Clay Co.: 2mi N of Hilton, *Henry* 2711 (A). Decatur Co.: E side of Faceville landing road, *Kron* 1391 (FLAS). Early Co.: E side Kolomoki Mounds Park, *Kral* 63310 (VDB). Fulton Co.: Heard's Ferry Rd, *Beadle* s.n. (US). Harris Co.: sliding rock area of Pine Mt, *Jones* 20697 (GA, SMU, UNC, USF). Meriwether Co.: Manchester Watershed, *Pace* s.n. (GA). Muscogee Co.: without definite loc., *Kische* s.n. (UNC). Walker Co.: 6mi NW of LaFayette near road to Trenton, *Cronquist* 4436 (GA, GH, NO, SMU, UC).

Mississippi. Lauderdale Co.: 2mi N of Kemper, *Cooley & Pease* 3156 (USF).

Tennessee. Cheatham Co.: W of Kingston Springs, *Shaver* 4495 (SMU, VDB). Davidson Co.: 6.6mi N of Goodlettsville, 1.3mi right on Ridgetop Dr., *Caudill* 14 (TENN). Hamilton Co.: Summit Lookout Mt, *Churchill* s.n. (GH). Lewis Co.: Meriweather Lewis Nt'l Monument, Little Swan Creek bank, *Quarterman* 1231 (TEX, VDB). Maury Co.: US 43 S of Rockdale, *Kral* 66968 (VDB). Robertson Co.: 22mi N of Nashville on Rte 41 off Woodruff in Ridgetop, *Heller* 71 (VDB). Wayne Co.: 9mi N Waynesboro, *Eyles* 7754 (TENN).

Rhododendron arborescens

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Cherokee Co.: on hwy 35 at Little River, 14mi NW of Gaylesville, *Davenport* 462 (NCU, UNA). Chilton Co.: US 31 at Verbena, *Kral* 47310 (VDB). Clay Co.: near summit of Blue Ridge, *Harper* 138 (NY). Cleburne Co.: 'Rock Garden' top of Cheaha Mt, *Clark* 4831 (NCU). Cullman Co.: along Mulberry Branch of Black Warrior River N of US 278, *Clark* 3942 (NCU). Dekalb Co.: Little River at Co. Rte 35, *Horn & Saiz* 341 (UNA). Etowah Co.: just below Noccalula Falls, Gadsden, *Clark & Landers* 16029 (NCU). Franklin Co.: N of Phil Campbell, *Kral* 40197 (NY, VDB). Jackson Co.: Long Island Creek, 3mi N of Flat Rocks, *Cunningham* s.n. (AUA). Jefferson Co.: Lost Creek, Shades Mt, near Birmingham, *Palmer* 38964 (A). Lee Co.: Hala Wakee Creek, E of Opelika, *Kral* 62333 (VDB). Marion Co.: above Buckatunna River by US 278, 0.3mi E of Hamilton, *Kral* 31120 (SMU, UNA, VDB). Marshall Co.: 9.5mi due SE of Grant, Lake Guntersville State Park, *Haynes* 7918 (NY, UNA, VDB). St Clair Co.: Gulf Creek, Chandler Mt, *Bostick* 286-1 (NCU). Talladega Co.: 3mi S of Camp Mac in Talladega Nt'l Forest, *Owsley* s.n. (AUA). Tallapoosa Co.: c.6.1mi NE of Alexander City, *Clark* 15238 (NCU). Walker Co.: Blackwater Creek, 5.2mi N of Jasper, *Clark* 12592 (NCU). Winston Co.: above Sipsey River, Bankhead Nt'l Forest, *Kral* 39272 (VDB).

Georgia. Carroll Co.: Whooping Creek, *Byrd* 487 (GA). Dade Co.: summit of Lookout Mt near Little River about 1.5mi E of W brow above Sulphur Springs Station, *McVaugh* 9012 (GA, MO, SMU, TEX, UNC). Dawson Co.: 2.6mi S of Lumpkin Co. line, *Adams & Duncan* 19055 (GA). DeKalb Co.: Stone Mountain, *Eggert* s.n. (MINN). Fannin Co.: Toccoa River at Dial, *Duncan & Hardin* 16424 (GA). Habersham Co.: without definite loc., *Harbison* 612 (A, UNC). Hart Co.: Log Creek N of Hartwell, *Lems* s.n. (TEX). Oconee Co.: Chatooga River, about 0.1mi from confluence with E Fork of river, *Kirkman, Ware & Ellis* 1234 (GA, NO). Rabun Co.: Rabun Bald Mt, *Jones & Jones* 15492 (GA, USLH, UNC). Stephens Co.: Panther Creek, *Fitzgerald* s.n. (GA). Towns Co.: Brasstown Bald, *Duncan* 5508 (GA, UNC). Union Co.: between Wolfpen Gap and Slaughter Mt about 10mi S of Blairsville, *Cronquist* 4495 (GA, MO, SMU). Upson Co.: along Double Branch above Flint Rd, SE of Woodbury, *Cronquist* 5499 (GH, MO, NCSC, NO, NY, SMU, TEX, UC, UNA). Walker Co.: Gayton Gulf, Pigeon Mt, 9.5mi SW of Lafayette, *Duncan et al.* 13831 (NCSC). White Co.: Lessanee Creek, Cleveland, *Lovett & Oosting* s.n. (DUKE).

Kentucky. Laurel Co.: just S of Rockcastle Co., *Smith & Hodgdon* 3781 (NY).

Maryland. Garrett Co.: Negro Mt, *Schrock* s.n. (NCU).

North Carolina. Avery Co.: US 221 opposite Brassnere, *Fox & Beaman* 4740 (NCSC). Buncombe Co.: Swannanoa River, *Beadle* 866 (F, MINN, NY, UC). Burke Co.: near Linville River below Linville Falls, *Currie* 666 (NCSC). Caldwell Co.: Wilson's Creek, *Small & Heller* 282 (GH, MINN, MO, NY, UC). Cherokee Co.: Nottely River near NC 60, *Radford & Haesloop* 7184 (NCU). Cleveland Co.: S bank of Broad River, 3.5mi S of Boiling Springs, *Fox* 4816 (GA, GH, NCSC, NY). Cumberland Co.: Little River near Manchester, *Totten & Harbison* s.n. (NCU). Davidson Co.: Little Cliff on Yadkin River, Yadkin College, *Totten* s.n. (NCU). Davie Co.: Yadkin River below Fulton Church, *Totten* s.n. (NCU). Durham Co.: Roxboro Rd, Little River, 150yds W of bridge (MO). Forsyth Co.: Winston-Salem, *Schallert* 889 (DUKE). Graham Co.: intersection of Horse Cove Branch and river, Nantahala Nt'l Forest, *Rogers et al.* s.n. (NCU). Harnett Co.: near Raven Rock on the Cape Fear River, *Radford* 6774 (GH). Henderson Co.: without definite loc., *Memminger* s.n. (NCU). Iredell Co.: Statesville, *Hyanis* s.n. (POM). Jackson Co.: Sylva, *Johnson* 1716 (F). Macon Co.: Wayah Bald, summit, *Kron* 1519 (FLAS). McDowell Co.: First Broad River 8mi SE of Dysortville, *Radford & Haesloop* 7156 (NCU). Mitchell Co.: near Little Switzerland, *Hunnewell* 11180 (GH). Montgomery Co.: 7.5mi NW of Mt Gilead

near Woodrum Creek, *Radford & Ahles* 13237 (NCU). Moore Co.: Deep River below dam at High Fall, *Fox & Boyce* 3608 (GA, MO, NCSC, NY). Orange Co.: Price's Creek, 1–2mi below Pritchard's Mill, *Coker* s.n. (NCU, NY). Polk Co.: Pulliam Creek, *Hardin* 13692 (NCSC, VDB). Randolph Co.: Deep River about 3mi S of Randleman, *Melvin* s.n. (NCU, USF). Rutherford Co.: 8mi SE of Dysortville, *Radford & Haesloop* 7156 (NCU, VDB). Swain Co.: Raven Fork 1mi E of Oconaluftee Ranger Station, Great Smoky Mts Nt'l Park, *Fox* 764 (NCSC). Transylvania Co.: Thompson River, 8mi N of NC–SC line, *Weaver* 62 (DUKE, NCU). Watauga Co.: Watauga River about 0.5mi E of Avery-Watauga Co. line, *Ahles & Duke* 43848 (NCU). Yancey Co.: S Tol River about 0.5mi downstream from Sevenmile Ridge Road bridge, *Jones & Powell* s.n. (AUA, LL, MINN, NCU, NO, RSA, SMU, TENN, UC, UNA, USCH, VPI, WVA).

Pennsylvania. Bedford Co.: in the vicinity of Hyndman, *Small* s.n. (NY). Centre Co.: Black Moshannon Creek, *Stark* s.n. (GH). Fayette Co.: Youghiogheny River, Ohio Pyle, *Bright* 18897 (UC). Lancaster Co.: McCall's Ferry, *MacElwee* 720 (A). Monroe Co.: Tannerville Bog, *Dimmick* 2746 (SMU). Perry Co.: near Marysville, *Small* s.n. (GH, NY). Westmorland Co.: Soyalharm Gorge, *Jennings* s.n. (MO) York Co.: McCall's Ferry, *Heller & Halbach* 617 (A, F, GH, MINN, MO, NY).

South Carolina. Anderson Co.: without definite loc., *Earle* s.n. (VPI). Cherokee Co.: near Gaffney, *Munz* 1350 (POM). Greenville Co.: 2.1mi W of jct of River Falls Rd and Oil Camp Creek, Pinnacle Mt, *Hill* 20067 (CLEMS). Oconee Co.: Chattooga River 1mi S of Big Bend, *DuMond* 1164 (NCSC, RSA). Pickens Co.: without definite loc., *Wilbur* 1906 (DUKE).

Tennessee. Bledsoe Co.: Lowry's Creek, 8mi E of Pikeville, *Heslen, Bain & Sharp* 3784 (NY, TENN, UC). Blount Co.: without definite loc., *Cain & Duncan* 640 (TENN). Cocke Co.: along French Broad River between Paint Rock and Del Rio, *Kearney, Jr* 819 (MINN, MO, NCU, NY). Cumberland Co.: along Caney Fork S of Clitty, 0.2mi downstream from bridge in Blue Hole Rec. Area, Bowaters Paper Company, *Patrick* 2398 (TENN). Fentress Co.: 2mi E of Clark Range, Shanks, *Sharp & Clebsch* 4006 (SMU, TENN). Grundy Co.: Big Fiery Gizzard Cove, Grundy State Forest, *Kral* 56060 (VDB). Hamilton Co.: 20mi along stream along US 27 bridge, and old trail crossing about 1mi W of Monttake, Chickamauga Gulch, *Brown* 53628.1 (SMU). Jackson Co.: near Culowee, Gregory's Bald, *Moses* 341 (SMU, TENN). Marion Co.: Foster Falls, *Underwood & Sharp* 2495 (NCU, NY, TENN). Monroe Co.: Cherokee Nt'l Forest, along road 217-1 between Rattlesnake Rock and Beech Gap, *Wofford & Boom* 79-170 (NLU, TENN). Morgan Co.: Clear Creek at Lilly Bridge, 4mi WSW of Lancing, *Wofford & Webb* 77-118 (TENN, VDB). Polk Co.: along Ocoee Lake, *Sharp, Norris & Russell* 23627 (TENN). Putnam Co.: 12mi E of Cookeville, *Shaver* 2982 (SMU, VDB). Rhea Co.: Wolf Creek, *Ruth* 192 (GH). Scott Co.: Big South Fork, Cumberland River S of Oneida and Western Railroad bridge, *Patrick, Wofford & Collins* 605 (TENN, VDB). Sevier Co.: Little River a few miles below Elkmont, *Anderson* 1345 (GH). Unicoi Co.: Nolichucky River 4mi SE of Erwin, *Sharp & Sharp* 1501 (TENN). Van Buren Co.: Falls Creek State Park, Falls Creek, *Shanks & Clebsch* 4530 (NCU, TENN). Washington Co.: Nolichucky River between Embreeville and Unicoi Co. line, *James* 17460 (TENN, VDB).

Virginia. Giles Co.: Big Cascades of Little Stoney Creek, *Shanks* 15214 (GH, TENN).

West Virginia. Alleghany Co.: Greenbriar River, White Sulphur Springs, *Harbison* 7131 (A). Barbour Co.: Middle Fork River above Belington, *Gray* s.n. (WVA). Braxton Co.: Little Kanawha River 1mi below Wildcat, *Rossbach* 8000 (NLU). Fayette Co.: New River Gorge, *Bartley & Hicks* 2105 (NY). Grant Co.: Stoney River, *Moreland* s.n. (WVA). Greenbriar Co.: Cheat River near Cheat Bridge, *Rehder* s.n. (A). Kanawha Co.: Queen Shoals, *Randolph* 200 (WVA). Marion Co.: near Bunner's Ridge, *Brown* s.n. (WVA). Mercer Co.: without definite loc., *Millspaugh* s.n. (F). Mineral Co.: Piney Swamp, *Davis, Strausbaugh & Sturm* s.n. (WVA). Mingo Co.: mouth of Little Huff Creek, *Berekely* 1038 (GH, MO). Monongalia Co.: without definite loc., *Anderson & Smith* 218 (WVA). Nicholas Co.: Meadow River, below bridge on US 19 14.5mi S of Summerville, 2mi N of Nallen, *Nicely* 879 (NCSC, NCU, VPI, WVA). Preston Co.: Coopers Rock State Forest, Little Laurel Run near Rte 73, *Core & Orris* s.n. (NCU). Randolph Co.: Cheat River near Cheat River Lodge, *Bartley* 15 (WVA). Summers Co.: Bacon's Falls Greenbrier River 2mi below Talcott, *Fox* 1975 (NCSC). Taylor Co.: Valley Falls, *Anderson* 4 (WVA). Tucker Co.: Blackwater River near falls, Canaan Valley, *Allard* 12275 (WVA). Upshur Co.: Ours Mill Island, Buckhannon River, *Grose & Grose* s.n. (WVA). Webster Co.: Rte 15 near Cowen, *Core* 6804 (WVA). Wyoming Co.: Guyandot River about 0.5mi above mouth of Long Branch, *Music* 2739 (GA, USCH, USF, WVA).

Rhododendron atlanticum

REPRESENTATIVE SPECIMENS: USA. **Delaware.** Kent Co.: near Hazletville, *Canby* s.n. (A). New Castle Co.: near Wilmington, *Sargent* s.n. (A). Sussex Co.: 4mi NE of Greenwood, *Tatnall* 2905 (GH).

Georgia. Bryan Co.: SE of Blitchton, *Pyron & McVaugh* 1372 (GA). Bulloch Co.: c.1.5mi W on road to Upper Lotts Creek Church, *Thomas & Drapalik* 31 (NCU). Candler Co.: c.11mi WNW of Statesboro, *Middleton & Drapalik* 34 (NCU). Effingham Co.: S of Oliver, *Eyles* 6900 (GH). Emanuel Co.: c.9mi E of Adrian, *Wilbur* 2980 (NCSC). Irwin

Co.: c.5mi S of Fitzgerald, *Wilbur* 3078 (FSU). Long Co.: 4mi E of Glennville, *Duncan* 2215 (GA, NY). Ware Co.: Suwannee Lake, *Harper* 115 (NY). Wayne Co.: SE of Jesup, *Duncan* 23732 (GA).

Maryland. Cecil Co.: near village of Elk Neck, *Henry* s.n. (GH). Garret Co.: near Oakland, *Allard* 12285 (WVA).

North Carolina. Beatie Co.: near Powellville, hwy 903, *Williams* 21 (NCU). Beaufort Co.: Bath, *Weatherby* 6083 (GH, NY). Bladen Co.: 10.85mi N of Bladen Lakes Forest Ranger Station, on SR 242, *Kron* 1419 (FLAS). Brunswick Co.: 3mi NW of the Bolivia Fire Tower, *Kologiski* 509 (NCSC). Carteret Co.: on NC 1124, 5mi SE of Newport, *Stone* 1567 (DUKE). Chowan Co.: 1.3mi E of Bertie-Chowan line on US 17, *Ahles & Ashworth* 39684 (NCU). Columbus Co.: c.2mi S of Chadbourn on Rte 410, *Wilbur* 5316 (DUKE). Craven Co.: New Bern, *Harbison* 115 (A). Cumberland Co.: c.13mi SE of Fayetteville on Rte 210, *Wilbur* 5574 (DUKE). Dare Co.: c.1mi W of jct of US 64 and US 264, Manus Harbor, *Cooper* 2697 (NCSC). Duplin Co.: N of Calypso, *Fogg* 5472 (GH). Edgecombe Co.: 8mi E of Rocky Mount, *Holmes* s.n. (NCU). Franklin Co.: 17mi SW of Ahoskie, *Barefield* 31 (UNA). Gates Co.: Wyanoke, *Ahles & Horton* 53078 (NCU). Green Co.: 6mi S of Farmville, *Totten* s.n. (NCU). Harnett Co.: without definite loc., *Oosting* 34129 (DUKE). Hertford Co.: Murfreesboro, *Harbison* s.n. (NCU). Hoke Co.: near Raeford, *Ashe* s.n. (NCU). Hyde Co.: 12mi NW of Swanquarter, *Kral* 10192 (VDB). Johnston Co.: 3mi S of Meadow School, *Smith* s.n. (NCU). Jones Co.: near church on NC 58 N of Co. Road 1100, *Dorr* 1337 (NCU). Lenoir Co.: 3mi SE of Kinston, *Godfrey & Kerr* 3715 (GH). Martin Co.: 3.6mi NE of Oak City, *Radford* 32194 (NCU). Moore Co.: 3mi E of South Pines, *Woods & Woods* s.n. (NCSC). Nash Co.: 0.8mi N of Drake on NC 48, *Ahles & Horton* 11776 (NCU). New Hanover Co.: 8.8mi N of Inland Waterway on River Road, *McCrary & Ahles* 2023 (NCU). Onslow Co.: near Dixon, *Moldenke* 1240 (DUKE, MINN, NY). Pasquotank Co.: 6.5mi NW of Knobbs Creek on US 17-168, *Ahles & Ashworth* 40086 (NCU). Pender Co.: 10.5mi NE of Burgaw on Rte 53, *Wilbur* 19612 (DUKE). Perquimans Co.: without definite loc., *Glasson* s.n. (DUKE). Pitt Co.: 3mi NE of Shelmerdine, *Radford* 32542 (NCU). Robeson Co.: 0.7mi S of Robeson Co. line, *Radford & Stewart* 966 (NCU). Sampson Co.: 1.1mi WSW of Newton Grove on NC 102, *Ahles & Haesloop* 29933 (NCU). Scotland Co.: without definite loc., *sin. coll.* s.n. (NCU). Tyrrell Co.: 2.8mi SE of Cross Landing on loop road, *Radford* 33821 (USF). Wake Co.: 4mi E of Rocky Mount, *Erlanson* 753 (NY). Washington Co.: 3.5mi E of Hoke, near NC 32, *Radford* 35152 (NCU). Wayne Co.: 6.5mi WSW of Pikeville, *Radford* 22022 (NCU, NY). Wilson Co.: 2mi E of Black Creek, *Radford* 33154 (NCU).

Pennsylvania. Stewartstown Co.: near Stewartstown, *Gable, Jr* 30 (A).

South Carolina. Beaufort Co.: near Beaufort, *Batchelder* 4957 (GH). Berkeley Co.: 7mi NE of Wando, *Duncan* 5920 (GA). Charleston Co.: Big Ocean, c.4mi W of Santee River, *Radford & Stewart* 1015 (NCU). Chesterfield Co.: 2mi W of Society Hill, *Duncan & Hardin* 15571 (GA). Clarendon Co.: near SC 58, 1mi NW of Turbeville, *Radford* 21088 (NCU). Colleton Co.: Cottageville, *Bell* 1848 (NCU). Darlington Co.: E of Darlington, *Moldenke & Moldenke* 27018 (LL). Dillon Co.: 9mi WNW of Latta, *Duncan & Hardin* 15551 (NCU). Dorchester Co.: without definite loc., *403 Class* 46752 (TENN). Florence Co.: just NW of Florence radio tower, *Bell* 10668 (NCU). Georgetown Co.: without definite loc., *Harbison* 14 (A). Horrey Co.: 5mi S of Myrtle Beach, *Weatherby & Griscom* 16605 (GH). Jasper Co.: 1mi S of Hampton-Jasper Co. line on SC 128, *Bell* 2583 (NCU). Marion Co.: 5mi S of Green Sea, *Blomquist* 10235 (DUKE). Orangeburg Co.: US 21, 9mi N of Orangeburg, *Beadle* s.n. (US). Sumter Co.: near US 378, 5.5mi SW of Shiloh, *Radford* 21074 (NCU). Williamsburg Co.: near SC 41, 1mi S of Hemingway, *Radford* 21443 (NCU).

Virginia. Chesterfield Co.: without definite loc., *Whitesel* 3197 (GH). Dinwiddie Co.: Cherry Hill, *Moldenke & Moldenke* 30029 (LL). Gloucester Co.: Rte 633, just N of jct with Rte 636, *Greaves* 1120 (NCU). Henrico Co.: jct of Parham and Darracott Sts, *Uttal* 640 (NCU). Isle of Wight Co.: 4mi W of Lees Mill, *Harvill* 15951 (MO, NCU). James City Co.: 15mi N of Newportnews on Rte 60 from Williamsburg, *Coker* s.n. (NCU). King William Co.: hwy 360, near Pemunkey River, *Kiltz* 146 (VPI). Nansemond Co.: c.8mi SE Franklin, *Kral* 12337 (SMU). New Kent Co.: less than 1mi W of Goddins Pond Dam, *Soltis & Ware* 784 (NCU). Norfolk Co.: without definite loc., *Weiss* 323 (VPI). Powhatan Co.: Jed Church, Rte 635, *Stevens* 3368 (VPI). Prince George Co.: SE of Petersburg, at head of Poo Run, *Fernald & Long* 9998 (F, GH). Princess Anne Co.: Buzzard's Neck Road, Back Bay, *Fograshy* 60 (VPI). Southampton Co.: NE of Statesville, *Fernald & Long* 7925 (GH). Surry Co.: 4.3mi ESE of Surry on VA 10, *Ahles & Baird* 58613 (NCU). Sussex Co.: US 460, 2.4mi NW of Waverly, *Porter & Svenson* 831 (GH).

Rhododendron austrinum

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Coffee Co.: Bluff Creek, 9.3mi N of Elba, *Clark* 15562 (NCU). Conecuh Co.: Bottle Creek off Co. Rd 42, 2.2mi N of Brooklyn, *Clark* 10319 (NCU). Covington Co.: US 29 0.3mi SW of Co. Rd. T24, 0.5mi SW of Crenshaw Co. line, *Uttal* 10979 (NCU, VP). Crenshaw Co.: Conecuh River, Dozier, *Clark* 14778 (NCU). Escambia Co.: Conecuh River, E of Brewton on US 29, *Kral* 38724 (GH, SMU). Geneva Co.: Flat Creek by Ala. 54, W of Samson, *Kral* 38619 (GA, GH, SMU, VDB). Mobile Co.: 7mi from Theodore, c.4mi from hwy 90, *Widder*

062 (AUA). Pike Co.: near Glenwood, *Norris* 59 (UNA). Santa Rosa Co.: W of Wallace, Escambia River, *Kral* 19689 (SMU, VDB).

Florida. Bay Co.: without definite loc., *Rogers* 133 (AUA). Calhoun Co.: Chipola River E of Clarksville, *Godfrey* 56343 (FSU). Escambia Co.: scenic hwy at sea level, Pensacola, *Miller* s.n. (GA). Franklin Co.: Ft Gadsden State Historic Site, S of Sumatra, *Godfrey* 79469 (FSU). Gadsden Co.: Aspalaga Landing, *Kron* 1382 (FLAS). Holmes Co.: NE of Darlington, *Godfrey* 55499 (FSU, NY, SMU, UNA, USF). Jackson Co.: S of Marianna, *Henry* 2020 (A). Leon Co. near Tallahasse, *Kuntz* s.n. (NCU). Liberty Co. without definite loc., *Sargent* 6092 (GA, POM, SMU). Okaloosa Co.: Niceville, *Ashe* s.n. (NCU). Santa Rosa Co.: bluff of Escambia River, E of Century, *Godfrey* 54586 (NY). Walton Co.: near Eucheeanna, *Palmer* 38598 (A, MO). Wakulla Co.: US 98 to Shell Point, *Trott* 42 (FSU). Washington Co.: Careyville, Choctaw Camp off Rte 279, *Churchill* 13-42322 (RSA).

Georgia. Berrien Co.: without definite loc., *Lemon* 248 (FLAS). Calhoun Co.: 11mi E of Edison, *Henry* 2720 (A). Decatur Co.: 5mi N of the GA–FL line, *Lauramere* s.n. (A). Dougherty Co.: Albany, *Harvey* 1514 (GA). Grady Co.: Wolf Creek, 0.8mi E of Grady-Decatur Co. line, 4.5mi NW of Whigham, *Faircloth & Hurst* 1674 (GA, MO, NCU). Lee Co.: 1mi E of Terrell Co. line and 0.5mi N of GA 32 on SR-1528, Middle Creek, *Golden* 1 (GA, NCU). Milles Co.: near Colquitt, *Henry* 2642 (A). Newton Co.: without definite loc., *Conrad* s.n. (AUA). Thomasville Co.: Wade estate not far SW of the house, *Coker* s.n. (NCU).

Rhododendron calendulaceum

REPRESENTATIVE SPECIMENS: USA. **Georgia.** Dade Co.: SW-facing cliffs in Cloudland Canyon, E of Trenton, *Cronquist* 5148 (NY). Dawson Co.: W side of Chestatee River, 2.6mi S of Co. line, *Duncan* 18547 (GA). DeKalb Co.: Decatur Water Works, *Whittaker* s.n. (UC). Fannin Co.: 2mi inside Blue Ridge City, *William & Jandebeur* s.n. (AL). Forsyth Co.: ravine on W side of Chestatee River, 7.5mi W 8°N of Gainesville, *Duncan* 18476 (NY, TENN). Fulton Co.: ravines running N into Chattahoochee River, SW of Roswell, *Duncan* 9355 (GA, USF). Gilmer Co.: between Ellijay and Fort Mt, *Cronquist* 5076 (GH, MO, NY). Hall Co.: along stream 5.7mi W 4°N of Flowery Branch, *Duncan* 18579 (USF). Lumpkin Co.: Frogtown Gap, *Leeds* 2516 (GH, NY). Meriwether Co.: without definite loc., *Henry* 2608 (A). Rabun Co.: N side of Rabun Bald, *Duncan* 2656 (UC). Towns Co.: Appalachian Trail crosses hwy 76, *Bryson* 1612 (VDB). Union Co.: 1.5mi N of Neels Gap between Dahlonega and Blairsville, *Cronquist* 5113 (GH, NY). White Co.: Younah Mt about 4.7mi N of Cleveland, Blue Ridge Mts, *Norsworthy* 456 (NCU).

Kentucky. Breathitt Co.: Camp Robinson Rd, Clemon Branch Creek, *Tutner* 222 (KY). Floyd Co.: Hueysville, *Centers & Blair* s.n. (KY). Harlan Co.: near summit of Big Black Mt, *McVaugh* 8680 (SMU, UNA). Letcher Co.: Lilley Cornett Woods, Appalachian Ecological Research Stations SW of Whitesburg near Skyline about 8mi SE of KY 7 on Rte 1103, *Sole* 1 (NCU). Morgan Co.: 10mi W of West Liberty on Oldfield Creed off US 460, *Miller* 59 (KY). Pike Co.: Breaks of the Sandy, *McInteer, Shacklette & Harvill* 889 (KY). Wolfe Co.: between Pine Ridge and Sky Bridge, *Wharton* 6421 (KY).

North Carolina. Alleghany Co.: 2.5mi SE of Whitehead, *Radford* 34150 (NCU). Ashe Co.: without definite loc., *Harbison* 14 (A). Avery Co.: Grandfather Mt, Linville, *Welch* 2294 (NY, UC). Buncombe Co.: 19mi E of Asheville, *Erlanson* 748 (A). Cherokee Co.: Cherokee Lake Recreation Area NC 294, 3.1mi NW of US 64 at Ranger, *Grant* 155 (AUA). Clay Co.: Shooting Creek Vista on US 64, *Radford & Ahles* 13700 (UNC). Forsyth Co.: S of NC 67 at Yadkin River, *Leonard* 1401 (UNC). Haywood Co.: Junaluska Mt, *Batchelder* 5114 (USF). Jackson Co.: W of Timber Ridge, *DuMond* 974 (NCSC). Lenoir Co.: without definite loc., *sin. coll.* 6192 (GH). Macon Co.: 4.6 m below summit of Wayah Bald, *Kron* 1749 (FLAS). Madison Co.: 2mi NW of Hot Springs on US 25 and US 27, *Boufford et al.* 13227 (NCU). McDowell Co.: 3.8mi S of Big Laurel Gap on Curtis Creek Rd, *Bell* 3552 (NCU). Mitchell Co.: Iron Mt Gap along Appalachian Trail, *Landry & Thomas* 7046 (LSU). Polk Co.: without definite loc., *Garren* 234 (DUKE). Rutherford Co.: Bald Mt, *Lynch* 6 (UNC). Stokes Co.: Peters Creek near Campbell, *Blomquist* 11074 (DUKE). Swain Co.: near end of Jump Up Trail, *Barksdale & Jennison* 1278 (TENN). Transylvania Co.: NC 215, 7.4mi N of jct of US 64 and Balsam Grove community, *Jones* 715 (NCSC). Watauga Co.: Blowing Rock, *Blomquist* 4457 (DUKE). Yancey Co.: Mt Mitchell, *Palmer* 42534 (MO, NCU, NY).

Ohio. Scioto Co.: Sugar Grove, *Horsey* 322 (A). Pike Co.: Whiskey Switch Rd, *Bartley & Pontius* 899 (NY).

South Carolina. Fairfield Co.: N 40 W from jct of S-225 and S-205. *Wooten & Marchant* 8311 (USCH). Greenville Co.: Rocky Spur, *Peattie* 1478 (NCU). Oconee Co.: N edge of future Bad Creek Reservoir, *Rodgers & Green* 73094 (NLU). Pickens Co.: top of Sassafrass Mt, *Bell* 3370 (NCU, NY). Spartanburg Co.: without definite loc., *McCarthy* s.n. (UC).

Tennessee. Blount Co.: Gregory's Mt on trail to Gregory's Bald, *Cain & Duncan* 625 (TENN). Carter Co.: Sinking Creek area, *Pearman* s.n. (TENN). Cocke Co.: Wolf Creek, *Ruth* s.n. (TENN). Greene Co.: Mt toward John Speer Camp, *Phillippe* 2977 (NCSC). Hawkins Co.: near Greene Co. line, *Wolfe* 19176 (TENN). Johnson Co.: Shady Valley,

Underwood 764 (TENN). Monroe Co.: Mecca Quad., Slarr Mt, 5.4mi S of Tellica Plains-Etowah Rd, left side of mt, *Boom* 447 (NLU, TENN). Polk Co.: on ridge between summit of Little Frog Mt and McFarland, *Partridge* 11378 (NCU). Sevier Co.: Long Branch, Greenbriar, *Cain & Duncan* 231-2 (TENN). Sullivan Co.: S of Bristol between Johnson City Rd and Southern Railway, *Jones* 17366 (TENN). Unicoi Co.: Temple Hill trail near Unaka Springs, *Price* 502 (DUKE).

Virginia. Alleghany Co.: 100 yds S of jct VA 600 and 613, *Uttal* 6242 (VPI). Bath Co.: Warm Springs, *Hunnewell* 17762 (VPI). Bland Co.: 0.3mi N of jct of Co. 617 and US 52, on US 52, *James* 8397 (VPI). Botetourt Co.: Blue Ridge Pkwy, Sta. 66-68J, W slope of S summit of Thunder Hill, *Freer* 1500 (GH). Buchanan Co.: 16mi SE of jct US 460 and VA 83, on US 460, *James* 10032 (NCU). Craig Co.: just off VA 658, Potts Mt Wildlife Management Area, *Uttal* 8782 (AUA). Dickerson Co.: on VA 83 at Dickerson and Wise Co. line, *James* 9916 (NCU). Floyd Co.: off VA 727 S side of fire road at Buffalo Mt, *Condit et al.* 35 (VPI).Giles Co.: Salt Sulphur Road, N of Mt Lake, *Massey* s.n. (VPI). Grayson Co.: on US 58, *James* 9223 (NCU). Highland Co.: Red Oak Knob, *Hunnewell* 19046 (VPI). Lee Co.: 0.7mi NE of Wise and Lee Co. line on US 23, *James* 9810 (NCU). Montgomery Co.: without definite loc., *Smyth, Jr* s.n. (NCU). Nelson Co.: Blue Ridge Pkwy, Humpback Picnic area, MP 8.5, *Freer et al.* 3893 (NCU). Pulaski Co.: Camp Ottari, Blue Ridge Boy Scout reservation, *Uttal* 11878 (VPI). Roanoke Co.: *Skinner* 801 (MOAR). Scott Co.: High Knob, Rte 619, *Uttal* 9704 (VPI). Smyth Co.: *Skinner* 1037-9 (MOAR). Tazewell Co.: *Skinner* 1036 (MOAR). Washington Co.: *Skinner* 789 (MOAR). Wise Co.: *Skinner* 888-14 (MOAR). Wythe Co.: 7.8mi N of Stony Creek on US 52, *James* 8208 (NCU).

West Virginia. Barbour Co.: Valley Furnace, *Haller* s.n. (WVA). Boone Co.: Joe's Creek, *Coon* s.n. (GA). Braxton Co.: Sugar Creek S of Gassaway, *Boggs* s.n. (WVA). Calhoun Co.: without definite loc., *Harris* s.n. (WVA). Greenbrier Co.: Kate's Mt, 1mi SE of White Sulphur Springs, *Hermann* 10305 (F, GH, MO, NY). Jackson Co.: Ripley, *Richardson* s.n. (WVA). Kanawha Co.: Clendinin, *Strickland* s.n. (WVA). Lincoln Co.: Hamilton Creek, *White* s.n. (WVA). Mercer Co.: without definite loc., *Harbison* 3 (A). Mingo Co.: Kermit, *Harris* s.n. (WVA). Monongahila Co.: without definite loc., *Millspaugh* s.n. (UC). Nichols Co.: near Calvin, *Creasy* s.n. (WVA). Pendleton Co.: E of Spruce Knob, *Stoutamire* 2134 (SMU). Pocohontas Co.: Alle Mt W of Monterey, *Bright* s.n. (USF). Raleigh Co.: along Rte 3, *Tosh* 53 (UC). Randolph Co.: road from Rte 33 to Bickels Knob, *Clarkson* 1179 (WVA). Roane Co.: 5mi W of Spencer, Rte 33, *Perkins* s.n. (WVA). Summers Co.: near Hunton, *Boone* 27 (WVA). Tucker Co.: along Bull Run 5mi from St George, *Gable* s.n. (WVA). Upshur Co.: without definite loc., *Grosse & Grosse* s.n. (WVA). Wayne Co.: Martha Noe's Branch, *Plymale* 368 (WVA). Webster Co.: Camden-on-Gauley, along Grassy Creek, *Davis* 8031 (UC). Wyoming Co.: Herndon, *Evans* s.n. (WVA).

REPRESENTATIVE PUTATIVE HYBRIDS: *R. calendulaceum* × *R. periclymenoides.* **Kentucky.** Rowan Co.: firetower road, Morehead, *Braun* 2428 (A). Flowers salmon-yellow with multicellular eglandular hairs on the corolla, bud-scale margins ciliate and slightly pubescent. **North Carolina.** Macon Co.: near Highlands, *Harbison* s.n. (A). Flowers pink with a yellow blotch, bud-scale margins glandular.

R. calendulaceum × *R. canescens.* **Georgia.** Murray Co.: Fort Mountain, east of Chatsworth, *Cronquist* 5083 (GA). Flowers pink with orange tinge on one petal, leaves densely unicellular pubescent, bud scales densely unicellular-ciliate with glandular margins.

R. calendulaceum × *R. periclymenoides* × *R. prinophyllum.* **West Virginia.** Pendleton Co.: old pasture halfway up Spruce Knob Mt, *Skinner* 867(b)-24 (A). Flowers orange, floral bud-scale margins glandular, the abaxial surface pubescent, corolla with multicellular eglandular hairs.

R. calendulaceum × *R. prinophyllum.* **Virginia.** Smyth Co.: 8mi SE of Chilhowie, Jefferson Nat'l Forest, *Skinner* 791-M-7 (A).

Rhododendron canescens

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Autauga Co.: by US 82, 20mi SE Maplesville, *Kral* 63337 (VDB). Barbour Co.: 8mi S of Eufaula along Ala. 95, *Kral* 28157 (VDB). Bibb Co.: without definite loc., *Totten* s.n. (NCU). Blount Co.: 2.5mi S Oneonta, *Kral* 30512 (SMU). Butler Co.: by I-65, 5.5mi S of Greeneville turnoff, *Kral* 41900 (VDB). Calhoun Co.: 3.7mi W of Piedmont, *Kral* 34457 (GA). Chambers Co.: SE of Cusseta, *Golden* 10 (AUA). Cherokee Co.: c.2mi E of Blanche on Ala. 35, *Kral* 30335 (VDB). Chilton Co.: Maplesville, *Harbison* 849 (A). Chocktaw Co.: 6mi N of Butler near Rudder Hill Hunt Club, *Smith* 203 (VDB). Clarke Co.: by US 43, 6mi S of Thomasville, *Kral* 38825, Clay Co.: Ala. 77, 10mi SE of Ashford, *Clark et al.* 11340 (NCU). Cleburne Co.: E of Coleman Lake and SE of Pine Glen, *Kral* 61630 (VDB). Coffee Co.: 5mi E of Enterprise, *Palmer* 38642 (A). Colbert Co.: c.2mi N of Littleville, *Kral* 19982 (VDB). Conecuh Co.: c.3mi W of Cohasset, *Kral* 38525 (VDB). Coosa Co.: Rte 22, 2mi E of Coosa River, *Uttal* 11036 (VPI). Covington Co.: between Lockhart and Wing, *Godfrey & Harrison* 55402 (FSU, NY). Crenshaw Co.: 3.2mi N of Brantley on US 311, *Kral* 34588 (VDB). Cullman Co.: without definite loc., *Harbison* H4224 (A). Dale Co.: 4mi NE of Ozark on Ala. 105, *Kral* 28094 (NLU). Dallas Co.: Selma, *Harbison* 825 (A). DeKalb Co.: DeSoto State Park, *Searcy*

s.n. (VDB). Elmore Co.: without definite loc., *Bayne* s.n. (VDB). Escambia Co.: Rte 41, *Uttal* 11008 (VPI). Fayette Co.: c.1.5mi E of jct with Ala. 171 along Fayette Co. 12, *Wiersema* 583 (UNA). Franklin Co.: c.17mi ENE of Haleyville, *Iltis et al.* 20143 (SMU). Geneva Co.: 3.5mi N of Sampson on Ala. 87, *Kral* 29995 (FSU). Greene Co.: on US 43 c.1mi S of Tuscaloosa Co. line, *Davenport* 310 (NCU). Hale Co.: S of Duncanville, Talladega N'tl Forest, *Chermock & Chermock* s.n. (UNA). Henry Co.: between Argus and Abbeville, *Erlanson* 726 (US). Houston Co.: 10mi W of Dothan, *McDaniel* 7315 (GA). Jackson Co.: c.2mi S of Pisgah by Ala. 71, *Kral* 34414 (VDB). Jefferson Co.: 3mi S of Bessemer, *Kral* 38376 (VDB). Lamar Co.: 1.5mi W of Buttahatchee River and c.7mi NE of Sulligent, *Clark* 10670 (NCU). Lauderdale Co.: without definite loc., *Minor* s.n. (NCU). Lee Co.: without definite loc., *Jones, Jr* s.n. (GA). Limestone Co.: 3mi S of Athens, *Hardin* 13414 (NCSC). Macon Co.: S of I-85 just E of its jct with US 80, *Freeman* 666 (NCU). Madison Co.: Monte Sano State Park, *Clark* 18419 (NCU). Marengo Co.: c.5.5mi SW of Sweetwater from jct of Ala. 10 and Co. 7, *Henderson* 150 (AUA). Marion Co.: without definite loc., *Franks* s.n. (NCU). Marshall Co.: Buck's Pocket State Park, *Kral* 49647A (VDB). Mobile Co.: along north bank of Mile Creek swamp Univ. of S. Ala. property, *Lelong* 4251.1 (NCU). Morgan Co.: c.1mi SW of S part of Newsome Sinks, *Clark* 11967 (NCU). Monroe Co.: c.5mi NE of Old Texas, *O'Halloran* 74 (AUA).

Pickens Co.: 4.2mi E of Gordo, *McDaniel* 10433 (GA). Perry Co.: Rte 183, 1mi E of Pinetucky, *Uttal* 11033 (VPI). Randolph Co.: c.1mi NE of Woodland, *Rutland* 285 (AUA). Russell Co.: c.3mi N of Huntsboro, *Koelling* 2161 (AUA). Shelby Co.: Cahaba River at US 31, SE Birmingham, *Sessler* 846 (VDB). St Clair Co.: 1mi W of Wolf Creek Road, *Bradshaw* 82 (UNA). Sumter Co.: S side of Sucarnochee Creek, 5km WNW of Livingston, *Clausen & Clausen* 5733 (NY, UC). Talladega Co.: by US 280, c.1mi SE of Scylacauga, *Kral* 46024 (VDB). Tallapoosa Co.: 3mi S of the Coben Abbott Hwy, *Dean* 12 (AUA). Tuscaloosa Co.: old mining road at Rocy Branch, *Boyd* 35 (UNA). Walker Co.: near hwy 69 along Wolf Creek, *Wiersema* 36 (UNA). Washington Co.: at Bates Creek, 2mi N of Calvert, *Crawford & Harvill* 875 (GA). Wilcox Co.: Pine Hill, *Moldenke & Moldenke* 26858 (LL). Winston Co.: 7mi W of Addison, *Hardin* 15284 (GA).

Arkansas. Bradley Co.: Banks, *Demaree* 18378 (A, MO, NY). Calhoun Co.: 2.7mi S of Locust Bayou, *Miller* 865 (UARK). Dallas Co.: 10mi N on Bucksnort Road, Fondyce, *Clark* 13 (UARK). Drew Co.: Monticello, *Demaree* 14372 (GH, MO, NY). Garland Co.: Hot Springs, *Moore* 490076 (UARK). Hempstead Co.: near Nope, *Moore* 50073 (UARK). Hot Springs Co.: Bismarck, *Demaree* 39415 (SMU). Lafayette Co.: Dorcheat Creek on US 62, *Beadle* s.n. (US). Montgomery Co.: SW of Black Springs, *Moore* 420068 (UARK). Neveda Co.: c.0.25mi E of Dills Mill, *Redfearn et al.* 30542 (NCU). Ouachita Co.: Stephens, *Demaree* 16822 (FSU, NY). Polk Co.: Ouachita N'tl Forest in Bard Springs Rec. Area, *Cooley et al.* 4265 (TENN). Saline Co.: Paron, *Demaree* 43582 (GH). Union Co.: Strong, *Demaree* 18915 (A).

Florida. Alachua Co.: c.5mi NE of Gainesville, *D'Arcy* 2400 (VDB). Baker Co.: at River bridge at Taylor, *Ashe* s.n. (NCU). Baldwin Co.: Lake Laurel, between hwy 22 and hwy 44, *Simpson* s.n. (NCU). Bay Co.: Calloway, 2mi from S-729 on Fla. 22 E, *Athey* s.n. (VDB). Calhoun Co.: Chipola River, E of Clarksville, *Godfrey* 56349 (NY, UC). Clay Co.: E of Penny Farms, *Ashe* s.n. (NCU). Columbia Co.: 0.6mi SW of Columbia-Hamilton Co. line at White Springs, *Ward & Ward* 3001 (GH). Duval Co.: near Jacksonville, *Rehder* 682 (A). Escambia Co.: US 90, 2mi W of I-10 intersection, *Thomas et al.* 6873 (SMU). Gadsen Co.: near Quincy, *Coker & Harbison* s.n. (NCU). Hamilton Co.: W side of US 41, 100 yds N of bank of Suwannee River, *Ward & Ward* 2999a (GH). Jackson Co.: near Grand Ridge, *Palmer* 35276 (A). Jefferson Co.: near Lake Miccosukee, *Godfrey* 56320 (GH, NY). Leon Co.: 3mi S of Tallahassee, *Kral* 4182 (SMU). Liberty Co.: vicinity of Hosford Fire Tower, just off Fla. 20, *Godfrey* 76279 (FSU). Marion Co.: Orange Creek just N of Orange Springs, along Rte 21, *Judd* 5079 (FLAS). Nassau Co.: Callahan, *Palmer* 38290 (A). Polk Co.: Mt Lake Bird Sanctuary, Lake Wales, *McFarlin* 4817 (FLAS). Santa Rosa Co.: Jay, *Hume* s.n. (FLAS). Taylor Co.: without definite loc., *Ashe* s.n. (NCU). Wakulla Co.: W of Crawfordville, in the Apalachicola N'tl Forest, *Godfrey* 74187 (VDB). Walton Co.: Mt Pleasant, N of DeFuniak Springs, *Godfrey & Harrison* 55389 (NY, SMU). Washington Co.: 3mi S of Chipley, around Falling Waters Sink, *Godfrey* 54368 (FSU, NY).

Georgia. Baker Co.: bank of Ichawaynochaway Creek near Field Station, *Thorne & Muenscher* 2836 (UC). Bartow Co.: c.4.5mi SE of Adairsville on Cassville Mt, *Greear* 6397 (GA). Ben Hill Co.: 15mi E of Fitzgerald, *Hermann* 10093 (GH, NY). Berrien Co.: without definite loc., *Lemon* PL-248 (US). Bibb Co.: 3mi SE of Macon, *Wherry* s.n. (A). Brooks Co.: 6mi SE of Barwick, *Adams* 15 (GA). Bryan Co.: 1.1mi ESE of Blitchton, *Oliver & Drapalik* 3 (NCU). Bulloch Co.: Blitch, *DeWolf* 1729 (NCU). Burke Co.: 2 airmiles NW of Keysville, *McRae* s.n. (GA). Calhoun Co.: 18mi E of Ft Gaines, *Henry* 3196 (A). Camden Co.: banks of Satilla River S of Burnt Fort and 1mi W of Baileys Mills Bluff, *Duncan* 23299 (LAF). Candler Co.: 5.7mi W of Metter on Stillmore Co. Road, *Park* s.n. (NCU). Carroll Co.: 6mi S of Carrollton, *Duncan* 10800 (GA). Charlton Co.: St Mary's River just E of St George, *Duncan* 2070 (GA). Chatham Co.: Fort Argyle landing, W of Savannah, *Harbison* 4 (A). Chattahoochee Co.: c.17mi NE of Columbus, Fort Benning Military Reservation, *Haynes* 7662 (UNA). Chattooga Co.: between Summerville, GA and Mentone, AL, *Erlanson* 738 (DUKE). Cherokee Co.: 2.5mi SE of Pine Log Mt firetower, *Richardson* s.n. (GA). Cobb Co.: near Marietta, *Larrabee* s.n. (GH).

Coffee Co.: 6mi E of Relee, *Blake* 1360 (GA). Columbia Co.: N slopes near to E peak of Burks Mt, *Duncan* 28957 (GA). Clarke Co.: c.3mi S of Athens, *Duncan* 4164 (GA). Clay Co.: along Sandy Creek, several mi N of Ft Gaines, *Thorne & Muenscher* 2722 (GA). Crisp Co.: near Cordele, *Coker & Harbison* s.n. (NCU). Dade Co.: base of Lookout Mt, *Palmer* 35477 (A). Dawson Co.: 1.3mi S of Lumpkin Co. line, *Duncan & Adams* 18516 (GA). Decatur Co.: Climax, *Harbison* 13907 (NCU). DeKalb Co.: Mt Arabia, *Primack* 751 (DUKE). Dougherty Co.: near River Bend, Flint River, *Thorne & Muenscher* 2847 (GA). Early Co.: NW of Blakely, *Henry* 2046 (GA). Echols Co.: US hwy 441 SW of Fargo, *Ertter* 2220 (NY, RSA). Effingham Co.: 5mi N of Springfield, *Duncan* 1249 (GA). Elbert Co.: island in the Savannah River, *Coile* 1850 (NCU). Floyd Co.: Horseleg Mt, *Lipps* s.n. (VDB). Forsyth Co.: W side of Chestatee River, 7.5mi W of Gainesville, *Duncan* 18486 (GA). Fulton Co.: Heard's Ferry Rd, *Beadle* s.n. (US). Gilmer Co.: Harris Branch, Carters Reservoir, *Kral* 50588 (VDB). Grady Co.: 6mi W of Cairo, *Eyles* 5871 (DUKE). Greene Co.: along Oconee River, SE of Watkinsville, *Jones, Jr* 1803 (FSU). Gwinnet Co.: on the Yellow River near McGuire's Mill, *Small* s.n. (A, NY). Habersham Co.: near Cornelia, *Harbison* 40 (A). Hall Co.: 12mi S of Gainesville, *Duncan* 18289 (GA). Haralson Co.: by GA 100, c.3.5mi S of Tallapoosa, *Kral* 63459 (VDB). Harris Co.: Robert Lewis Girl Scout Camp off GA 103, *Jones & Coffey* 21793 (VDB). Hart Co.: banks of Savannah River ENE of Hartwell, *Duncan et al.* 15480 (GA). Jefferson Co.: Ogeechee River Bridge, hwy 24, *English* s.n. (NCU). Johnson Co.: 2.8mi W of Co. line, *Bozeman* 10813 (NCU). Jones Co.: 0.6mi S of jct of US 129 and US 441, *Kron* 1761 (FLAS). Lanier Co.: 4mi NE of Lakeland, *Duncan & Hardin* 14769 (GA). Lee Co.: Co. Road S527 W of Leesburg, *Bozeman* 9796 (NCU). Lincoln Co.: Graves Mt between Lincolnton and Washington, *Cronquist* 4314 (MO, SMU). Long Co.: 1mi W of US 301 on GA 261, *Bozeman* 2591 (NCU). Lowndes Co.: along the Withlacoochee River, *Coker et al.* s.n. (NCU). Macon Co.: 1.3mi W of Flint River on hwy GA 127, *Taylor, Jr* s.n. (WVA). Madison Co.: 2mi W of Comer on S fork of Broad River, *Duncan* 4776 (GA). McDuffie Co.: vicinity of Thomson, *Bartlett* 1478 (POM). Meriwether Co.: inside city limits of Manchester, *Wilbur & Webster* 2702 (SMU). Monroe Co.: SW of Forsyth, *Duncan & Hardin* 14831 (TENN). Morgan Co.: N side of Little River, 9.25mi SE of Madison, *Duncan* 13413 (GA). Murray Co.: 2.5mi E of jct of FA 68 and GA 2 on GA 2, *Williamson* 143 (AUA). Muscogee Co.: Bull Creek, c.7.5mi NE of Columbus, Fort Benning Military Reservation, *Haynes* 7649 (NY, UNA).

Oconee Co.: 3mi E of Farmington, *Duncan* 4888 (GA). Ogelthorpe Co.: 7mi NE of Lexington, *Cronquist* 4962 (MO, NY, SMU). Okaloosa Co.: 2mi W of Laurel Hill, *Henry* 3150 (A). Pike Co.: 4mi S of Zebulon, *Duncan* 6284 (UNA). Putnam Co.: 5.5mi NW of Eatonton, *Duncan* 7932 (GA). Randolph Co.: Cuthbert, *Harbison* 18 (A). Richmond Co.: Augusta, *Harbison* 16204 (NCU). Screven Co.: Dover, *Harbison* 25 (A). Talbot Co.: S of bridge 9mi S of Thomaston, *Duncan* 6267 (GA). Tatnall Co.: 6mi SW of Cobbtown, *Henry* 3216 (A). Telfair Co.: 6mi W of hwy 441 near McRae, *Bricker* s.n. (NCU). Thomas Co.: Greenwood Plantation near Thomasville, *McDaniel* 8678 (GA). Toombs Co.: near Lyons, *Palmer* 38283 (MO, UC). Troup Co.: 3mi from LaGrange, *Hicks* 6 (GA). Turner Co.: 0.25mi N of Co. Road 1798 overpass, *Godfrey & Leonard* 75256 (VDB). Upson Co.: 4mi SE of Woodbury, *Cronquist* 4348 (MO, SMU). Walker Co.: Pigeon Mt Wildlife Management Area, *Coile & Hill* 2588 (GA). Walton Co.: S of Loganville, *Cooley* 2107 (LAF). Washington Co.: 1mi W of GA hwy 15 on N end of Tennille, *Manhart* 390 (GA). Wayne Co.: near 'Ox Lot', SE of Jesup, *Duncan* 4691 (GA). Wilcox Co.: 3.8mi E of Pineview, *Bozeman* 5571 (NCU). Wilkes Co.: 6mi NE of Tignall, *Cronquist* 4988 (NY, SMU). Worth Co.: 5.2mi SE of Oakfield, *Faircloth* 4140 (GA).

Illinois. Union Co.: Pine Hills, *Gleason* s.n. (GH).

Kentucky. Calloway Co.: along Ky 614 near jct with Ky 121, *Athey* 4119 (FSU).

Louisiana. Allen Par.: 6.5mi NW of Kinder, *Thieret* 19264 (FSU). Beauregard Par.: c.4.5mi S of Bancroft, *Thieret* 16974 (DUKE). Bienville Par.: c.6.25mi NE of Bienville, *Vincent* 279 (LAF). Bossier Par.: Plain Dealing, *Hudson* 125 (LSU). Caddo Par.: 1mi SE of Vivian, *Thomas & Overby* 33638 (NLU). Calcasieu Par.: c.3mi NW of Oakdale, *Reese* 1754 (LAF). Caldwell Par.: 2mi S of Columbia, *Shell* 40 (NLU). Catahoula Par.: 2.5mi S Rosenfeld, *Kral* 19527 (SMU). Claiborne Par.: E of Marsalis, N of Hurricane, *Lewis & Lewis* 123 (NLU). DeSoto Par.: between Cypress Creek and Circle Marina Rd, *Dixon & Reitzell* 2895 (NLU). East Baton Rouge Par.: near Magnolia, *Ward* 10 (LSU). East Feliciana Par.: c.10mi E of Clinton, *Allen* 6312 (LAF). Evangeline Par.: beside LA 15 at Bayou LaFourche, *Thomas et al.* 27559 (VDB). Grant Par.: 0.5mi N of Williana, *Brown & Lenz* 7542 (LSU). Jackson Par.: near Cartwright, *Thompson* 526 (GA). LaSalle Par.: c.2mi NW of Rhinehart, *Allen* 6930 (GA). Lincoln Par.: c.2mi NW of Vienna, *Kral* 16432 (SMU). Livingston Par.: c.2.5mi SE of Holden, *Allen* 6410 (USF). Morehouse Par.: LA 140 at Twin Oaks N of Log Cabin, *Thomas & Pias* 58255 (NLU). Natchitoches Par.: c.1.5mi SE of Kisatchie, *Thieret* 22272 (LAF). Ouachita Par.: 5mi W of Woodlawn School on LA 34, *Kral* 8393 (GH). Rapides Par.: 1.2mi E of Hineston, *Shinners* 27932 (SMU). Red River Par.: along Cleco Power line right-of-way, S of LA 784, *Thomas & Kee* 45099 (NLU). Sabine Par.: near Pearson firetower W of Fisher, *Brown* 15850 (LSU). St Helena Par.: c.3.5mi ENE of Greensburg, *Allen* 490 (GA). St Tammany Par.: Old River, *Bougere* 783 (LSU). Tangipahoa Par.: Kentwood, *Montz* 1660 (SMU). Union Par.: 4.9mi W of jct of LA 2 and LA 143, *Smith* 50 (NLU). Vernon Par.: c.12mi N of Leesville, *Brown* 15836 (LSU). Washington Par.: hwy 436 near

State line, *Urbatsch* 3394 (LSU). Webster Par.: c.6.5mi NE of Sarepta, *Thieret* 25475 (LAF). West Baton Rouge Par.: Baton Rouge, *Cocks* 3323 (A). West Feliciana Par.: 4.3mi N of jct of LA 66 and Ouida Irondale Road, *Pruski* s.n. (LSU). Winn Par.: c.0.5mi S of St Maurice on US 71, *Holmes* 3715 (NY).

Mississippi. Alcorn Co.: 6mi SW of Kossuth, *Temple* 4685 (GA). Clarke Co.: 18mi ENE of Quitman near AL line, *Jones* 11430 (NCU). Covington Co.: 4mi S of Seminary, near US 49, *Wallus et al.* s.n. (NLU). DeSoto Co.: c.1mi E by Goodman Road to Scenic Road, *Rogers* 46018 (TENN). Forrest Co.: 10mi SE of Hattiesburg near McCallum, *Ray, Jr* 6048 (GH). Franklin Co.: 4mi E of Roxie, *Mathews* 27 (NLU). George Co.: beside hwy 98, N of Lucedale, *Renfrow* 39 (NLU). Grenada Co.: near Grenada, *Millsaps* s.n. (NCU). Hancock Co.: along road to Ansley, *Clark* 1062 (SMU). Harrison Co.: along Shorecrest Road, 15mi N of Mississippi City, *Middlebrooks & Garner* 145 (NLU). Itawauba Co.: 6mi SSW of Red Bay, *Kral* 23645 (DUKE). Jackson Co.: on hwy 57 NE of Ocean Springs, *Jones & Jones* 21685 (TX). Jasper Co.: on Mrs Lena Cook's farm S of Bay Springs, *Pias* 3831 (NLU). Jones Co.: along Leaf River, between I-59 and Eastabuchie, *Jones et al.* 11412 (LAF). Kemper Co.: c.10.5 airmiles N of Dekalb, *McDaniel* 15860 (VDB). Lamar Co.: 4mi W of Hattiesburg, *Jones, Jr* 2667 (NCU). Lauderdale Co.: 2mi N of Kemper, *Cooley et al.* 3156 (VDB). Leake Co.: c.8mi WSW of Carthage, *McDaniel* 15818 (VDB). Lee Co.: near Mooreville, *Palmer* 39016 (A). Lincoln Co.: 5mi S of Bogue Chitto, *Ray, Jr* 7829a (USF). Lowndes Co.: c.4mi W of AL–MS state line, *Lelong* 3656 (NCU). Marion Co.: 4mi NNW of Morgantown, near White Bluff, *Jones & Reynolds* 11129 (VDB). Monroe Co.: vicinity of Greenwood Springs, *Kral* 20000 (VDB). Newton Co.: 18mi SE of Philadelphia, *Jones* 16175 (NCU). Oktibbeha Co.: 1mi from Choctaw Co. line, *Cooley* 4697 (USF). Pearl River Co.: c.8mi NW of Picayune, *Jones & Sargent* (USF). Perry Co.: Runnellstown, *Moldenke & Moldenke* 26833 (LL). Pike Co.: 5mi W of Summit on Smithdale Road, *Lindley* 32 (NLU). Rankin Co.: Pelahatchie, *Harbison* 6 (A). Scott Co.: Roosevelt State Park, near cabin ground, *Temple* 11195 (GA). Simpson Co.: beside bridge over unnamed creek on Strong River Church Road, *Wallus et al.* s.n. (GA). Stone Co.: within 0.25mi radius of Bond home, Perkinston, *Bond* 100 (GA). Tishomingo Co.: near Rock Quarry Branch, Tishomingo State Park, *Cooley & Ray* 4661 (GA). Webster Co.: 12mi NW of Eupora, *Ray, Jr.* 7527 (USF). Wilkinson Co.: 2.7mi N of Woodville, *Moritz* 28 (NLU). Winston Co.: 9mi NE of Louisville, *McDaniel* 2371 (NY).

North Carolina. Bladen Co.: near NC 87, *Radford* 6863 (NCU). Brunswick Co.: McMilly Swamp, Shallotte, *Blake* 12467 (LL). Columbus Co.: Bear Branch, 0.5mi N of Old Dock, *Bell* 12785 (NCU). Davie Co.: 9mi N of Salisbury, *Harbison* 7 (A). Henderson Co.: 5mi NE of Hendersonville, *Pittillo* 93 (NCU).

Oklahoma. Calhoun Co.: Harrell, *Demaree* 14396 (NY).

South Carolina. Abbeville Co.: 3.5mi S of Calhoun Falls, *Radford* 20050 (NCU). Aiken Co.: near Hazel's Lake, Beech Island, *Radford & Radford* 1384 (NCU). Allendale Co.: 2mi SW of Barton on Co. Road 68, *Ahles & Bell* 10649 (NCU). Anderson Co.: Tugaloo River near Seneca River jct, *Radford* 17993 (NCU). Bamberg Co.: Salkehatchie River on Co. Road 41, *Ahles & Haesloop* 22268 (NCU). Barnwell Co.: 1.2mi W of jct of Co. 217 and US 78, *Ahles & Crutchfield* 56432 (NCU). Beaufort Co.: 2.6mi NE of Gardens Corner, *Ahles & Bell* 10391 (NCU). Berkeley Co.: near Moncks Corner, *Weiss* 338 (WVA). Calhoun Co.: Halfway Swamp Creek on SC 33, SW of Lone Star, *Leonard & Radford* 1228 (NY, RSA). Charleston Co.: Rantowles, *Moldenke & Moldenke* 26389 (LL). Clarendon Co.: 4.5mi E of Sardina, *Radford* 21141 (NCU). Colleton Co.: 15mi N of Walterboro, *Coker* s.n. (NCU). Dorchester Co.: 0.5mi NE of Grover on Co. Road 70, *Ahles* 54367 (NCU). Edgefield Co.: 3mi SE of Morgana, *Radford* 20272 (NCU). Florence Co.: near Lake City, *Coker et al.* s.n. (NCU). Georgetown Co.: near Brookgreen Garden, *Totten et al.* s.n. (NCU). Hampton Co.: southern border of Yemassee, *Coker* s.n. (NCU). Horry Co.: S of Conway, *Ashe* s.n. (NCU). Jasper Co.: c.6mi S of Hardeeville, *Bell* 1625 (NCU). Marion Co.: 5mi S of Green Sea, *Blomquist* 10237 (DUKE, NY). McCormick Co.: 5mi S of Clarks Hill, *Radford* 20243 (NCU). Newberry Co.: 9mi S of Prosperity, *Coker* s.n. (NCU). Orangeburg Co.: 4.4mi SE of jct of SC 692 and US 178, *Ahles & Haesloop* 21548 (NCU). Richland Co.: 7.2mi W of Wateree River, *Beadle* s.n. (US). Saluda Co.: near US 178, E of Saluda, *Radford* 20610 (NCU). Sumter Co.: Black River near US 378, E of Sumter, *Radford* 21066 (NCU). Williamsburg Co.: Lanes, *Ashe* s.n. (NCU).

Tennessee. Anderson Co.: without definite loc., *Varnell* s.n. (TENN). Benton Co.: near Fairview School, S of Camden, *Sharp et al.* 12864 (TENN). Bledsoe Co.: W of Pikeville, *Cain & Sharp* 4329 (NY, TENN). Blount Co.: in valley NE of Look Rock Campground, north prong of Flat Creek, *Thomas* s.n. (TENN). Cannon Co.: E side of Road 53, 8mi S of Woodbury, *Kriebel* 9437 (SMU). Carroll Co.: SE of Buena Vista, *Sharp et al.* 8491 (TENN). Chester Co.: 2mi left of Henderson, *Galbraith* 15906 (TENN). Coffee Co.: W of Tullahoma, *Svenson* 10281 (GH, NY). Cumberland Co.: 1mi E of Lloyd Selby's store, N side of branch in Roaring Hollow, *Patton* 16 (TENN). Davidson Co.: 1mi S of Ridgetop, *Quarterman* 1144 (VDB). DeKalb Co.: E of Smithville, *Kral* 30099 (GA). Franklin Co.: Green's View, mt top, *Krickbaum* s.n. (NCU). Grainger Co.: Lea Lakes, *Jones* 3675 (TENN). Grundy Co.: near Stinking Creek and Firey Gizzard River, *Gonsoulin* 1608 (VDB). Hamilton Co.: Suck Creek, *Trimble* s.n. (SMU). Hardeman Co.: N of Hornsby, *Sharp et al.* 12575 (TENN). Hardin Co.: E of Cerro Gordo, *Sharp et al.* 10108 (TENN). Henderson Co.: near Cub Lake,

Natchez Trace State Park, *Sharp et al.* 9353 (TENN). Knox Co.: U.T. Farm, Knoxville, *Sharp* 239 (TENN). Lawrence Co.: game refuge N of Red Hill, *Sharp et al.* 11044 (TENN). Lewis Co.: N of Hohenwald, *Sharp et al.* 10100 (TENN). Lincoln Co.: 6.3mi E of Kelso on US 64, *Kral* 30295 (SMU). Louden Co.: 0.75mi N of Lenoir City, *Wilson* 4277 (UC). Madison Co.: without definite loc., *Bain* 132 (GH). Marion Co.: E of Monteagle, *Kral* 59662 (VDB). Maury Co.: c.15mi N of Lawrenceburg, *Kral* 26346 (VDB). McNairy Co.: W of Ramer, *Woods et al.* 14600 (TENN). Meigs Co.: NE of Decatur, *Sharp & Jones* 28247 (TENN). Moore Co.: 3mi WSW of Tullahoma, by TN 55, *Kral* 42509 (VDB). Overton Co.: 0.3mi W of jct of SR 136 and Roaring River, *Smith* 136 (VDB). Rhea Co.: between Dayton and Morgan Springs, *Wofford & Clebsch* 50517 (NCSC). Sumner Co.: Bug Hollow Road 2mi from 109, *Alcorn* 344 (VDB). Union Co.: Rhodelia unit, Norris Lake Forest, *Morrison* s.n. (TENN). VanBuren Co.: by TN 30, 6–7mi E of Spencer, *Kral* 42371 (VDB). Warren Co.: Collin's River, McMinnville, *Sharp & Cain* 4339 (TENN). White Co.: N of Sparta, *Sharp* 22079 (TENN).

Texas. Angelina Co.: Favalla, *Boon* s.n. (TX). Bowie Co.: Texarkana, *Palmer* 29429 (A). Hardin Co.: Sour Lake, *Johnson* s.n. (TX). Jasper Co.: Jasper, *Warnock & Rose-Innes* 743 (TX). Orange Co.: Orange, *sin. coll.* s.n. (TX). Newton Co.: c.7mi E of Burkeville, *Correll & Correll* 29098 (LL). Polk Co.: without definite loc., *Tharp* s.n. (TX). Sabine Co.: Low's Creek S of old Sabinetown, *Correll & Correll* 24873 (LL). San Augustine Co.: near Boykin Springs, Angelina Nt'l Forest, *Correll & Correll* 15809 (LL). Tyler Co.: c.5mi N of Rte 190, *Correll & Rosier* 29408 (LL).

REPRESENTATIVE PUTATIVE HYBRIDS: *R. canescens* × *R. alabamense*. **Georgia.** Early Co.: on shady hillside above creek, 1mi N of Blakely, *Henry* 2641 (A). **Florida.** Leon Co.: vicinity of Muccosukee, *Godfrey* 78499 (FLAS). Flowers pink to unevenly pink with a yellow blotch and glabrous to slightly pubescent bud scales. The Godfrey collection was cited as occurring with a mixed population of *R. canescens* and *R. alabamense*.

R. canescens × *R. atlanticum*. **Georgia.** Bryan Co.: 14mi E of Pembroke, *Duncan* 23743 (GA). Candler Co.: 11mi W of Statesboro, *Parrish & Drapalik* 142 (NCU). Flowers with white corolla lobes and pinkish tube, bud scales densely pubescent, leaves densely pubescent, sepals densely pubescent, habit low-growing and strongly rhizomatous.

R. canescens × *R. austrinum*. **Florida.** Okaloosa Co.: 5.5mi SE of Holt, *Chapman & Chapman* 0448 (FLAS). Plants with all the characters of *R. austrinum* except that the corolla is pink. **Mississippi.** George Co.: along Red Creek, 5mi E of Ramsey Springs, *Ray, Jr* 8125 (USF). Bud-scale margins eglandular as well as petioles and leaf margins, flowers with yellow-orange lobes, red tube.

R. canescens × *R. flammeum*. **Georgia.** Dekalb Co.: Stone Mountain, *Kron* 1783, 1784, 1785, 1786 (FLAS). Flowers pale to deep pink, with a yellow-orange blotch on upper corolla lobe; plants intermediate in height between *R. canescens* and *R. flammeum*, bud scales slightly pubescent, some plants with a few short-stalked multicellular gland-tipped hairs on the corolla tube, growing intermixed with *R. canescens* and *R. flammeum*.

R. canescens × *R. periclymenoides*. **South Carolina.** Calhoun Co.: Halfway Swamp Creek on SC 33, SW of Lone Star, *Leonard & Radford* 1228 (NCU). Leaves glabrous, corolla tube short; bud scales less pubescent than *R. canescens* (more like *R. periclymenoides*), ovary densely unicellular pubescent as in *R. canescens*.

Rhododendron cumberlandense

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Cleburne Co.: vicinity of tower Mt Cheaha, *Clark* 12344 (NCU). Randolph Co.: Crockett Mt near Tallapoosa River, 5.5mi W of Wedowee, *Dean* s.n. (AUA).

Georgia. Blount Co.: Foothills Pkwy near Look Rock, *Thomas* s.n. (TENN). Dade Co.: summit of Lookout Mt, *McVaugh* 9042 (MO, NCU). Gilmer Co.: 7mi E of Chalsworth, *Eyles & Eyles* 31 (GH, UNA). Lumpkin Co.: Blood Mt, *Eyles* 7221 (GA). Murray Co.: Fort Mt, *Pyron & McVaugh* 2931 (US). Pickens Co.: NE of Jasper, *Duncan* 6297 (GA). Towns Co.: S side summit of Brasstown Bald, *Duncan* 29095 (GA). Union Co.: Neel Gap, *Lemmon* s.n. (A). White Co.: Cleveland, *McKay* s.n. (GH).

Kentucky. Bell Co.: KY hwy 74 W slope of Cumberland Mt and 11mi W of Middlesboro, *Beadle* s.n. (US). Harlan Co.: Caney Creek, *Sharp & Shanks* s.n. (TENN). Laurel Co.: 10mi E of London, *Braun* s.n. (A). Letcher Co.: SW of Whitesburg near Skyline, 8mi SE of KY 7 on Rte 1103, *Sole* 220 (NCU). McCreary Co.: near US 27, 3km S of Parkers Lake, *Conrad* 1114 (NCU). Whitely Co.: near Rockhold, *Galliher* s.n. (KY).

North Carolina. Graham Co.: 3.7mi NW of Robbinsville, *Duncan* 21811 (GA). Macon Co.: on trail near Old Road Gap, 7mi E of Andrews, *Fox* 4041 (NCSC). Swain Co.: Gregory's Bald, *Jennison* 4569 (TENN).

South Carolina. Union Co.: edge of stream, S end of secondary road 263, West Springs, *Newberry* 2669 (USCH).

Tennessee. Anderson Co.: along hwy 116 N of Petros, *Rohrbaugh* 287 (SMU). Bledsoe Co.: 8mi E of Pikeville, *Sharp* 3786 (TENN). Blount Co.: 1.1–1.4mi W of Sevier Co. line, upper end of Miller Cove, *Rogers* 43649 (NY). Campbell Co.: between Coreyville and Pioneer, *Sharp, Shanks & Clebsch* 3810 (TENN). Claiborne Co.: Gap Creek W of Arthur, *Sharp et al.* 30316 (TENN). Cocke Co.: Mts E Tenn., Wolf Creek, *Ruth* s.n. (TENN). Cumberland Co.: 6mi N of

Crossville, *Uttal* 8034-A (VPI). Fentress Co.: near Buffalo Cave, *Shanks, Sharp & Clebsch* 4047 (TENN). Grundy Co.: along logging road, south rim, *Patrick* 156 (VDB). Hamilton Co.: Signal Mt, *Sharp & Hesler* 1062 (TENN). Haywood Co.: near Turkey Cove Trail, Cove Creek Gap, *McDowell & Jennison* 4447 (TENN). Jefferson Co.: English Mt, *Chapman* s.n. (TENN). Morgan Co.: hwy between Sunbright and Wartburg, *Underwood et al.* 1338 (TENN). Polk Co.: N of Appalachia, *Ashe* s.n. (UNC). Putnam Co.: Double Springs Prairie, Rte 56, 1mi N of Baxter, *DeSelm* 1816 (TENN). Rhea Co.: NE of Morgan Springs, *Shanks, Sharp & Clebsch* 4368 (TENN). Scott Co.: along road to Big Island, 2mi from Big South Fork, *Patrick et al.* 607 (TENN). Sevier Co.: trail from Hotel Place to Devil's Den, Chilhowee Mt, *Thomas et al.* 36036 (NLU). Union Co.: White Hollow, *Cain* s.n. (TENN). VanBuren Co.: Fall Creek, *Shanks & Clebsch* 4534 (TENN).

Virginia. Buchanan Co.: SE of Clell, just inside Buchanan Co. line, *Kral* 12983 (VDB). Dickenson Co.: c.11mi S of Haysi, above Cranes Nest River, *Kral* 12745 (VPI). Lee Co.: along VA 606 at Painter community, *Uttal* 7226 (VPI). Scott Co.: N of Hurland Church, SE Scott Co., *Harvill & Harvill* 31743 (VPI). Wise Co.: summit of Black Mt, 35mi N of VA 160, on logging road, *Kron* 1836 (FLAS).

REPRESENTATIVE PUTATIVE HYBRID: *R. cumberlandense* × *R. arborescens.* **Alabama.** Jackson Co.: top of Mt Cheah, *H. T. Skinner* (MOAR).

Rhododendron flammeum

REPRESENTATIVE SPECIMENS: USA. **Georgia.** Baldwin Co.: Milledgeville, *Harbison* s.n. (NCU). Bulloch Co.: E side of Lotts Creek about 7mi SW of Statesboro, *Duncan* 22634 (GA). Burke Co.: 2 airmiles NW of Keysville, *McRae* s.n. (GA, FLS). Cobb Co.: NE slopes of Sweat Mt, Coosa River drainage system, *Duncan* 13477 (GA, NCU, US). Crisp Co.: Gum Creek near Cordele, *Coker & Harbison* s.n. (NCU, TENN). DeKalb Co.: Stone Mt Memorial Park, *Kron* 1775 (FLAS). Douglas Co.: without definite loc., *Moldenke & Moldenke* 29297 (LL). Effingham Co.: ravine running into Savannah River 4mi NE of Stillwell, *Duncan & Hardin* 15134 (GA, NLU, USLH, VDB). Fulton Co.: Heard's Ferry Rd, Atlanta, *Beadle* s.n. (US). Blue Springs, S band of Savannah River NE of Newington, *Anderson* 58 (FLAS). Richmond Co.: high ridge Belair, Augusta, *Cuthbert* s.n. (FLAS). Spalding Co.: 12mi W of Griffin, *Henry* 1081 (NY). Union Co.: Neel Gap, *Lemmon* s.n. (GA). Upson Co.: 6mi S of Thomaston, *Godfrey* 58422 (FSU, RSA, UNA, USF, USL, VPI).

South Carolina. Barnwell Co.: Savannah River Operation Area, AEC, *Batson* s.n. (USCH). Darlington Co.: Black Creek near cabin of Woods Dargan S of Darlington, *Smith* 1035 (NCU). Oconee Co.: Newry, *Hunse* 1935 (USLH).

Rhododendron luteum

SPECIMENS EXAMINED: POLAND. Wola-Zarczycka, *Furth* s.n. (W), *Kloekiz* s.n. (W), *Raciborski* 342 (A, WA).

TURKEY. Prov. Amasya: without definite loc., *Manisadjan* 116 (W); Erbaa above Kozlu, *Tobey* 2218 (E); Azabaghy, *Manissadjian* 419 (M); Tawschan-Dagh, *Manissadjian* 200 (M). Prov. Coruh: Kemalpasa, *Baytop* 45290 (IBE); mts above Artvin, *Davis & Hedge* 29724 (E); Savval Tepe above Murgill, *Davis & Hedge* 32396 (E), *Davis & Hedge* 32377 (E); Tirijal Dagh above Murgill, *Davis & Hedge* 29885A (E, W); Borcka-Murgul, *Duzenli* 696 (W). Prov. Balikesir: Edremit, *Kayacik & Elicin* 2109 (E), *Browicz & Zielinske* 57 (E), *Cubukcu* 24531 (IBE), *Selik* 3208 (E). Prov. Batum: Gaderski Pereval, *O. R. Holmberg* 1832, 1833 (W). Prov. Giresun: Yavuzkamal, *K. Krause* 1892 (W); Balabandaglari above Tamdere, *Davis et al.* 20494 (E). Prov. Kastamonu: Kastambuli, Kure-Nahas, *Sintensis* 3733 (W); Azdavay to Cide, *Baytop* 21794 (IBE); above Kure, *Davis* 21627 (E). Prov. Ordu: Uniye to Fatsa, *Baytop* 15269 (IBE); S of Uniye, *Furse & Synge* 132 (E, W). Prov. Rize: between Molleneyse and Hemsin, *Davis & Dodds* 21282 (E); Ortakoy-Cat, *Davis & Dodds* 21234 (E); Meyden Kobaca-Mollaveysa, *Davis & Dodds* 21376 (E); without definite loc., *Gorz* 754 (A), *Gorz* 761 (A), *Gorz* 749 (A). Prov. Samsun: Kavak, *Kerck* 17/3 (W), *Baytop* 9086 (IBE); Ladik above Soganlikoy, *Alpinar* 38699 (IBE). Prov. Sinop: near Sakarabasi, *Davis et al.* 38145 (E); Boyabot to Sinop, *Davis et al.* 38076 (E). Prov. Tokat: Maghmur-Dagh, *Bornmuller* 345 (A, W). Prov. Trabzon: Zigana daglari, *Baytop* 4680 (E); Hamsikoy to Zigana, *Baytop* 15326 (IBE); c.35km N of Torul and N of the Zigana Dagi Pass, *Kukkonen* 8084 (E); S of Trabzon, *Gorz* 196, 643, 793, 798 (A); c.2km S of Hamsikoy, *Kukkonen* 8101 (E); without definite loc., *Kotschy* 482 (W); near Fol Koei, *Handel-Mazzetti* 533 (W); near Stephanos, *Handel-Mazzetti* 228 (W); without definite loc., *sin. coll.* s.n. (M).

USSR (former). Azerbajdzhan SSR: above Belokany and Zakataly, *Beideman* s.n. (A). Dagestan, ASSR: Tabassaran, *Alexenko & Woronow* 59 (LE). Georgia: Abkhazskaya, Sukhumi, *Davis* 33642 (E), *Vasak* s.n. (M); Abkhazskaya, Gudauta, *Goghina & Matsenko* s.n. (LE); Abkhazskaya, Gagra, *Palibiy & Vorsbeer* 863 (A), *Elias et al.* 6762 (FLAS); Abkhazskaya, Mestiya, *Vasak* s.n. (M); Adzharskaya, Kobuleti, *Zedelmejer* s.n. (LE); Chokhatauri, *Vasak & Esvandzia* s.n. (M); Chokhatauri, between Bakhmaro and Chkhakaura, *Vasak & Esvandzia* s.n. (M); Dombai, *Stohr* s.n. (BHU); Ordshonididze, *Bassler* 17, 18, 144, 154 (BHU). RSFSR: Distr. Adler, Sochi, *Vasak* s.n. (M); Distr. Khosta, *Vasak* s.n. (M); Distr. Kuban, *Busch & Klopotow* 189 (E, W, WA), *Busch & Klopotow* s.n. (A); Distr. Krasnodar, State Caucasus

Reserve, Mt Akhun, c.10km SE of Sochi, *Elias et al.* 6562 (FLAS); Distr. Lazarevskoya, vicinity of Solokhaul, *Vasak* s.n. (M). Osetinskaya SSR: Alagir, *Marcowicz* s.n. (A, E, GH), *Marcowicz* 627 (LE, W), *Marcowicz* s.n. (LE), *A. H. & V. F. Brotherus* s.n. (M, W); near Teberda, *Hellmer* s.n. (BHU), *Kohler* 157 (BHU), *Vekhov* s.n. (M), *Beck & Lucius* s.n. (BHU), *Beurton* s.n. (BHU); Distr. Kiev. Dneiper River, *Kleopow & Gryna* 81 (E, W, WA). Ukraine: Distr. Ovrutsch, *Skvortsov* s.n. (M), *Makchmobz & Tahemnhb* s.n. (A), *Rogovitsch* s.n. (W), *Macko* s.n. (A), *Macko* s.n. (A, WA); Distr. Rorasteu, *Lazarenko* s.n. (E).

YUGOSLAVIA (former). Slovenia: Gorjanci, *Mayer* 55867 (BHU), *Merxmuller & Wiedman* 410/60 (M), *Podlech* 6798 (M).

Rhododendron occidentale

REPRESENTATIVE SPECIMENS. USA. **California.** Amador Co.: 1.5mi E of Deadman Flat, *Gifford* 346 (UC). Butte Co.: 2mi SE of Promontory Pt, *Albertus* 41 (UC). Calaveras Co.: Stanislaus River, *Hansen* 212 (A). Del Norte Co.: 0.5mi below Patucks Creek on the Smith River, *Wolf* 1028 (POM, RSA, UC). El Dorado Co.: Simpson's Ranch, Sweetwater Creek, *Brandegee* s.n. (UC). Fresno Co.: 5mi NE of Shaver Lake on hwy 168 to Big Creek, *Balls & Everett* 18229 (NY, RSA). Humboldt Co.: Patrick's Pt. State Park, *Thorne* 19025 (RSA). Kern Co.: Greenhorn Mts, Cane Springs Creek, 3/4–1mi below Cane Springs, *Smith* s.n. (JEPS). Lake Co.: Cobb Valley, Mayacamas Mt Range, Kelsey Creek, *Egan* s.n. (UC). Madera Co.: 7.9mi NE of The Pines on Bass Lake, Sierra Nevada Mts, *Constance* 2365 (NY, UC). Marin Co.: Rattlesnake Camp #1, Mt Tamalpais, *Frost* 401 (JEP). Mariposa Co.: 75mi N of Happy Camp, *Peterson* 48 (UC). Mendocino Co.: near Mendocino City, *Eastwood* s.n. (GH). Napa Co.: NE slope of Mt St Helena, near Lake Co. line, *Wiggins* 12093 (RSA, UC). Nevada Co.: 2.5mi S of Washington, *French* 543 (UC). Placer Co.: without definite loc., *Carpenter* s.n. (UC). Plumas Co.: Berry Creek, above Vergilia, Feather River Canyon, *Weatherby* 1531 (NY, RSA, UC). Riverside Co.: Dark Canyon, San Jacinto Mt, *Munz & Johnston* 8787 (UC). San Benito Co.: NW side of Fremont Peak, *Morley* 87 (A, GH, MO, NY, UC). San Bernadina Co.: without definite loc., *Perry & Lemmon* 222 (F, NY). Santa Cruz Co.: Big Basin, *Randall* s.n. (UC). San Diego Co.: Palomar Mt State Park, *Cooper* 1468 (A, POM, RSA). San Francisco Co.: Lake Merced, *Michener & Bioletti* s.n. (NY). San Mateo Co.: Pescadero, *Elmer* 4298 (MO, NY). Shasta Co.: without definite loc., *Rosenbaum* s.n. (UC). Sierra Co.: 2mi from hwy 49 down Sardine Lake Road at Sand Pond, 10mi W of Bath House, *Zamzow* 33 (JEP). Siskiyou Co.: Mt Eddy, *Copeland* 3881 (F, GH, JEP, LL, MO, NY, UC). Sonoma Co.: Pitkin Ranch, Vine Hill region, 10mi W of Santa Rosa, *Robbins* 204 (UC). Tehama Co.: Dry Lake, N of Mineral, *Eggleston* 7201 (MO, NY). Trinity Co.: Brown's Creek, *Yates* 387 (UC). Tulare Co.: Sequoia Nt'l Park, *Frost* s.n. (UC). Tuolumne Co.: Yosemite, Sierra Nevada Mts, *Pierson* 843 (A, RSA). Yuba Co.: Smartsville, Greenville, *Elvin* 53 (RSA, UC).

Oregon. Coos Co.: along roadside near Coquille, *Purer* 4625 (RSA). Curry Co.: Babyfoot Lake, upper drainage of the Chetco River, *Chambers* 2276 (OSC). Douglas Co.: W of Cornutt, *Lawrence* 2101 (OSC). Jackson Co.: Wimer, *Hammond* 265 (MO, NY). Josephine Co.: 2.2mi W of Gasquet Trail on Wimer Rd, *Kruckenberg* 1852 (RSA, UC).

Rhododendron periclymenoides

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Clarke Co.: 4mi S of Thomasville, *Harbison* 5882 (A). Cleburne Co.: Cheaha State Park 27mi S of Oxford, *Hess & Thomas* 5779 (F). Jefferson Co.: 5mi W of Leeds, *Erlanson* 715 (A). Marshall Co.: Buck's Pocket State Park, *Kral* 49626 (VDB). Tuscaloosa Co.: 7mi E of Tuscaloosa, *Crawford & Harvill* 1091 (TX).

Connecticut. Fairfield Co.: Bridgeport, *Eames* s.n. (GH). Hartford Co.: East Hartford, *Weatherby* 45 (NCSC). Middlesex Co.: *Leonard & Radford* 1315 (NCU). New Haven Co.: without definite locality, *Ebinger* 1113 (OSU). New London Co.: Norwich, *Setchell* s.n. (UC).

Delaware. New Castle Co.: Newport Pike S of Newport, *Canby* s.n. (GH). Sussex Co.: N of Howlands Glade, 3mi NW of Rehoboth, *Tatnall* 2873 (GH).

District of Columbia. Kensington, *Sargent* s.n. (SMU).

Georgia. Clay Co.: 2mi E off hwy 37, Ft Gaines, *Williams* 24 (AUA). Dougherty Co.: near Dawson Road, 5mi from Albany, *Shelley* E7887 (GA). Fulton Co.: Crestwood Forest, *Grier* s.n. (SMU). Habersham Co.: Turnerville, *Quaintance* 179 (GA). Hall Co.: Gainesville, *Sheer* E1537 (GA). Morgan Co.: 1mi W of Hard Labor Creek State Park, Studdard Cemetary, *Kron* 1773 (FLAS). Rabun Co.: Tallulah Gorge, *Eyles* 6910 (GH). Randolph Co.: Cuthbert, *Harbison* 19 (A). Spalding Co.: Flint River, *Riegel* 118 (GA). Stevens Co.: Currahee Mt S of Toccoa, *Beadle* s.n. (US). Telfair Co.: Seneca, *Harbison* 4025 (NCU).

Kentucky. Boyd Co.: Patton Hill, *McCoy* s.n. (UC). Laurel Co.: Lely, *Braun* 2374 (A). McCreary Co.: N of KY 90, 2mi W of Cumberland Falls State Park, *Marx* 900 (NLU). Pike Co.: Floyd Creek, *Miniard* 13 (KY). Pulaski Co.: Bower loop, *Braun* 2283 (A). Rowan Co.: Clark Mt, *Braun* 2409 (A). Whitley Co.: Corbin, *Horsey* 2180 (A).

Maryland. Allegany Co.: Will's Mt Cumberland, *Lane* 3630 (NCU). Anne Arundel Co.: near Annapolis, Magothy River, *Rehder* s.n. (A). Baltimore Co.: along abandoned RR on Cromwell Bridge Road, *Windler & Lombardo* 3057 (NCU). Caroline Co.: near Ridgely, *Wherry* s.n. (A). Cecil Co.: N of Carpenter Pt, *Long* 54335 (GH). Frederick Co.: Catoctin Mountain Park, *Hickey* II 284 (NCU). Garrett Co.: 5mi N of Accident, *Deniker* s.n. (NCU). Harford Co.: 0.25mi SE of Flintville, *Adams* 4355 (GH). Prince George Co.: off Pontiac St, College Park, *Barger* s.n. (GA). Queen Anne Co.: near Millington, bank of Chester River, *Thatcher* 31 (SMU). Talbot Co.: 1.75mi SSE of Easton, *Earle* 3085 (WVA). Worcester Co.: Pocomoke River swamp, *Beaven* 206 (DUKE).

Massachusetts. Bristol Co.: Somerset, *sin. coll.* s.n. (A). Hampshire Co.: Northampton, *Wheeler* 107402 (VDB). Norfolk Co.: Stoughton, *Blake* 392 (LL).

New York. Monroe Co.: Mendon, near Rochester, *Baxter* s.n. (A). Orange Co.: Chatfield Place near Arthur's Pond, *Raup* 8082 (GH, NY). Richmond Co.: Arlington, Staten Island, *Magee* s.n. (GH).

New Jersey. Burlington Co.: c.1mi W of South Branch Rancocoas Creek, *Long* 48320 (UC). Camden Co.: Merchantville, *Long* 20776 (UC). Cumberland Co.: 2mi SSE of Deerfield, *Long* 32093 (GH). Essex Co.: Mills Reservation, Watchung Range, *Mason* 243 (OSU). Gloucester Co.: Chestnut Branch of Mantua Creek, Mantua, *Long* 26869 (UC). Hunterdon Co.: c.1mi SSW of Drea Hook, *Long* 53730 (GH). Middlesex Co.: New Brunswick, *Chrysler* s.n. (POM). Somerset Co.: Rocky Hill, *Lighthipe* s.n. (TX).

North Carolina. Alamance Co.: c.2mi N of jct of Blue Ridge Pkwy and Tr. 21, *Fox* 892 (NCSC). Anson Co.: PeeDee River near Blewett Falls, *Radford et al.* 7807 (NCU). Ashe Co.: c.1.5mi W of Glendale Sprngs on county road 1159, *Downs & Smith* 12660 (NCSC). Beaufort Co.: 2mi WNW of Coxs crossroads, *Radford* 33323 (NCU). Bladen Co.: 0.6mi S of Elizabethtown, *Ahles & Ramseur* 23506 (NCU). Brunswick Co.: Wilmington, *Sargent* s.n. (A). Buncombe Co.: Asheville, *Canby & Sargent* 66 (GH). Burke Co.: 1mi SW of Linville River at Lake James, *Bell* 6471 (NCU). Cabarrus Co.: 0.6mi W of Stanly–Cabarrus Co. line, *Bell* 2199 (NCU). Caldwell Co.: hwy 321 between Boone and Lenoir, *Mullis* 65 (NLU). Caswell Co.: NC Wildlife Commission entrance road off NC 1120, *Plumblee* 1 (NCU). Catawba Co.: off hwy 10, Casar, *Lewis* 44 (NCSC). Chatham Co.: 1mi N of jct US 64 and NC 54 on NC 54, *Ahles & Crutchfield* 53263 (KY). Cherokee Co.: Murphy, *Beal* s.n. (GH). Cleveland Co.: 3.5mi S of Boiling Springs, *Fox* 3944 (NCSC). Craven Co.: c.20mi NW of New Bern, *Blomquist* 16302 (DUKE). Cumberland Co.: 7mi S of Fayetteville, *Radford & Stewart* 90 (NCU). Davie Co.: 6.5mi SW of Mocksville, *Radford* 10932 (NCU). Duplin Co.: 2.1mi NW of Kenansville on NC 24, *Ahles & Ramseur* 23973 (NCU). Durham Co.: *sin. coll.* 4460 (DUKE). Forsyth Co.: 0.3mi E of Belews Creek, *Ahles* 40750 (NCU). Franklin Co.: Youngsville, *Hill, Jr* s.n. (NCSC). Gaston Co.: 0.75mi W of Stanely, *Henry* 2770 (A). Granville Co.: 1.9mi ENE of Dickerson, *Radford* 10524 (NCU). Greene Co.: Snow Hill, *Galloway* 3113 (NCU). Guilford Co.: between US 421 and NC 62, near jct NW of Julian, *Bell* s.n. (NCU). Halifax Co.: 4.2mi S of jct of US 301 and US 301 Business, *Leonard & Radford* 1315 (NCU). Harnett Co.: near Raven Rock, *Crutchfield* 418 (NCU). Henderson Co.: Flat Rock, *Memminger* s.n. (NCU). Hertford Co.: 1.1mi S of VA line on US 258, *Bowers* s.n. (NCSC). Iredell Co.: Statesville, *Veerhoff* 298 (NCSC). Johnston Co.: near Princeton, *Mitchell* s.n. (DUKE). Jones Co.: 5mi NE of Pollocksville, *Sears* C56 (NLU). Lee Co.: 1mi NE of Salem Church, *Stewart* 329 (NCU). Lenoir Co.: 1mi from Kinston, *Parker* 4 (NCU). Lincoln Co.: on NC 150, 6mi E of Lincolnton, *Fox et al.* 2221 (NCSC). Macon Co.: Highlands, *Harbison* 16 (A). Madison Co.: Hot Springs, *Harbison* 7212 (NCU). Martin Co.: 2mi W of Jamesville, *Cooper* 2689 (NCSC). McDowell Co.: 4mi E of Marion, *Erlanson* (A). Mecklenburg Co.: Charlotte, *Knowlton* s.n. (GH). Mitchell Co.: without definite loc., *Harbison* 26 (A). Montgomery Co.: 0.2mi E of 1150, *Uttal* 11771 (VPI). Moore Co.: near Carthage, *Harriot* s.n. (NO).

Nash Co.: along Turkey Creek near Middlesex, *Godfrey & White* s.n. (GH). New Hanover Co.: NW of Wilmington, *Godfrey & Beaman* 50039 (NCSC). Northampton Co.: 1.5mi S along Roanoke River, 0.5mi SE of Vultare on NC 46, *Ahles & Duke* 41982 (NCU). Onslow Co.: 6mi N of Jacksonville, *Leeds* 2343 (DUKE). Orange Co.: 3mi W of Chapel Hill, *Radford & Stewart* 465a (NCU). Pender Co.: Rock Fish Creek at US 117, *Ahles & Ramseur* 23426 (NCU). Person Co.: 3.4mi N of Mt Tirzah, *Bell* 11207 (NCU). Pitt Co.: 1mi N of Grimesland, *Radford* 32402 (NCU). Polk Co.: near Saluda, *Garren* 235 (DUKE). Randolph Co.: by Caraway Creek W of Asheboro on US 64, *Bell* 12144 (NCU). Rockingham Co.: 1.5mi ESE of Leahsville, *Radford* 9759 (NCU). Rowan Co.: between Cleveland and Ducktown, *Erlanson* 742 (A). Rutherford Co.: c.1.5mi NE of Sunshine, *Bell* 2079 (NCU). Stanley Co.: along Yadkin River, near Albemarle, *Palmer* 39988 (A, MO). Stokes Co.: Moore's Knob trail, Hanging Rock State Park, *Knox* s.n. (NCSC). Surry Co.: Pilot Knob, *Harbison* s.n. (NCU). Swain Co.: vicinity of Deals Gap, *Jennison* 2234 (TENN). Transylvania Co.: Toxaway River Gorge, along road to Frozen Lake, *Cooper* 2358 (NCSC). Union Co.: 3mi WNW of jct NC 200 and 218 on Crooked Street, *Ahles & Haesloop* 23153A (NCU). Vance Co.: 5.2mi SW of Bearpond, *Ahles & Leisner* 17644 (NCU). Wake Co.: off the end of Gorman Street, Raleigh, *Downs* 12542 (NCSC). Warren Co.: Poplar Mount, *Seaman* 3054 (NCU). Washington Co.: near Westover on Mackeys Road, *Radford* 32304 (NCU). Watauga Co.: near Boone,

Smith et al. s.n. (NCU). Wayne Co.: cliffs of the Neuse State Park, *Bruton* 184 (NCSC). Wilkes Co.: c.1mi NW of Ball Mill, *Radford & Stewart* 1897 (NCU, NY, TX). Wilson Co.: 3mi W of Stantonburg, *Radford* 33136 (NCU). Yadkin Co.: without definite loc., *Schallert* s.n. (UC).

Ohio. Lawrence Co.: Ironton, *Horsey* s.n. (A). Pike Co.: Jackson Twp. head of Union Run, *Pontius & Bartley* 1087 (NY).

Pennsylvania. Alleghany Co.: Natrona, *Shafer* 1500 (GH). Bedford Co.: 1.5mi SE of Alum Bank, *Berkheimer* 1627 (GH). Berks Co.: without definite loc., *Berkheimer* 2391 (GH). Bradford Co.: 4mi W of Camptown, *Honey* s.n. (GH). Bucks Co.: Bowmans Hill, *Adams* 3236 (A). Carbon Co.: 3.5mi SW of Christmans, *Adams* 3416 (A). Centre Co.: Scatia, *Mathias* 1102 (NY). Chester Co.: Unionville, *Pennell* 12061 (GH, NY). Delaware Co.: 2mi SW of Newton Square, *Adams* 1282 (A). Fulton Co.: 1.5mi N of Shortys Place, *Adams* 5079 (A). Huntingdon Co.: Birmingham, *Jennings* s.n. (UC). Indiana Co.: upper part of Sylvan Springs Valley, *Wherry* s.n. (GH). Lancaster Co.: near Smithville, *Heller & Halbach* s.n. (F, GH). Lebanon Co.: in the South Mts near Penryn, *Heller & Small* s.n. (F, GH). Luzerne Co.: about [sic] Long Pond, *Heller & Halbach* 619 (A). Monroe Co.: Pocono Mt, *Wolfs* s.n. (GH). Montgomery Co.: NE of Cold Point, *Adams & Adams* 1949 (A). Northampton Co.: Swoveberg, 1.5mi SW of Wassergass, *Schaeffer, Jr* 17253 (GH). Perry Co.: 1mi SE of New Bloomfield, *Adams & Adams* 2928 (A). Philadelphia Co.: along Phila.–Trenton Br. of P.RR, Cedar Grove, *Adams* 202 (A). Pike Co.: vicinity of Millrift, *Wilson* s.n. (NY). Synder Co.: Selinsgrove, *Moldenke* 3159 (NY). Somerset Co.: Soap Hollow, 2.5km NNW of Davidsville, *Shetler* 235 (NY). Westmoreland Co.: 1mi E of Laurelville, *Henry* 644 (F, UC). Wyoming Co.: Tunkhannock, *Osterhout* s.n. (POM). York Co.: Stewartstown, *Byhouwer & Kobuski* 115 (A).

Rhode Island. Providence Co.: Wallum Lake, *Palmer* 44606 (A).

South Carolina. Anderson Co.: Anderson, *Davis* 233 (TX). Barnwell Co.: Savannah R. Operations Area, AEC, *Kelley* s.n. (USCH). Calhoun Co.: Halfway Swamp Creek on SC 33, SE of Lone Star, *Leonard & Radford* 1228 (LL). Cherokee Co.: 1mi N of jct SC 18 and Co. Road 98, along Broad River, *Ahles & Haesloop* 30954 (NCU). Chester Co.: near Leeds Lookout Station, Sumter Nt'l Forest, *Freeman* 5653 (NCU). Clarendon Co.: without definite loc., *Weiss* s.n. (VPI). Darlington Co.: Coker College Arboretum, *Smith* 243 (NCU). Dillon Co.: 0.8mi N of Little Rock on Co. Road 23, *Ahles & Ramseur* 23226 (NCU). Fairfield Co.: by Beaver Creek on Co. Road 99, NNE of Blair, *Bell* 7151 (NCU). Florence Co.: Rte 64 NE of Florence, *Bell* 6014 (NCU). Georgetown Co.: 1mi SE of Rhems, *Radford* 21444 (NCU). Greenville Co.: 1.5mi from I-26, *Wheeler* 6523 (USCH). Greenwood Co.: hwy 178 just past jct of 240, *Baker* 557 (NCU). Kershaw Co.: 7.5mi NW of Camden, *Radford* 20822 (NCU). Lancaster Co.: jct of Rtes 204 and 86 at White Bluff Church, *Massey et al.* 3860 (NCU). Laurens Co.: 6.3mi S of Clinton, at Little River, *Bell* 5498 (VDB). Lee Co.: SW of Rte 154 and 12mi NE of Sumter, *Rossbach & Murphy* 2497 (WVA). Lexington Co.: 10mi W of Columbia, *Coker* s.n. (NCU). Marlboro Co.: 7mi from NC line on US 1, *Oosting* 360 (DUKE). Newberry Co.: Billy Dreher Island, *Buff* 705 (USCH). Oconee Co.: along Whitewater River, just above Jocassee, *Crosby & Anderson* 1306 (FSU). Orangeburg Co.: just W of Santee and E of Chapel Hill Church, on N side SC 6, *Nelson* 3443 (USCH). Pickens Co.: Table Rock, *Rodgers* 472 (DUKE). Richland Co.: 7.2mi W of Wateree River, on US 70, *Beadle* s.n. (US). Spartanburg Co.: jct of hwys 9 and 29, *Garner* 76 (DUKE). Sumter Co.: 5mi WNW of Pinewood, *Radford* 20983 (NCU). Union Co.: N of Gist Mansion, SSE of Union, *Bell* 5825-2 (NCU). York Co.: 2.8mi N of Newport on SC 274, *Ahles & Haesloop* 22948 (NCU).

Tennessee. Anderson Co.: Norris Dam area, *Greene* s.n. (TENN). Benton Co.: without definite loc., *Walker* 16681 (TENN). Bledsoe Co.: above Pikeville on Walden Ridge, *Sharp* 26745 (TENN). Blount Co.: c.2mi from E end of the Foothills Pkwy, *Phillippe* 2595 (TENN). Carter Co.: Forge Hill, *Grindstaff* s.n. (TENN). Cheatham Co.: Craggie Hope, *Hrabovsky & Treanov* s.n. (VDB). Claiborne Co.: Little Creek Valley, Powell River system, *Drumke et al.* 30887 (TENN). Coffee Co.: W of Tullahoma, *Svenson* 10281 (GH). Cumberland Co.: Crab Orchard, *Adams* 3680 (TENN). Davidson Co.: Little Marrowbone Creek region, *Shaver* s.n. (VDB). Decatur Co.: near Cherry School, SE of Cozette, *Sharp et al.* 12918 (TENN). Fentress Co.: where hwy 28 crosses Clear Creek, S of Clarkrange, *Norris & Sharp* 16119 (TENN). Franklin Co.: Cumberland Mt, *Eggert* s.n. (NY). Grainger Co.: near Blaine, *Jennison* 120 (TENN). Hardeman Co.: W of Hornsby, *Sharp et al.* 12580 (TENN). Hickman Co.: S of Centerville, *Sharp et al.* 11924 (TENN). Knox Co.: between French Broad River and hwy 9, *Wilson* 4230 (NY, TENN). Loudon Co.: Grassy Valley Farm, *Ward* s.n. (TENN). Marion Co.: Hogjaw Ridge near Ferry Road, Shellmound, *Porter* s.n. (GH). Maury Co.: c.15mi N of Lawrenceburg, *Kral* 26346 (GA). McMinn Co.: Mecca Quad. Bullett Cr. on summit of Star Mt, *Wofford et al.* 86-21 (NY, TENN). Monroe Co.: Calderwood, *Kinsey* s.n. (TENN). Morgan Co.: 3mi E of Rugby, *Corry* s.n. (TENN). Perry Co.: 2.5mi NW of Flatwoods on TN 13, *Kral* 39010 (VDB). Pickett Co.: c.1.5mi N of entrance to Pickett State Park, *Kral* 49844 (VDB). Polk Co.: Hiwassee River near Oswald Dome, 4 (TENN). Roane Co.: 2mi W of Oral Baptist Church, *Shanks* 22059 (TENN). Sevier Co.: Bluff Mt beside Dupont Springs, *Painter et al.* (NLU). Scott Co.: N of Norma, *Sharp* 25660 (TENN). Union Co.: Island-F, Norris Lake, *Kelley* s.n. (TENN).

Vermont. Caledonia Co.: Peacham, *Blanchard* s.n. (NY, TX).

Virginia. Accomack Co.: 0.3mi S of Onley on US 13, *James* 3773 (NCU). Albemarle Co.: at Albemarle and Nelson Co. line on VA 6, *James* 12128 (VPI). Alleghany Co.: 0.6mi S of jct Co. 616 and Co. 622 on Co. 616, *James* 7952 (NCU). Amelia Co.: without definite loc., *Lewis* 146 (VPI). Amherst Co.: 0.2km E of the Rockbridge Co. line and the Blue Ridge Pkwy, *Boufford & Wood* 21040 (USF). Appomattox Co.: just N of Bent Creek, *Harvill* 17115 (NCU). Arlington Co.: 18th St at Kirkwood Rd, *Hermann* 10254 (NY). Augusta Co.: Mt Rogers (Elliot's Knob), *Heller* 774 (A, NY). Bath Co.: Hot Springs, *Hunnewell* 4069 (GH). Bedford Co.: without definite loc., *Curtiss* s.n. (F, GH, MO). Boutetort Co.: jct of Co. Road 614 and 618, SW of Arcadia, *James* N-265 (NCU). Brunswick Co.: Seward Forest and vicinity, *Lewis & Massey* 2529 (VPI). Buckingham Co.: Woods Mt, S of Buckingham courthouse, *Harvill* 21245 (NCU). Campbell Co.: W of Altavista near Leesville, *Kral* 12270 (VDB). Caroline Co.: at Mattoponi River on Co. 722, *James* 13801 (NCU). Charles City Co.: Rte 623, N of Rustic, *Ware* 2877 (VDB). Charlotte Co.: 5mi S of Charlotte courthouse, *Harvill* 21500 (NCU). Chesterfield Co.: c.6mi N of Petersburg, *Henry* 2793 (A). Clarke Co.: at jct of Co. Road 606 and VA 7, *James* 10966 (NCU). Craig Co.: Potts Mt E slope, *Sharik & Martin* SM77-5436 (VPI). Culpeper Co.: near Culpeper, *Hunnewell* 10558 (GH). Cumberland Co.: bank of Cape Fear River, 1.3mi N of Cedar Creek, *Wyatt & O'Connell* s.n. (NCU). Dickenson Co.: near VA 671, at the head of Rock Lick, *Lafferty* s.n. (NLU). Dinwiddie Co.: 3mi S of Dewitt, *Harvill* 13762 (NCU). Essex Co.: near head of Dragon Run, *Harvill* 16249 (NCU). Fairfax Co.: Great Falls, *Hunnewell* 8763 (VPI). Fauquier Co.: 1mi below Beverly Mill, Pond Mt, *Allard* 1119 (VPI). Floyd Co.: firetower trail on Buffalo Mt, *Burrell et al.* 37 (VPI). Fluvanna Co.: Bremo Bluff, *Harvill* 15574 (NCU). Franklin Co.: jct of US 220 and Co. Road 755, on US 220, *James* 10766 (NCU). Frederick Co.: Mountain Falls, *Hunnewell* 17041 (VPI). Giles Co.: N of Mountain Lake, *Massey* s.n. (VPI). Gloucester Co.: Berg Farm, Rte 616, Clay Bank, *Berg* 171 (AUA). Goochland Co.: Rte 644, 75 yds from road, *Kimsey* 131 (NCU). Grayson Co.: at Grayson and Washington Co. line on US 58, *James* 9248 (NCU). Greene Co.: Roach's River, 1mi SE of Dyke, *Wieboldt* 2440 (NCU). Greensville Co.: by Fontaine Creek, W of Dahlia, *Fernald et al.* 14210 (GH, MO). Halifax Co.: just off US 501, NW corner of county, *Webster* s.n. (VPI). Hanover Co.: at jct of VA 54 and the W city limit of Ashland, *James* 13827 (NCU). Henrico Co.: Louis Ginter estate, *Kiltz* 641 (VPI). Henry Co.: just off US 58, E of Martinsville, *Straley* 6925 (VPI). Isle of Wight Co.: S of Lee's Mill, *Fernald et al.* 14212 (GH). James City Co.: Newportnews, *Causey* 9 (NCU). King and Queen Co.: 0.2mi SW of Middlesex Co. and King and Queen Co. line, *James* 5275 (NCU). King George Co.: near Cash Corner, *Harvill* 16156 (NCU). King William Co.: bank of Mattaponi River at Horse Landing, near King William courthouse, *Fernald & Long* 11602 (DUKE, F). Lancaster Co.: 0.2mi N of jct VA 3 and VA 200 on VA 3, *James* 6054 (NCU). Loudoun Co.: 4mi N of Lucketts, on Rte 15, *Downs* 4181 (NCU). Louisa Co.: at jct of Co. Road 690 and US 15, *James* 13633 (NCU). Lunenberg Co.: along Bear Element Creek, *Harvill* 16000 (NCU). Mecklenburg Co.: on US 1, SW of South Hill, *Ahles & Baird* 58647 (NCU). Middlesex Co.: 0.5mi W of Rte 17 along road from Dragon Run bridge, *Train* 55 (VPI). Montgomery Co.: Brushy Mt, Forest Service Road 188, *Uttal* 7902 (FSU).

Nansemond Co.: W shore of Lake Drummond, Great Dismal Swamp, *Fernald & Long* (GH). Nelson Co.: Monticello, *Killip* 30952 (A). New Kent Co.: 27mi S of Richmond, *Dugan* 25 (NCU). Norfolk Co.: along Northwest River, NE of Northwest, *Fernald & Long* 13993 (GH, NY). Northampton Co.: 3.1mi N of jct Co. Road 600 and 662 on 600, E of Martins Siding, *James* 3761 (NCU). Northumberland Co.: 0.1mi N of Northumberland and Lancaster Co. line on VA 200, *James* 5892 (NCU). Nottoway Co.: on hwy 723, 0.25mi N of jct with 633, *Ramsey et al.* 11097 (VPI). Orange Co.: along Rte 33 near Eheart, *Hall* 3845 (NCU). Page Co.: c.7mi from Luray, about halfway down Skyland Mt, *Coker* s.n. (NCU). Patrick Co.: 0.7mi N of jct of VA 609 and 616, on VA 609, *Uttal* 7886 (VDB). Pittsylvania Co.: Bannister River at bridge on Co. Road 832, *Ruska* s.n. (NCU). Powhatan Co.: 1.25mi E of Fine Creek, *Corcoran & Diggs, Jr* (NO). Prince Edward Co.: Redd Shop on Co. Road 630, *James* 3327 (NCU). Prince William Co.: Bull Run Mts, 0.5mi below Beverly Mill, *Allard* 8523 (VPI). Pulaski Co.: on VA 764 halfway between 693 and Carroll Co. line, *Roane* s.n. (FSU). Roanoke Co.: near Dixie Corners, *Harvill* 18198 (NCU). Rockbridge Co.: 2.25mi below Petites Gap, road to Arnolds Valley, *Freer* 2382 (GH). Russell Co.: c.3mi NW Mendota, *Kral* 23841 (FSU). Shenandoah Co.: Massanutten Mt, *Uttal* 6448 (VPI). Smyth Co.: Hungry Mother State Park, *Cruise et al.* 11023 (NCU). Southampton Co.: Three Creek, Drewryville, *Fernald & Long* 7930 (GH). Spotsylvania Co.: Alum Springs Park near Fredericksburg, *Hall* 4012 (VDB). Stafford Co.: Aquia Park, *James* 8576 (NCU). Surry Co.: without definite loc., *Henry* 2792 (A). Sussex Co.: along Stony Creek, *Fernald & Long* 7927 (GH). Tazewell Co.: 2.8mi N of jct Co. 601 and VA 16 on Forestry Rd 222, *James* 9497 (NCU). York Co.: Hampton, *Churchill* s.n. (GH). Warren Co.: near Browntown, *Hunnewell* s.n. (VPI). Washington Co.: 5.6mi SW of jct of US 58 and Co. Road 603, on US 58 E of Damascus, *James* 9191 (NCU). Westmoreland Co.: Nomini Grove, hwy 621 E of 637 jct, *Roane* s.n. (FSU).

West Virginia. Barbour Co.: 2mi E of Tr. 92, Colebank Road, *Haller* s.n. (WVA). Berkeley Co.: North Mt, *Shreve* s.n. (WVA). Boone Co.: Joe's Creek, *Coon* s.n. (WVA). Braxton Co.: Sugar Creek, S of Gassaway, *Boggs* s.n. (WVA).

Cabell Co.: Barboursville, *Utterback* 54 (GH). Calhoun Co.: without definite loc., *Harris* s.n. (WVA). Fayette Co.: mouth of Wolf Creek, South Fayette, *Phillips* s.n. (WVA). Gilmer Co.: Woofter Farm, *Woofter* s.n. (WVA). Greenbrier Co.: White Sulphur Springs, *Hunnewell* s.n. (GH). Hampshire Co.: Hanging Rock, *Frye* 99 (WVA). Hardy Co.: c.5mi S of Moorefield, *Wilson* s.n. (WVA). Harrison Co.: Stonewood, along Elk Creek, *Ware* s.n. (WVA). Jefferson Co.: South Mt, *Thompson* s.n. (WVA). Kanawha Co.: Clendenin, *Strickland* s.n. (WVA). Lincoln Co.: near West Hamlin, *Thacker* s.n. (WVA). McDowell Co.: Coalwood Mt, *Music* s.n. (WVA). Mercer Co.: Athnes, *sin. coll.* s.n. (WVA). Mineral Co.: Allegany Front, *Gray* s.n. (WVA). Mingo Co.: Chattaroy, *Hall* s.n. (WVA). Monongalia Co.: Halleck, *Anderson et al.* 153 (WVA). Morgan Co.: c.2mi NE of Gt. Cacapon, *Downs* 6104 (NCU). Nicholas Co.: Mt Nebo, *Burr* s.n. (WVA). Pocahontas Co.: along Cold Run Road, 1mi S of Cass, *Clarkson* 107 (WVA). Preston Co.: Masontown, *Maysilles* s.n. (WVA). Raleigh Co.: New River at Henton, *Tosh* s.n. (WVA). Randolph Co.: Rte 219, just N of Mill Creek, *Rossbach* 2613 (WVA). Summers Co.: near Hinton, *Boone* 85 (WVA). Taylor Co.: Tappan Road, Boothsville, *Constable* s.n. (WVA). Tucker Co.: along Bull Run, 5mi from St George, *Gabel* s.n. (WVA). Upshur Co.: 2mi E of French Creek village, *Rossbach et al.* 5873 (NCU). Wayne Co.: near Wayne on Rte 52, *Smithson* s.n. (WVA). Wetzel Co.: near Littleton, *Haught* 7230 (WVA). Wirt Co.: near Owensport, *Bartholomew* s.n. (WVA). Wyoming Co.: Herndon, *Evans* s.n. (WVA).

REPRESENTATIVE PUTATIVE HYBRIDS: *R. periclymenoides* × *R. atlanticum*. **Delaware.** Newcastle Co.: along railroad, 0.8mi SSE of Coochs Bridge, *Tatnall* 5095 (GH). **South Carolina.** Darlington Co.: near Hartsville, *Coker & Harbison* s.n. (NCU). Low growing, with corolla shape of *R. atlanticum*, but with multicellular eglandular hairs on the corolla tubes, flowers tinged with pink, or the tube red and the lobes white; bud scales glabrous.

R. periclymenoides × *R. prinophyllum*. **Rhode Island.** Providence Co.: Cumberland, *Robinson* s.n. (GH). Pedicel length and corolla shape like *R. prinophyllum*, the leaves conspicuously ciliate, bud scales glabrous, pedicels and sepal margins eglandular, the corolla weakly glandular, leaves glabrous abaxially.

Rhododendron prinophyllum

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Cherokee Co.: E scarp of Lookout Mt, by AL 68, due WNW of Leesburg, *Kral* 63408 (VDB).

Arkansas. Bradley Co.: Banks, *Demaree* 20999 (MINN). Calhoun Co.: Hampton, *Demaree* 18933 (MO). Cleburne Co.: Heber Springs, *Palmer* 6973 (MO). Cleveland Co.: on US 79, *Beadle* s.n. (US). Crawford Co.: Ft Smith, *Einklestein* (NCU). Faulkner Co.: Cove Creek, *Demaree* 66 (MINN, MO). Franklin Co: c.20mi N of Ozark, along Mulberry River, *Tucker* 4118 (NCU). Garland Co.: Mountain Pine, *Demaree* 36499 (GA, GH, SMU, VPI). Hot Springs Co.: Fourch A'Loup Mt, Bismarck, *Demaree* 34846 (FSU, GA, GH, NO, SMU, USF). Independence Co.: Batesville, *sin. coll.* s.n. (UARK). Johnson Co.: without definite loc., *Demaree* 52193 (GA, NCU). Madison Co.: 6.5mi SE of Pettigrew, *Clark* 1442 (UARK). Marion Co.: between Yellowville and Burns Ridge Hills, *Pyle* 6514 (UARK). Montgomery Co.: Mt Ida, *Ashe* 27 (NCU). Newton Co.: Jasper, *Palmer* 6932 (A, MO, POM). Polk Co.: Board Camp, *Demaree* 36649 (SMU). Pope Co.: Nogo, *Merrill* 208 (UARK). Searcy Co.: 2mi N of Harriet, *Milstead* 1 (UARK). Stone Co.: Barkshed Rec. area, on small tributary to Sycamore Creek, *Graham* 349 (NCU). Van Buren Co.: near Shirley, *Palmer* 25186 (A, NA, UARK).

Connecticut. Cornwall Co.: without definite loc., *Eames & Starr* 10897 (RSA). Stafford Co.: without definite loc., *Graves* s.n. (GH). Woodbury Co.: without definite loc., *Weatherby* 4253 (NCSC).

Delaware. Kent Co.: Cooper's Corner, SW of Dover, *Baker* s.n. (DUKE).

Illinois. Union Co.: near Alto Pass, *Palmer* 15023 (A).

Kentucky. Carter Co.: N of Carter Canes State Park, *Meijer* s.n. (GA, KY). Greenup Co.: South Portsmouth, *Horsey* s.n. (A). Powell Co.: N trail about half way to Devil's Gulch at Natural Bridge State Park, *Pittillo* 2199 (KY).

Maryland. Garrett Co.: summit of Negro Mt on US hwy 40, *Hermann* 1031 (UNA).

Massachusetts. Berkshire Co.: east of Lenox, *Kluerder* s.n. (A). Bristol Co.: North Easton, *Ames* s.n. (LL). Franklin Co.: without definite loc., *Day* 43 (A, GH). Hampden Co.: Wilbraham, *Clark & Seymour* 690 (NY). Hampshire Co.: Belchertown on Rt 21, *Ahles* 79959 (MINN). Nantucket Co.: without definite loc., *Day* 115 (GH). Norfolk Co.: Purgatory, Westwood, *Kennedy* s.n. (GH). Suffolk Co.: Purgatory Swamp, Dedham, *Forbes* s.n. (TX). Worcester Co.: Ashburnham, *Knowlton* 7 (USF).

Missouri. Bollinger Co.: T31N, R9E, SW ¼ sect. 15 and 16, 2–3mi SE of Bessville, *Steyermark* 69598 (F, NY). Carter Co.: T25N, R1W, sect. 10, 5mi SW of Eastwood, *Steyermark* 72301 (F, NY). Douglas Co.: N fork of White River between Roosevelt and Richville, *Steyermark* 14684 (GH, MO). Howell Co.: Indian Creek 4.5mi W of Willow Springs, *Summers* s.n. (MO). Iron Co.: along Stout's Creek, near 'Lake Killarny', near Arcadia, *Palmer* 30243 (A, MO, NY). Madison Co.: bluffs of little St Francis River, Mine La Motte, *Palmer* 30289 (A, MINN). Oregon Co.: 2.5–3mi E of

Greer, *Steyermark* 78875 (GA). Ozark Co.: N fork of the White River, c.4mi SE of Dora, *Redfearn, Jr & Eggers* (VDB). Perry Co.: T33N, R14E, sect. 6, 3mi SE of Altenburg, *Steyermark* 4904 (F, MO). Reynolds Co.: E of Lesterville, *Steyermark* 7800 (MO). Ripley Co.: 3.5–4mi W of Fairdealing, *Steyermark* 79400 (GA). Ste Genevieve Co.: River Aux Vases, 3.5–4mi NW of Coffman, *Steyermark* 84410 (GA). Texas Co.: T28N, R8W, sect. 10 and 11, 4mi NE of Clear Springs, *Steyermark* 72385 (F, NY).

New Hampshire. Cheshire Co.: banks of Connecticut River, near Walpole, *Bacigalupi* 2211 (UC). Grafton Co.: Lebanon, *Grover* s.n. (UC). Hillsboro Co.: without definite loc., *Batchelder* s.n. (MO, TENN).

New York. Albany Co.: without definite loc., *House* 27279 (UC). Cattaraugus Co.: Bear Bog, Allegheny State Park, *Camp* 216 (NY). Chemung Co.: without definite loc., *Lucy & Elmira* 266 (NY, UC). Chenango Co.: near Brisben Station, *Muenscher* 15834 (GH). Columbia Co.: near Turedy Lake, *Beals* s.n. (NY). Delaware Co.: vicinity of North Hapersfield, *Topping* 180 (A). Fulton Co.: Northville, *Young* s.n. (A). Genesee Co.: Berger Swamp, *Killip* 13678 (A). Greene Co.: vicinity of Tannersville, *Vail* s.n. (NY, UC). Hamilton Co.: Piseco Lake, *House* 11925 (GH). Herkemer Co.: without definite loc., *Harberer* 565 (GH). Livingston Co.: Canadice, *Baxter* s.n. (A). Monroe Co.: Mendon Ponds, Mendon, *Wiegand* 10569 (A). Oneida Co.: without definite loc., *Swartley* 83 (A). Onondaga Co.: near Syracuse, *Packard* 1 (NY). Orange Co.: near Cahoonzie, *Muenscher et al.* 15831 (GH). Oswego Co.: between Canada Lake and Green Lake, Fulton, *Muenscher & Lindsey* 3509 (UC). Rensselear Co.: Troy, *McCall* s.n. (UC). Saratoga Co.: South Hadley, Bare Mt, *Brooks* s.n. (UC). Suffolk Co.: Long Island, Locust Valley, *Ferguson* 6591 (NY). Sullivan Co.: at Wolf Lake on E side, c.9mi NW of Wurtsboro on hwy 17, W. *Hess* 4424 (NA). Tompkins Co.: first road E of Thatcher's Pinnacle, Danby, *Gershoy & Metcalf* 8588 (A). Ulster Co.: between Slide and Cornell Mt, *Stebbins et al.* 28 (GH). Washington Co.: Hudson Falls, *Burnham* s.n. (GH). Welland Co.: Tonawanda, near Syracuse, *Maxcey* s.n. (POM). Yates Co.: Penn Yan, *Sartwell* s.n. (GH, NY).

North Carolina. Ashe Co.: Bluff Mt, *Tucker* 2225 (NCU, SMU). Transylvania Co.: below Beech Gap, *Bozeman et al.* 9117 (GA, LL, WVA).

Ohio. Ashtabula Co.: Phelps Creek Gorge, *Pontius & Bartley* 897 (NY). Geauga Co.: without definite loc., *Watson* s.n. (F, MINN). Pike Co.: head of Hixon Run, *Pontius & Bartley* 1086 (NY). Portage Co.: Hiram Twp., *Webb* s.n. (GH). Scioto Co.: Shawnee State Forest, Wilson's Fork, *Demaree* 10654 (GH).

Oklahoma. Adair Co.: 1mi W of intersection of Okla. 51 and US 59 on Okla. 51, *Perino* 170 (SMU). Cherokee Co.: Camp Egan, 2mi NW of Eldon on US 62, *Wallis* 8145 (GA, GH, USF, VDB). Delaware Co.: 6mi S, 4mi E of Jay Steep, *Stephens* 10549 (GH). LeFlore Co.: Rich Mt, near Page, *Palmer* 22251 (A). McCurtain Co.: 6mi S of Big Cedar on US 259, Kiamichi Mt, *Perino & Perino* 942 (NCSC).

Pennsylvania. Alleghany Co.: pond at Logan's Ferry, *Ortman* 840 (UC). Berks Co.: Pulpit Rocks, *Britton* s.n. (NY). Blair Co.: c.5mi N of Tyrone, *Yunckers* 10596 (GH, UC). Bradford Co.: near summit of Mt Pisgah, E of Troy, *Henry* 3027 (A). Clinton Co.: 9.5mi NNW of Renovo, *Earle* 2927 (GH). Crawford Co.: Meadville, *Curtis* 54 (POM). Elk Co.: 4mi E of Caledonia, *Wahl* 637 (GH, UC). Fulton Co.: 1.75mi W of Saluvia, *Adams* 4257 (A). Jefferson Co.: 2mi S of Egypt, *Wahl* 2314 (GH). Juniata Co.: Run Gap, Tuscarora Mt, 3.5mi S of Port Royal, *Adams* 5199 (A). Lackawanna Co.: 7mi E of Moscow, *Randolph & Randolph* 38 (GH, UC). Lebanon Co.: about Penryn, *Heller & Halbach* s.n. (A, UC). Luzerne Co.: Bean Run, *Taylor* 2099 (NY). McKean Co.: Catharine Swamp, *Wahl* 3306 (GH). Monroe Co.: Pocono Summit, *Porter* s.n. (GH). Northampton Co.: The Big Offset, NE summit, *VanPelt* s.n. (GH). Perry Co.: near New Bloomfield, *Byhouser et al.* 151 (A). Philadelphia Co.: without definite loc., *Watson* 18 (UC). Schuykill Co.: S of Pottsville, *Wagner* 6176 (MINN). Stewartstown Co.: Hunting camp, located near Driftwood, *Byhouser & Kobuski* 179 (A). Sullivan Co: Spook Swamp, 2.5mi NW Eagle Mera, *Fosberg* 15105 (GH, NY). Wayne Co.: woods N of Hawley, *Byhouser & C. E. Kobuski* 220 (A).

Rhode Island. Providence Co.: near Providence, *Thurber* s.n. (GH).

Vermont. Addison Co.: Middlebury, *Brainerd* s.n. (GH). Bennington Co.: Woodford, *Carpenter et al.* s.n. (MO). Rutland Co.: West Rutland, *Eggleston* s.n. (GH, MO, NY). Windham Co: Woodford, *Carpenter et al.* s.n. (USF).

Virginia. Augusta Co.: summit of Elliott Knob, *Allard* 1668 (F, NY, VPI). Bath Co.: without definite loc., *Trumbo* s.n. (VPI). Bedford Co.: without definite loc., *Curtiss* s.n. (GH). Bland Co.: Big Walker Mt, *Music* s.n. (VPI). Boutetourt Co.: Blue Ridge Parkway, Station 66-68J, *Freer* 1499 (GH). Craig Co.: Brush Mt, along old CCC trail following ridge, *Uttal* 7088 (VPI). Frederick Co.: 2mi W of Gore on US 50, *Hess* 1189 (SMU). Giles Co.: along road to West Virginia, *Massey* s.n. (VPI). Grayson Co.: Independence, *Gleason* 8735 (NY). Highlands Co.: SE of city of Monterey, *Boufford et al.* 22133 (USF). Madison Co.: overflow campground at Big Meadows, *Edwards* 203 (VPI). Montgomery Co.: along old Blacksburg spur of Norfolk and Western RR, *Uttal* 8015 (VPI). Nelson Co.: gap between Maintop and Spy Rock, *Freer* 2463 (GH). Page Co.: Kennedy's Peak, *Artz* s.n. (VPI). Roanoke Co.: Rte 612, 3.5mi S of Wabun, Poor Mt, *Uttal* 10347 (NCU). Rockbridge Co.: Blue Ridge Parkway, above Irish Creek Overlook, *Freer* 3807 (NCU). Rockingham Co.:

along WVA line near US 33, *Lems* 59091803 (TX). Russell Co.: without definite loc., *Kral* 12971 (VPI). Shenandoah Co.: W slope of Three Top Mt, near Woodstock, *Allard* 6490 (VPI). Smyth Co.: Walker Mt in the vicinity of Marion, *Britton et al.* s.n. (NY). Warren Co.: near summit North Marshall Mt, *Hunnewell* 20056 (VPI).

West Virginia. Grant Co.: along the hwy near Bismarck, *Clarke* 53 (WVA). Greenbrier Co.: without definite loc., *Weatherby & Una* 6413 (A). Mercer Co.: Mercer Springs, *Harbison* 10 (A). Mineral Co.: without definite loc., *Brown* s.n. (WVA). Monongahila Co.: Morgantown, *Anderson* s.n. (NLU). Monroe Co.: Peters Mt, 1mi N of Hanging Rock tower, *Uttal* 8786 (VPI). Morgan Co.: directly across from Hancock, Md., *Downs* 6035 (NCU). Pendleton Co.: on top of North Fork Mt, along US 33, *Bartholomew* 140 (FSU, MO, NO, NY, OSU, TENN, UC, VPI, WVA). Pocahontas Co.: 1mi S of Traveller's Repose, *Core* s.n. (WVA). Tucker Co.: Rohrbaugh Plains, c.3mi N of Jordan Run Road, *Ramsey et al.* 10579 (NCU, SMU).

Rhododendron prunifolium

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Henry Co.: 2.5mi NW of Shorterville, *Kral* 62309 (VDB). Lee Co.: ravine above Hallawakee Creek, 6mi ENE Opelika, *Kral* 62392 (VDB).

Georgia. Clay Co.: 1mi S of Fort Gaines, *Thorne* 5842 (F, MO, NY, UC). Early Co.: along Factory Creek, c.8mi NNW of Blakeley, *Duncan* 6817 (GA, NY). Harris Co.: N slope of Pine Mt in FDR State Park, *Jones* 21415 (GA, USL, WVS). Quitman Co.: N side of Georgetown, *Kral* 62445 (VDB). Randolph Co.: 7mi S of Cuthbent, *Henry* 998 (A, NY, VDB). Stewart Co.: slopes and ravines of Providence Canyon, *Bozeman* 6654 (NCU, NLU). Troup Co.: Callaway Gardens near Pine Mt, *Floyd* 45 (AUA).

Rhododendron viscosum

REPRESENTATIVE SPECIMENS: USA. **Alabama.** Baldwin Co.: Loxley, *Bomhard & Haas* s.n. (NO). Barbour Co.: by Pig Creek, W of Clio, *Kral & Demaree* 30860 (NCU). Bibb Co.: without definite loc., *Laessle* s.n. (GA). Chilton Co.: 0.8mi NW of jct Chilton 16 and adjacent school, *Kral* 63733 (VDB). Covington Co.: c.4.5mi E of Florala, *Clark* 14923 (NCU). Dallas Co.: Sardis, *Cocks* 2020a (A). Escambia Co.: 8mi SW of Atmore on US 31, *Watson, Jr* 133 (AUA). Lee Co.: Auburn, *Earle & Underwood* s.n. (MINN, NY, UNA). Mobile Co.: S half of S16, T4S, R2W, *Lelong* 3306.1 (NCU). Tuscaloosa Co.: 8mi NE of Tuscaloosa on old hwy 11, *May* 95 (UNA).

Arkansas. Clark Co.: near Okalona, *Palmer* 27163 (A). Dallas Co.: c.1.5mi NE of Ouachita, *Roberts* 1028 (UARK). Faulkner Co.: Cove Creek, *Buchholz* 951 (A, NY). Garland Co.: near Hot Springs, *Palmer* 23144 (A). Grant Co.: 1mi E of Lee Mills Road and Rhoden Springs, *Locke* 204 (SMU). Hemstead Co.: Hope, *Small & Wherry* 12438 (GH). Hot Springs Co.: near Malvern, *Palmer* 30346 (A, MO). Independence Co.: along Salado Creek, upstream from hwy 167 bridge, *Tucker* 11132 (UARK). Jefferson Co.: 1.4mi W of Pine Bluff, *Locke* 3008 (UARK). Miller Co.: Garland, *Demaree* 42419 (GA). Montgomery Co.: near Albert Pike Rec. Area, *Sundell & Darwin* 2332 (UARK). Nevada Co.: 13mi E of Prescott, *Moore* 56-150 (UARK). Newton Co.: 3mi N of Deer, Alum Cove Natural Bridge, *Redfearn* 18898 (GA). Pike Co.: Salt Gum Ford, *Demaree* 9356 (SMU). Polk Co.: near Bear Bluff, Cossatot River, *McWilliam* C71089 (UARK). Saline Co.: near Bryant, *Crawford* 330027 (GH, NY). Yell Co.: 64mi W of Little Rock, 15mi S of Rover, *Iltis* 5103 (UARK).

Connecticut. Fairfield Co.: Oxford, *Harcer* s.n. (GH). Hartford Co.: Kenny Park, Hartford, *Driggs* s.n. (GH). Litchfield Co.: Plymouth, *Denslow* s.n. (NY). Middlesex Co.: Cromwell, *Pillsbury* s.n. (A). New Haven Co.: Waterbury, *DuBois* s.n. (UC). New London Co.: Ledyard, *Bissell* s.n. (GH). Tolland Co.: near Hebron, *Palmer* 45204 (A).

Delaware. Kent Co.: 1mi W of Hazlettville, *Earle* 1695 (UC). Newcastle Co.: without definite loc., *Canby* s.n. (NY). Sussex Co.: 1mi NW of Nassau, *McVaugh* 6553 (GH, NY).

District of Columbia. Suitland Bog, near Washington, *Beadle* AzG3134 (NCU).

Florida. Alachua Co.: NW 55 Blvd, Gainesville, *Judd* 2225 (NO). Bay Co.: 0.5mi W of Econfina River, W of Youngstown, *Godfrey* 64235 (FSU). Calhoun Co.: NW corner of Chipola, along Four Mile Creek, *Ford* 5318 (FSU). Clay Co.: Penney Farms, *Totten* s.n. (NCU). Escambia Co.: US 90 crossing Marcus Creek, W of Pensacola, *Kral* 17639 (VDB). Franklin Co.: 7.5mi N of Green Point, *Correll & Correll* 52278 (NY, USF). Gadsden Co.: River Junction, *Ashe* s.n. (NCU). Hardee Co.: USF archaeological site no. 8, c.10mi W of Bowling Green, *Kuczynski* 38 (USF). Highlands Co.: Parker Islands, 3.5mi S of Lake Istokpoga, *Brass* 15251 (GH). Hillsborough Co.: Stallion Hammock, sect. 16, R21E, T31S, *Shuey* s.n. (USF). Lake Co.: Eustis, *Harbison* s.n. (NCU). Leon Co.: 7.4mi W of centre of Tallahassee, *McDaniel* 9261 (VDB). Liberty Co.: near Hosford, *Godfrey* 53617 (DUKE, NY). Madison Co.: Aucilla River bridge, 6mi W of Greenville, *Wiegand & Manning* 2434 (POM). Manatee Co.: W of FL 39 and N of FL 62, *Shuey* s.n. (USF). Marion Co.: 0.5mi E of FL 19, c.10mi NE of Juniper Springs, *Ward & Will* 3027 (NCU). Nassau Co.: 2mi W of Callahan, *Hood* 4428 (MINN). Okaloosa Co.: 5.5mi S of Crestview, *Smith* 1589 (LAF). Orange Co.: 1.75mi E of Maitland, *Baker* 529a (A). Osceola Co.: 4mi W of Intercession City, *Hansen & Robinson* 8525 (USF). Pasco Co.: S30, T25, R19E, *Lakela &*

Riegler 24270 (MINN, USF). Polk Co.: 1mi E of Mt Pisgah Road, *Shuey* 1958 (USF). Putnam Co.: S37, T11S, R25E, *Cooper & Martin* 613 (USF). Santa Rosa Co.: just inland from Oriole Beach, *Kral* 17680 (VDB). Seminole Co.: Wekiova Springs, *McFarlin* 5748 (TX). Taylor Co.: Perry, *O'Neill* s.n. (A). Wakulla Co.: on Speer Harris tract, *Ashe* s.n. (NCU). Walton Co.: 3.5mi N jct C-183 and C-10, along C-183 at Koerber, *Persson* 31-1-78 (USF). Washington Co.: 4.8mi E of Ponce de Leon, *Godfrey* 68728 (FSU).

Georgia. Appling Co.: 5.5mi N of GA 99 at Big Satilla Creek, *Bozeman* 9270 (NCU). Bacon Co.: c.1.5mi S of GA 32, off Hurricane Creek, *Bozeman* 4652 (NCU). Bartow Co.: 6.8mi SE of Adairsville, *Duncan* 13271 (GA). Ben Hill Co.: GA 10, E of Fitzgerald, *Beadle* s.n. (US). Berrien Co.: 5.3mi NNE of Ray City, *Faircloth* 1930 (GA). Bibb Co.: W of Macon, *Beadle* AzG222 (NCU). Brantley Co.: 3mi E of Nahunta, *Wilbur & Webster* 2747 (NY, SMU). Brooks Co.: 0.8mi W of Withlacoochee River, *Bozeman* 4882 (NCU). Bryan Co.: near Blitchton, *Ashe* s.n. (NCU). Bulloch Co.: 7.5mi SW of Statesboro, where RR crosses creek, *DeWolf & Boole* 1670 (SMU). Camden Co.: 4mi ENE of Kingsland, *Blake* s.n. (GA). Candler Co.: 0.4mi N of the Canoochee River, *Bozeman* 4244 (NCU). Charlton Co.: 4.7mi E of Moniac, *Jones et al.* 23364 (UNA). Chatham Co.: 2.3mi to centre Savannah River bridge, Georgia side, *Beadle* s.n. (US). Coffee Co.: 0.9mi N of GA 107, *Bozeman* 4637 (NCU). Colquitt Co.: 3.3mi NW of Berlin, *Faircloth* 2658 (NCU). Cook Co.: 3.6mi E of Cecil, *Faircloth* 2033 (NCU). Decatur Co.: near Climax, *Harper* 1929 (GH, NY). Dodge Co.: SE of Eastman, 0.5mi W of Parkerson Church, *Bozeman* 5446 (NCU). Dougherty Co.: Albany, *Gillespie* E1382 (GA). Echols Co.: 6.9mi E of Lake Park, *Faircloth & Dean* 2295 (NCU). Effingham Co.: 3mi S of Stillwell, *Bozeman* 4090 (MO, NCU). Emmanuel Co.: 5mi E of Swainsborough, *Craig & Craig* 3409 (POM). Grady Co.: 6.5mi SE of Whigham, *Faircloth* 357 (MO, NCU). Harris Co.: at roadside park above and S of Callaway Gardens, *Jones* 20783 (VDB). Heard Co.: 4mi SW of Franklin, *Pyron & McVaugh* 1764 (GA). Irwin Co.: jct Irwin and Ben Hill counties at US 129, *Plummer & Pullen, Jr* s.n. (GA). Jeff Davis Co.: 1.2mi S of Altamaha River on US 221, *Bozeman* 9213 (NCU). Lanier Co.: 1.7mi NE of jct of GA 168 and US 221, S of Pearson, *Faircloth* 3576 (GA, MO). Long Co.: SE of Beard's Creek, *Duncan* 3769 (GA). Lowndes Co.: 13mi E of Valdosta, *Faircloth* 2077 (GA). McDuffie Co.: 1.5mi SSE of Arrington Mill, *Duncan* 11534 (GA). McIntosh Co.: 2mi NW of Cox, *Bozeman* 830 (NCU). Meriwether Co.: Mrs Crowder's pasture near Durand, *Jones & Chapman* 21811 (NCU). Pierce Co.: city limits of Patterson on US 82, *Ahles & Bozeman* 56043 (NCU). Polk Co.: Lakeland, *Harbison* 4673 (NCU). Rabun Co.: Rocky Knob, Mountain City, *J. H. M.* E1383 (GA). Randolph Co.: Cuthbert, *Harbison* s.n. (NCU). Richmond Co.: Hepzibah, *Beadle* AzG1711 (NCU). Screven Co.: near Oliver, *Curtiss* 6837 (MINN, UC). Tattnall Co.: 3.9mi NW of Reidsville, *Ahles & Mueller* 54191 (NCU). Taylor Co.: 3mi N of Butler, *Cronquist* 5517 (GA). Telfair Co.: 3.1mi SW of jct US 23 and 341, *Bozeman* 5625 (NCU). Thomas Co.: Thomasville, *Taylor* s.n. (A). Tift Co.: 0.5mi N Animal Ecology Lab off Zion Hope Rd, *Phillips* s.n. (NLU). Turner Co.: c.11mi SE of Ashburn on Rte 32, *Wilbur* 3382 (NCSC). Union Co.: near summit of Brasstown Bald, *Mark* s.n. (DUKE). Ware Co.: 5mi S of Waycross, *Cypert* 207 (VDB). Wayne Co.: Jessup, *Harbison* 240 (NCU). Wheeler Co.: just SE of Jesup, *Duncan* 3691 (GA). Wilcox Co.: 1.1mi N of Alapaha River, SW of Rochelle, *Bozeman* 5589 (NCU). Worth Co.: c.8mi NE of Sylvester, *Wilbur* 3393 (FSU).

Louisiana. Beauregard Par.: jct of Lee Ave. and North St, *DeRidder, Roper & Seale* 179 (NLU). Bienville Par.: c.2.5mi E of Saline, *Allen et al.* 7892 (NCU). Caddo Par.: 1mi S of Mira, *Thomas* 42427 (NLU). Claiborne Par.: W of Junction City, *Thomas et al.* 52248 (NLU, NY). Natchitoches Par.: Red Dirt Game Preserve, Kisatchis Nt'l Forest, *Nesom* s.n. (NCU). St Tammany Par.: Primate Research Center, Covington, *Rylander* 149 (SMU). Union Par.: T23N, R3W, sect. 24, N of Sparrsville, *Thomas* 84146 (NY). Vernon Par.: c.5.5mi E of Carvens, near Slaughter Branch, *Allen et al.* 9209 (SMU). Washington Par.: NW of Enon, near Barton Creek, *Thomas et al.* 35552 (NCU). Winn Par.: W of LA 1233 at Pine Ridge Baptist Church, *Thomas & Kessler* 75736 (NLU).

Maine. York Co.: Wells, *Parlin* s.n. (MINN).

Maryland. Anne Arundel Co.: NE side of Severn Run at Dicus Mill Road near Aurora Hills, *Hill* 10431 (GA, NY). Caroline Co.: 1mi N of Hollingsworth Crossroads, *Hill* 17394 (CLEMS, NY). Cecil Co.: 2mi W of Elkton, *Randolph & Randolph* 133 (GH). Charles Co.: Waldorf, *Piper* s.n. (UC). Harford Co.: Bush River, *Core* s.n. (WVA). Prince Georges Co.: Laurel, *Topping* E6937 (GA). Queen Anne Co.: along Chester R., *Thatcher* 4 (MINN). Worcester Co.: N of Dividing Creek bridge, *Beaven* 452 (DUKE).

Massachusetts. Barnstable Co.: Chatham, *Fernald & Long* 10127 (GH). Bristol Co.: New Bedford, *Baxter* s.n. (UC). Dukes Co.: Gay Head, *Palmer* 45182 (A). Essex Co.: Andover, *Moore* 81 (A). Hampden Co.: Chapin Pond, Ludlow, *Seymour* 559 (GH. MINN). Middlesex Co.: Westford, *Rollins & Hodge* 1081 (MINN, NY, UC). Nantucket Co.: Nantucket Island, *Bicknell* s.n. (NY). Norfolk Co.: Norwood, *Murdoch* s.n. (A). Plymouth Co.: Marshfield, *Churchill* s.n. (GH). Suffolk Co.: Arlington Heights, *Grover* s.n. (UC). Worcester Co.: Douglas, *Gates* 26579 (USF).

Mississippi. Forrest Co.: 2.4mi N of Maxie, *Temple* s.n. (GA). George Co.: Cedar Creek, Agricola, *Demaree* 33487 (LAF). Greene Co.: 2mi SE of Leakesville, *Jones* 8448 (NCU). Harrison Co.: Handsboro, *Demaree* 31142 (SMU).

Jackson Co.: Ocean Springs, *Demaree* 28247 (SMU, UNA). Lamar Co.: c.4mi W of Purvis, *Rogers* 763 (NY, TENN). Marion Co.: 1mi S of Sandy Hook, *Thomas et al.* 19622 (NLU). Pearl River Co.: 2mi E of Wolf River, *Kral* 17370 (VDB). Perry Co.: outskirts of Beaumont, *Webster & Wilbur* 3407 (GA, NY). Stone Co.: Beatrice, DeSoto Nt'l Forest, *Demaree* 34074 (LAF).

New Jersey. Atlantic Co.: Egg Harbor, *Bartram* s.n. (A). Bergen Co.: just NW of Paramus, *Rossbach* 4043 (USF). Burlington Co.: along Mullica River, Atsion, *Svenson* 7949 (MINN, UC). Camden Co.: Blue Anchor Branch at RR at Ancora, *Bassett* s.n. (GH). Cape May Co.: c.1mi SE of Dias Creek, *Benner* 9308 (MINN, UC). Cumberland Co.: 3.75mi NW of Shiloh, *Adams* 487 (GH). Essex Co.: Clinton, *Beals* s.n. (NY). Gloucester Co.: NW of Repaupo, *Long* 16067 (GH). Mercer Co.: Bear Swamp, Lawrence Station, *Bartram* s.n. (A, NY). Middlesex Co.: Monmouth Jct, *Taylor* 1983 (NY). Monmouth Co.: Farmingdale, *Taylor* 2152 (NY). Morris Co.: Lake Hopatcoug. *Aldinger* s.n. (UC). Ocean Co.: Whitesville, *Moldenke & Moldenke* 28530 (LL). Passaic Co.: Beaufort Mt, *Alexander & Ross* s.n. (NY). Salem Co.: vicinity of Dilke's Pond, Alloway, *Beals & Bassett* 948 (NY). Sussex Co.: N of Stockholm, *Muenscher* 91 (GH). Warren Co.: Hope, *Moldenke* 2962 (NY).

New York. Albany Co.: S of Glenmont, *House* 18184 (UC). Bronx Co.: McLean's Woods, *Holtzoff* s.n. (NY). Columbia Co.: Knickerbocker Lake, *House* 23707 (NY). Orange Co.: E side of Sutherland Pond, *Raup* 7369 (GH, NY). Queens Co.: Kissena Park, *Croizat et al.* s.n. (NY). Rockland Co.: Harriman Sect. Stony Pt Twp., elev. 1000ft, *Lehr* 75 (NY). Suffolk Co.: Peconic River, Southampton, *St John* 2862 (GH). Ulster Co.: near Glenerie, *House* 25802 (TX).

North Carolina. Alexander Co.: near Rocky Face Mt, *Totten et al.* s.n. (NCU). Alleghany Co.: 2mi NE of Whitehead, *Radford* 34064 (NCU). Anson Co.: without definite loc., *J. S. H.* s.n. (NCU). Ashe Co.: 1.5mi E of Brownwood, *Radford* 34324 (MINN, NCU). Avery Co.: Pineola, *Duke* 241 (VPI). Beaufort Co.: 4mi SW of Chocowinity, *Blair* 582 (NCSC). Bertie Co.: 1mi SW of Aulander on NC 350, *Ahles & Duke* 46066 (NCU). Bladen Co.: without definite loc., *Ashe* s.n. (NCU). Brunswick Co.: N of US 74 and 76, just E of Wilmington, *Thomas et al.* 53074 (NLU). Buncumbe Co.: Biltmore, *Beadle* 1399a (A, MINN). Carteret Co.: E of Horse Island Road, *Snyder* 1109 (NCU). Chowan Co.: 1.5mi WNW of Chowan-Perquimans Co. line on NC 37, *Ahles & Duke* 44248 (NCU). Clay Co.: 1.6mi SW of Hayesville on Sweet Water Gap Road, *Ahles & Radford* 13823 (NCU). Columbus Co.: 2.1mi SW of Old Dock, *Bell* 12766 (NCU). Craven Co.: New Bern, *Harbison* 53 (A). Davidson Co.: 1.25mi N of Silver Valley on NC 109, *Radford* 12798 (SMU). Duplin Co.: without definite loc., *sin. coll.* s.n. (NCU). Gates Co.: 4.8mi SE of Gatesville, *Ahles & Duke* 44631 (NCU). Guilford Co.: c.5mi S of Greensboro, *Melvin* s.n. (NCU). Harnett Co.: E of RR station, Manchester, *Totten & Harbison* s.n. (NCU). Haywood Co.: near summit of Mt Pisgah, *Ramseur* 4508 (NCU). Henderson Co.: 1.5mi SE of Mills River, *Freeman* 5859 (NCU). Hertford Co.: Meherrin River, *Herford* s.n. (NCSC). Hoke Co.: 4.5mi S of Raeford on NC 211, *Ahles & Haesloop* 29574 (NCU). Iredell Co.: 3.2mi W of Harmony, *Radford* 2668 (NCU). Jackson Co.: Whiteside Mt, *Kron* 1760 (FLAS). Johnston Co.: 0.5mi from Selma, *Deans* s.n. (NCU). Jones Co.: Pond Pine Pocosin Research Natural Area, *Snyder* 1168 (NCU). Lee Co.: 1mi S of Juniper Spring Church, *Stewart* 825 (NCU). Lenoir Co.: 1.5mi S of LaGrange, *Radford* 22141 (NCU). Lincoln Co.: 0.4mi NNE of Toluca, *Bell* 8805 (NCU). Macon Co.: Horse Cove, near Highlands, *Godfrey* 51328 (NCSC). Martin Co.: near Parmele, *Martin* 1957 (DUKE). McDowell Co.: NW of Glenwood, *Radford & Haesloop* 7147 (NCU). Mitchell Co.: between Cranberry and Linville, *Small & Heller* 452 (MINN, NY). Montgomery Co.: near Wadeville, *Correll* 833 (DUKE). Moore Co.: near Lakeview, *Currie* 616 (NCSC). Nash Co.: US 264, 0.5mi from W boundary of county, *Blomquist* 7691 (DUKE). Onslow Co.: NC 50 W of Surf City, *McCrary* 501 (NCU). Pasquotank Co.: old RR track on Winslow's Farm, *Rabb* s.n. (NCSC). Pender Co.: Holly Shelter Bog, Burgan, *Wells & McMenamin* (NCSC). Perquimans Co.: Winfall, *Weigand & Manning* 2431 (GH). Pitt Co.: between Wilson and Greenville, *Blomquist* 6680 (DUKE). Richmond Co.: on US 1 just S of Moore Co. line, *Fox* 3673 (GA, MO, NY). Robeson Co.: 11mi S of Lumberton along Flowers Swamp, *Britt* 2927 (NCU, NY). Rockingham Co.: near NC 87, 3.2mi E of Williamsburg, *Leonard* 568 (NCU). Rowan Co.: Salisbury, *Harbison* 7 (NCU). Rutherford Co.: near Cuba, *Lynch* 23 (NCU). Sampson Co.: Roseboro, *Godfrey* 4527 (DUKE). Scotland Co.: 12mi N of Laurinburg, *Godfrey* 4602 (GH). Swain Co.: S side of Gregory Bald, *Jennison* 4565 (TENN). Transylvania Co.: US 276 near Cedar Mt, *Freeman* 57464 (NCU). Tyrrell Co.: 5mi S of Columbia, *Godfrey* 4332 (GH). Vance Co.: 0.5mi E of Bearpond, *Ahles & Leisner* 17379 (NCU). Wake Co.: Raleigh, *Harbison* 32 (A). Washington Co.: 4mi ENE of Hoke, *Radford* 35195 (NCU). Watauga Co.: 0.5mi W of Laxon on US 421-221, *Ahles & Duke* 43932 (NCU). Wayne Co.: 5mi E of Mt Olive, NC 55, *Duke* 2565 (NCU).

Oklahoma. LeFlore Co.: Page, *Palmer* 12644 (A, MINN, MO). McCurtain Co.: between Bethel and Smithville, *Nelson et al.* 5609 (GH).

Pennsylvania. Bucks Co.: 1mi E of Bristol, *Adams* 4519 (A). Delaware Co.: Linicum, *Smith* s.n. (A). Lancaster Co.: 1.5mi SW of New Providence, *Tanger* s.n. (GH). Lebanon Co.: Penryn, *Haller & Halbach* s.n. (MINN). Lehigh Co.: c.1.4mi NNW of Lehigh Furnace, *Pretz* 9439 (UC). Monroe Co.: Long Pond, *Britton & Britton* s.n. (NY). Northhampton

Co.: 0.75mi SE of Johnsonville, *Schaeffer, Jr* 18283 (GH). Philadelphia Co.: Cedar Grove, *Benner* s.n. (GH, MINN). Pike Co.: Forest Park, *Bartram* s.n. (GH). York Co.: near Stewartstown, *Gable, Jr* s.n. (A).

Rhode Island. Newport Co.: SW of Old Harbor, Block Island, *Fernald et al.* 10131 (GH). Providence Co.: near Diamond Hill, *Palmer* 45575 (A). Washington Co.: Kingston, *Thurber* s.n. (GH).

South Carolina. Aiken Co.: without definite loc., *Coker* 278 (NCU). Barnwell Co.: 1.2mi W of jct of Co. Road 217 and US 78 on Co. Road 217, *Ahles & Baird* 56972 (NCU). Beaufort Co.: Bluffton, *Mellichamp* s.n. (A). Berkeley Co.: c.2mi SSE of jct Co. Roads 16 and 46 on 16, *Ahles & Haesloop* 26422 (NCU). Calhoun Co.: Geiger Ecol. Preserve, c.1 1mi W of St Matthews, SC6 at county road 8, *Horn* 1766 (USCH). Charleston Co.: 0.4mi NW of jct Co. Road 75 and US 78 on US 78, *Ahles & Haesloop* 25678 (NCU). Chesterfield Co.: 0.5mi E of US 1 on Co. Road 13-20, *Bozeman & Logue* 9177 (LAF, NCU, USCH). Clarendon Co.: 7mi NE of Manning, *Radford* 24604 (NCU). Colleton Co.: c.2mi SE of jct Co. Road 120 and SC 64, *Bell* 2354 (GA, NCU, NY). Darlington Co.: Hartsville, *Smith* s.n. (NCU). Dillon Co.: 0.7mi NW of jct Co. Roads 61 and 70, *Ahles & Leisner* 32198 (NCU). Dorchester Co.: WSW of Reevesville, *Ahles & Haesloop* 26284 (NCU). Florence Co.: 1.5mi W of Coward, *Swails & Howe* 84/162 (USCH). Greenwood Co.: 4mi E of Hodges, *Radford* 23005 (NCU). Hampton Co.: 1.8mi NNE of Early Branch, *Ahles & Bell* 12456 (NCU). Horry Co.: 2mi S of Loris, *Bell* 7758 (NCU). Jasper Co.: 2.3mi NE of jct of SC 128 and 170 on 128, *Bell* 3833 (USF). Kershaw Co.: 2.5mi S of Lugoff, *Britt* 732 (NCU). Lancaster Co.: c.3.5mi E of Haile Gold Mine Settlement, *Ahles & Haesloop* 27443 (NCU). Lexington Co.: 1.5mi W of SC 71 on SC 602, *Nelson* 1256 (FSU). Marion Co.: c.0.5mi S of radio tower by US 76 between Marion and Mullins, *Bell* 13632 (NCU). Marlboro Co.: 3mi S of Blenheim, *Radford* 12525 (VDB). Oconee Co.: 0.4mi NW of jct of SC 28 and 107 on 28, *Ahles & Radford* 13358 (NCU). Orangeburg Co.: 1.8mi NW of Orangeburg–Berkeley Co. line, *Ahles & Haesloop* 25662 (NCU). Pickens Co.: 3.8mi N of US 178 on Sassafras Mt Road, *Ahles & Bell* 14337 (FSU). Richland Co.: 5.3mi S of Columbia, *Beadle* AzG1739 (NCU). Saluda Co.: 1.3mi E of Ward, *Radford* 23030 (NCU). Union Co.: 1.9 WNW of Lockhart, *Bell* 8548 (NCU).

Tennessee. Blount Co.: Gregory Bald, *Jennison & Smith* 2715 (TENN). Sevier Co.: between Cades Cove and Gregory Bald, *Steyermark* 65811 (GA).

Texas. Anderson Co.: Engeling Wildlife Area, *Tharp & Graham* 57-7 (TX). Angelina Co.: N edge of Boykin Springs, Angelina Nt'l Forest, *Correll* 16496 (LL). Bowie Co.: Texarkana, *Palmer* 29659 (A, MO). Cass Co.: 2mi SW of Linden, *Shinners* 26195 (SMU). Hardin Co.: Clear Lake SE of Kountze on road to Silsbee, *Correll & Smith, Jr* 29648 (LL). Houston Co.: Grapeland, *Palmer* 12063 (MO, UC). Jasper Co.: 1mi S of Erin, *Correll* 27409 (UC). Marion Co.: 4mi E of Lodi, *Correll* 30178 (LL). Nacogdoches Co.: c.9mi W of Garrison on Rte 1087, *Correll & Smith, Jr* 29662 (LL). Newton Co.: 9mi S of Burkeville, *Correll et al.* 22266 (LL, MO). Polk Co.: without definite loc., *Tharp* s.n. (NY, TX). San Augustine Co.: 16mi SE of Zavalla, *Gould* 8654 (MO, SMU). San Jacinto Co.: The Big Thicket, *Reeves* 9052 (A). Shelby Co.: 9.5mi SW of Center, *McVaugh* 8423 (SMU). Smith Co.: 2mi S of Sand Flat, *Correll* 37406 (LL). Tyler Co.: 6mi NE of Woodville, *Correll* 23457 (F, LL, NY).

Vermont. Essex Co.: Middlebury, *Ames* s.n. (GH).

Virginia. Accomack Co.: near Pocomock Sound, *Harvill* 15336 (NCU). Amelia Co.: without definite loc., *Lewis* s.n. (NCU). Augusta Co.: Big Spring Pond, Big Levels Refuge, *DeGarmo* s.n. (VPI). Brunswick Co.: 9mi W of Emporia, *Kral* 13718 (VPI). Caroline Co.: 12mi S of Fredericksburg, *Iltis* 3898 (SMU). Carroll Co.: Galax, *Schallert* 300 (DUKE). Chesterfield Co.: old Girl Scout Camp, *Kiltz* 230 (VPI). Dinwiddie Co.: c.10mi W of Stony Creek, *Kral* 11329 (VPI). Essex Co.: 0.8mi NW of jct of Co. Road 617 and US 17, on US 17, *James* 5466 (NCU). Fairfax Co.: George Mason College campus, *Bradley* 4136 (VPI). Franklin Co.: without definite loc., *Ashe* s.n. (NCU). Giles Co.: 1mi NW of Univ. of Va. Biological Station, *Churchill* s.n. (SMU). Gloucester Co.: near Gloucester, *Smith* s.n. (VPI). Greenville Co.: 2mi W of Mitchells Mill, *Harvill* 16636 (NCU). Hanover Co.: 2mi S of Ashland, *Wiegand & Manning* 2430 (POM). Henrico Co.: near Univ. of Richmond, *Wood & Townsend* s.n. (VPI). Isle of Wight Co.: 4mi S of Lees Mill, *Harvill* 16715 (NCU). James City Co.: 1mi E of Five Forks Mill Creek, SW of Williamsburg, *Grimes* 3579 (POM). King and Queen Co.: 0.2mi SW of Middlesex–King and Queen Co. line, *James* 5256 (NCU). King George Co.: 2.3mi W of King George, *McVaugh* 4879 (UC). Lunenburg Co.: 1.1mi S of jct of Co. Roads 646 and 637 on 637, *James & Ahles* 3063 (NCU). Middlesex Co.: 1.9mi NW of jct of Co. Roads 615 and 602, on 602, *James* 5692 (NCU). Nansemond Co.: 7mi W of Suffolk, *Hubricht* B2489 (TX). Norfolk Co.: near Firebreak Canal, *Weiss* 9 (VPI). Northumberland Co.: 0.1mi N of Northumberland and Lancaster Co. line on VA 200, *James* 5914 (NCU). Page Co.: without definite loc., *Artz* s.n. (VPI). Prince George Co.: SE of Petersburg at head of Poo Run, *Fernald & Long* 9999 (GH). Princess Anne Co.: near Sigma, *Fernald et al.* 4686 (GH, NY). Southampton Co.: Assamoosick Swamp, S of Sebrell, *Fernald & Long* 10361 (F, VPI). Spotsylvania Co.: near Spotsylvania courthouse, *Kiltz* 231 (VPI). Surry Co.: NE of Elberon, *Fernald & Long* 13101 (GH). Sussex Co.: Nottoway River, S of Chub, *Fernald & Long* 12426 (GH). Westmoreland Co.: 1.5mi E of Oak Grove, *McVaugh* 4965 (UC). Wise Co.: Cumberland Mts, Norton, *Seymour* 55 (GH).

REPRESENTATIVE PUTATIVE HYBRIDS: *R. viscosum* × *R. cumberlandense.* **Tennessee.** Blount Co.: Gregory Bald, *Cain* 692 (TENN). Flowers pink with an orange spot, multicellular eglandular hairs on the stem, leaves expanded; growing intermixed with *R. viscosum. Ibid., Wilson* 1790 (TENN). Flowers yellow, bud-scale margins glandular, corolla shape like that of *R. viscosum*, multicellular eglandular hairs on the stem. *Ibid., Jennison* 352 (TENN). *Ibid., Sharp & Wilson* 1782 (TENN). Flowers white with a yellow blotch; multicellular eglandular hairs on the stem. *Ibid., Cain* 690, 691 (TENN). Flowers white with a yellow blotch, style pink.

R. viscosum × *R. arborescens.* **North Carolina.** Haywood Co.: Great Pisgah Mt, *Skinner* 1058-9 (A).

HYBRID NAMES

The following are names which appear in the literature and may cause confusion. They are listed for information only.

Azalea bakeri Lemmon & McKay, Bartonia 19: 16 (1938).

Rhododendron bakeri (Lemmon & McKay) Hume, Azaleas, Kinds and Culture, p. 28 (1948). Probably = *Rhododendron flammeum* × *Rhododendron canescens.* Type: Georgia. Union Co.: Neel Gap. *W. P. Lemmon* s.n. 1 vi 1936 (holo PH).

Azalea fastigifolia Lemmon, Bartonia 19: 14 (1938).

Rhododendron fastigifolium (Lemmon) Hume, Azaleas, Kinds and Culture, p. 30 (1948). = *Rhododendron flammeum* × *Rhododendron canescens.* Type: Georgia. Cobb Co.: property of L. L. Dangers, Mtn View District. *W. P. Lemmon* s.n. 4 v 1936 (holo. PH).

Azalea furbishii Lemmon, Bartonia 21: 5 (1940).

Rhododendron × *furbishii* (Lemmon) Leach, Garden Journal 9: 3 (1959). = *Rhododendron cumberlandense* × *Rhododendron arborescens.* Type: Georgia. Union Co.: Vogel State Park, Neel Gap. *W. P. Lemmon* s.n. (holo. PH).

Azalea pennsylvanica Gable, Price-list Orn. Trees Shrubs, p. 10 (1930).

Rhododendron × *pennsylvanicum* (Gable) Rehder, Rhodora 20: 425 (1939). = *Rhododendron atlanticum* × *Rhododendron periclymenoides.* Type: cultivated at Arnold Arboretum under no. 291-35 (n.v.).

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