

American Rhododendron Society





American Rhododendron Society

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ARS Office: <http://www.arsoffice.org>

ARS On-line Journals: <http://scholar.lib.vt.edu/ejournals/>

JARS/

ARS Archives: <http://www.lib.virginia.edu/small/>

Society's Purpose

To encourage interest in and to disseminate knowledge about rhododendrons and azaleas. To provide a medium through which all persons interested in rhododendrons and azaleas may communicate and cooperate with others through education, meetings, publications, scientific studies, research, conservation and other similar activities.

Membership Benefits

- Chapter affiliation with scheduled meetings
- Journal American Rhododendron Society* published quarterly
- Annual convention and regional conferences
- Seed exchange
- Listing of registration of names and descriptions of new rhododendron hybrids published in the *Journal*

To Join the Society

Membership categories:

(January 1 – December 31)

Student (include proof if over 18)	\$10.00
Regular	\$40.00
Commercial	\$90.00
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You can join the ARS through your local ARS chapter (check the website www.rhododendron.org for chapter contact info) or by sending a check or money order directly to the Executive Director of the American Rhododendron Society at the above address. Checks must be in US funds. Make checks payable to the "American Rhododendron Society." Membership includes one year (4 issues) of the *Journal American Rhododendron Society* and affiliation with the chapter of your choice. **To receive the winter issue of the Journal, renewals must be postmarked no later than Dec. 1.**

From the President

What's going on in the Northeastern US and Eastern Canada? Last issue I was sending good wishes to those areas after Sandy. Now they are digging out from a massive snow storm. I've been watching the areas and gardens that we visited during the 2010 ARS Convention and I'm sure I would see some drastic differences now. My thoughts are with you all and I hope that spring arrives early as Punxsutawney Phil predicted on Groundhog Day.

Don Smart
Carnation,
Washington



You've seen me talk about or read my campaign for a stronger ARS through volunteers. Well, I'm still on that campaign. I was asked by a nearby chapter to give a program about the workings of the Society. After all, I'm the president and should know it all. That really is not the case, but I have learned things over the years, and the most important thing I've learned is that there are no "workings" without all of the folks who volunteer. I titled my program "Get Involved and, Oh, the Places You'll Go." I stole part of that title from a Dr. Seuss book we gave my daughter when she graduated from high school. In my program, I laid out how satisfying it has been from being a chapter board member to various officer positions; to being a District Director; and then Western VP and now President. And I will still be involved for a couple more years at the Society level as Past President. All the while, I'm still heavily involved at the chapter level because, after all, that's where the rubber meets the road.

Getting involved at the chapter level means meeting people with like interests; having fun at meetings; putting on flowers shows and sales; talking to people at nurseries or other garden clubs. The next step is volunteering to help host conventions and conferences with your District and your circle of friends grows. When you are asked to become a District Director and start attending ARS Board meetings, your horizons start to stretch across North America, and in some cases, beyond. All of these activities give you the opportunity to make new friends and my wife Carolyn and I really enjoy our larger circle of friends.

It is sad to report, though, that we have chapters that are dissolving because no one wants to take the reins and help run the chapter or meetings. We have Districts that do not have a Director. We have ARS committees that are inactive because there are no volunteers to chair them. On the website www.arsoffice.org, you can find lists of Districts and Committees where there are vacancies. There is also an ARS Organization Chart that shows how all of the Officers, Directors, and Committees fit together. We do have three paid positions, our Executive Director, Laura Grant; and our Journal Editor and Assistant Editor, Glen Jamieson and Sonja Nelson respectively. But they cannot do their jobs without the help of volunteers throughout the ARS, particularly because all non-research journal articles are volunteered and are not paid for,

So, I challenge all of you to look at where you can contribute in our wonderful Society and its chapters. As spring arrives and we start getting together in our gardens and at shows and sales, ask how and what you can do to help. Also, please look at the vacant committees on the ARS Office site and read about the roles of committees in the ARS Policies of the Board (www.arsoffice.org/policies.htm), as maybe with your experience you can contribute there too. In all seriousness, please consider finding a fit for your talents, and "Oh the Places You'll Go."

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From the Editor



Glen Jamieson
Parksville, BC
Canada

It is mid-March as I write this, and it has been a strange winter here in the Pacific Northwest. I concur with Don's hopes that the storms in eastern North America have not caused too much damage, but I expect that some gardens did suffer significantly. Here at sea level in Parksville, BC, we have not even had a frost all winter, and we've had rhododendrons flowering since November, with no flower loss due to freezing! This has never happened before, and while there has been freezing and snow at slightly higher elevations inland, and a great deal of snow on local mountains, this is nevertheless exceptional weather for us.

However, what has made this winter even more unusual is that our rhododendrons that have flowered to date have done so many months earlier than in past years! I have intentionally not planted many early-flowering species of hybrids because of normal frosts, often in February or March when the rainy (and cloudy) period is weakening and clearer skies prevail, but those early flowering rhododendrons I do have have been amazing! *R.* 'Lee's Scarlet' fully flowered in November and early December (normally January), 'Christmas Cheer' in January/February (normally March/April), and 'Rosamundi' in February/March (normally March/April). 'Snow Lady' is also about four weeks earlier than in past years. I've talked with other island ARS members and many have made the same observations. As a consequence, many of us are now keeping phenological records (the study of periodic plant and animal life cycle events and how these are influenced by seasonal and interannual variations in climate) to document this occurrence over time to try and allow us to explain it. Perhaps a consequence of this is that island chapter truss shows in late April and early May may have many later flowering species and cultivars in them this year, in contrast to the flowering rhododendrons that have typically characterized shows in past years. That will be a nice change and this will allow us to show off plants not normally seen!

This pattern may also affect the trusses on display at the ARS conference in early May in the Seattle/Tacoma area, as the climate there is often quite similar to that on Vancouver Island. It should thus be particularly interesting, and I hope to see many of you there. For those coming, safe travels!

Cover Photos

Top left and bottom right: Cross of *R. degonianum* ssp. *yakushmanum*, *R. pseudochrysanthum*, *R. arboreum* ssp. *zeylanicum*, *R. rex* ssp. *rex* and *R. bureavii* by Frank Fujioka. Top right: 'Amber Waves' by Jim Barlup. Bottom left 'Pilkingtons' Pride' by Don Hyatt.



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Stalking the Wild Lepidote: *Rhododendron minus* Reconsidered

Ron Miller
Pensacola, Florida



Like Rodney Dangerfield, the American lepidote rhododendrons just don't get no respect. Taxonomy, admittedly, has cared enough to swell the ranks by using DNA to add *Ledum*. Such molecular prestidigitation will remain academic until we seniors who defiantly employ old names finally fall in line by dying off. No doubt *R. lapponicum* is a longstanding lepidote, but it is more of a cosmopolitan green-carder than a native American. Consequently, in the text below, "lepidote" is shorthand for "a rhododendron of the section *Rhododendron*, subsection *Caroliniana*," and "var. xxx" short for "*R. minus* var. xxx." Our lepidotes have even spawned celebrities such as the PJM series and 'Dora Amateis'. These get their pizzazz from the Asiatic side of the family. For the most part, *R. minus* is dutifully acknowledged in checklists and occasionally mentioned in emails. Were all the lepidotes to vanish tomorrow, however, there would be less hand wringing or newspaper coverage than if we lost one of our charismatic snail darters or spotted owls.

My own experience reveals why these rhodies are ignored. When vocational indecision and a long, aimless, postgrad camping trip brought me face to face with the vegetation of the Southeastern mountains, "deer laurel" (so said the nature trail brochures) popped up here and there. They were mauve-pink and small flowered. Why bother with the runts when the candelabra trusses of *R. catawbiense* were scattered along the highest parts of the Parkway? Nor could those nondescript rust-flecked leaves compete with the large, dark rosettes of *R. maximum* beckoning us to linger in the cool shade on June and July days. These elepidotes, gaudy and opulent, were Appalachian spring and summer epitomized. They seemed like royalty to someone who grew up in the proletarian brown glare of South Texas seasons. By this trope, the lepidotes were ericaceous Jukes and Kallikaks holding on in spots amid the *Kalmia*, but without the mountain laurel's masses of intricately figured and mechanically marvelous flowers. A rhododendron, perhaps, but what's in a name?



Figure 1. Var. *chapmanii* flowers.



Figure 2. Var. *chapmanii* leaves in Delaware. Photo by Rick Lewandowski.

On first looking into Chapman's rhody. Upon taking a job in Florida, my goal of goals the first spring break was to sniff out that curiosity, var. *chapmanii*, on the coast to my east. It was a long drive through clearcut pine woods and around boggy thickets and by cinderblock beach camps. The condos of Destin and Panama City Beach were then only a glimmer in developers' eyes. "You mean," I despaired, "there are rhododendrons *here*?" Where were the rocky outcrops demanded by the tribe? Hours of back road bouncing and sweaty failure. Then, laboring to extricate our van bogged in the sand of a power line right of way, we glimpsed a pink rag hanging above the fronds of the saw palmettos being pillaged to pave our way out. On a closer look, familiar lepidote flowers appeared, with a bush even more straggly than that of the mountain form. The leaves, flattened, were dead ringers for those of the deer laurel, though they might have been a bit stubby and rounded and were decidedly boat shaped. The delightfully clean pink, tubular flowers were designed just like those farther north (Figure 1; compare with Figures 4 and 6 on page 10).

Once we dug and spun ourselves free, on much-deflated tires we looked for palmetto patches between the pine ridges and the *Cliftonia* swamps. Finding rhody colonies became a piece of cake. In areas now posted and gated, hundreds and maybe thousands of uniform pink tufts floated above the *Seranoa* and *Lyonia ferruginea* and *Smilax* to provide an amazing, albeit scarcely beautiful, sight. My memory of our first big var. *chapmanii* colony echoes Dr. Johnson's wry assessment of a dog walking on its hind legs: "It is not done well; but you are surprised to find it done at all."

No article, whether popular or academic, concerning var. *chapmanii* has been half so enlightening as those first few minutes when I ran my fingers down into the rotting saw palmetto mat to trace the pattern of layering and mulching that enables a lepidote to persist on fossil sand dunes paralleling a shoreline a mile or two away. I saw no

seedlings that day, or since, probably because seedbeds become available briefly only after fires. The familiar lankiness of rock-clinging *R. minus* was evident, exaggerated into long emergent shoots lifting greenery and flowers into the light above the tangle. The leaves were distinctly revolute, as were those of the ever-present *Lyonia ferruginea* and the *Quercus geminata*, obviously a means of limit water loss in droughty soil—if you can call sugary silica “soil.” Years later I saw lesser but similar reflexing, though not the uprights, on var. *minus* on a scalding southwest-facing cliff in middle Alabama. Curling leaves and water management scales may occasionally help in dry weather on exposed slopes farther north, but on a Zone 9 sand dune in August, they shine. In the metaphor of the French structuralists, evolution is not an engineer constructing an ideal solution to match a unique situation; it is a handyman, a *bricoleur*, who makes do with whatever happens to be available to jerry-rig a fix to meet the occasion.

Imagine, then, my dismay when sitting down later with the definitive article (Duncan and Pullen 1962) that established var. *chapmanii* as a variety of *R. minus* and not, as before, a separate species. No mention was made of the amazing accommodation of a rock-loving rhody to a sandy scrub. Though the article did acknowledge the telltale upright stems and revolute and rounded leaves, it treated them as non-diagnostic because plants cultivated in cooler climes backslide to the var. *minus* norm. I have myself noticed var. *minus* traits in plants labeled “chapmanii” in the Bloomquist Garden at Duke and in photos from as far north as Philadelphia. The tags of course assume that the plants are in fact 100% var. *chapmanii*, certainly a leap of faith concerning identifications in the trade or at institutions. Figure 2 displays very characteristic leaves on a coastal Delaware var. *chapmanii* grown from seed directly pilfered from a Port St. Joe, Florida, roadside thicket a few years ago. I also have seen shots of plants fully characteristic of var. *chapmanii*, with leaves blunt-tipped and revolute and rugose, and with stems as upright as a patch of asparagus, from Washington, DC, and from northern New Jersey.

The flip side avoids the puzzle. If the signature traits of var. *chapmanii* are not intrinsic, var. *minus* transplanted into Florida should come to resemble var. *chapmanii*. Not so. In my own well watered, generously mulched beds in Pensacola, var. *chapmanii* retains its hardscrabble appearance, while var. *minus* from the coastal plain or piedmont shows no tendency whatsoever to become revolute-leaved or vertical-stemmed. John Thornton has had the identical experience in southeast Louisiana with an even wider sampling of var. *chapmanii* and var. *minus*. The only environment that matters, after all, is the one in which competition and survival and reproduction occur. We might otherwise conclude that swimming cannot be used to characterize fish because they do not do so out of water. Nothing could better illustrate my contention that taxonomy should focus on natural selection in definable niches rather than on recurrent features on decontextualized samples.

Upon considering alternatives, Duncan and Pullen found in shorter leaf petioles the only statistically reliable difference to survive cultivation northward. Surely their

number crunching provided a cover for a foregone conclusion. If a perturbation of a single minor trait within a local population can by itself establish a variety, our checklists must inevitably grow like the *Congressional Record*. The authors could hardly have avoided noticing the countryside as they gathered samples, yet you can read the entire 1962 paper without catching the slightest hint that these plants are siliciphile scrub dwellers, probably pyrophytes, no less dependent upon *Serenoa* than a barnacle is upon its rock.



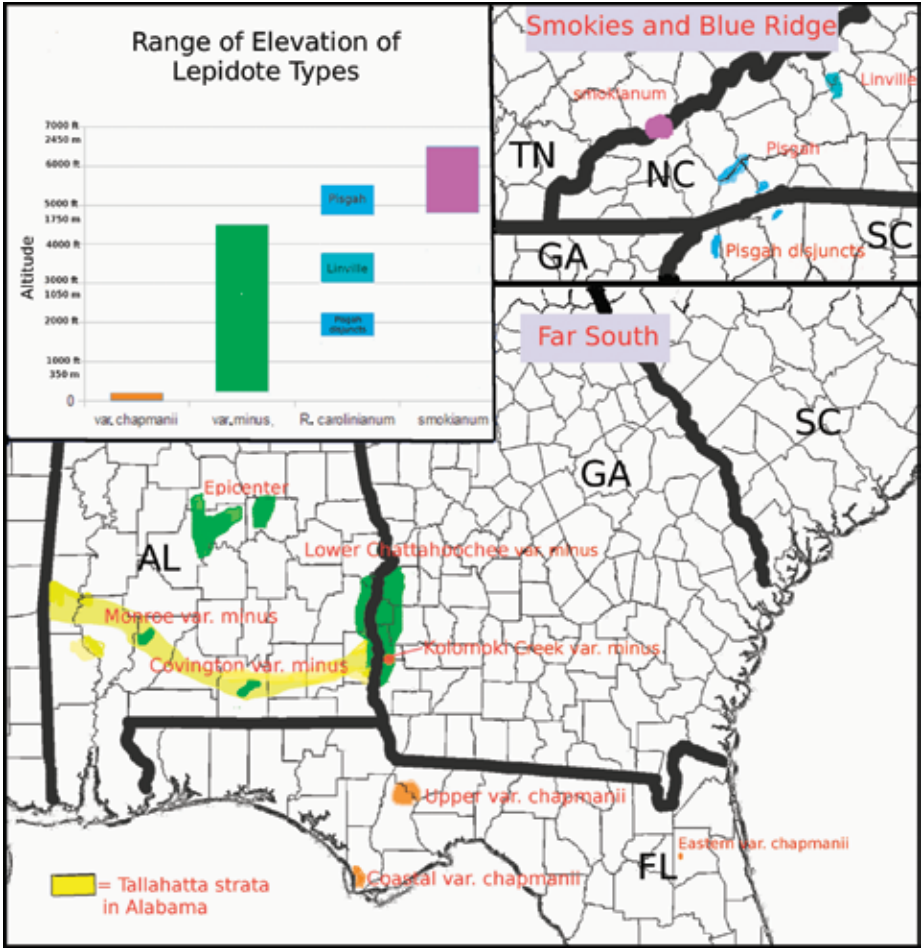
Figure 3. Kolomoki Creek, GA, white var. *minus*.

Nonetheless, argumentation aside, their choice of varietal status seems a reasonable compromise. Weakley (2011, p. 664) has recently promoted this rhody once again to species rank. This seems a stretch, considering the extraordinary morphological continuities between it and var. *minus*. The major downside to Weakley's decision to declare three independent species of lepidote—and as we shall see, by all rights there should then be one more—is that some very useful distinctions get lost in the leveling up.

Beads on the Tallahatta necklace. Duncan and Pullen (1962) provided a county map of the lepidotes which inspired subsequent outings. Why does var. *minus* stop at the edge of the piedmont everywhere else, while extending along the Chattahoochee River into the coastal plain? Could var. *chapmanii* be a cut-off extension of the Chattahoochee plants?

Nope. Trips to the lower Chatta-hoochee revealed a very different strain of var. *minus* inhabiting the deeply incised *R. prunifolium* country not far from the Florida line. These low-stature lepidotes can be pure white in one small area and light pink throughout, with tight trusses produced by short petioles (Figure 3). As John Thornton first pointed out to me, trusses from white and pink-blush plants above Kolomoki Creek in Georgia are practically indistinguishable from the whitish trusses from the Pisgah Ridge west of Asheville. Across the river on Abbie Creek in Alabama, the plants are similar, except for darker shades. These lepidotes bloom late in the seasonal cycle, during the last weeks of April or even the first week of May, while var. *chapmanii*, less than 70 mi (110 km) to the south, starts in mid March. The var. *minus* most resembling var. *chapmanii* in flower shape and strawberry tubes and bloom time occurs 80 mi (130 km) to the west, in a colony unknown to Duncan and Pullen.

Subsequent expeditions revealed that the Chattahoochee lepidotes vary remarkably



Map. Locations and elevations of *R. minus* varieties, *R. carolinianum* varieties, and “smokianum” in Tennessee (TN), North Carolina (NC), South Carolina (SC), Alabama (AL), Georgia (GA), and Florida (FL). The entire distribution of *R. minus* var. *minus* is not shown.

in flowering times over short distances. Some var. *minus* near Providence Canyon peak in March; others to their south in Georgia and to the southwest on the northern outskirts of Eufaula, Alabama, bloom mid April. Lepidotes are scattered intermittently up the Chattahoochee onto the piedmont and, north of Atlanta, into the lower mountains. Whether the southernmost Chattahoochee var. *minus* are more akin to nearby standard pinks or to lepidotes further north, only DNA will tell.

In the mid 1970s, I was blindsided while camping in a Corps of Engineers park in

southwestern Alabama. Killing time with a morning coffee in hand and a companion still asleep, I wandered down a trail admiring the mountain laurel hanging over a rocky precipice, only to see—Oh my gosh!—run-of-the-mill var. *minus*. Trespassing onto the next high ridges betrayed large colonies to the north. By chance a few years later, I mentioned these to an Auburn grad student; the word got out. A decade or so afterward, a map appeared showing var. *minus* there and in an Alabama county even farther south. It took years of boating and clambering to find the latter. Both of these are more removed from the main body of var. *minus* in the piedmont than the northernmost var. *chapmanii* colony is from the Chattahoochee plants. They grow on steep, rocky terrain, mostly on north-facing (rather than, as in the mountains, often on south-facing) slopes.

The geology is significant. Var. *minus* colonies occur where major rivers slice through the exceedingly resistant uplifted strata, the *cuestas*, of the Eocene Tallahatta Formation—“Tallahatta quartzite,” as this rock is called by archaeologists who study projectile points, though it is actually super-hard sandstone. Lepidote colonies fall on the arc of the Tallahatta (shaped much like a necklace or a catenary) extending (a) from the Alabama River in northern Monroe County; (b) to a low point on the Conecuh River in Covington County, as close as 18 mi (30 km) from the Florida border; and (c) to the Chattahoochee in the previously discussed broader area in both Alabama and Georgia. For a map of these sites and the broad zone where Tallahatta outcrops occur, see Map on page 8. The jagged terrain created by the erosion of these indurated layers, and maybe the magnesium-rich intermediate layers of claystone, provides an equivalent to the favored hard rock, micaceous sites of var. *minus* above the Fall Line. John Thornton has had soil tested from a large variety of lepidote sites from the Florida coast to the Pisgah Ridge, and all samples have come back high in magnesium, at times elevated enough to alarm agricultural testers. Even the sand beneath var. *chapmanii* is very high in this element. Interestingly, these same Eocene strata are also the home turf of *R. colemanii*.

These coastal zone plants have extraordinary horticultural potential. They are as heat tolerant as var. *chapmanii* without the latter's gangly form and are much less miffy about soil type and perhaps less susceptible to *Phytophthora*. But most important, they appear never to have gone through a genetic bottleneck like the one which must have curtailed the diversity of var. *chapmanii*. See Figures 3-6 on pages 7, 10, for baubles from the Tallahatta necklace. The coastal populations offer a range of handsome rhodies that should do well in Dallas, Baton Rouge, Mobile, Jacksonville, or Charleston. In cultivation they become bushes that fill out nicely, unlike the leggy mountain or Florida forms. One clone named ‘Southern Cerise’ (Figure 4, page 10) has been distributed by Dr. Tom Ranney of North Carolina State.

No place like home. Can anyone get beyond first impressions? Heroic skepticism



Figure 4. Coastal dark var. *minus* ('Southern Cerise').



Figure 5. Coastal pink var. *minus*.

or just plain dumb luck is needed to acknowledge details that challenge our habitual ways of thinking. In my own case, I knew the lepidotes first in the mountains and for decades dismissed the southern disjuncts as cool-temperate expatriates doggedly holding on in an overheated land, like Britishers assigned to the Houston consulate. Thanks to books on climatology, boats in the water, and boots on the ground, three recognitions finally liberated me from conventional wisdom:



Figure 6 Coastal pale var. *minus*.

1. Rather than a rarity on the lower piedmont, var. *minus* populations are more extensive there than in the uplands. When we factor in the biomass of colonies which go on and on and on, the greatest density of the species seems to be middle Alabama, though it takes a boat to view most of these vast populations.
2. Without a doubt, the greatest genetic diversity can be found in the lower piedmont. Maximum diversity is often taken to indicate the epicenter of a species.
3. "The Pleistocene must be viewed as a cold, glaciated epoch, interrupted periodically by catastrophic warm events—the brief interglacials with climate similar to that of today" (M. B. Davis, qtd. in Graham 1999, p. 280). Therefore, the mountain *minus*es must be seen, even more than the coastal, to be climactic relicts, outliers, jetsam, debris. For most of the last 2.5 million years, the Appalachian uplands were treeless areas, when not outright tundra, and thus were probably devoid of rhodies except maybe *R. lapponicum* or its kin. The Tallahatta band of the coastal zone, on the other hand, has probably harbored lepidotes throughout the Pleistocene and maybe before.



Figure 7. Piedmont dark var. *minus*.



Figure 8. Piedmont light pink var. *minus*.

Almost a decade ago, in mid-Alabama boating to map the July-September blooming “georgiana” form of *R. arborescens*, I came upon var. *minus* blanketing miles and miles of inaccessibly steep bluffs above rivers and creeks and reservoirs. Individual plants extended less densely along the lower banks of rocky creeks and spread sporadically far into hardwood slopes with rocky outcrops. The favored scarps were ordinarily north-facing and consequently somewhat mesic, with *Kalmia latifolia* replacing var. *minus* on south- or west-facing or on less precipitous declivities. Nonetheless, the single most varied population known to me, the patch with the highest percentage of show-stopping clones, is remarkably dry, with rhodies at the upper edge extending as scattered specimens into xeric longleaf pine woods, where they are accompanied by tufts of wiregrass, patches of *Cladonia* lichen, dwarf huckleberries, and occasional trailing arbutus. Above a reservoir on the Tallapoosa River west of Auburn, Alabama, stunted var. *minus* occupy bare rock faces seemingly too dry even for *Kalmia*, nesting there in niches that look to a Texan as if they were sites for strawberry cactus in the Big Bend.



Figure 9. Piedmont white var. *minus*.

Figures 7-10 present a series of flowers from the igneous rocks of Coosa and Chilton counties, Alabama, between Montgomery and Birmingham, at 200-300 ft (60-90 m). See the “epicenter” on the Map for the area.. These plants will flourish in gardens as far south as Zone 9 or perhaps 10a, and might do well in Zone 6. Piedmont plants are often

quite happy moving north. During the Pleistocene, they had lots of practice. Var. *minus* in the lower piedmont represents the single most underexploited group of our native rhodies. There is scarcely a lepidote in the mountains that does not have a doppelgänger above the river impoundments and creeks there: short tubes, long tubes; red tubes, pink tubes; yellow freckled bee guides, green freckles, no freckles; tight trusses, loose trusses; white corollas, dark corollas; pure pinks, muddy pinks; flared petals,



Figure 10. Piedmont varicolored var. *minus*.

narrow petals; and on and on and on. Why has such wealth not been noticed before? Because most of the colonies are seen only by jet skiers and fishermen, few if any of whom give a hoot about vegetation on the banks, except maybe as something to hang bush hooks on. Botanical collectors on per diem, on the other hand, seldom pull jon boats behind them or pore over topo maps and satellite photos for steep cliffs and locals-only boat ramps far from the Holiday Inn Express.

Nor are these lower piedmont rhodies noteworthy only for their flowers. Growth forms can be found with shiny, almost *R. maximum*-sized leaves that made us think wrongly that they were tetraploids. There are var. *minus* with minuscule leaves and normal flowers; tall, lanky forms and short forms with compact shapes; forms clinging vine-like to dripping vertical surfaces and clumpy forms with slightly curled leaves on pea gravel inclines devoid of other vegetation.

What may be even more surprising than this plenitude is the Spanish moss (*Tillandsia*) festooning many colonies, while the soil underneath supports Appalachian *Galax*. In Figure 11, the moss-laden trees above the wall of var. *minus* just above the water are mostly mountain or chestnut oak, *Quercus prinus*. Low country Florida anise (*Illicium floridanum*) displaces the rhodies at the bottoms of wet slopes and within gullies. Incidentally, along rocky creeks, this mix of montane and Gulf vegetation is supplemented by the densest population of *R. arborescens* that I have seen anywhere. Perhaps this is the epicenter for the smooth azalea, too.

The lepidotes in the upper piedmont or above the Fall Line on the Chattahoochee River or the Flint or the Oconee or the Savannah, to the extent of my wanderings, seem less rich and varied. I have never visited the lepidotes in the eastern piedmont of South Carolina or on the Pee Dee River in North Carolina. The flower colors on the lower piedmont and the coastal plain are consistently less mauve than those in the lower mountains. At this point, one can only surmise that the lesser diversity in the upper regions reflects a pollinator preference in cooler climes for shorter-tubed, purplish



Figure 11. A wall of var. *minus* with Spanish moss, Jordan Lake, Alabama.

strains. Maybe a genetic bottleneck was also involved. The high mountain lepidotes (which we shall see are not var. *minus*) scarcely have tubes at all. As you might expect, as var. *minus* goes higher in altitude, it becomes more able to colonize south-facing slopes. Upper piedmont and low mountain var. *minus* appear most often on drier substrates; they cannot compete on truly mesic slopes where *R. maximum* (the northern analog to *Illicium floridanum*) prevails.

Though the paragraphs above emphasize local differences, nothing in the lepidotes from the Florida line to the lower mountains justifies hairsplitting. The rhodies occupy similar habitats and present similar appearances. All reflect in the same basic economy. Two things var. *minus* demands everywhere are (a) an acid growing medium, however thin, and (b) very, very sharp drainage. *Kalmia latifolia*, its constant companion, will occasionally spill down onto sandy floodplains; var. *minus*, never. The mountain laurel, which offers plant hunters a handy signal to start looking for the rhody, also gives an estimate of its state of bloom. The two plants tend to overlap in flowering, with one or the other slightly preceding according to the local strains. This congruence will become significant when considering the mysterious lepidotes high in the Great Smoky Mountains. With the exception of some lower Chattahoochee colonies, peak bloom seems to be constant within the progress of the season: from March near sea level in lowest Alabama to late May or June in the mountains at 1000-4500 ft (300-1370 m; the latter on Mt. Toxaway near Cashiers, North Carolina).

Desperately seeking carolinianum. Once we move into the higher mountains, flowering times become critical. Early flowering was the bedrock of previous claims for a separate mountain type. Indeed, Alan Weakley (2011) has recently made this trait paramount in his revival of *R. carolinianum* as a separate species, countering Duncan and Pullen's overall conclusion that subdivisions except var. *chapmanii* cannot be justified by comparative traits:

Rhododendron carolinianum Rehder, Carolina Rhododendron, Punctatum. Rocky summits, heath balds, high elevation forests, moist slopes. Late April-May; September-October. A Southern Appalachian endemic: w. NC, e. TN, ne. GA, and nw. SC, from the Linville Gorge area south and west to the Great Smoky Mountains; its precise southern limit uncertain. *R. carolinianum* is phenologically separated from *R. minus*, flowering earlier than *R. minus*, despite its occurrence at higher elevations and with a more northerly distribution. Morphological distinctions between the two taxa are subtle and inconsistent, as discussed by Duncan & Pullen (1962). From a horticultural perspective, Davidian (1982) supports recognition of *R. carolinianum* and *R. minus* as distinct. Gensel (1988, and pers.comm.) did detailed studies of the complex and supported the recognition of 3 taxa (*R. carolinianum*, *R. minus*, and *R. chapmanii*). (Weakley 2011, p. 664)

It seems puzzling for Weakley to accept Duncan and Pullen's evidence for the uncertainty of traits while rejecting their conclusions, especially since flowering time was singled out by the earlier authors as being unreliable. Specifically, they observed that herbarium sheets from some sites could be found with flowers dating from March into July and even later, thus proving that the precocious mountain form is little more than a rural legend.

Nonsense. We can take you where they grow. Lepidotes are notorious about

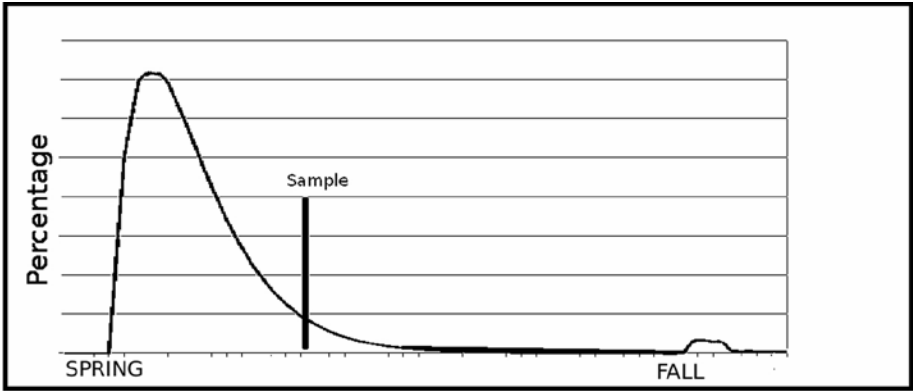


Figure 12. Yearly bloom curve.

blooming out of season. The coastal Covington County colony mentioned above, for instance, puts on a show worth visiting almost every October—not as rich and varied as the March-April extravaganza, perhaps, but well worth the gasoline. Other than during the dead of winter, a few stray flowers are likely to be found somewhere within most extensive colonies. Since dates of flowering bear the burden of Weakley’s declaration of a species, we need to digress to ask what “bloom time” really means.

Figure 12 is a schematic *R. minus* flowering curve, with the “y” axis representing the percentage of plants in bloom and the “x” the growing season. A typical secondary fall reblooming maximum is indicated by the blip at the right. Suppose you were a collector. What would you do if you visited the colony on the date indicated by the vertical line? From which would you gather a sample, one of the vast majority of plants with spent flowers or one of the minority still bearing trusses? More importantly, what would a taxonomist dependent upon your sheets conclude from the dried flowers?

The crucial datum is not the presence of flowers but the peak of bloom, the inflection point of the curve, within the overall seasonal sequence. Normalized to the local progression of spring, an *R. carolinianum* peaking in early May at 5000+ ft (1500+ m) in North Carolina, when frosts remain possible if not likely, is effectively earlier than var. *minus* and *Kalmia latifolia* near the Gulf Coast blooming in late March, when frosts have long been a thing of the past. As anyone knows who has scheduled an azalea pilgrimage to the Southeastern mountains the autumn before, spring displays vary from year to year; and when one anticipated plant is out of sync with expectations, all are. The only way to hit a calendrical peak in any given year is to visit the colony in question periodically, to have friends working at the Pisgah Inn, or to get lucky.

Well, then, were Duncan and Pullen’s debunkings right about the other suggested discriminants? Older plantsmen proposed a grab bag of differences: less pointed leaves, flowers appearing before the shoots, greater lobe-to-tube ratios, shorter filaments, higher altitude, etc. These assertions were tested by (a) dividing sheets from non-var.

chapmanii lepidotes into three geographical areas (two in the mountains and one below), (b) recording dates and measurements and calculating ratios, and (c) plotting bar and scatter graphs. Such a broad-brush method might reveal a steady north-south cline or a discontinuity between luckily placed, relatively homogeneous large regions. However, as we shall see—and as the upper map on page 8 shows—areas where non-standard lepidotes occur are small and discontinuous. Moreover, the plants within differ widely. It is therefore impossible to say how many of the actual non-var. *minus* enclaves were sampled. A few aberrant points on the scatter graphs suggest that some were. Grouping the sites by altitude would have been useful, if these data had been available on the sheets, as would describing locations more precisely than by the mere counties of origin. The reliance upon dried materials and flowers reconstituted by soaking does not make one feel confident about the linear measurements, either.

Clarence Towe and I decided to do the simpleminded thing. Drawing upon our own experience and asking around, we chose two widely acknowledged early blooming areas and visited them two years in a row. Both of us had long experience with the Parkway's white Pisgah form that stretches from just east of Mt. Pisgah to Beech Gap. In addition, we were directed to pink colonies near Linville Gorge, north of Spruce Pine, North Carolina (see Map on page 8). Clarence carried with him intimate knowledge of var. *minus* in the upper piedmont and lower mountains; I had surely worked the lepidotes of the lower piedmont and coastal zone as extensively as anyone ever has.

First of all, both groups of apparent *R. carolinianum* do indeed peak quite early, however extended the decaying tails of their bloom curves might be. For characteristic flowers, see Figures 13 and 14. At those elevations, the first week of May (in 2011) or late April (in 2012), the oaks and *Aesculus flava* were just coming out, four-winged silverbells were still blooming, *Trillium grandiflorum* was nearing its glorious climax, *R. vaseyi* was appearing, and occasional shadbushes retained a few of their terminally



Figure 13. Pisgah *R. carolinianum*.



Figure 14. Linville *R. carolinianum*.

pinkish petals. Down on the Gulf edge, shadbush and four-winged silverbell bloom around the first of February; and var. *minus* and mountain laurel, depending on origin, peak from late March to mid April. Calendar-wise, the higher altitude Pisgah plants put on their best display a week or so later than the Linville but may in fact peak a bit earlier within the vegetative sequence. In the upper piedmont of South Carolina near 1000 ft (300 m), where Clarence keeps watch, var. *minus* blooms two or so calendar weeks later than the *R.*



Figure 15. Lower mountains *R. carolinianum*.

carolinianum 3000-4000 ft (900-1200 m) above him, or about a month later within the seasonal progression—long after, for instance, his local piedmont *R. calendulaceum* is spent. Try to find a flame azalea blooming at Pisgah or on the lip of Linville Gorge on May 1. Or, at either spot, find a *Kalmia latifolia* open along with the *Halesia*. The long-tubed mountain var. *minus* puts on a mid spring show. *R. carolinianum* is a harbinger of warm days ahead.

By an odd twist, at least three local populations exist of what is surely a recurrence of the Pisgah form at 1500-2000 ft (450-600 m) in the lower mountains of South Carolina and adjacent North Carolina. The plants grow in odd microclimates at Jones Gap and near Lake Jocassee and in the Green River headwaters, on rather moist to drippy, highly micaceous sites (see Map). These disjuncts must be relicts from cooler times when the ridges above were more likely to be frequented by musk oxen than rhodies. Examine Figure 13 and 15 to compare high and low altitude flowers. Considering their elevation, these lower plants bloom about as early in the sequence as do the Pisgah lepidotes above.

Thus the old early/late distinction between var. *minus* and *R. carolinianum* holds up when one consults the rhodies in situ and keeps in mind the ambiguity inherent in the words “early” and “late.” No less distinct are the flower tube lengths. The flowers of the two high altitude plants, in profile, look like shallow dishes with a small bump or nipple for a tube. Var. *minus*, with its noticeably constricted and lengthy tube, resembles a 19th century ear horn or the amplifier in the old Victrola ads (see Figure 16 on page 18 and the bottom half of 19 on page 22). Though the tubes of var. *minus* tend to become shorter as one moves north, the change from the lepidotes of the lower mountains to those on Pisgah Ridge or on the lip of Linville Gorge is discontinuous and extreme. Once again the observations of those woefully unscientific plant hunters of yore were right and the statistifications of their successors, misguided.

The economies of the two varieties are similar. Both are less given to generating dense, monospecific colonies than is var. *minus*. No doubt they will come up in clusters wherever a seed bed makes itself available on mossy edges, on roadcuts along the Parkway, and in areas of freshly disturbed ground. Fine-seeded, wind-distributed plants all do this. Both types of *R. carolinianum*, however, seem most at home scattered in open woods or on bushy slopes amid other vegetation. Var. *minus*, by contrast, is happiest en masse competing by choking out other vegetation. If the Pisgah form of *R. carolinianum* can be found more often in exposed situations, that may merely reflect the higher Canadian zone where it grows.

The two forms are far from identical. The Pisgah form tends to have smaller, more acuminate leaves than the Linville form. The leaves of Linville are often more obovate than either those of the white Pisgah form or of *R. minus*. The Linville plants are on the whole the more robust of the two varieties and perhaps a little taller. Neither shows the lanky reach that makes the moniker “minus” rather ironic in lower regions. The most striking difference between the two populations is provided by the magenta-pink, red- and golden-freckled, wider, and definitely more showy flowers of the Linville plants, which lack the dominant white colors of its sibling to the south. Pisgah flowers often have yellow, brown, or green freckles and an undertone of ethereal pink seen nowhere except on the lower-altitude disjuncts and on the Kolomoki plants near Florida. The almost tubeless *R. carolinianum* both have tighter trusses than any of the lowland lepidotes except (again) those southwest Georgia oddballs.

John Thornton reminds me that the Kolomoki plants and the upper and lower Pisgah plants all display a whitish bloom on leaf undersides resembling the bloom found on the lamina of *R. alabamense*. So eerie is this resemblance, added to the others, that one must be reminded that the Kolomoki plants cannot be annexed into the Pisgah crew because of their late flowering and undeniably tubular flowers. Maybe sequencing will explain these affinities.

Unfortunately, my own home is not close enough to the mountains to carry out the week-in, week-out peregrinations necessary to discover whether there are lower-



Figure 16 Profiles of *R. carolinianum*.

altitude disjuncts of the Linville form below the Blue Ridge escarpment in the Marion, North Carolina, area or whether the reported lepidotes north and west of Grandfather Mountain represent standard var. *minus* or more *R. carolinianum* or a third something. *R. minus* maps show the species extending all the way up into southern Kentucky. With luck, this article will inspire readers in these regions to check things out.

So then do the Linville and the Pisgah lepidotes constitute a genuine unity worthy of specific or varietal recognition? Almost certainly yes, though without next-generation DNA sequencing, all bets must be hedged. Flowering time, flower morphology, smaller and rather hippy buds, lower stature, dispersed growth, and high altitude combine to make them considerably more distant from var. *minus* than the habitat-aberrant var. *chapmanii* is. What we need to know first of all is their genetic relationship to var. *minus*. Since var. *chapmanii* is apparently a specialized spinoff from the species norm, perhaps *R. carolinianum* is too. Or these plants may instead have arisen in parallel with var. *minus* from ancestral stock, or var. *minus* may even prove to be a spinoff from *R. carolinianum*. One thing is certain: whoever has the motivation and the credentials to revise the subsection formally should start with plants in situ rather than with stacks of dried material.

My choice would be, as above, to follow Weakley and to call *R. carolinianum* a species until sequencing determines how close the two types are to each other and to vars. *minus* and *chapmanii*. If they are close indeed to *R. minus*, then demote them; or if they are at some distance, continue them as a species, with DNA work determining whether the two merit separate varietal recognition. Their ranges are quite distinct, and Clarence and I found them patently different plants. When we examined the low-altitude *R. carolinianum* disjuncts in South Carolina, there was never a thought that we might be seeing a reappearance of the Linville variety. Horticulturally, these are separate rhodies with distinct virtues that deserve cultivation wherever the climate will allow.

On top of Old Smoky. But there is one more high altitude lepidote in plain sight a few hundred yards/meters from one of the busiest parking lots of our National Park System, at Newfound Gap on the Tennessee-North Carolina line. If sheer altitude (5000 ft, 1500 m) were the determining trait of *R. carolinianum*, this Smoky Mountain plant would be a slam-dunk ID. Of late, Don Hyatt has been calling our attention to this plant because of its mid- to late-June blooming and purplish, tiny, tubeless flowers. Actually, from photos on the Web, plants on Mt. LeConte can bloom as late as August 1. Don was not the first to notice this oddity. S. D. Coleman, Sr., found the lepidote so distinct that he dubbed it "*R. gilbreathi*[i]" after his son-in-law (Coleman 1965), a name that lacks taxonomic standing, as well as the necessary Latin additional "i." To avoid wordiness and just for fun, let's nickname the rhody "smokianum."

Don's reports tempted Clarence and me to refer to smokianum casually in our deliberations as "Don's late minus" or "tardiflora." Ours, however, was but another

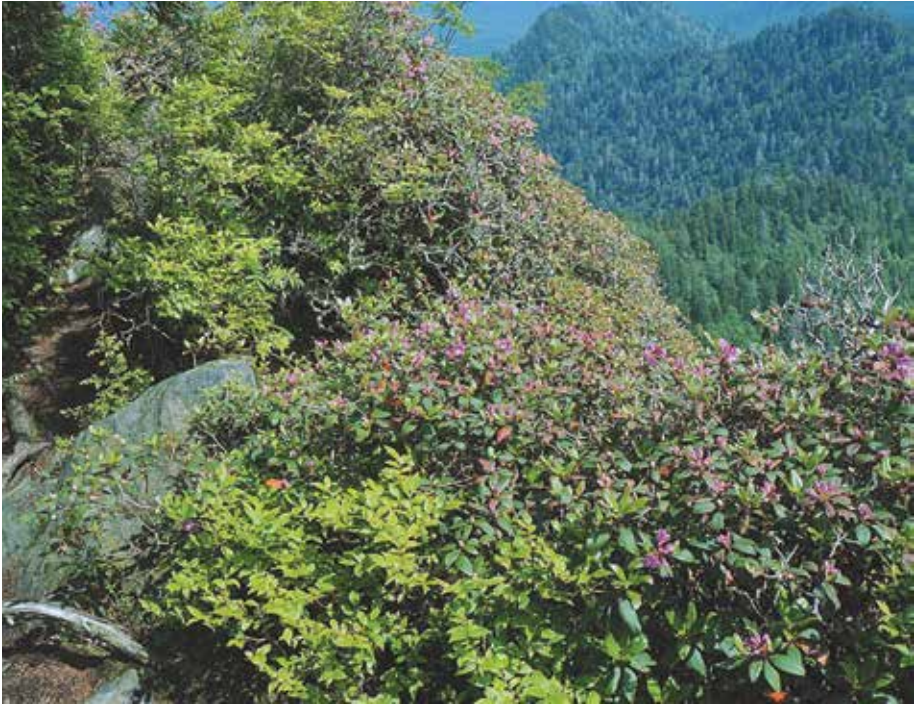


Figure 17. The Jumpoff.

case of confusing seasonal and calendrical time. The plant blooms exactly when one would expect a var. *minus* to bloom at such an altitude, along with the *Kalmia latifolia*. Thus Weakley is mistaken to pigeonhole this plant in *R. carolinianum*, which is wholly defined by early flowering. His other arguments for *R. carolinianum* simply acknowledge the opinions of others. The Linville and Pisgah plants are seasonally quite early, the Smokies plant solidly midseason. What is late up there is the season itself.

Smokianum's leaves are small and more pointed than those of any var. *minus*. They exhibit to excess the gunmetal green hue that often sets off southern lepidotes not in bloom. Like var. *minus* and unlike *R. carolinianum*, this plant grows primarily in impenetrable, monospecific masses, though it will scatter in the cracks and nooks of rock faces. Like var. *minus*, it prefers precipitate slopes and sharp drainage—indeed, it is the most demanding of all lepidotes in this regard.

There the resemblances end, as my wife and I discovered climbing up from Newfound Gap to examine an extensive colony revealed by Web photos from a spur of Mt. Kephart called the “The Jumpoff,” at 6100 ft (1860 m). There smokianum forms continuous, interwoven, and smooth-surfaced hanging mats that seem sculpted (Figure 17). Though piedmont var. *minus* colonies can stretch on and on, these always reveal a clear subtexture of distinctly individual clones. The Smokies plants seem to operate as parts of a whole like polyps of a brain coral. Are the hanging mats a single



Figure 18. Smokianum branched bush.

clone? Though colonial var. *minus* does reproduce primarily by layering, I have never seen a clone so extensive. Most likely, massed smokianums only look identical. No plant is more than 3-3.5 ft. (~1 m) tall. The individual bushes exhibit none of the legginess of var. *minus* but are intricately branched like boxwood. See Figure 18 for twiggy and rounded plants growing from a crack in a roadcut on US 441, where wind pruning can scarcely be a factor. This shape must be genetic.

On “The Jumpoff,” stray plants could not be found amid the hobblebush viburnum, mountain ash, and spruce woods adjacent to the high altitude precipice from which the lepidote mats hang, as there would have been if the plants had been *R. carolinianum* or var. *minus*. On the way up, we chanced upon a few small colonies on the lips of minor rock faces, though never on the broken or boulder-strewn steep slopes where *R. catawbiense* thrives. Not a single seedling was visible in the fine rubble at the bases of the overhangs. Tiny plants could be found only on sharp edges, on lips and cracks in vertical, not horizontal, surfaces, and never in the woods amid other plants. Though all rhodies and azaleas require well-drained, leafless substrates for successful seeding, only Eastern Hemisphere epiphytes seem from all accounts so narrowly specialized. Indeed, if mossy or detritus pockets were lodged on large tree limbs high in the Smokies, we might be calling smokianum a “sometime epiphyte.”

These are emphatically not dryland plants in the way the montane var. *minus*

can be. They insist on mossy cracks in dripping, wet rock faces or the seepage lips of disturbed areas or cliffs. When one drives up US 441 from Cherokee, North Carolina, many rocky slopes in the rain shadow (the south and east sides of the divide) look ideal for var. *minus*. None can be seen. Only in Tennessee, on the north and west side just below the summit, do these lepidotes appear in what might be called the “Smokies mist belt,” where the rainfall may total 80 in (2000 mm) per year and mist or fog occurs most days during the growing season. From the highway they are visible only on road cuts or on the exposed lip of the great slide area of the Anakeesta Ridge. Where the cuts are south-facing



Figure 19. Profiles of *smokianum* and var. *minus*.

and thus less damp, not a single lepidote. Higher up, the pattern holds. Perhaps these rhodies, like the redwoods of a more famous fog belt, derive much of their water by absorption through the leaves. From photos on the Web, one gathers that the center of distribution is Mt. LeConte, with colonies scattered at least from Charlies Bunion to Clingmans Dome and Chimney Tops—all places high and misty.

The flowers are not as shallow or flared as those of the Pisgah or Linville *R. carolinianum*. They are shaped more like a bellflower than like the Victrola horn of *R. minus* (see Figure 19 and compare Figure 16). As Robert Frost might say, something there is up there that doesn't like a tube. There must have been a tube somewhere in the ancestry of *R. carolinianum*. Maybe *smokianum* had a tube and lost it, or never had a tube at all.

The colors of the flowers of this mist dweller are certainly darker and more purplish and more uniform than those of any lepidote strain anywhere. No less characteristic are the small, tight trusses resulting from the lack of tubes. Coleman (1965) called the flowers “violet colored,” a bit of an exaggeration, though extremes are close enough to look violet on cloudy days or in poorly color-balanced photos. A scattering of the flowers, though highly pigmented, might pass unnoticed in a highly colored var. *minus* patch of the upper piedmont (Figure 20). The massed opening buds and flowers at a distance are, however, unmistakably dark and uniform, as can be seen in some rather fine panoramic shots at

<https://picasaweb.google.com/michalumjohnno/ATToJumpoffCharliesBunion#> and <http://fineartamerica.com/products/clingmans-dome-from-cliff-top-alan-lenk-metal-print.html>.



Figure 20. Smokianium color.

Anyone unconvinced by such scenes that smokianum is something else, something new, will also have trouble telling a lepidote from a lepidopteran.

The clumpy growth form and bluish, tubeless flowers have tempted several of us to speculate in our emails that ancestral *R. minus* might have mixed with *R. lapponicum* or another, no longer present, member of the *Lapponica* during a glacial maximum. To my eye, however, the purple looks like an intensification of the same mauve tint that darkens upland var. *minus*. The cyanic undertone of the magenta-pink Linville *R. carolinianum* seems based on a different pigment. Any likeness to the Asiatic alpine rhodies is likely the result of natural selection, in

a convergence of genetically separated organisms called “homoplasy,” creating similar traits in diverse plants growing in peaty, cold, wet, windy settings.

Is then smokianum a separate taxon? Its geographical isolation and its distinct habit, flowers, and edaphic and atmospheric requirements all shout yes. Is it a species or a variety? That choice might depend on the direction of the gene flow. It could be, as Clarence Towe believes, that the lepidotes as a group are in ancestry mountain plants; and then smokianum most likely represents a separate species that may have hybridized with ancestral *R. minus*. Parallel hybridization might even account for *R. carolinianum*. In flower shape, the Smokies plant is more distant from the *R. minus* norm than either *R. carolinianum* or var. *chapmanii*; and it is hard to believe that pollinator preference by itself could make tubes vanish in a geologically brief period of time.

My counter-hypothesis is more mundane. Similarities with mountain and upper piedmont var. *minus* in bloom time and flower pigment and gregariousness suggest that smokianum is, like var. *chapmanii*, an offshoot of standard *R. minus* created by peripatric evolution: the divergence of a fragmentary population isolated at the edge of the range of its parental species (Mayr 1976, p. 324). Var. *chapmanii* is almost certainly a var. *minus* fragment which diverged when the climate warmed and the mass of the parental stock retreated to cooler climes. Explanatory efficiency (i.e., Occam’s Razor) would suggest that smokianum was similarly marooned, not on sand dunes but on high mountain ridges, where it diverged and adapted when the climate cooled during the next glaciation or stadial. Its remarkable uniformity could be explained by a narrow genetic bottleneck during the process. In this climate-cycle narrative, the growth form

and flower shape and habitat specialization of *smokianum* offer another instance of the evolutionary handyman/*bricoleur* making do with whatever was lying around. The species-or-variety choice would thus depend wholly on the extent of the makeover, which was considerably more ambitious for *smokianum* than for *var. chapmanii*.

Certainly, if *var. chapmanii* deserves to be set apart, *smokianum* does, too. Coleman and Hyatt are to be celebrated for spotting these plants and recognizing that they had encountered something, well, strange. Before seeing Don's photos, I had inched several times across Newfound Gap in the bumper-to-bumper traffic without even noticing the deer laurels, much less recognizing that they are unlike the familiar ones below. Since Don called our attention to these plants, I have spent hours Googling to find incidental references by naturalists and hikers to "minus" or "Carolina rhododendron" in the Smokies. Not a single hint that these plants are in any way non-standard.

Perhaps the greatest impediment to our taxonomic perception is the cozy sense of closure that washes over us upon affixing a label. In an initial encounter, the Rolodex of the mind spins to find a ready tag to hang on the bird or beast or plant. We say to ourselves, "Oh, it's an XXX!" From then on, that name provides the screen upon which experience is projected. Last year, a well-known azalea fancier objected to a paper of mine describing the "pink austrinum" on one of my local rivers. Experts, he countered, had toured that stream and had seen only *R. canescens*. No argument there: what they saw was *R. canescens*; what they never saw was the actual pink tetraploid on the banks. At Newfound Gap, Hyatt and Coleman looked twice, carefully, with an unprejudiced eye.

Could these Smokies plants be horticulturally useful? Not likely. Far showier and more adaptable lepidotes are available from the piedmont. Besides its novelty, *smokianum*'s only appeals are its compact form and tight trusses. This rhody is primarily a curiosity that might survive in rock gardens in Nova Scotia or, better, Scotland. It could also be tried in crosses with *R. lapponicum* or *R. dauricum*. Best of all, it might just be left to the enjoyment of hikers who like brisk air and the odors of balsam and damp clothing. Not everything in this world needs to be domesticated.

Gaining respect. All in all, Duncan and Pullen (1962) err in arguing that, except for *var. chapmanii*, *R. minus* is a varied but undifferentiated whole. Weakley's wholesale writ of speciation, though a step in the right direction, bulldozes useful distinctions and misconstrues *smokianum* by ignoring its bloom time, its habit, and its habitat. At present, with only field experience to go by, the best bet is that the lepidotes will divide into three species, *R. minus*, with a "minus" and a "chapmanii" variety; *R. carolinianum*, with a Linville "carolinianum" and a Pisgah "album" variety; and a separate *R. xxxx*, the Smokies plant, with some fitting species name. This last, however, might be close enough to *R. minus* to be considered a third variety thereof. It is my hope that these notes from the field will spur someone with the proper credentials and with access to next

generation DNA sequencing to undertake a formal revision of subsection *Caroliniana*, with special attention paid to the two wings of *R. carolinianum*, to *smokianum*, and to the Kolomoki plants.

No less important is for rhodo-dendron fanciers and hybridizers to exploit the extraordinary riches of this group, especially the plants at the genetic epicenter in the lower piedmont. Though the clones there may not match the size and showiness of some of the gussied-up lepidote hybrids, the individual flowers are as elegant as any. And, as an extra grace note, they will flourish in the Deep South as well as in the traditional rhody zones. Here, as Dryden said of Chaucer, is God's plenty.

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Ron Miller is a repentant liberal arts academic and a born-again redneck. He thanks John Thornton for his obsession with southern lepidotes that first introduced us to one another and for his keen observations from his garden and his travels. As always, the author owes most to his consigliere Clarence Towe, who refined the evidence and selected the photos and so by all rights should be co-author of this paper, if we could only have found a way to keep the pronouns straight. Photos by the author unless otherwise noted.

Quince Isn't just for Spring

Betty Montgomery
Campobello,
South Carolina



(Modified from the January-February 2013 Blue Ridge Review.)

When one hears the word “Quince,” most people immediately think of spring. For me, quince makes me think of Christmas. Every year, I bring bare branches of quince into the house. The buds slowly start to swell. Shortly I see flowers starting to open and that means that soon our home will be filled with lovely flowering branches.

Quince is a member of the rose family. It is an heirloom plant that has been around for thousands of years. It goes in and out of favor, but for me, it is always a must-have plant. When most of the garden is still dormant, flowering quince is a welcome sight as it opens a flower here and there to test the weather. Their profusion of pink, red or white flowers put on a magnificent show of color.

Flowering quince consists of three species. Japanese flowering quince (*Chaenomeles japonica*) grows 3 feet (0.9 m) tall and wide and is in my opinion more refined looking with flowers red through white and in lovely shades of salmon to orange. It has small apple-shaped fruit 1.2-1.6 in (3–4 cm) diameter. It will spread outward if it is in a happy spot. The Cathay flowering quince (*C. cathayensis*) is a small tree that has spines that are intimidating. It is native to western China and has the largest fruit of the genus, which are pear-shaped, 4-6 in (10–15 cm) long and 2.4-3.5 in (6–9 cm) wide. Its flowers are usually white or pink, and it grows in more temperate regions and has fruit that is available commercially.

The Chinese flowering quince (*C. speciosa*) grows to about eight feet (2.4 m) tall and wide, is native to China and Korea, and has hard green apple-shaped fruit 2-2.4 in (5–6 cm) in diameter. Its flowers are shades of red, white, or flecked with red and white. This is the traditional kind you see in front of old houses that almost outlive the house. It is a deciduous woody shrub with a thorn here and there but nothing to scare you away. It sports lovely flowers that are larger than the Japanese flowering quince, therefore showier, and has flowers before the leaves are visible.

The fruiting quince (*Cydonia oblonga*) has small edible, pear-shaped fruit 3–5 in (7–12 cm) long and 2–4 in (6–9 cm) wide, with white or pale pink two in (5 cm) flowers. It grows to 16–26 ft (5–8 m) in height and 13–20 ft (4–6 m) wide. The fruit of

most varieties of fruiting quince are too hard, astringent and sour to eat raw, and have an acidic tartness that most people find distasteful. However, being high in pectin, they are used to make jam, jelly and quince pudding. Fruiting quince is resistant to frost and requires a cold period below 7° C (45° F) to flower properly. Trees are self-fertile, but benefit in yield with cross-fertilization.

Some recent exciting news about flowering quince is that Tom Ranney with the North Carolina State University Research Station has developed three new varieties. All three are about six feet (1.8 m) when mature and are thornless and fruitless. ‘Orange Storm’ is a multi-stemmed shrub that Tom says has flowers that look like orange petticoats. ‘Pink Storm’ has two inch (5 cm) diameter, double pink flowers that resemble sweetheart roses. ‘Scarlet Storm’ has large, scarlet-red, double flowers and unlike most quince, tends to flower right to the tops of its branches. All three are now available (<http://www.monrovia.com/plant-catalog/search.php?query=flowering+quince&x=0&y=0>).

For me, I love my white quince best but I plan on finding one of these wonderful new varieties. I cannot wait to grow one, bring it inside along with the branches that I have growing now. It might not take the place of my old-time plant but I am sure that if Tom Ranney had something to do with these new varieties, they are going to be a “home run”.

Betty Montgomery is a member of the Southeastern ARS Chapter.



Flowering quince. Photo by Betty Montgomery.

SOCIETYNEWS

Awards

DE ANZA CHAPTER

Bronze Medal: Erika Enos

It was with great pleasure that the De Anza Chapter of the American Rhododendron Society presented Erika Enos with the Bronze Medal.

She fulfills all the requirements one thinks of when presenting this medal. She has been President for several years, offered her home for meetings and picnics, is a great promotor of rhododendrons, and most of all, has been our Newsletter person for five years. This last job is really vital to our organization and she does a terrific job. On top of all this, she is an avid gardener, always looking for the unusual in rhododendrons as well as other plants, which she often shares with the membership. All this makes her an outstanding member and deserving of the Bronze Medal.

EUREKA CHAPTER

Bronze Medal: Carol Dunning

Since joining the Eureka Chapter of the American Rhododendron Society, you have worked hard to increase participation in the annual truss show. Your efforts have included organizing the Flower Arrangements section by helping to develop the rules and classifications, obtaining judges each year through the Humboldt Arrangers' Guild, and serving as a clearing house for exhibitors to be sure adequate space is allocated for the arrangements.

You have also been a volunteer for show duties, as well as for other Chapter activities and programs over the years. You've also been a regular participant—and frequent winner—in the annual show.

For your contributions and dedicated work on behalf of the Chapter, the Eureka Chapter of the American Rhododendron Society is pleased to present the Bronze Medal to Carol Dunning this 6th day of December 2012.

HAWAII CHAPTER

Bronze Medal: Chuck Martin

For over 15 years, as a Charter Member of our vireya society, you have provided trusses for every meeting you have attended. You have provided trusses and companion plants to everyone who visits your garden. You have supported our chapter by putting your garden on tour, manning our information table, and taking care of our ID tags. You have also shown your support by volunteering your time and energy to be a Board Director for many years. You are truly a fine example of generosity and support that will be hard to match. We of the Hawaii Chapter, ARS, thank you for all you have done and continue to do as a member and friend of our chapter.

MIDWEST CHAPTER

Bronze Medal: Susan Garland

The Bronze Medal, the highest award that an ARS chapter may award, is being presented to Susan Garland.

Susan, a member since 1976, has served many roles in her 36 years including District Director. Currently she sits on our board as the Membership Officer among other varied and notable responsibilities.

Susan believes strongly about developing personal relationships with all of our

Awards (Continued from page 28.)

members and she insists on personally calling each member for renewal, passing the convenient but impersonal use of email. She takes her responsibilities as a mentor seriously, personally calling on new members when possible to ensure they get off to a welcome and successful start.

Outnumbered as the only female on the board, she makes sure her points are heard in our often intense discussions frequently interjecting the statement “let me finish” when she felt the guys were speaking out of turn.

The lunches she serves at her home during board meetings, for which she receives no compensation, are a favorite usually finished with tempting strawberries and whipped cream for desert.

As President of The Midwest Chapter, I am honored to present Susan Garland with the Bronze Medal. Her certificate reads:

“In recognition of your many contributions to advance the interest of rhododendrons including your outstanding service as ARS District Director, your tireless efforts to strengthen our membership as Midwest Chapter Membership Director and your outstanding dedication and personal involvement in many chapter activities including the plant sale, our mentoring program, social functions and most of all the personal relationships you develop with our members.” September 8, 2012.

Bronze Medal: Dave Hinde

The Bronze Medal, the highest honor that an ARS Chapter may award, is being awarded to David Hinde for his tireless work and contributions to The Midwest Chapter.

Dave, a member of the ARS since 2005, is a dedicated participant and supporter of the ARS and The Midwest Chapter. Currently Dave serves on The Midwest Chapter Board as Treasurer, a position he has held since 2006. He also served as Membership Director and has worked tirelessly at our annual Plant Sale and Truss Show.

Dave and his wife Ellen live in Roscoe, Illinois, nearly two hours from Chicagoland where our Board Meetings are held. Dave rarely misses a meeting despite the distance.

As a former professor of physics at Rock Valley College in Rockford, Illinois, he brings his scientific background and expertise to his passion for the genus *Rhododendron*. Along with associates in Rockford, he established the Rhodo-dendron and Azalea collection at the Klehm Arboretum and Botanic Garden which he continues to foster and maintain. Klehm is located in plant hardiness zone 4b to 5a and as a result of Dave’s efforts and guidance there are now over 80 different species and cultivars in its collection which makes for an ideal testing ground for our rhododendrons in the Midwest.

An ardent nature lover, Dave also serves as Secretary of the Blackhawk Chapter of Trout Unlimited which seeks to restore and maintain trout habitats throughout the country.

As President of The Midwest Chapter, I am honored to present Dave Hinde with the Bronze Medal. The certificate reads:

“In recognition of your outstanding contributions to The Midwest Chapter serving as Treasurer and Membership Director, and for your personal involvement in chapter activities including our annual Plant Sale and Truss Show. All this despite the long commuting distance to attend chapter meetings and functions.” December 3, 2012.

SOCIETYNEWS

Awards (Continued from page 29.)

MOUNT ARROWSMITH CHAPTER

Bronze Medal: John England

This is in recognition of John's longstanding service to MARS. Since he joined many years ago, he has been a willing volunteer; he has edited the newsletter, coordinated meetings, chaired the Garden Tour Committee and acted as liaison with Milner Gardens. He has taken part in many Truss Shows, chaired the successful 20th Anniversary party, and served as President for three years. Two England gardens have been featured on the Garden Tour. Both John and his wife Arlene have been gracious hosts to many potlucks and also many, many guest speakers over the years. With great pleasure, we recognize this outstanding service to MARS with the chapter's highest honour, the Bronze Medal.

VICTORIA CHAPTER

Bronze Medal: Jacqueline Bradbury

The Victoria Rhododendron Society (VicRS) is pleased to bestow its Highest Award, the Bronze Medal, to Jacqueline Bradbury in recognition of her many contributions to the VicRS.

A long-time VRS member, Jacq was a Board member from 2003 to 2005, then a Vice President in 2006. She assumed the role of President in 2007 through 2009, then past-President in 2010-11. Her presidential tenure had been extended to three years because she took over responsibility in mid-term when the previous President became ill.

For the 2005 ARS convention, Jacq was in charge of floral displays and undertook many other tasks throughout the event. She is a constant volunteer whenever floral displays are needed, especially the December club meeting, and has been an active participant and volunteer at our annual show and sales for more than a decade.

Multi-talented, she is also a key member of several other garden societies in Victoria and has been club President and continues to chair the Victoria Rock and Alpine Garden Society's annual show and sale. She frequently adds another dimension to the club's general meetings by selling interesting companion plants.

In summary it is with great pleasure that we award our highest honour, the ARS Bronze Medal, to Jacq to recognize her long and outstanding service to the VicRS.

Bronze Medal: Lois Blackmore

The Victoria Rhododendron Society (VicRS) is pleased to bestow its Highest Award, the Bronze Medal, to Lois Blackmore in recognition of her significant contributions to the VicRS.

Lois has led the chapter through a difficult transition in our show and sales. Lois very thoughtfully received all the executives' ideas for a new direction in sales and successfully developed a model that works. Lois' positive attitude has been contagious. As soon as one show and sale is completed, she is working on next year's arrangements. Lois is always on-hand at all the society's functions providing thoughtful guidance and exemplary effort. Lois has also successfully arranged to have hundreds of Jim Barlup's cuttings grown in BC.

In summary it is with great pleasure that we award our highest honour, the ARS Bronze Medal, to Lois in recognition of her leadership and guidance to the VicRS.

SOCIETYNEWS

Awards (Continued from page 30.)

WILLAMETTE CHAPTER

Bronze Medal: Wally and Kathy Reed

The Willamette Chapter ARS, Salem, Oregon, presented its highest honor, the ARS Bronze medal to Wally and Kathy Reed on May 9, 2012, at the annual pot-luck and plant sale at Stonebrink's big red barn in Rickreall.

Kathy and Wally have spent countless hours for the good of the Rhododendron Society and the City of Salem. There are too many to list but to mention a few: Representing our local chapter with being a interactive president for the past 6 years, also for the great job of organizing and setting up of the truss show and plant sale as well as having it moved to the Bush Park and intergraded it with the "Friends of Bush Park" sale. He has also been the main auctioneer at the annual pot-luck and plant sale.

Wally and Kathy has been generous host of the board meetings as well as opening and decorating their house for our annual Christmas pot-lucks. They have managed the committee and put in many physical hours for the "Compton Trust" and many hours on planting and clean-up of the existing Rhododendrons at Bush Park. We have had some great field trip planned and hosted my them.

We are a very fortunate chapter to have two such wonderful committed members who have contributed so much.

MIDWEST CHAPTER

Laura Grant: Certificate of Appreciation

The Midwest Chapter of the American Rhododendron Society wishes to recognize Laura Grant, Executive Director of the American Rhododendron Society, for her contributions to and unwavering support of the Midwest Chapter in its efforts to "encourage interest in and to disseminate information about the genus *Rhododendron*." Laura has an expansive and detailed knowledge of the current and past history of our Society and its members and has gone above and beyond the call of duty to answer our requests for assistance on repeated occasions. In 2011 when our Board could not identify a set of By-Laws for our Chapter, she quickly identified a copy in the Society archives. Repeated requests for information about membership qualifications and recruiting have helped the Chapter grow to its current 75 members. We could not have increased to this level without her knowledge and timely support. With membership in garden organizations declining, including our own Rhododendron Society, her help and leadership have been an inspiration and a key to our growth.

The need for timely shipment of Society literature has been met with a quick response and a trip through customs to Buffalo for rapid and convenient mailing. The meetings Laura orchestrated at the annual convention were informative and well planned which further aided in the ability of our Chapter to serve our members in an effective manner. No request has gone unfulfilled, or completed without a friendly response. Working with Laura has been a joy and we wish to thank Laura for her attendance at this our 50th year celebration.

In Memoriam

Charles (Chuck) Roger Barnes

For years, rhododendron-interested individuals around the world received seeds of crosses made by hybridizers Fred and Jean Minch.

With the untimely demise of Jean and the subsequent disabling of Fred to care for the hundreds of seedlings which had been cultivated, Chuck Barnes (a nephew by marriage of Jean's) stepped forward to rescue and nurture on the products of the Minch's efforts. Chuck organized potting sessions to give these progeny an opportunity to mature to their rightful blooming stage. The care for those plants, their subsequent moving from Minch property to Chuck's parents place and ultimately to Chuck and Sandy Barnes' daughter's home was undertaken by Chuck in the manner of love for the genus and the feeling that the Minch's efforts should not be abandoned.

Chuck was educated in California, receiving a degree from Alan Hancock Jr. College and then a bachelor's degree from Washington State University, Pullman, Washington, where he toiled on the Cougar's football team. At WSU, Chuck met his love, Sandy, and they married in 1965.

Chuck personified a deep love of country, integrity and generosity during his lifetime and particularly while serving as an Air Force F-4 Phantom pilot in Viet Nam. He was the recipient of the Distinguished Flying Cross among several service awards. He spent his working career as a Special Agent with the FBI.

He was a talented gardener and hybridizer in his own right and enjoyed cultivating prized rhododendrons. Following retirement, the joys of building his 1949 F1 Ford pickup, joining fellow members of the Dipstick Hot Rod Club, catching up with Cougar teammates, his Sigma Phi Epsilon brothers and numerous friends, and savoring time in the Arizona home with Sandy was surpassed only by his devotion to family. To Chuck, nothing was more important than family.

Chuck was a supportive member of the Tacoma Chapter and was very generous with his efforts and plant donations to members and the chapter's Point Defiance Rhododendron Garden in Tacoma. His friendly demeanor and willingness to share with fellow members will be sorely missed.

Chuck, born in 1943, was interned in Tahoma National Cemetery in Covington, WA on February 15, 2013—a fitting destination for a dedicated American.

Fred Whitney
Tacoma ARS Chapter

Bob & Merrie Goodwin

Bob Goodwin passed away last month. Bob's wife, Merrie, predeceased him a year ago. Although Bob and Merrie had not been active in the Noyo Chapter the last couple of years they left their imprint and helped make our Chapter what it is. Bob is the only person to have served as president of the Noyo Chapter three times. Merrie devoted her talents to a variety of tasks, but especially to publicity and the Silent Auction at our annual Show. Both Bob and Merrie were willing to do what needed to be done without complaining. The chapter acknowledged their contributions by awarding them a Bronze Medal in 1998. We are lucky to have had mentors like Bob and Merrie Goodwin.

SOCIETYNEWS

In Memoriam (Continued from page 32.)

Mary Elizabeth “Betts” Layman

The Greater Philadelphia Chapter lost one of its best-beloved members on Aug. 15, 2012, with the death of Betts Layman. She was born in 1924 and was 88.

There is no summing up of Betts Layman—she did so much with such vivacity. The Greater Philadelphia Chapter knew her as chapter president, host for uncountable board meetings, propagator extraordinaire (and not merely of rhododendrons and azaleas), consummate gardener, fabulous baker, and kindest soul within a few thousand miles.

There was much more. The *Philadelphia Inquirer* quoted her daughter, Kate Layman Gee, as saying, “If she couldn’t be useful, she wasn’t happy.” And useful she was, to Historic Bartram’s Garden, Braille publishers, All Saints Episcopal Church in Wynnewood, Pa., and of course the rhododendron community. For years, a high-grossing “pre-sale” was conducted from the Layman driveway in the days leading up to the annual plant sale.

The garden that she and Dan Layman created in Wynnewood is a wonder to behold, and the number of plants that left in the hands of admiring visitors is staggering. Those gifts always came with cogent advice.

One plant that many chapter members cherish is the azalea ‘Betty Layman’, with large salmon flowers in the late-midseason. One of the Robin Hill azaleas, it was named for her by Robert Gartrell around 1970 and registered in 1985. The Greater Philadelphia Chapter is now propagating it in large quantity in honor of Betts and with the intention of getting it into many gardens in the Philadelphia area.

Fred S. Winter

This stalwart member of the Rhododendron Society died on June 21, 2012.

Born in Schenectady, N.Y., in 1919, Fred Winter came to the Philadelphia area for postgraduate radiology studies at the University of Pennsylvania. In a long medical career, he was affiliated with Philadelphia General Hospital, Delaware Hospital of Wilmington, Hahnemann Medical College and Hospital, and, for 25 years, Pottstown Memorial Medical Center, along with posts elsewhere in the United States and Europe.

Fred was a veteran of World War II and the Korean War.

As a gardener, Fred was a devotee of rhododendrons, and his Company Farm near Pottstown was the frequent site of tours and ARS events. He served as president of the Valley Forge Chapter and as a national board member. He was a frequent competitor in the Valley Forge and Greater Philadelphia flower competitions, taking multiple Best in Show trophies, among many others.

Several rhododendron cultivars are associated with Fred. ‘Fred’s Barbara’ is a well-regarded white flower on a handsome shrub he grew from seed exchange material. He also named and registered ‘Break Fast’ and ‘Blessing.’ ‘Fred Winter’ is a Joe Becales hybrid (‘Merley Cream’ X ‘Polynesian Sunset’).

Letter to the Editor

EDITOR:

The Winter 2013 issue of the *Journal American Rhododendron Society* contains an error in the article entitled "Rhododendron of the Year Awards, 2013." The evergreen azalea cultivar 'Rose Greeley' (sic) is misspelled in the image caption that appears in the Mid Atlantic Region collection of plants at the bottom of page 42 and in the text, in the left hand column, at the bottom of page 45.

In 1987, I noticed that there were two different spellings for this excellent, white, Gable cultivar, and I concluded that was one too many for my purposes. Rose Greely died in 1969, so she was unavailable to resolve the problem. With the help of the American Society of Landscape Architects in Washington, DC, I located an address for John C. Greely, her nephew, in Charleston, South Carolina. In reply to my inquiry, he confirmed: "The spelling of Greely as "Greeley" is a common mistake from which all members of our family suffer." With that, I corrected my files.

When the *International Rhododendron Register and Checklist* (Second Edition) was published in 2004, I noticed that there were three "e"s in Greeley. I contacted Jay Murray and shared with her the information that I had obtained from John Greely. A correction was published in the Corrections to the *International Rhododendron Register and Checklist* (2004), First Supplement, p. 47. The correct spelling for this highly desirable evergreen azalea is 'Rose Greely'.

William C. Miller III
Bethesda, Maryland

ARS Financial Update

Budget and Finance Committee: Dave Collier, Kath Collier and Bill Mangels

The American Rhododendron Society (ARS) annually sends out an appeal to members for gifts in support of the Society. This year's letter mentioned a budget deficit of \$13,505 and included a plea for donations. The response was phenomenal and we have received in excess of \$24,000. We also received several questions about budget processes, oversight, and what the future might look like. The intent of this article is to answer those questions and provide information on what is being done to minimize future deficits.

Before discussing the future, it would be helpful to take a look at recent changes that have affected the Society budget over the last couple of years and will, undoubtedly, continue to affect our future. The ARS, like most other non-profit organizations, is faced with a declining membership. In 2007, the fall census report showed 4,249 members. Each year since then, there has been a net loss bringing us to 3,268 as of last fall. Some loss is always expected based on population changes, economics, and interest. A 23 percent loss over the last five years, however, creates a challenge particularly when membership provides approximately two-thirds of our total income. Other income is derived from *Journal* advertising, general contributions, Life and Endowment Fund incomes, some convention receipts, and other minor sources. Operational expenses for the Society include administrative support (salaries, office space, printing, copying, mailing, postage, travel, website, etc.) and *Journal* support (honorariums, equipment, printing, and mailing).

The Society has had budget difficulties before and several alternatives for addressing the problem have been examined. In 2007, the Society was in pretty good shape financially, along with the rest of the economy, and showed a positive balance at the end of the fiscal year. The downturn in the economy shortly thereafter created significant losses from September 2007–August 2009. Losses were the result of drop in membership as well as lowered interest being earned. This lost income was balanced by withdrawals from an operational savings account.

The Board recognized the account limits of this fund and began to look at alternatives for creating a better budgetary balance. In 2009, the Society elected to increase membership dues and restructure the fees. Increasing dues, no matter the size of the increase, is always a painful process and decision for both the Society and for the members who were no longer able to participate. Since that time, the Board has been reluctant to put dues increases on the table even though expenses have continued to increase and membership decline.

In the 2011–2012 budget, changes were made as to how the budget information was presented to the Board, making it easier to understand and discuss. The Long Range Planning Committee (LRPC) was asked to help formulate potential ideas for balancing the budget, and ad hoc committees were formed to evaluate various ideas. One of the key recommendations from the LRPC was to try to maintain membership fees at the current levels.

Expenses in the 2012-2013 budget have been contained, at least for the present. However, there was no way without the help of your recent contributions to achieve a balanced budget, as the expected dues income was only \$98,000. To help address

ARS Financial Update (Continued from page 34.)

future possible needs, there have been several other ad hoc subcommittees working on projects that could help balance future budgets. A few of these improved services include offering the *Journal* in an electronic format. This option provides a high quality product at a reduced cost if at least some members decide it meets their needs and are willing to stop receiving a printed issue, as this will reduce printing and mailing costs. There is also a committee looking into the idea of creating an online store that might sell ARS-branded materials like vests, hats, etc.

One of the best long-term solutions, however, is to find ways to increase membership. New members provide not only operational funds but also a potential workforce for keeping educational programs, shows, and fun activities going. Nearly every board meeting in the last couple of years has included a discussion about membership and how to increase it. There have been many activities targeted at increasing membership. An award program has been instituted over the past few years for Chapters that are able to increase their membership by 10% or more each year, and articles have appeared in the *Journal* with ideas on how chapters might increase their memberships. Filling the currently vacant ARS Membership Committee Chair position, along with other vacant chair positions at the Society level, is critical to our long-term success.

As a follow-up to this article, the Budget and Finance Committee plans to create a financial overview paper that describes the Society's budget process and accounts in greater detail. The goal of this document would be to present this information to subsequent Budget and Finance Committee members, Board members and any others who want to know more about the Society's financial status.

Again, thanks to all of you who donated funds to our Society this year.

Acquiring New Chapter Members!

Shirley Rock
ARS Membership Chair

The Southwestern Oregon Chapter is looking at a new category for their truss show. Bob McIntyre observed an 8-year-old helping her mom pick out plants by choosing a truss and matching it with a plant for sale in the chapter's plant sale. Bob discovered that the child knew the name and color of every rhododendron in their yard. Bob asked the little girl's dad if he thought she might be interested in entering a truss in their spring show. The father thought that she would. This started the ball rolling! The chapter is looking at a category for 16 years old and under.

Now it looks like there are three youngsters interested in showing trusses. The public can also enter trusses in SW Oregon's show. Do other chapters do this? Sounds like a good idea to me. This might give folks a chance to get to know chapter members and test the waters before joining. Chapter members can talk with those folks informally, and encourage them to join. Sometimes, it's the simple things that work best.

SOCIETYNEWS

Chapter Shows

Early shows were reported in the winter issue.
No admission charge unless noted.

EUREKA - Rhododendron Show and Sale; 9 a.m. to 4 p.m., Sat., April 27, and 10 a.m. to 3:30 p.m., Sun., April 28; entries received 6 to 9 p.m., Fri., April 26, and 7 to 9 a.m., Sat., April 27; St. Bernards School, Miles Hall, Henderson St., Eureka, CA; Tom Marking.

MASON-DIXON - Flower Show and Plant Sale; 9 a.m. to 4 p.m., Sat., May 11; Carroll County Agricultural Center, 706 Agricultural Center Drive, Westminster, MD 21157.

NOYO - 36th Annual John Druecker Memorial Rhododendron Show and Plant Sale; open to public 1:30 p.m., Sat., May 4, and 9 a.m., Sun., May 5; Mendocino Coast Botanical Gardens, 18220 N. Highway 1, Ft. Bragg, CA. There will be hundreds of gorgeous flowers on display, celebrity judging, people's choice awards, raffles, and an opportunity to purchase plants on site.

PORTLAND - Mother's Day Show and Plant Sale; truss entries received at the Cool House, 7-9:45 a.m., Sat., May 11, with the show opening to the public at noon after judging and closing at 5 p.m.; show opens at 9 a.m. on Sun., May 12, and closes at 5 p.m.; Crystal Springs Rhododendron Garden, SE 28th Ave., north of Woodstock Blvd., Portland, OR. Huge rhododendron and companion plant sale, 9 a.m. to 5 p.m. both days. Admissions to show and plant sale are free. The Show is inside the Garden and the Plant Sale is in the parking lot of the Garden. Admission to Crystal Springs Rhododendron Garden is \$4. Maria Stewart.

SIUSLAW - May Rhododendron Festival Flower Show and Plant Sale; show includes a Rhododendron Leaf Display and Elementary School Students Rhododendron Art Show; open to public 1 to 5 p.m., Sat., May 18, and 10 a.m. to 5 p.m., Sun., May 19; Florence Events Center, 715 Quince, Florence, OR 97439. Plant Sales, open to the public, are outside the south wall of the Events Center on Saturday and Sunday from 10 a.m. to 5 p.m. The public is welcome to bring flower trusses on Saturday from 7 to 9 a.m. to be judged by rhododendron experts. The truss must come from a plant that the owner has grown for at least 6 months. Ribbons and trophies will be awarded. It's a great time to ask questions on rhododendrons and azaleas, purchase books and plants besides enjoying the blooms and fragrances of azalea and rhododendron. Larry Jensen.

SOUTHWESTERN OREGON - South-western Oregon Chapter Rhododendron Show and Sale; 11 a.m. to 5 pm Sat., April 27, and 12 noon to 4 p.m. Sun., April 28; Pony Village Mall, North Bend, OR 97459. Pete Baumer.

VANCOUVER - Annual Rhododendron Show and Sale; 10 a.m. to 3 p.m., Sat., May 11; Park & Tilford Gardens, 333 Brooksbank Ave., North Vancouver, British Columbia, Canada.

International Vireya Seminar - Feb. 21–22, 2014

Come join us next winter on the Big Island of Hawaii. Leave the snow and the storms behind and come join us as we explore the latest information about growing vireyas around the world and enjoy garden tours.

Don't forget the Humpback Whales spend their winters in the Hawaiian Islands. There were 50 whales in Hilo Bay this February. Last but not least, Kilauea Volcano has been erupting continuously for the past 30 years. There are many reasons to come to the Big Island and the International Vireya Seminar is just one more reason to stop by and say ALOHA. The following speakers give you five more:

1. Steve Hootman, WA, USA: Vireya plant hunter (*Executive Director of the Rhododendron Species Foundation*).
2. Dennis Bottemiller, WA, USA: Vireya propagator (*Propagator at the Rhododendron Species Foundation*).
3. Neil Puddey, Australia: Vireya nursery owner (*Vireya grower, hybridizer, international shipper*).
4. Christy Hartsell, CA, USA: Vireya grower (*Vireya grower of 300 plus varieties in containers*).
5. Andrew Rouse, Australia: Vireya plant hunter and hybridizer (*Second generation vireya grower & hybridizer*).

Rhododendron Calendar

- 2013** International Rhododendron Species Conservation Conference, Royal Botanic Garden, Edinburgh. April 20–21.
- 2013** ARS Annual Convention, SeaTac, WA/Tacoma, WA area. May 1–5. Board meeting.
- 2013** ARS Western Regional Conference, Newport, OR. Sept. 27–29.
- 2013** ARS Eastern Regional Conference, RSC Atlantic Region. Oct. 4-6, Dartmouth, NS Canada. Board meeting.
- 2014** International Vireya Seminar, Island of Hawaii, HI, Feb. 21–22.
- 2014** ARS Annual Convention, Cleveland, OH, May 16–18. Board Meeting.
- 2014** ARS Western Regional Conference, District 2, Everett, WA. Sept. 26–28.
- 2014** New Zealand Rhododendron Association International Conference, Dunedin, NZ, Oct. 20–25.
- 2015** ARS Annual Convention, 70th Anniversary, Sidney, British Columbia, Canada. May 6-10.

2012/13 ARS Rhododendron Photo Contest Rules

The Contest is open only to ARS members in good standing as of the contest closing date. Judges and their immediate family (spouse, parents, siblings, and children) and household members are not eligible.

By participating in the Contest, each entrant fully and unconditionally agrees to and accepts these Official Rules and the decisions of the Judges, which are final and binding in all matters related to the Contest. There are no prizes except bragging rights, and the Editor of *JARS* has the right to publish runner up and winning entries in *JARS* and to put them on the ARS website.

All photos submitted must have been taken between January 1, 2012, to July 31, 2013. Entries must be received by midnight PST, July 31, 2013. All entries should prominently feature either **rhododendrons, azaleas and/or vireyas** in the composition.

Competition categories:

- 1) Flower, truss or spray;
- 2) Plant in bloom;
- 3) Landscape or plants in the wild;
- 4) Foliage;
- 5) People, Insects, or Animals; and
- 6) Other, for creative or artistic effects of any kind that involves these plants. This could involve the use of software products like PhotoShop.

Photo Guidelines:

- 1) The Photo must be in .jpg .jpeg, or .gif;
- 2) Images submitted should be sent by email and be of modest size, about 1024 to 1280 pixels in length and 480 to 768 in width, which would correspond to a dpi of at least 300 for a 3 x 5 in (7.6 x 12.7 cm) photo;
- 3) Cropping of digital images and minor adjustments to exposure and color balance is permitted for entries in all categories. Advanced image editing features available in software products like Photoshop should not be used except for entries in category six;
- 4) The Photo caption and/or description must not exceed 200 characters in length. Provision of some details about the camera and settings for each entry is also required, and for submissions in category 6, include a brief explanation of how the image was created;
- 5) The Photo cannot have been submitted previously in a contest of any kind; and
- 6) The number of entries by any individual per category is restricted to two.

Here is a link on the web to photography guidelines, as we hope this competition can also be an educational tool, especially for our new photographers: <http://photo.tutsplus.com/articles/roundups/100-helpful-photography-tutorials-forbeginners-and-professionals/>.

Glen Jamieson, Editor

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Nomenclatural Pitfalls: Linnean Azalea Names

Donald H. Voss
Vienna, Virginia



My forehead furrowed as I read in “The Biltmore Estate’s Azalea Legacy” (Andrews 2012) that *Azalea lutea* is *Rhododendron calendulaceum* and the name *A. lutea* is associated with the Pontic azalea. These statements highlight the confusion that may follow on the heels of botanical name changes, including those arising when

plants are transferred to a different genus. If the specific epithet in the old genus is not already in use in the new genus, the matter is simple and transparent: *Azalea indica* L. became *Rhododendron indicum* (L.) Sweet. Sometimes the matter is *not* simple, and the authorship of a name or new combination may be important.

The listing of azalea species from the Biltmore catalog and the associated commentary provide examples of difficulties that may be encountered. The story begins in 1753 with publication of the first edition of *Species Plantarum* by Linnaeus. Six *Azalea* species were included: *indica*, *pontica*, *lutea*, *viscosa*, *lapponica*, and *procumbens*. New combinations in *Rhododendron* used the Linnean epithets in *R. indicum*, *R. viscosum*, and *R. lapponicum* (the latter recognized as a lepidote rhododendron). In 1812, Loiseleur found that the structure of the ovary in *A. procumbens* differed significantly from that found widely in azaleas and rhododendrons. A year later, Desvaux published *Loiseleuria procumbens* based on the *A. procumbens* of Linnaeus.

The fates of the Linnean *A. pontica* (from the Eurasian Pontic region) and *A. lutea* (from “Virginia”) are intertwined. The Latin word *luteus* means yellow. Appropriately for the yellow-flowered Pontic azalea, Linnaeus’s 1753 description of *A. pontica* included “*flore luteo*,” while his description of *A. lutea* mentioned hairs on the corolla and very long stamens but not color. In preparing Volume 1 of the second edition of *Species Plantarum* (1762), Linnaeus omitted *A. pontica* from the azaleas but added *R. ponticum* to the rhododendrons. The description and synonymy of *A. pontica* reappeared in the appendix of Volume 2 in 1763. In 1830, when Sweet transferred *A. pontica* to *Rhododendron*, the epithet could not be used for the azalea because of the *R. ponticum* established by Linnaeus in 1762 for the Pontic lepidote rhododendron. For the Pontic azalea, Sweet chose the replacement name *R. luteum*, probably based on the 1753 color description for *A. pontica*.

In the second edition of *Species Plantarum*, *A. lutea* became *A. nudiflora* (with references to Kalm and Duhamel added to the synonymy). In 1824, Torrey transferred the species to *Rhododendron* as *R. nudiflorum*. Perhaps assuming that Linnaeus’s choice

of *A. lutea* for a plant of “Virginia” must have been based on its color, C. K. Schneider in 1911 published *R. luteum* (*non* Sweet), citing as synonyms *A. lutea* Linnaeus (1753), *A. calendulacea* Michaux (1803), and *R. calendulaceum* (Michaux) Torrey (1824). The Schneider name is a later homonym (a name spelled the same way) of Sweet’s name for the Pontic azalea and thus illegitimate under the Botanical Code. The final indignity for the Linnaean names *A. lutea* and *A. nudiflora* came in 1962 when Shinnery pointed out that in changing the epithet to *nudiflora* Linnaeus had created a superfluous, illegitimate name. The next available name for the species was *R. perichymenoides* (Michaux) Shinnery, based on Michaux’s 1803 *A. perichymenoides*.

The reported listing of *R. calen-dulaceum* as *A. lutea* in the Biltmore catalog may well have occurred as a result of familiarity with Schneider’s *Handbuch* and his illegitimate *R. luteum*. In any event, the correct association of *R. luteum* Sweet, the Pontic azalea, is to *A. pontica*, not to *A. lutea*. The correct name for *A. lutea* is *R. perichymenoides*. *R. calendulaceum* (Michaux) Torrey is based on *A. calendulacea* Michaux.

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Note: The Linnaeus, Schneider, Sweet, and Torrey books are available at <http://www.biodiversitylibrary.org/>.

Select Browse by Author, select first letter of author’s surname, scroll to locate author. For Linnaeus, select Linne, Carl von (1707-1778). Scroll to find the desired title, edition, and publication date.

Don Voss is a member of the Potomac Valley Chapter.

Rhododendron Growing in a 'Mediterranean' Climate: The British Columbia Experience

Brenda Macdonald
North Vancouver, BC
Canada



*(Modified from the Dec. 2012 newsletter of
the Fraser South chapter.)*

"For the rain, it raineth every day . . ."
(William Shakespeare, "Twelfth Night,"
Act 5, Scene 1.)

This scrap of Elizabethan nonsense sprang to mind the other day as I gazed out our windows at the rain pouring off the overloaded gutters. We were experiencing extended periods of wet rain (you know, the kind that gets you really wet) in amongst the relentless dry rain (the kind that just gets you damp) that had been going on for days. This is all part of living in a "Mediterranean" climate zone, although in the depths of a Pacific Northwest winter it is hard to see what exactly is Mediterranean about it.

But this is what climatologists do, define climates by the range and sequence of average temperatures and the pattern of wet and dry periods. And we are part of a climate type that enjoys warm arid summers and wet mild winters.

This is, unfortunately, exactly what rhododendrons do **not** need in order to grow successfully. What they really need is a "Monsoon" climate zone, which has warm, very wet summers and mild dry winters. This delivers all the moisture to the plant when it is actively growing, but keeps its feet dry during the cool winters when it is resting.

We are all aware, and quite thankful, that the western edges of the continents in the northern hemisphere are significantly milder both in summer and in winter than the eastern edges. This is true both in North America and in Britain, although the differential is certainly more pronounced in North America, due, no doubt to its vastly greater breadth. In both cases, the western edges of the continents benefit from the tempering nature of warm ocean currents—the North Atlantic Drift (the northern arm of the Gulf Stream) for the western side of Scotland, and the North Pacific Current for the Pacific Northwest. It is also what causes the high rainfall on these wet west coasts.

But this is also what allows parts of Scotland at 56°N, and Vancouver at 49°N to grow plants that are impossible for almost all inhabitants of the eastern seaboard of North America much above 37°N.

And what allows those Scottish gardens at 56°N to grow rhododendrons even more effectively than Vancouver or even Seattle is not so much the temperature as it is the rainfall distribution. Scotland definitely does not enjoy a Mediterranean climate, so even though there is less total rain

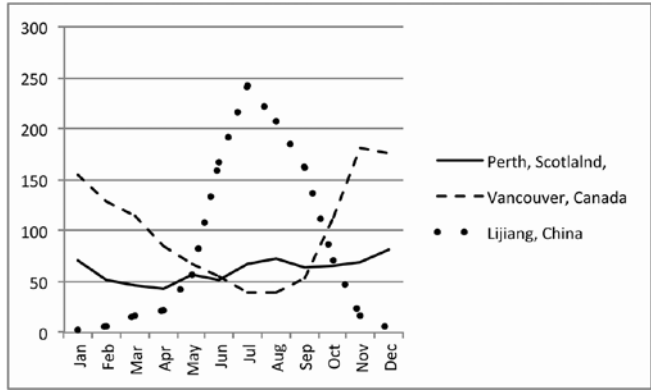


Figure. Average monthly precipitation (mm) by location.

in Perth, Scotland, for instance, than in Vancouver, Canada, it is the constant amount, the higher volumes during the crucial growing months of April through September that provide the benefit. You can see the rainfall distribution in the figure on this page.

This is what rhododendrons like; this is what they have in their native habitat in Asia. All summer long, from the beginning of the wet season in May or early June, to the beginning of the dry season in September or early October, the rhododendrons are bathed in water every day. It can be literally running over their roots, but as long as it is not stagnant and as long as it is during the active growing season, they couldn't be happier. Then, by the time the dry season comes, the rhodos are slowing down and need little water to keep them going until the next spring comes. So the problem with the Pacific Northwest is that we have it all bass-ackwards. We have drought just when we need deluges, and constant rain when the rhodos want to rest.

Which brings us to the cultural workarounds we can use to combat these difficulties:

1) plant your rhodos on the ground, not in it. By placing the root ball at or just slightly below ground level, and piling good quality soil with lots of coarse organic matter all around, supporting the root ball well without smothering the top, you will be able to keep the plant above the worst of the winter wet.

2) which means in the summer you will have to water, water, water. Plants sitting above the ground level will be more susceptible to drought stress than those planted in the garden proper. Rhododendrons are not xeriscape plants, so a system of emitter hoses or sprinklers is going to be essential if you want to have thriving plants with good bud set.

Brenda Macdonald is the current President of the Fraser South Chapter.

A Specialty License Plate Honoring the Rhododendron will Benefit Non-profit Gardens in Washington State

Glen Jamieson
Parksville, BC, Canada



(Modified from <http://blog.senatedemocrats.wa.gov/haugen/specialty-plate-will-benefit-meerkerk-gardens/>)

A specialty license plate honoring the rhododendron as the state flower of Washington State now exists that will create a stable revenue stream for the Meerkerk Rhododendron Gardens on Whidbey Island and other garden associations around the state.

Sen. Mary Margaret Haugen amended House Bill 2299 to establish a State Flower Account to dispense all proceeds from the sale of the specialty plates above and beyond the start-up costs for the program. The bill originally created a specialty license plate only for 4-H clubs, but Haugen's amendment broadened it to include the rhododendron plate.



“This is extremely important, as Meerkerk Gardens is a relatively small nonprofit,” said Don Lee, president emeritus of the gardens’ Board of Directors. “This could very easily become the major income stream for us. It has the potential to stabilize our budget and even allow us to expand.”

To initiate the process, there was a requirement to gather 3500 signatures from registered vehicle owners over several months. Advocates for this special plate distributed petition information to encourage the filling up of signature sign-up sheets by friends, family, garden group members and the public! A signature was not a commitment to purchase a plate but rather simply a show of support for the concept of the project (<http://www.meerkerkgardens.org/license%20plate%20pages.pdf>). Lee said a stable revenue stream is crucial to hiring staff and maintaining non-profit gardens, which attract visitors from around the world.

“The better we make the gardens, the more visitors we can draw, which brings more people to spend money in the local community while they’re here,” said Don Meehan, a professor emeritus with Washington State University’s extension program with more than 30 years’ experience.

“One of the values of this is that it [supports] local programs, and is not a state program. The money goes to local nonprofits, with 75% of the funds paying for employees at local gardens across the state.” Haugen said she hopes the rhododendron plate can be as successful as were Washington lighthouse plates, which today underwrites the cost of lighthouses there. “It’s appropriate that the native rhododendron [*R. macrophyllum*] is the state flower,” she said. “It really makes for a beautiful plate.”

Meerkerk Gardens is a non-profit, 10-acre (4 ha) garden surrounded by 43 acres (17.4 ha) of woodland preserve and more than four miles (6.4 km) of nature trails that offer educational activities as well as sightseeing. The garden is currently funded by Friends of Meerkerk memberships, plant sales, admission and donations.

As with other state specialty plates, the new rhododendron plate will cost \$40 beyond the standard fees and taxes charged for state license plates; renewal will cost \$30. Once the proceeds have covered all start-up costs, the state treasurer will deposit the subsequent proceeds of the rhododendron plate into the State Flower Account.

[Editor’s note: The Meerkerk Rhodo-dendron Garden is one of the Whidbey Island Gardens on Tour A (Friday, May 3) at this year’s ARS Spring Convention in District 3 in Seattle, WA.]

Photo 101: Tips re Camera Focusing

[Editors note: Articles on camera operation, including this one, are being included in JARS to assist beginners in photography and hopefully encourage them to submit images for this journal's annual photo competition.]

Dick Jones
Fort Bragg,
California



(Modified from the Jan 2013 Noyo News.)

Do you know any gardeners who do not take pictures of their plants? Many factors influence a photographic image, including equipment, subject, purpose, and technique. For most gardener photographers whether the goal is a large poster or a snapshot for the refrigerator an image that is sharp is desired.

Different factors affect how sharp an image can be. Four of these are subject movement, shutter speed, aperture, and camera shake.

In the garden the primary cause of subject movement is the wind. Here on the coast we are seldom totally free of some breeze. So, pick your days when it's less breezy. Besides simple clothespins there are a number of clamps available that can be used to hold a stem relatively still, or to move an obstructing stem out of the way. To see some examples check:

'The Plamp' (<http://www.tripodhead.com/products/plamp-main.cfm>)

or

NastyClamps (<http://www.nastyclamps.com/categories/Shop-For-Nasty-Clamps/>)

Shutter speed (i.e. how long the shutter is open) and aperture (i.e. how wide open the lens is) both have an influence on how much light gets into the camera and both influence how sharp an image may be. On today's cameras you have the option to set the camera on "automatic" and lose any ability to decide about shutter speed or aperture. Other settings allow you to make the decision. Serious photographers do not use the auto setting! If the shutter speed is too slow the movement by the subject or the camera will result in a blurred image. In general, 1/200 of a second is fast enough to stop most movement. Slower shutter speeds, e.g. 1/100 sec. will often suffice. Faster

shutter speeds require that the aperture be larger in order to let the proper amount of light into the camera.

Larger apertures have less depth of focus which increases the chance that part of the image will not be in sharp focus. Large apertures like $f/2$ or $f/2.8$ have a narrow depth of focus. This might be desirable if one wants the background to be out of focus. Smaller apertures like $f/8$ to $f/16$ have more depth of focus which may be what is desired for a particular image. After deciding what kind of image you want you must then decide what combination of shutter speed and aperture works in that setting.

There are numerous ways to reduce camera shake. The most common is to stabilize your camera on a tripod. There are other techniques for less serious images. Bracing your hands against a wall, placing your camera on a sock filled with dried beans, or resting your camera on a car window are common solutions. Securing your camera and then using the timer to trip the shutter reduces the movement caused by your fingers and hands. Today's point 'n shoot cameras are small and harder to hold still than digital single-lens reflex (DSLR) cameras.

There are different products that are useful. Gorillapods (<http://joby.com/>) are available for many different sized cameras, including the large, heavy DSLR's. These handy gadgets can be used for other purposes such as moving an obstruction like a leafy stem out from in front of a flower.

To increase the chances of a sharp image get out of the auto setting, select the optimum shutter speed and aperture, and get your camera stable.

Happy shooting!

Dick Jones is the newsletter editor of the Noyo News, the newsletter of the Noyo Chapter.

Sheep's Sorrel

One of the more common garden weeds is sheep's sorrel, *Rumex acetosella*, also known as red sorrel, sour weed, and field sorrel. The plant and its subspecies are common perennial weeds. It has green arrowhead-shaped leaves and red-tinted deeply ridged stems, and it sprouts from an aggressive rhizome. Weeding by chopping, pulling or hoeing seems to encourage its rambunctious growth, as it is hard to remove all of its thin rhizomes as they tear apart easily.

The plant is native to the British Isles but has been introduced to most of the rest of the northern hemisphere, where it is now a common weed in gardens, fields, grasslands, and woodlands. It favors moist acidic soil, so it thrives in floodplains and near marshes. It is often one of the first species to take hold in disturbed areas. Its leaves are not very nutritious and contain oxalates, but have a lemony, tangy or nicely tart flavor and so is used by some in salads. Its redemption in West Coast gardens is that *R. acetosella* is a host plant for *Lycaena xanthoides*, the great copper butterfly.

The Name *Rhododendron calendulaceum* Revisited

Don Voss
Vienna, Virginia



In the “Hooper Bald Native Azalea Project” (Beck 2012), an imaginative but untenable explanation for the epithet chosen by Michaux for *Azalea calendulacea* was provided; namely, “*R. calendulaceum*, the flame azalea, was named for the resemblance of its expanded, yet unopened buds, to candle flames.” The Latin word for candle is *candela*. The relevant word here is *kalendae* (*calendae*), which later

became the root of the genus name *Calendula* (the pot-marigolds).

When Michaux published *Azalea calendulacea* in 1803, he included “*calendulaceis*” in the description of the flowers; there was no mention of flower buds. The Latin suffix -aceus, -a, -um indicates resemblance or similarity, thus the epithet translates to “resembling *Calendula*,” which may be interpreted as orange or yellow-orange in color. Michaux listed two varieties of *A. calendulacea*: α *flammea* with *flammeo-calendulaceis* (scarlet to orange) flowers, and β *crocea* with *croceis* (saffron yellow) flowers.

The common name “flame azalea” can be traced to William Bartram’s account of his travels along the Georgia - South Carolina border in 1776 [1775?]. Among the plants that he reported seeing on his trek was “...fiery Azalea, flaming on the ascending hills or wavy surface of the gliding brooks. The epithet fiery, I annex to this most celebrated species of Azalea, as being expressive of the appearance of its flowers, which are in general of the colour of the finest red lead, orange and bright gold, as well as yellow and cream color ...” A few pages later, Bartram referred to the plants as *Azalea flammea* but did not include a description or diagnosis necessary for recognition as a validly published scientific name. He did not mention buds or candle flames.

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Don Voss is a member of the Potomac Valley Chapter.

ARS Newsletter Contest Results

Shirley Rock, Newsletter Contest Chair

Fourteen chapters sent newsletters to compete in the ARS Newsletter Contest! The long-term goal was to establish a standard that newsletter editors could use to produce a useful means of chapter communication. A team of three judged the entries, and agreed on the winners. The following entries came out on top and epitomize what is desirable to achieve a great “regular monthly” newsletter: North Island (*The Rhodoteller*); Mt. Arrowsmith (*The Rhodovine*), and Potomac Valley.

It may not be possible to have all the following items in your newsletter every month, but please consider the following for inclusion. Note the criteria are listed in order of importance:

1. Meeting information – Date, time, location, program description, photos of speaker, topics, etc.

2. Technical Information – Monthly horticulture (what to do that month with regard to possible weather damage, fertilizer, pruning, planting, etc.); Special programs or workshops (e.g., cuttings, grafting, DNA, etc.); Truss or plant spotlighting.

3. Membership and chapter specifics – Biography or recognition of members; Chapter issues to consider; Calendar of events; Chapter officer contact information.

4. ARS promotion – Articles and information, including upcoming conventions and conferences.

Your newsletter does not need to be lengthy. Your newsletter needs to be more than pretty. It needs to provide members everything they need to know about what is going on in your chapter. The chapter’s communication effort needs to get to the members in a timely manor too.

Thank you to the following chapter newsletter editors for sending entries to the contest:

Donald W. Hyatt (Potomac Valley); Marilyn Dawson (Mount Arrowsmith); Helena Stewart (North Island); Azalea Blooms (no editor listed); Don Smart (Cascade); Frances Burns (Eugene); Ellie Gayner (Eureka); Jane Adams (Viva Vireya!); Anthony Greco (Midwest); Dick Jones (Noyo); Tom Hoffman (Portland); Marilyn Haynes (Southeastern); Tom Schuetz (Susquehanna Valley); Dick Lundin (Willamette). You all did a great job! We are volunteers who take pride in our chapters and getting the word out about it.

Evolution, Adaptive Radiation and Vireya Rhododendrons - Part II

Peter Adams
Pahoa, Hawaii



(Modified from *Viva Vireya*, Volume 17 (4), April 2012.)

Part I of this article (*JARS* 66(4), Fall 2012); described the phylogenetic, or evolutionary relationships, discovered in a study of the DNA of vireyas (Goetsch et al. 2011). As described in Part I, the results of the study demonstrated how the studied group of over a hundred vireya species form a single clade, meaning all the studied species are genetically related to one common ancestor (with one exception), as shown in Fig. 1. And within *Schistanthe*, the study divided the section into several branching clades within the vireya clade. Several of these clades corresponded to existing subsection-level taxonomic groups of vireyas identified by botanists in the past (Sleumer 1966; Argent 2006). But the study also showed that many other vireyas, despite widely varying visible characteristics (morphology), are much more closely related than previously believed, reducing the number of subsections that group vireya species together. More will be discussed on this below.

Many other fascinating and exciting results were also obtained in this study. One interesting result involved *R. vanderbiltianum*, which while listed as a vireya by Chamberlain et al. (1996), had been suggested as an intermediate maddenian-vireya by George Argent (Argent 2006). Indeed, the DNA sequences uncovered in the Goetsch et al. (2011) study do place this species in an intermediate position between maddenias and vireyas. By including *R. vanderbiltianum* in the vireya genetic relationship tree, statistical support for a monophyletic vireya clade was significantly improved, making it even more likely that all vireyas have just one common ancestor! But, to be clear, by analyzing living specimens, genetic studies do not identify ancestors, but rather similarities or differences in genes. Both *R. vanderbiltianum* and the vireya species studied are all derived organisms, today's forms based on what existed in the past. So what exactly are we studying here with this odd species?

While "missing link" is a misleading and non-scientific term, evolutionary biology

has a concept of “transitional fossils” representing intermediate forms between earlier and later organisms. Indeed, many forms have been found in the fossil record that appear to share some characteristics of both earlier and later organisms. However, the old view of evolution as a consistent, linear onward march from one organism morphing into a subsequent form is not supported by our modern understanding of genetics. Today’s cladistics, the classification of organisms into evolutionary clades, is based on measurable genetic characteristics, not their morphological (visual shape or configuration) similarities. Rather than a linear line of evolution, modern cladistics shows a complex, bush-like pattern of evolution with many branches and many dead ends. So instead of trying to identify organisms that are directly ancestral to other organisms, like a family tree, genetic-based cladistics classifies living species based on greater or lesser similarities between their DNA, the molecular blueprint of life.

Indeed, this could not be otherwise. Genetic changes, alterations of the DNA molecule, necessarily occur only in individual organisms carrying the altered DNA and these individuals may, or may not, pass this alteration down to their offspring. Evolution is based on innumerable small variations within normal genetic variability. Since variations are random, if a positive change is possible within an existing genotype, one or more individuals may eventually come up with this improvement and pass it on to future generations. In addition, variations that give no particular advantage may be simply carried along within a surviving lineage. Unfortunately, genetic changes are more frequently detrimental than advantageous so in any evolutionary process, the actual lineage or “family tree” sufficient to produce a new species, must be the contributions of many individuals, common ancestors passing along and mixing traits over a very long time interval. So *R. vanderbiltianum*, while not a direct ancestor, shares sufficient genetic similarities to other vireyas that including it “fills out the family,” and further strengthens the monophyletic vireya relationship.

One strange result is the “anomalous” (Goetsch et al. 2011) phylogenetic position of *R. santapau*, surprisingly close to both *R. ferrugineum* (section *Rhododendron*), the European “Alpenrose,” and *R. micranthum* (China and Korea) (see Fig. 1) and outside the identified vireya monophyletic clade (Fig. 1). While being clearly identified as a vireya, *R. santapau*’s outlier genetic position is supported by its unusual geographical location in Eastern India (Arunachal Pradesh), a considerable distance from the typical vireya territory of eastern Mainland Asia and further to the west. Perhaps more importantly, *R. santapau* is also the least derived (i.e., more closely related to the *R. camtschatium* outgroup as noted in Fig. 1) of vireyas. During periods of rapid evolution separate lineages may produce similar mutations. The result is that lineages may look similar in genetic makeup while being in fact separate. Also, perhaps the ancestors of *R. santapau* began their dispersal much sooner, possibly in the earlier stages of tectonic plate movement that eventually led to today’s geographic locations of vireyas in the Himalayas, Asia, Malesia and Australia. *R. santapau* may be a modern vireya that is

genetically more similar, i.e., less changed, from the original progenitors of vireya at a time when geography, climate and/or dispersal patterns were different.

The status of *R. santapau*, i.e., its being outside the vireya clade and its location in eastern India, confirms its unique status. *R. santapau*'s situation contrasts with the various species within the least derived subclade (subsection) that was clearly identified as being within the larger monophyletic vireya clade (*Schistanthe*). This subclade, *Discovireya*, had been previously identified as a separate subsection within the section *Vireya* (now *Schistanthe*) (Sleumer, 1966; Argent, 2006). Unlike *R. santapau*, *Discovireya* is not geographically isolated at all. This subsection is widely, if not richly, found from Indonesia to the Philippines and even in New Guinea. Perhaps the implication is that *Discovireya* ancestors dispersed at a time after *R. santapau*'s isolation when these geographical regions were physically closer together, sea levels were lower or before tectonic movement enlarged the distances between the islands. But to add to the mystery, a more derived (i.e., with greater genetic differences from the *R. camtschatium* outgroup) subclade, *Pseudovireya*, whose members were also identified as a distinctive *Vireya* subsection in the past (Sleumer, 1966; Argent, 2006), is quite confined to the Asian Mainland. Perhaps their evolution took place after the Asian islands became inaccessible through seed dispersal. Another speculation is that the ancestor species of *Pseudovireya* had physical characteristics that particularly limited their seed dispersal.

Another major result of the study is that the phylogenetic tree of vireyas, as determined by genetic analysis, maps very well to their overall geographic range dispersal, termed "adaptive radiation" in biology. As the article pointed out, the genetic analysis supports the conclusion "that evolutionary divergence of the various [vireya sub]clades accompanied a dispersal that was polarized in an eastward direction" (Goetsch et al. 2011). Looking at Fig. 1, one can see the radiation of more derived species moving eastward. From the *Pseudovireya* section with the green dots on the Asian Mainland and Malay Peninsula, to the broad mix of medium-derived species in the larger Malesian region indicated by orange dots and, finally, to the blue dots showing the most-derived species in the most eastern locations, the radiation indeed appears polarized to the east.

But wait! There's more! As earlier noted, the phylogenetic analysis suggested that there were such close relationships between species that the existing subsection *Euvireya* had to be broadened much further than previously understood. In fact, the phylogenetic relationships are so close that the 150 species of *Euvireya* in New Guinea, Australia and the Solomon Islands had perhaps only one common ancestor! The article's discussion of this point is worth quoting extensively, as it points up the physical basis for the diversity that we find so fascinating in *Rhododendron* and vireyas in particular (some definitions in brackets):

These *Euvireya* species are noteworthy for the wide range of appearances they present. Whether it be corolla [flower] architecture or color, pollination syndrome,

leaf size, shape or texture, or preferred growth habit, the range of phenotypes [visible characteristics] within these plants is extraordinary among *Rhododendrons*. Yet, phylogenetic analysis of the DNA sequences show that all *Euwireya* species native to New Guinea, Australia and the Solomon Islands share a unique common ancestor. Two probable factors contributing to this radiation are based on tectonism, namely the recent juxtaposition of New Guinea with Asia, which was a source of *Rhododendron* germplasm, and the creation of new habitat by accretion of volcanic terranes [fault-bounded regions with a distinct geological history] (Hall, 1996) and the mountain building that followed the collision of Australian plate with the Pacific plate. Following the colonization of New Guinea by one or a few founding *Euwireyas*, the evolving mountainous landscape, with consequent interactions between aspect, slope, altitude, vegetation, and soil produced many unique ecological niches wherein each newly evolved morph [gradual transformation from one form to another] could speciate. The variation in corolla color and shape in *Euwireya* species...provides ample opportunity for the development of flowers attractive to major pollinator phyla, i.e., birds, ants, nocturnal moths, diurnal butterflies, bees, etc. (Stevens, 1976) and it seems this has been an important driver of the radiation. (Goetsch et al. 2011).

Acknowledgements

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Pete Adams is a member of the Hawaii Chapter.

The Word: Raceme

Bruce Palmer
Cutten, California



Our rhododendrons are in bloom again. What a glorious time of year! An appropriate word for the rhododendron season is **RACEME** (Latin: *racemus*, a bunch of grapes). That's the category of inflorescence (Latin: *infloresco*, I begin to bloom) where trusses (from the French *trouser*, to pack into a bundle) belong.

Flowers in groupings are called inflorescences and botanists distinguish inflorescences by how the flowers are arranged and in what order the individual flowers bloom. In the case of racemes, the flowers are arranged along a central stalk called a rachis (Greek: *rachis*, a backbone). Each flower has a pedicel (Latin: *pediculus*, a little foot), a smaller stalk that attaches it to the rachis. In racemes, the flowers open from the bottom or outside inward or upward. It may not be obvious that trusses are racemes in many of our rhododendrons but look at the woody flower heads you forgot to deadhead last year. It is then clear that those skeletons of last year's beautiful trusses are racemes.

Racemes can be compound, as in lilacs. In this situation individual racemes arise from a central flower stalk. These inflorescences are called panicles. Racemes are not the only type of inflorescence. Cymes (Latin: *cyma*, a cabbage sprout) come to mind because that is what grape inflorescences are (they are not racemes, despite the meaning of raceme). The most significant difference is that cyme flowers open from the inside outward or the top down in contrast to racemes. Among other inflorescences there are spikes, such as snapdragons, where the flowers are on a rachis but have no pedicels. Umbels, such as dill are common, where all the flowers are displayed in a flat-topped layer but all the flowers' pedicels arise from a single point. Umbels can be simple or compound, with one primary origin point and many secondary origins, as in dill.

The examples above are some of the simpler inflorescences. Flowering plants exhibit a great variety of adaptations in their flower arrangements that help them attract pollinators. Members of the sunflower family have their flowers arranged in heads; all of the flowers arise from a single expanded receptacle. In a sunflower head, the flowers in the center are different from those at the edge. The center flowers are called disc flowers and are fertile, while those at the edges are called ray flowers. Ray flowers are sterile and are designed to attract insect pollinators. Catkins (Dutch: *kattekin*, a kitten [from the resemblance of the inflorescence to a cat's tail]) are common in plants whose flowers are wind-pollinated, such as the willow. Typically, there are no petals and the male and female flowers are in separate catkins. Male catkins are looser than female catkins and wave in the breeze, distributing pollen at random on the wind. Jack-in-the-pulpit and skunk cabbage, both in bloom about now in early spring, have an inflorescence called

a spadix (Greek: *spadix*, a palm branch with fruit). The inflorescence is the stalk in the middle of the flowering structure. The top portion contains male flowers and the bottom female flowers, both without petals. The pollinating insects, usually flies and beetles (a bad smell to us attracts them), have to crawl over the male flowers, and then the female flowers to get to the base of the spadix. Often, members of this group have hairs pointed downward that partially trap the insect to enhance opportunity for pollination of the female flowers, and after a while the hairs will wilt allowing the pollinator to exit.



Rhododendron racemose.

There are many more types of inflorescences that aren't described here, but this is getting far afield from the genus *Rhododendron*. Perhaps the species epithet *Rhododendron racemosum* now makes some sense. The nearly endless variety of methods employed by flowering plants to dominate the land is truly fascinating. Let's get out in the garden and enjoy the many unique and beautiful flower structures, patterns and colors used by our plants to attract insects and thereby enhance their reproduction.

The Rhododendron Species Foundation

The Rhododendron Species Foundation (RSF) does valuable work promoting education and conservation of rhododendrons in Asia; making these rare plants available to members, many of which are new discoveries; and every year its annual yearbook, beautifully produced, has a wide array of topics with an international focus. If you become a member, you will receive priority in purchasing plants at its biannual plant sale, discounts for garden visits and gift shop purchases, and the yearbook.

The RSF is presently mounting a membership drive with the purpose of involving more people from other geographic areas in order to broaden its support base so that it is not so narrowly focused in the Seattle area. Please consider supporting the Foundation's work! Individual memberships are \$35, and can be purchased from its website at www.rhodygarden.org.

History and Cytological Reassessment of *Rhododendron canadense*

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Summary

Rhododendron canadense represents a morphologically unique and taxonomically complicated species of azalea. Early attempts at classification commonly placed *R. canadense* and *R. vaseyi* together in clades based upon odd features such as extra stamens and tubeless flowers. However, more recent molecular studies suggest *R. canadense* shares a closer relationship with other deciduous azaleas including *R. luteum*, *molle*, and *calendulaceum*. Cytological and cytometric studies have yielded equally confusing results by reporting inordinately small genome sizes (DNA content) and both diploid and tetraploid individuals of *R. canadense*. This study utilized flow cytometry and traditional cytology to provide conclusive evidence that *R. canadense* exists primarily as a diploid species. A survey of relative genome size of *R. canadense* also revealed that this species has approximately 26% less DNA than most other deciduous azaleas. Further cytological investigation indicated that *R. canadense* may also possess a lower base chromosome number with $2n = 2x = 24$ compared to most other *Rhododendron* with $2n = 2x = 26$. Additional investigation into *R. canadense* must be undertaken to reveal the full complexities of its cytogenetics, evolutionary history, and relationships within *Rhododendron*.

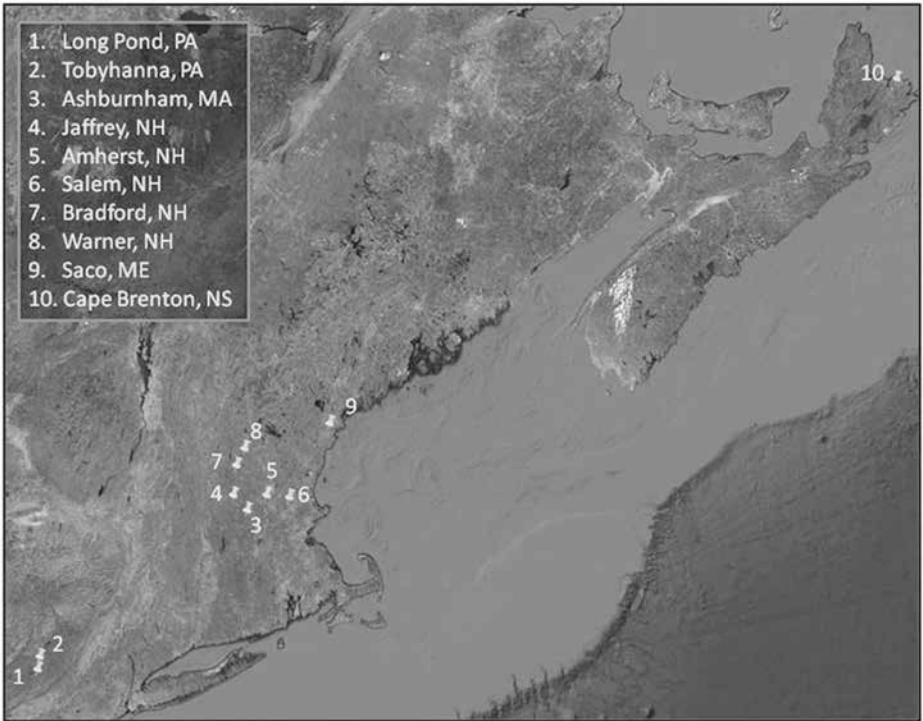


Figure 1. Locations of *R. canadense* sampling sites. Map compiled using Google Earth (Google Inc., Mountain View, CA).

Introduction

Rhododendron canadense (L.) Torr., commonly known as Rhodora, is an unusual, primitive azalea that has been plucked from the rising grassy tussocks of sodden bogs for use in ornamental landscapes. Suited to the cold, wet conditions of northeast North America, *R. canadense* has charmed countless gardens with its bare, low-growing stems topped with trusses of rose-pink to purple flowers in the spring (Judd and Kron, 1995). In addition to providing a distinctive feature in the garden, *R. canadense* has also played an important cultural role in its native New England. After spending years exploring the natural landscape of Massachusetts, the renowned poet Ralph Waldo Emerson was so moved by this “rival of the rose” that he penned one of his most famous poems, “The Rhodora,” in its honor (Wilson and Rehder, 1921). The rhodora was again honored in Massachusetts by becoming the namesake of the journal of the New England Botanical Club, a prestigious Harvard-affiliated scientific journal.

Rhododendron canadense has several morphological features that make it conspicuous among the deciduous azaleas. In April to early July, flowers occur before (or occasionally with) the leaves, and are borne on terminal, umbellate racemes of 3-9

rose-purple to pink (rarely white) flowers (Judd and Kron, 1995). The distinct feature of the *R. canadense* flower is the complete lack of a floral tube due to lack of fusion in its corolla. Flowers are two-lipped, with the fusion of the upper three corolla lobes contrasted by the flaring two lower lobes (Judd and Kron, 1995). Not only does *R. canadense* have the only tubeless flower of the deciduous azaleas, it also typically has ten or seven stamens instead of the usual five (though *R. vaseyi* Gray and *R. schlippenbachii* Maxim are nearly tubeless with more than five stamens) (Galle, 1987; Judd and Kron, 1995; Towe, 2004).

Rhododendron canadense typically grows as a rhizomatous shrub reaching a height of less than 1m. This unique species is the most northern of all the eastern North America azaleas, and can be found in glaciated areas along river banks, in moist woods, and in swamps from sea level to 1900 m. The geographic distribution of *R. canadense* stretches from Labrador and Newfoundland to southwestern Quebec, continuing down through New England into central New York, northern New Jersey, and northeastern Pennsylvania (Galle 1982; Judd and Kron, 1995; Towe, 2004) (Fig. 1).

Before its classification as *R. canadense* (Torrey, 1839), rhodora underwent several classifications including *Rhodora canadensis* (Linnaeus, 1762), *Hochenwartia canadensis* (Von Crantz, 1766), *Rhododendron rhodora* (Gmelin, 1791), and *Azalea canadensis* (Kuntze, 1891). The construction of phylogenies for *Rhododendron* and the particular placement of *R. canadense* have historically proven difficult. The first major classification of *Rhododendron* performed by George Don (1834) divided the genus into sections, with *R. canadense* belonging to section *Pentanthera* G. Don. Wilson and Rehder's monograph (1921) recognized the rank of subgenera, with subgenus *Anthodendron* (Endl.) Rehder section *Rhodora* (L.) G. Don containing *R. vaseyi*, *R. canadense*, *R. nipponicum*, *R. pentaphyllum* Maxim, and *R. albrechtii* Maxim. Philipson W. (1980), Philipson M. (1980), and Judd and Kron (1995) placed *R. canadense* in subgenus *Pentanthera* (G. Don) Poyarkova and further reduced section *Rhodora* to only *R. vaseyi* and *R. canadense*, taxa exhibiting a two-lipped corolla with a glabrous inner surface.

In addition to morphological studies of *Rhododendron*, studies using macromolecular data have helped determine relationships within the genus (Gao et al., 2002; Goetsch et al., 2005; Kurashige et al., 1998, 2001). Kurashige et al. (2001) and Gao et al. (2002) constructed phylogenies based on chloroplast matK and trnK intron sequences and nuclear ITS sequences, respectively; both placed *R. canadense* in subgenus *Pentanthera* section *Rhodora*, sister to section *Pentanthera*. More recently, Goetsch et al. (2005) evaluated 87 species based on analysis of the RPB2-I gene and found *Rhododendron canadense* was nested within section *Pentanthera* and more closely allied with *R. luteum* (L.) Sweet, *molle* (Bl.) G. Don, and *calendulaceum* (Michx.) Torr.

Rhododendron canadense does not hybridize readily with other species (Galle, 1987). However, limited hybrids have been reported including *R. ×seymourii* Herbert ex Lind-

Table 1. Genome sizes and ploidy levels of *Rhododendron canadense* samples from throughout its natural range.

Location/Source	2C Genome size (pg) ^z	Ploidy Level (x)
Lincoln Bog, Ashburnham, MA, USA. Perkins ^k .	1.13 ± 0.02	2x
Tobyhanna State Park. Tobyhanna, PA. Perkins ^k .	1.07 ± 0.03	2x
Exit 1, Interstate 93. Salem, NH, USA. Perkins ^k .	1.16 ± 0.02	2x
Exit 1, Interstate 93. Salem, NH, USA. Perkins ^k .	1.14 ± 0.02	2x
Ponemah Bog. Amherst, NH, USA. Perkins ^k .	1.17 ± 0.02	2x
Bradford Bog. Bradford, NH, USA. Perkins ^k .	1.15 ± 0.04	2x
Mt. Kearsarge Bog. Warner, NH, USA. Perkins ^k .	1.11 ± 0.03	2x
Saco Heath Bog. Saco, Maine, USA. Perkins ^k .	1.13 ± 0.05	2x
Cape Breton, Nova Scotia, Canada. Clyburn ^w .	1.17 ± 0.03	2x
Mt. Monadnock, Jaffrey, NH. Newman ^x via Perkins ^k . NCSU 2009-164	1.23 ± 0.02	2x*
Long Pond, Poconos Mts., PA. Plyler ^q via Krebs ^v . NCSU 2009-173	1.22 ± 0.01	2x*

^kPerkins – Sally and John Perkins, Salem, NH.

^qPlyler – Jim and Bethany Plyler, Natural Landscapes Nursery, West Grove, PA.

^vKrebs – Stephen Krebs, Holden Arboretum, Kirtland, OH.

^wClyburn – Bruce Clyburn, Cape Breton, NS.

^xNewman – George Newman, Bedford, NH.

^z8.75 picograms was used as the genome size for the internal standard, *Pisum sativum* 'Ctirad'.

*Ploidy confirmed with cytology.

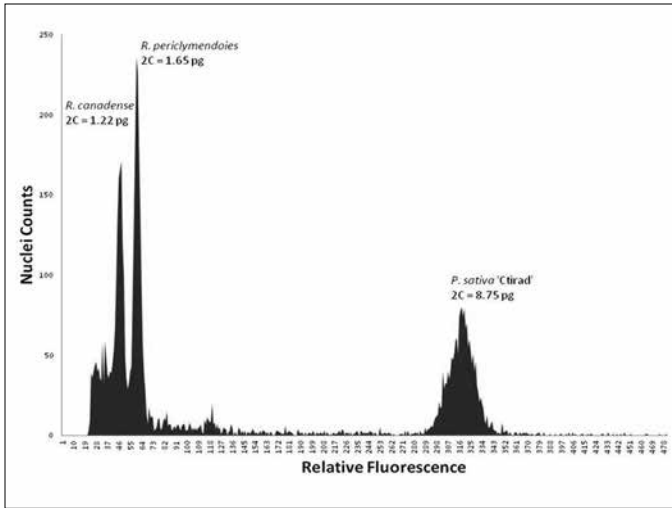


Figure 2. Comparison of genome size of *R. canadense* L. (NCSU 2009-164) and *R. periclymenoides* Michx. (NCSU 2011-027).

ley (*R. canadense* × *luteum*) and *R. ×fraseri* W. Watson (*R. canadense* × *japonicum* (A. Gray) Sur.) (Wilson and Rehder, 1921).

Studies on genome sizes and ploidy levels provide insights into the cytogenetics of *Rhododendron*. Early efforts to verify ploidy level relied on counting chromosomes, though cytological studies of *Rhododendron* are notoriously difficult. The counting of *Rhododendron* chromosomes has historically proven a laborious, time consuming, difficult task because of the friability and small size of roots, the inordinately small chromosomes, interference of tannin granules, and the difficulty of obtaining meiotic pollen mother cells in the proper stage (Galle 1970, McAllister, 1993, Li 1957). For these reasons, relatively few studies have been conducted on cytogenetics and chromosome numbers of *Rhododendron*.

The earliest cytological investigation into *Rhododendron* was performed by Moringa et al. (1929) on *R. quinquefolium* var. *speciosum* N. Yonez., finding the base chromosome complement of *Rhododendron* to be $x = 13$. Sax (1930) confirmed this finding in a study that tested pollen mother cells of 16 species. Sax (1930) found all samples tested to be diploid ($2n = 2x = 26$) with the exception of 2 tetraploids ($2n = 4x = 52$), *R. calendulaceum* and *R. canadense*. In a large-scale study in 1950, Ammal et al. investigated 360 species of *Rhododendron* completing over 550 counts. They confirmed Sax's earlier findings of tetraploidy in *R. calendulaceum* and *R. canadense*, finding them to be the only polyploid *Rhododendron* in North America. However, for such a monumental study, no methods or materials were published, and subsequent studies have reached contradicting conclusions for certain species (Eeckhaut, 2004; Jones et al., 2007; Li, 1957; Zhou et al., 2008).

Numerous studies have utilized flow cytometry to quantify relative genome size and ploidy level in *Rhododendron* (De Schepper et al., 2001; Jones et al., 2007; Väinölä, 2000; Zhou et al., 2008). Flow cytometry measures fluorescence of individual nuclei, stained with a fluorescent dye, while suspended in a precise stream of fluid as a means to determine genome size (DNA content) relative to an internal standard (Doležel and Bartoš, 2005). Zhou et al. (2008) utilized flow cytometry to confirm tetraploidy in *R. luteum*, *R. atlanticum* Rehder, *R. calendulaceum*, *R. colemanii* R. Miller, and *R. austrinum* (Small) Rehder, but found *R. canadense* to be a diploid. However, only a single clone of *R. canadense* was tested, and the authors proposed further investigation into the ploidy of *R. canadense* to confirm their findings (Zhou et al., 2008).

Due to the contradictions in the literature regarding the phylogeny and ploidy level assessment of *R. canadense*, the objective of this study was to perform a survey of genome size and ploidy level of *R. canadense* samples from throughout its natural range.

Methods and Materials

Flow Cytometry. To determine relative genome size of *R. canadense*, a survey composed of 11 *R. canadense* samples from across its natural range (Table 1) was conducted using flow cytometry. For each sample, approximately 1 cm² of newly expanded leaf tissue was placed in a petri dish containing 500 µL of nuclei extraction buffer (CyStain ultraviolet Precise P Nuclei Extracrtion Buffer®; Partec, Münster, Germany) and chopped finely with a razor blade until sample was completely incorporated into the buffer. After 1-2 minute incubation at room temperature (22°C), the resulting solution was filtered through a Partec CellTrics™ disposable filter with a pore size of 50 µm. Then, 1.2 mL of a nucleotide staining buffer (4', 6-diamidino-2-phenylindole; CyStain ultraviolet Precise P Staining Buffer; Partec) (DAPI) was added to the filtered solution. The resulting stained nuclei were analyzed with a flow cytometer (Partec PA II; Partec) with counts exceeding a minimum of 3,000 cells per analysis. The mean fluorescence for each sample was compared with an internal standard of known genome size (*Pisum sativum* 'Ctirad' 2C genome size = 8.75 pg) and holoploid, 2C genome size (i.e., DNA content of entire non-replicated chromosome complement irrespective of ploidy) was calculated as $2C = \text{DNA content of standard} \times (\text{mean fluorescence of sample} / \text{mean fluorescence of standard})$.

Cytology. Over the course of a year, actively growing root tips were collected following a sunny day from rooted stem cuttings and mature plants of both *R. canadense* (NCSU 2009-164, Long Pond, PA) and *R. canadense* (NCSU 2009-173, Jaffrey, NH). Root tips containing mitotic cells were collected before 10AM and placed in freshly made vials of pre-fixative solution (2 mM 8-hydroxyquinoline + 70 mg L⁻¹ cycloheximide). The com-pound 8-hydroxyquinoline has proven an effective method to condense chromo-somes and destroy the mitotic spindle in order to arrest cells at metaphase in somatic plant cells (Grant and Owens, 1998; Grant and Owens,

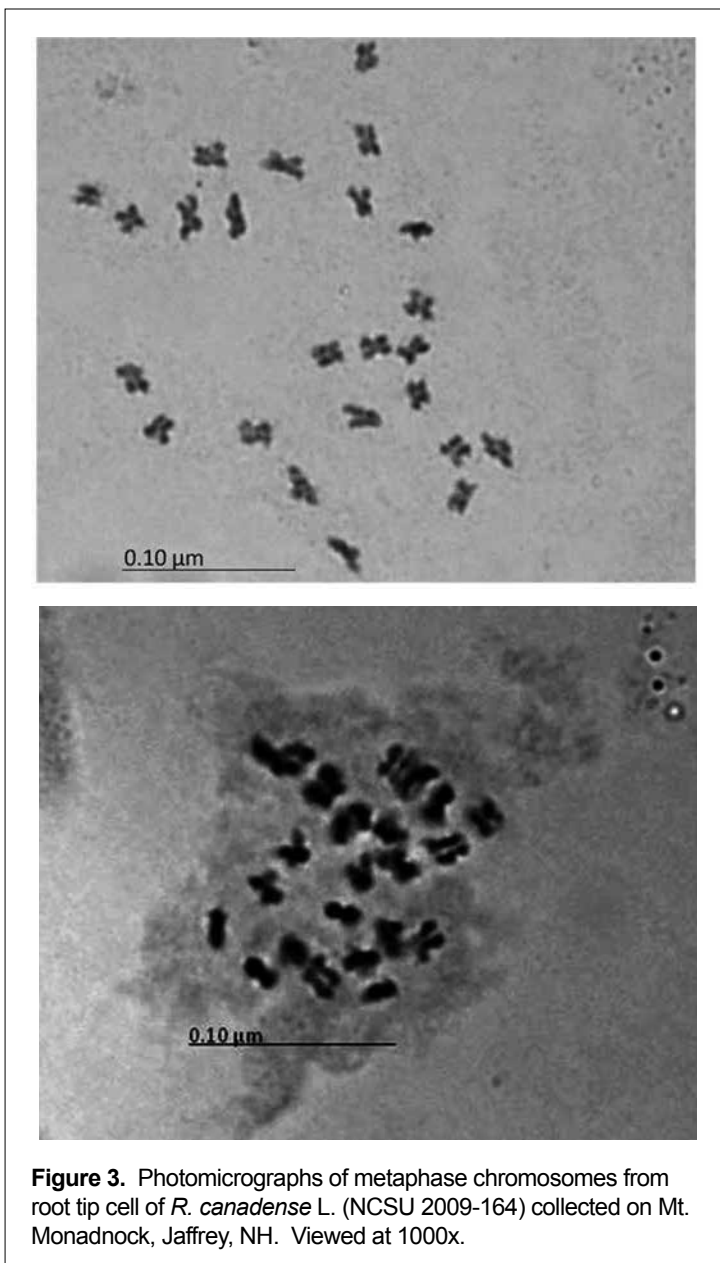


Figure 3. Photomicrographs of metaphase chromosomes from root tip cell of *R. canadense* L. (NCSU 2009-164) collected on Mt. Monadnock, Jaffrey, NH. Viewed at 1000x.

2001; Watanabe and Orrillo 1993). Baszczyński et al. (1980) demonstrated that cycloheximide acts in the G2 phase and late metaphase, altering the movement of cells through the nuclear cycle as well as causing an increase in the mitotic index, an increase

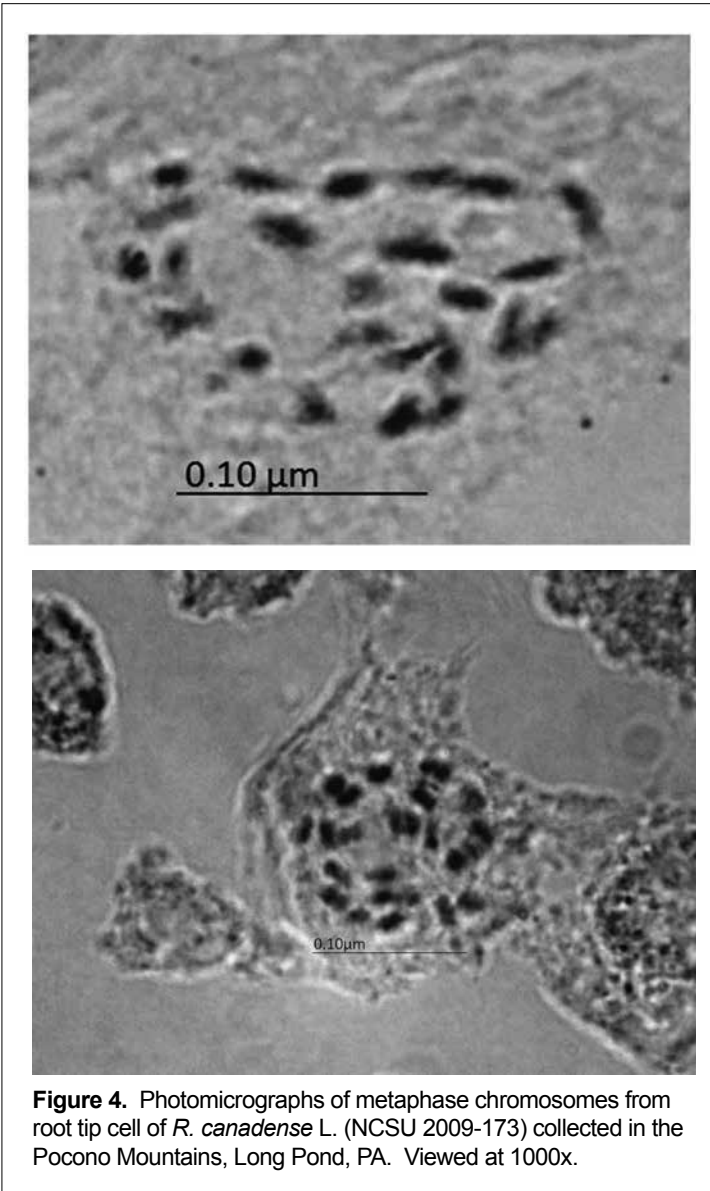


Figure 4. Photomicrographs of metaphase chromosomes from root tip cell of *R. canadense* L. (NCSU 2009-173) collected in the Pocono Mountains, Long Pond, PA. Viewed at 1000x.

in metaphase frequency, a decrease in anaphase frequency, and an inhibition of the spindle fiber apparatus assemblage. After remaining in the dark for 3 hours, all vials were moved into a dark refrigerator at approximately 4°C for 3 hours yielding a total pre-fixative treatment of 6 hours. All root tips were rinsed with distilled water and transferred to a freshly made 1:3 fixative solution of propionic acid : 95% ethanol, and

left overnight at room temperature (22°C). The next day, a 1:3 hydrolysis solution of 12M HCl : 95% ethanol was made for the root squash procedure.

For each root squash, a fresh root was removed from the fixative and hydrolyzed for approximately 30 seconds before being moved to a clean slide. The root tip was excised under a dissecting microscope and placed on a separate, clean slide with a drop of modified carbol-fuchsin stain. The stain used was a modification of the Carr and Walker (1961) carbol fuchsin stain for human chromosomes (Kao, 1975). The slide was tilted until the stain completely encompassed the excised root tip, and left for several minutes. Then, a clean cover slip was placed over the droplet of stain containing the excised root tip. A clean sheet of bibulous paper was placed over the cover slip while gently applying pressure with a pencil eraser (sometimes thumb) to squash the cells. The slide was then observed and photographed using a light microscope (Nikon Eclipse 80i, Nikon, Melville, NY). Layered images containing multiple depths of field were composed using Photoshop CS4 (Adobe Systems, San Jose, CA).

Results and Discussion

Flow Cytometry. All 11 samples of *R. canadense* were found to be diploid (Table 1), in contrast to previous reports of tetraploid individuals (Ammal et al., 1950; Sax, 1930). Relative genome sizes (2C) in our study ranged between 1.07 pg and 1.23 pg (mean 1.15 pg). The fluorescent stain DAPI used in this study binds to adenine-thymine rich regions of DNA, though other stains are available that may provide slightly different estimates of absolute genome size (Doležel and Bartoš, 2005).

Though the sampling distribution covered multiple locations across nearly the entire geographic distribution of *R. canadense*, no tetraploids were found. These results augment the findings of Zhou et al. (2008) and further demonstrate that *R. canadense* is primarily a diploid species. In addition, relative genome sizes (2C) of all *R. canadense* tested proved unusually small (1.07 to 1.23 pg) when contrasted with diploid genome sizes of other deciduous azaleas in previous studies (Jones et al., 2007; Zhou et al. 2008). In the study by Zhou et al. (2008), diploid azalea genome sizes (not including *R. canadense*) ranged between 1.44 pg and 1.57 pg, and in Jones et al. (2007) the diploid azaleas ranged between 1.51 pg and 1.74 pg.

After the flow cytometry results revealed significant discrepancies in relative genome size (2C) between *R. canadense* and other diploid azaleas from previous studies, a separate cytometric analysis was performed by combining leaf tissue from both *R. canadense* (NCSU 2009-164, Long Pond, PA) and *R. periclymenoides* (NCSU 2011-027), as well as *Pisum sativum* 'Ctirad' (internal standard) into a single sample. The resulting histograms showed there to be a significant difference in relative genome size between *R. canadense* and *R. periclymenoides* (Fig. 2), with *R. canadense* having approximately 26% less total DNA than *R. periclymenoides*.

Previous studies indicate that evolution of base genome size (i.e., DNA content of one complete set of chromosomes: 1Cx value) in angiosperms is a dynamic process of

increases and decreases, with the general trend of small genome size representing the ancestral state and larger genome size representing derived state (Leitch et al., 1998, 2005; Soltis et al., 2003). Surprisingly, however, 1Cx genome size in *Rhododendron* (not including *R. canadense*) is highly conserved with 1Cx values between 0.61- 0.97 pg for the entire genus and between 0.72 – 0.97 pg for subgenus *Pentanthera* (Jones et al., 2007). We found *R. canadense* to have a particularly low relative (1Cx) genome size of 0.54-0.62 pg, considerably below the typical range for subgenus *Pentanthera*. Interestingly, Zhou et al. (2008) also found *R. luteum* to have a somewhat low 1Cx genome size of 0.65 pg, a species reported to be fairly closely allied to *R. canadense* in phylogenies based on macromolecular data (Gao et al., 2002; Goetsch, 2005; Kurashige et al., 2001). These results suggested further investigation into base chromosome number was warranted. Therefore, two samples of *R. canadense* (NCSU 2009-164, Long Pond, PA and NCSU 2009-173, Jaffrey, NH) were selected for further study using traditional cytological techniques to determine the true diploid chromosome number of *R. canadense*.

Cytology. Despite extensive cyto-logical examination performed over the course of a year, including observation of >20 cells with well-resolved chromosomes, no diploid cells were found where more than 24 chromosomes could be discerned (Fig. 3 and 4). These results confirm *R. canadense* to be a diploid and further suggest a base chromosome number of $x = 12$.

The plants in the genus *Rhododendron* have been thought to have a uniform base chromosome number of $x = 13$, with the exception of plants in the basal subgenus *Therorhodium* (Maxim.) Small with $x = 12$ (Kron and Judd, 1990; Kurashige et al., 2001; Gao et al., 2002, Stevens, 1971). Curiously, *R. canadense* (subgenus *Pentanthera*) and *R. camtschaticum* Pall. (subgenus *Therorhodium*) share certain traits, such as rhizomatous growth, July blooms of speckled pink/purple flowers, connate petals with a tubeless corolla, and 10 stamens (Hutchinson, 1921). Perhaps *R. canadense* retained the ancestral chromosome number of $2n = 2x = 24$, similar to plants in subgenus *Therorhodium*, but that is unlikely, based on recent phylogenetic analyses (Kurashige et al., 2001; Gao et al., 2002; Goetsch et al., 2005). Alternatively, various processes such as translocations, inversions, insertions or deletions can lead to chromosome fusion (Da Silva, 2005; Luo et al., 2009; Lysak et al., 2006; Schubert, 2007) resulting in reduced chromosome numbers. This may also be the case in *R. canadense*.

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Plant Hardiness Zones

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Whether or not you believe that the current rapid rate of climate change is the result of human activity or not, I believe that most of us will at least admit that recent weather is quite different from that experienced even just a few decades ago. Much gardening literature refers to plant hardiness zones, also known as climate zones or growing zones. These zones are a guide to help gardeners know which plants are likely to grow well in different areas of the basis of climate. Given the current rate of climate change, the boundaries of current zones are thus likely to change more rapidly than in the past, so while the data presented below are the most recent, they are nevertheless largely based on selected weather from 1960-2005. They should therefore be interpreted with this in mind when you apply them in 2013.

Plant hardiness zones are largely based on the temperature tolerances of different plants. I say largely based because while in the USA this is the single criterion, other criteria have also been considered in other countries, notably in Canada (discussed later), making it difficult to compare hardiness zone categories between different countries. Basic laboratory testing can determine the lowest sustained temperature a particular plant type can withstand, but, as gardeners, we still need to know how these measurements relate to garden conditions in our own specific locations.

USDA and Canadian Hardiness Zones

In an attempt to determine meaningful zones, years ago botanists and horticulturists started gathering weather records throughout North America to compile a database to show the average coldest temperatures for each region. These records were condensed into a range of temperatures and transformed into various zones of plant hardiness. Maps were then made to show the contour lines between these temperature zones.

In the USA, the climactic studies and maps were undertaken by two independent groups: the Arnold Arboretum of Harvard University in Cambridge, Massachusetts, and the United States Department of Agriculture (USDA) in Washington, D.C.

The two maps produced reflected some variances, but in recent years, the differences between the Arnold Arboretum and the USDA zones have narrowed. Today, the USDA map of Plant Hardiness Zones, which was last updated and released in 2012 (based on weather records from 1976-2005), is generally considered the standard measure of plant hardiness throughout much of the United States (Fig. 1, p. 73). A similar map for Canada (Fig. 2, p. 74) has been issued by the Canadian government's Department of Agriculture (<http://atlas.nrcan.gc.ca/site/english/maps/environment/forest/forestcanada/planhardi>).

However, as most gardeners know, there are recognized problems with zones just based on average coldest temperature, as the average minimum temperature is not the only factor in figuring out whether a specific plant will survive in one's garden. Soil type, rainfall, daytime temperatures, day length, wind, humidity and heat also play a role. For example, although both Austin, Texas, and Portland, Oregon, are both in plant hardiness zone 8, the local climates are dramatically different. Even within a city, a street, or a spot protected by a warm wall in your own garden, there may be microclimates that affect how plants grow. The published zones are thus a good starting point, but gardeners still need to determine for themselves what will and won't work in their gardens.

USA

The 2012 USDA Plant Hardiness Zone Map (Fig. 1, http://planthardiness.ars.usda.gov/PHZMWeb/Images/All_states_halfzones_poster_300dpi.jpg) is the current standard by which gardeners and growers can determine which plants are most likely to thrive at a location. The map is based on the average annual minimum winter temperature, divided into 10° F (5.5° C) zones. For the first time, the map is now available as an interactive GIS-based map (<http://planthardiness.ars.usda.gov/PHZMWeb/>).

This map is GIS (Geographic Information System)-based for the first time and is also the first map that is specifically designed for the Internet, allowing examination of plant hardiness zones at a much finer scale than before. For the first time, a sophisticated algorithm was used to interpolate low-temperature values between actual weather reporting stations. Zones in this edition of the map are based on 1976–2005 weather data and each zone represents the mean extreme minimum temperature for an area, calculated from the lowest daily minimum temperature recorded in the above time period. The previous edition of the USDA PHZM, revised and published in 1990, was drawn from weather data from 1974–1986.

Number of zones: The USDA plant hardiness map divides the USA into 13 hardiness zones. Zone 1 is the coldest; Zone 13 is the warmest. Two new zones have been added to the latest edition of the USDA map: Zones 12 and 13 for regions with average annual extreme minimum temperatures above 50° F (10° C) and 60° F (16° C), respectively. They only appear on the maps for Hawaii and Puerto Rico but

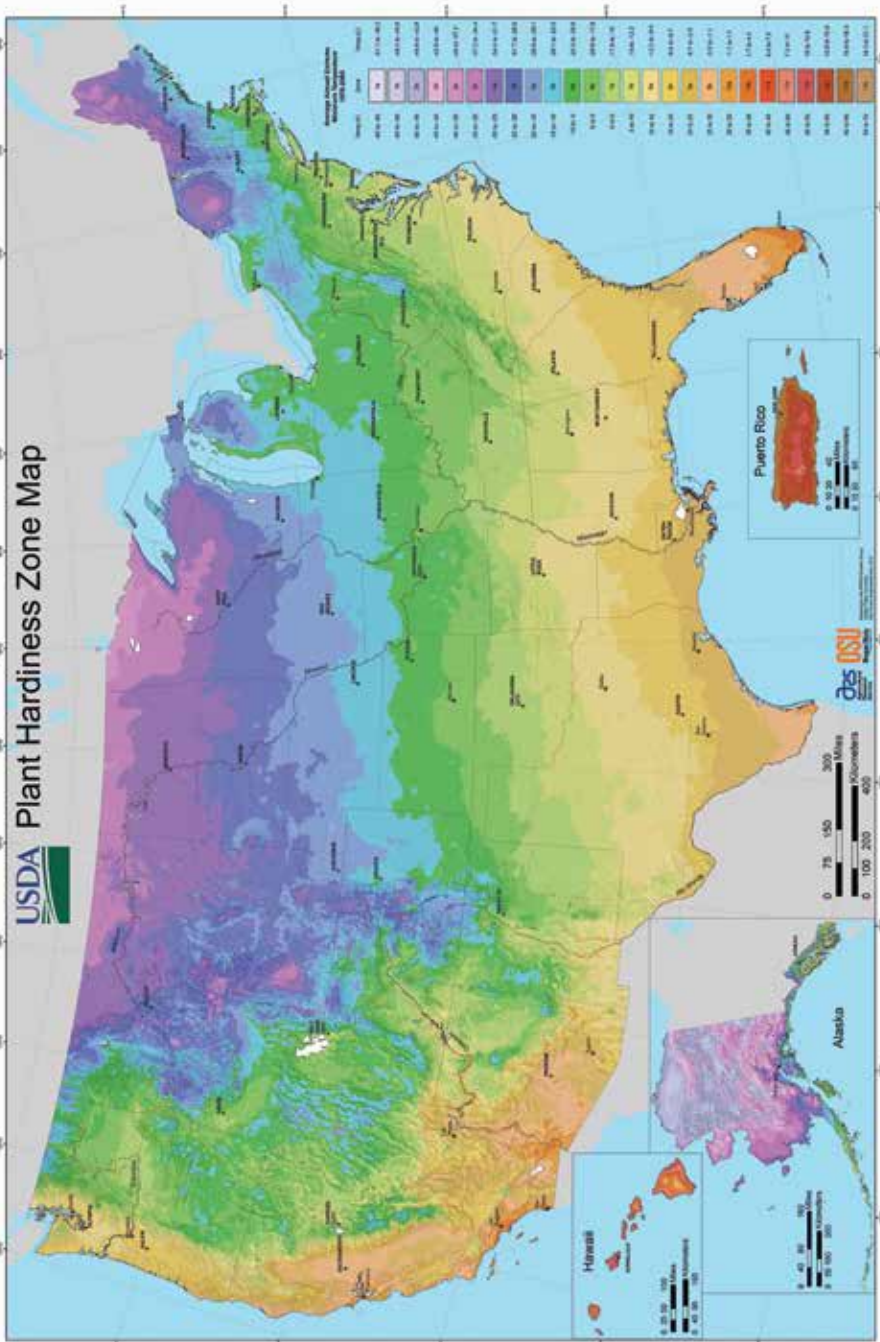


Fig. 1: The USA Plant Hardiness Zone map (http://planthardiness.ars.usda.gov/PHZMWeb/Images/All_states_halfzones_poster_300dpi.jpg).

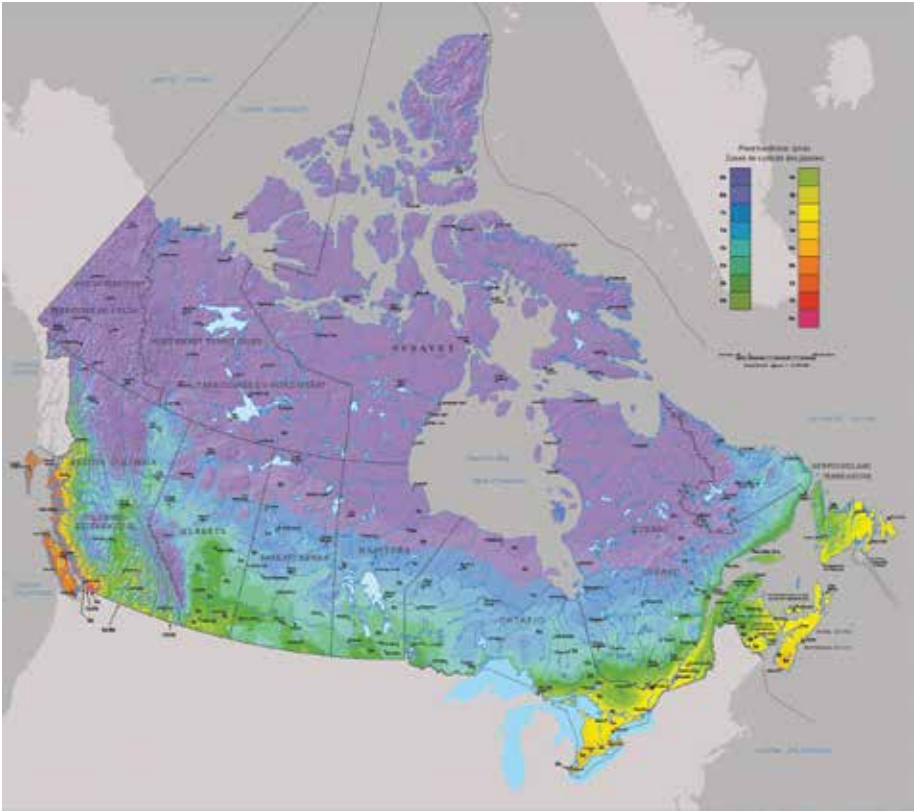


Fig. 2: Canada's 2000 Plant Hardiness Zone map (<http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/intro.html>).

the additional frost-free zones enable better definition of conditions for tropical and semitropical plants, which often serve as house or patio plants in many parts of the country. Zones 1-11 follow a fairly predictable pattern across the continent, though a closer look will reveal scattered patterns of variations. Generally, the colder zones are found at higher latitudes and higher elevations.

Applying zone references: Plant encyclopedias may refer simply, for example to “Zone 6,” which generally means that the plant is hardy to that zone (and will endure winters there), and generally can withstand all the warmer zones below. More detailed information may indicate a range of zones (e.g., Zones 4-9), which means the plant will only grow in those zones, and will not tolerate either the colder or warmer conditions outside them.

To determine your zone on the Plant America Zone map, go to <http://www.backyardgardener.com/zone/index.html#usda> and input your zipcode, and your plant hardiness zone will be indicated. The average coldest temperature ranges for USDA

hardiness zones (each zone is now divided into two 5° F subzones, “a” and “b”, with “a” being the colder; e.g., zone 2b is -45 to -40° F (-43° to -40° C)) are:

- Zone 1: below -50° F (below -46° C)
- Zone 2: -50° to -40° F (-46° to -40° C)
- Zone 3: -40° to -30° F (-40° to -34° C)
- Zone 4: -30° to -20° F (-34° to -29° C)
- Zone 5: -20° to -10° F (-29° to -23° C)
- Zone 6: -10° to 0° F (-23° to -18° C)
- Zone 7: 0° to 10° F (-18° to -12° C)
- Zone 8: 10° to 20° F (-12° to -7° C)
- Zone 9: 20° to 30° F (-7° to -1° C)
- Zone 10: 30° to 40° F (-1° to 4° C)
- Zone 11: 40° to 50° F (4 to 10° C)
- Zone 12: 50° to 60° F (10 to 16° C)
- Zone 13: above 60° F (above 16° C)

Compared with the 1990 map version, zone boundaries in the latest map have shifted in many areas. The new zonation is generally one half-zone warmer than the previous zonation throughout much of the United States, but some changes are to a cooler rather than a warmer zone. Most changes are the result of the more recent temperature averaging period (1976–2005 VS 1974–1986 in the older map) but some result from the new, more sophisticated mapping methods and the greater numbers of station observations now being used, which has improved accuracy, especially in mountainous regions (<http://planthardiness.ars.usda.gov/PHZMWeb/AboutWhatsNew.aspx>).

Sunset Zones versus USDA Zones

Gardeners in the western United States may be confused when confronted with the eleven Hardiness Zones created by the USDA, because they also have a 24-zone climate zone system created about 40 years ago by Sunset Magazine. The Sunset zone maps, which cover 13 Western states, are much more precise than the USDA's, since they factor in not only winter minimum temperatures but also summer highs, lengths of growing seasons, humidity, and rainfall patterns, and thus provide a more accurate picture of what plants may be expected to grow in different locations.

If you live in the western U.S., you'll find that nurseries, garden centers, and other western gardeners usually refer to the Sunset climate zones (<http://www.sunset.com/garden/climate-zones/>) rather than the USDA plant hardiness zones. In fact, the Sunset zones and maps are what are listed for each plant in Sunset's *Western Garden Book* and *Western Garden CD-ROM*, which are considered the standard gardening references in the West. The above site also lists a variety of plants that are the right plants for your specified zone.

However, the USDA zones are still important to western gardeners since the USDA zones are used in the rest of the country. For those gardeners that order plants

from catalogs or read general garden books, it helps to know your USDA zone in order to be able to interpret references listed in these documents correctly.

Heat Zones

The American Horticultural Society (AHS) has issued an interactive, GIS-based Plant Heat-Zone Map (http://ahs.org/publications/heat_zone_map.htm). The effects of heat damage are often more subtle than those of extreme cold, which may often kill a plant instantly. Heat damage can first appear in many different parts of the plant over time: flower buds may wither, leaves may droop or become more attractive to insects, chlorophyll may disappear so that leaves appear white or brown, or roots may cease growing. Plant death from heat is often slow and lingering, and a plant may survive but be in a stunted or chlorotic state for several years. When desiccation reaches a high enough level, the enzymes that control growth are deactivated and the plant dies.

The AHS Plant Heat-Zone Map (Fig 3, p. 77) operates in the same way as does the Plant Hardiness Map. Simply find your town or city on the map; larger versions of the map have county outlines that may help you do this.

The twelve zones of the heat zone map indicate the average number of days each year that a given region experiences “heat days”, defined as temperatures over 86° F (30° C), which is the point at which plants begin suffering physiological damage from heat. These zones range from Zone 1 (less than one heat day) to Zone 12 (more than 210 heat days) annually.

Zone Number of days with air temperature above 86° F (30° C):

1	>1	7	>60-90
2	1-7	8	>90-120
3	>7-14	9	>120-150
4	>14-30	10	>150-180
5	>30-45	11	>180-210
6	>45-60	12	>210

Thousands of garden plants have now been coded for heat tolerance, with more to come in the near future. Because Heat Zone ratings are relatively new, not all catalogs, web sites and garden centers currently indicate a plant’s tolerable Heat Zones. But more and more, you will begin to see two ratings for a given plant, such as 5-10, 11-1. The first pair of numbers is the cold Hardiness Zone. This plant will survive winter temperatures in zones 5 to 10. The second pair of numbers, which are reversed in magnitude, is the Heat Zone tolerance. 11-1 indicates that the plant is heat tolerant in zones 11 through 1. For example, a tulip may be 3-8, 8-1. If you live in USDA Zone 7 and AHS Zone 7, you will know that you can leave tulips outdoors in your garden year-round. An ageratum may be 10-11, 12-1. It can withstand summer heat throughout the United States, but will over-winter only in the warmest zones. An English wallflower may be 5-8, 6-1. It is relatively cold hardy, but can’t tolerate extreme summer heat.

The AHS also points out (http://www.ahs.org/publications/heat_zone_map).

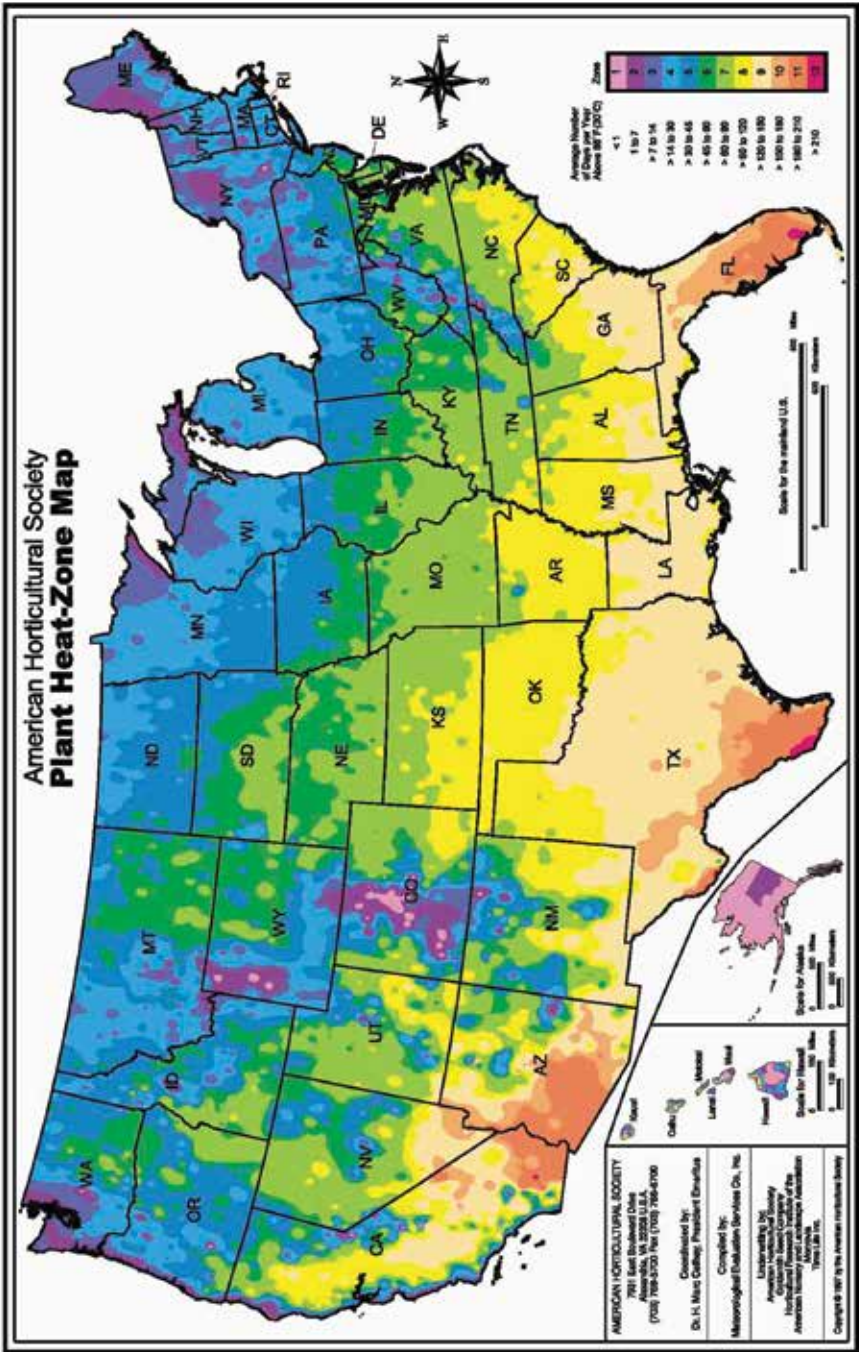


Fig. 3: The USA Heat-Zone map (http://www.ahs.org/pdfs/05_heat_map.pdf).

htm#1) that:

Most important, the AHS Plant Heat-Zone ratings assume that adequate water is supplied to the roots of the plant at all times. The accuracy of the zone coding can be substantially distorted by a lack of water, even for a brief period in the life of the plant.

Although some plants are naturally more drought tolerant than others, horticulture by definition means growing plants in a protected, artificial environment where stresses are different than in nature. No plant can survive becoming completely desiccated. Heat damage is always linked to an insufficient amount of water being available to the plant. Herbaceous plants are 80-90% water, and woody plants are about 50% water. Plant tissues to survive must contain enough water to keep their cells turgid and to sustain the plant's processes of chemical and energy transport.

Watering directly at the roots of a plant, through drip irrigation for instance, conserves water that would be lost to evaporation or runoff during overhead watering. In addition, plants take in water more efficiently when it is applied to their roots rather than their leaves. Mulching will also help conserve water.

There are other factors that can cause stress to plants and skew the heat-zone rating. Some of them are more controllable than others:

Oxygen: Plant cells require oxygen for respiration and the amount of oxygen your plant roots receive can be controlled by making sure your plants have good aeration-adequate space between soil particles.

Light: Light affects plants in two ways. First, it is essential for photosynthesis and energy absorbed affects the temperature of the plant. Available light can be adjusted by choosing to situate your plant in shade or dappled shade.

Air movement: While a gentle spring breeze can "cool" a plant through transpiration as it does us, fast-moving air on a hot day can have a negative effect, rapidly dehydrating it. Air movement in a garden is affected by natural features such as proximity to bodies of water and the presence of surrounding vegetation, as well as structures such as buildings and roads. You can reduce air circulation by erecting fences and planting hedges.

Surrounding structures: If the environment is wooded, transpiration from trees and shrubs will cool the air. On the other hand, structures of brick, stone, glass, concrete, plastic, or wood in the sun will emit heat and raise the air temperature. Gardeners wanting plants to produce early or survive in cold zones will often plant them on the south side of a brick wall, but this this would not be a good place for a plant at the southern limit of its heat zone!

Soil pH: The ability of plant roots to take up water and nutrients depends on the relative alkalinity or acidity of the soil. Most plants prefer a soil close to neutral (pH 7), but there are many exceptions, such as members of the Ericaceae, which prefer acidic soil. The successful cultivation of any plant requires that it be grown in a medium within a specific pH range. While it is possible to manipulate the pH of soil with amendments, it is easier to choose plants appropriate to your soil type.

Nutrients: Plants vary greatly in the ratio and form of elements they need for consistent, healthy growth. When these are present in appropriate quantities, they are recycled over and over again as the residue of woody material and dropped leaves accumulates and decays, creating sustainable landscapes.

Canada

In Canada, the generally very cold climate in northern Canada has resulted in little need for plant hardiness zones to be mapped in that relatively large area, so some Canadian plant hardiness zone maps (e.g., Fig. 4, p. 80) only show zones for the more heavily populated areas, i.e., within about 1200 km (750 miles) of the Canada/USA border. The new Canadian plant hardiness map (Fig. 2, interactive map at <http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/>) is divided into nine major zones: the harshest is 0 and the mildest is 8. Subzones (e.g., 4a or 4b, 5a or 5b) are also noted in the map legend, and these are likely familiar to Canadian gardeners. It should be noted, though, that some significant local factors, such as micro-topography, amount of shelter and subtle local variations in snow cover, are too small to be captured on the map. Year-to-year variations in weather and gardening techniques can also have a significant impact on plant survival in any particular location.

Natural Resources Canada's Canadian Forest Service scientists have now updated Canadian plant hardiness zones using the same variables as in the older (1930-1960) and more recent (1961-90) climate data. They have used modern climate mapping techniques and incorporated the effect of elevation. The most recent Canadian Plant Hardiness Zones map (McKenney et al, 2001) was developed by mapping a plant hardiness or suitability index. This index comes from a formula originally developed by Oullet and Sherk (1967a,b,c), namely:

$$Y = -67.62 + 1.734X_1 + 0.1868X_2 + 69.77X_3 + 1.256X_4 + 0.006119X_5 + 22.37X_6 - 0.01832X_7$$

where: Y = estimated index of suitability X1 = monthly mean of the daily minimum temperatures (°C) of the coldest month; X2 = mean frost free period above 0°C in days; X3 = amount of rainfall (R) from June to November, inclusive, in terms of R/(R+a) where a=25.4 if R is in millimeters and a=1 if R is in inches; X4 = monthly mean of the daily maximum temperatures (°C) of the warmest month; X5 = winter factor expressed in terms of (0°C - X1)R_{jan}, where R_{jan} represents the rainfall in January expressed in mm; X6 = mean maximum snow depth in terms of S/(S+a) where a=25.4 if S is in millimeters and a=1 if S is in inches; and X7 = maximum wind gust in (km/hr) in the past 30 years.

The new map indicates that there have been changes in plant hardiness zones that are generally consistent with what is known about climate change. The approach involved using models to develop topographically dependent, spatially continuous, mathematical climate surfaces from Canada's historical climate record (http://www.glf.forestry.ca/VLF/landscape/bulletin_13_eng.pdf). The result was a DEM, which is a regularly spaced grid of longitude, latitude and elevation that represents the topography of an area. Elevation has a major influence on climate. Standard errors of the surfaces were about 0.5°C or less for temperature variables and 5 to 28% for rainfall depending

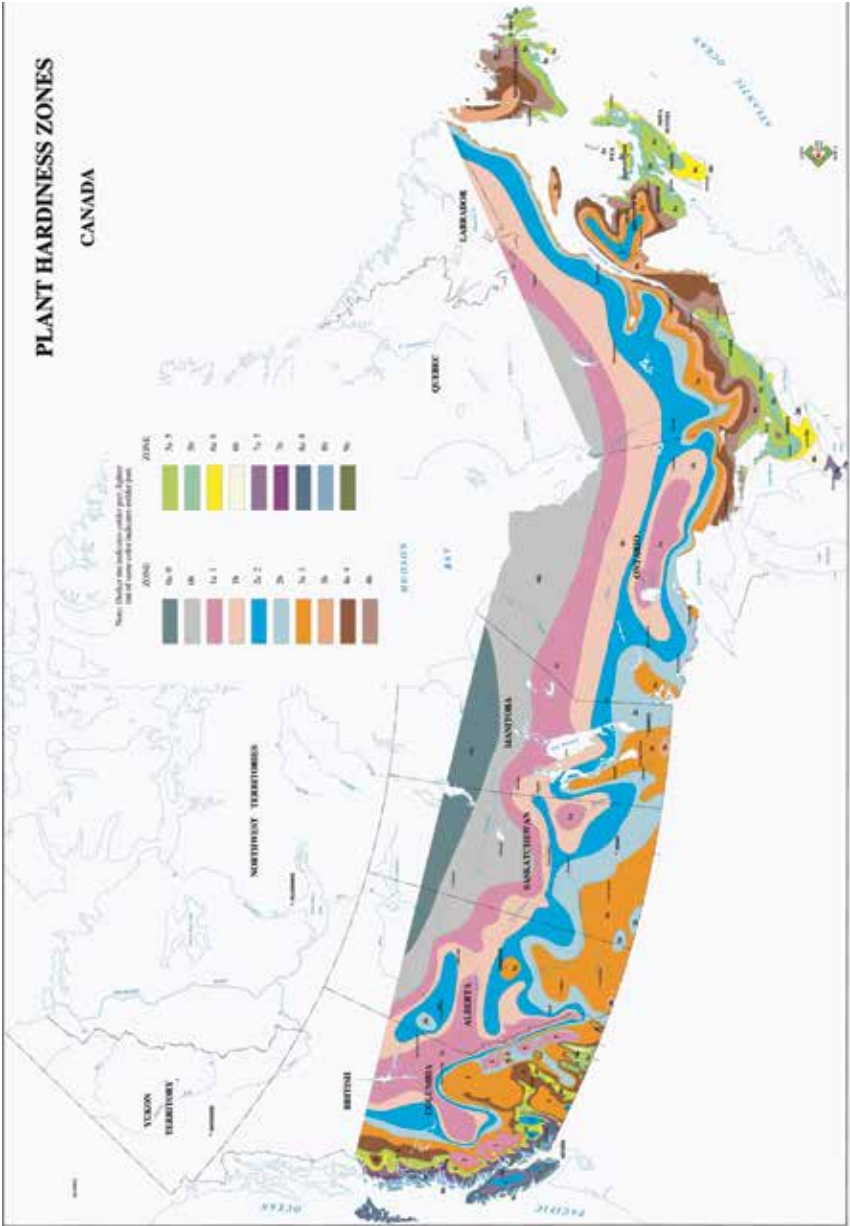


Fig 4: A schematic mapping of Plant Hardiness Zones in southern Canada (interactive year 2000 map at <http://sis.agr.gc.ca/cansis/nsdb/climate/hardiness/>).

on the month (winter months being the worst). The creation of a new DEM of Canada has enabled the mapping of each variable required for the plant hardiness formula at spatial resolutions of 1 km to 10 km. The figure is from an approximate 2 km resolution DEM. These models better capture the spatial variation in climate than was previously possible and hence should provide a stronger basis for applications such as the determination of plant hardiness zones. The new maps indicate that changes are most pronounced in western Canada; the hardiness index has declined (environmental conditions are becoming harsher) or remained stable in eastern garden Canada and has increased (climate is becoming more benign) in western garden areas.

The interactive map outlines the different zones in Canada, but because it allows zooming in, etc., it cannot be shown here in detail. The 2000 map was jointly created by the Canadian Forest Service and Agriculture and Agri-Food Canada. Because many parameters are used in the calculation of Canadian plant hardiness zones, no range of any one value, such as average minimum temperature, can be given for any specific location, as occurs with the USA plant hardiness zones. Future plans are to go beyond a single general map and to develop potential range maps for individual species of trees, shrubs and perennial flowers. Canada's approach is to develop a climatic profile for each plant using new continent-wide climate models, and then map them to provide an indication of the possible range of each species (<http://www.planthardiness.gc.ca/>).

Hardiness Zones in Other Parts of the World

Duncan Heather, Oxford College of Garden Design, has a website (<http://gardendesigncourses.blogspot.ca/2012/01/plant-hardiness-zones-for-europe-us.html>) that shows plant hardiness zones for Europe, North America, China, Japan and Australia. However, it should be noted that while the zone boundary categories in his maps for the USA, Europe and China are similar, those for Canada, Japan and Australia differ. Perhaps more useful for Europe, the website <http://www.uk.gardenweb.com/forums/zones/hze.html> allows a viewer to click on any of 35 European countries for a more detailed view of the zone boundaries in that country.

As discussed above, in the USA, plant hardiness zones are based on average annual extreme minimum temperatures, but because most places in Europe where people grow plants fall within US hardiness zones 6 to 10 (Fig. 5, p. 82), different terminologies have been developed for European hardiness rating systems by the RHS (Royal Horticultural Society) and EGF (European Garden Flora (Cullen et al. 2011), a manual for the accurate identification of cultivated ornamental plants in Europe). Fig. 6, page 83, compares the zonation categories for the three systems, along with the winter minimum temperatures that apply to each (<http://theseedsite.co.uk/hardiness.html>). Definitions and temperatures used by the RHS and EGF are:

RHS zones: **H** (Fully Hardy): Hardy to -15° C (5° F); **FH** (Frost Hardy): Hardy to -5° C (23° F); **HH** (Half Hardy): Hardy to 0° C (32° F); **FT** (Frost Tender): Not hardy

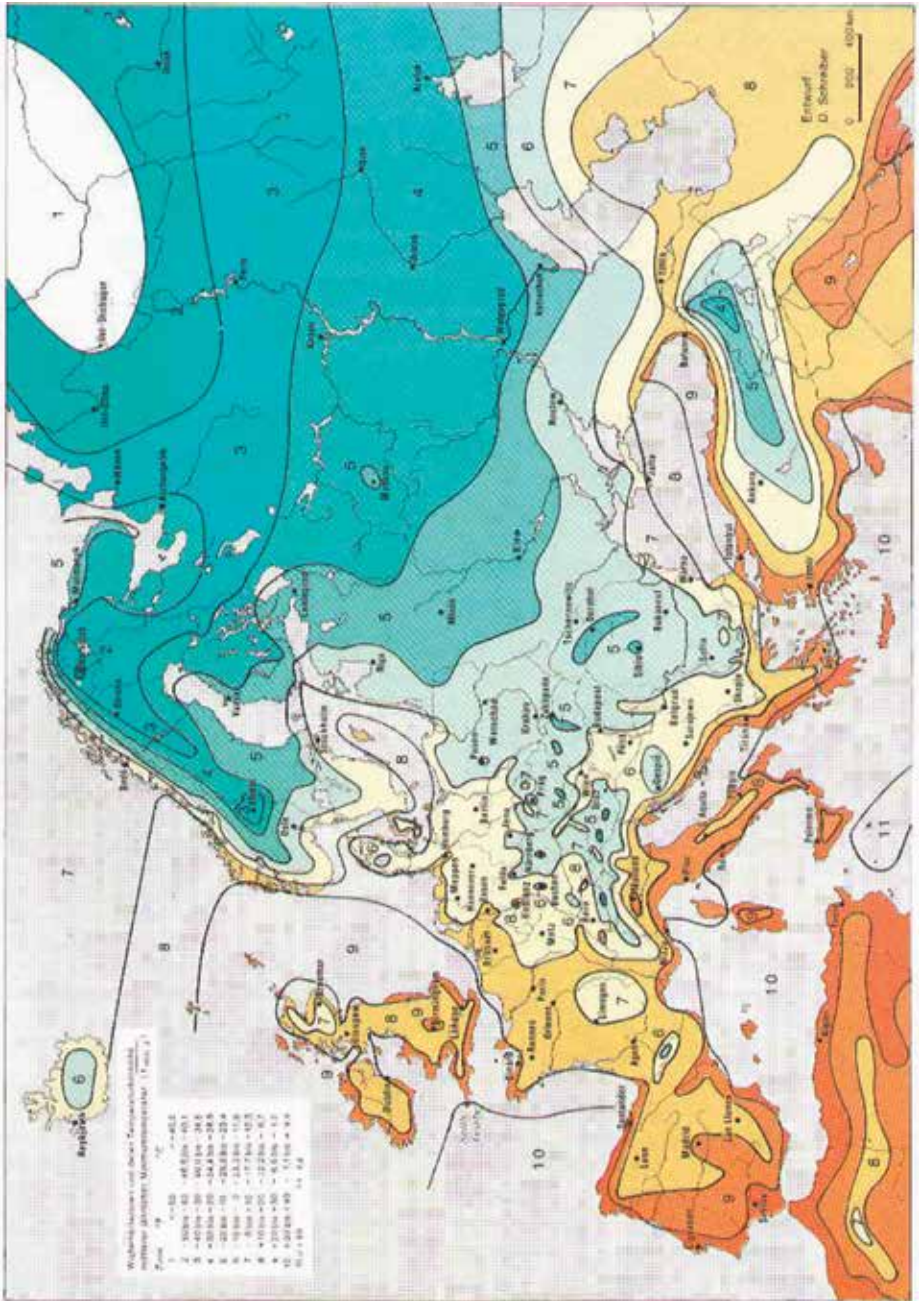


Fig. 5: European plant hardiness zones using the USA boundary zonation (<http://www.backyardgardener.com/zone/europe1zone.html>).

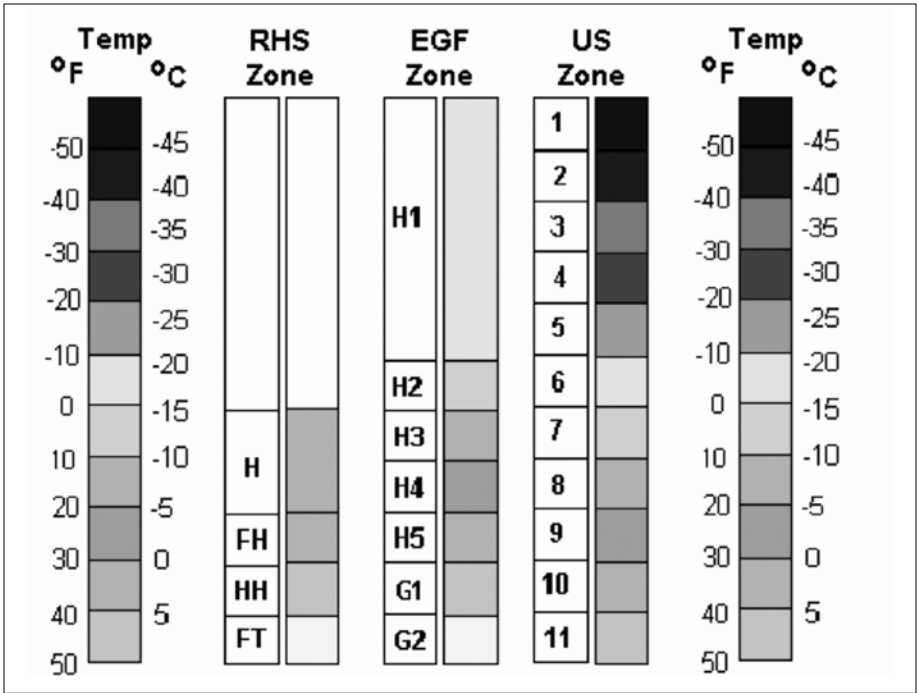


Fig 6: US, RHS and EGF plant hardiness zone boundary comparisons (<http://theseedsite.co.uk/hardiness.html>). Acronyms are explained in the text.

below 5° C (41° F).

EGF zones: **H1:** Hardy to -20° C (-4° F) and below; **H2:** Hardy to -15 to -20° C (5 to -4° F); **H3:** Hardy to -10 to -15° C (14 to 5° F); **H4:** Hardy to -5 to -10° C (23 to 14° F); **H5:** Hardy to 0 to 5° C (32 to 40° F); **G1:** Requires cool greenhouse protection; **G2:** Requires heated greenhouse protection.

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2013 Eastern Fall Conference - Nova Scotia

céad míle fáilte - a hundred thousand welcomes

Sheila Stevenson and
Anitra Laycock
Prospect Bay, Nova
Scotia
Canada



Sheila Stevenson



Anitra Laycock

ARS District 12 Atlantic Chapter is delighted to host the **2013 Eastern Fall Conference** and hope to see you here in this historic and scenic region of Atlantic Canada. Our club began in 1976 as RSCAR, the Rhododendron Society of Canada Atlantic Region, with Don Craig and Captain Richard Steele as founding members. We continue as the Atlantic Chapter of the American Rhododendron Society, one of the original three Regions in the RSC that now form ARS District 12.

We invite you to mark your calendars now for **October 4-6** and plan your stay at the Holiday Inn Harbourview in Dartmouth, Nova Scotia (www.hiharbourview.ca). Look to see the registration form by early April on the ARS and ARHS (www.atlanticrhodo.org) websites. A complete conference package will appear in the Summer issue of the ARS Journal.

An exciting programme of Tours and Talks is planned to make your visit memorable. Speakers will include Todd Boland, Steve Hootman, Nick Yarmoshuk, Christina Woodward, Walter Ostrom, Jamie Ellison, Niki Jabbour, Tim Amos, and Bernard Jackson. Tours will be offered on Friday and Saturday afternoons and all day on Sunday.

On Friday we tour historic Halifax and visit beautiful Boulderwood gardens, begun in the late 1950s under the guidance of a very enthusiastic resident, Dick Steele, who introduced *Rhododendron* species and hybrids to Nova Scotia from all over the globe. On Saturday our tour will take you out of the city to the species-rich ericaceous barrens of the Peggy's Cove area. After lunch at a Maple Sugar plant, you will tour the garden formerly owned by Walter Ostrom. Here judicious use of shelter and niche plantings allows a wonderful collection of dwarf rhododendrons to flourish within the barrens habitat. Todd Boland will then lead you on a guided walk to explore the native flora of the barrens.



The barrens near Peggy's Cove, Nova Scotia.

The Sunday tour will take you to the south of the Province to the Historic Annapolis Royal Gardens, where plant collections and display gardens illustrate the long history of the area, dating from French settlement in 1605. With ten acres of cultivated gardens and seven of dykeland, the Gardens have received many awards, most recently in 2012 as one of the “5 North American Gardens Worth Traveling For.” Themed areas demonstrate historic gardening styles including a 17th century Acadian-style potager, a knot garden, and an 18th century-style Governor’s Garden.

By early October, fall color will be dramatic. Japanese maples, witch hazels, parrotia, disanthus, smoke tree, dogwoods, and tupelo are highlights. Herbaceous perennials, annuals, hydrangeas, and ornamental grasses will be in flower accompanied by fruits and berries from beautyberry, euonymous, hollies, and rosehips. The rhododendron collection, although not in flower, presents a beautiful composition with over 120 species and cultivars arranged under oaks in an area of pools and a waterfall. There are hybrids from Dexter, Steele, Muntz, Craig and Weagle, among others. On the way, to Annapolis Royal, we will stop at the Irving Botanical Gardens, where the native plants of the Acadian Forest Region are to be found in an artfully arranged and well-signed display. The return trip will include a stop at Grand Pré winery where you will be offered a wine tasting.

Sheila Stevenson and Anitra Laycock are members of the Atlantic Chapter.

Hybridizing for Foliage: III - Rhododendrons with Indumentum and Tomentum

Frank Fujioka
Freeland,
Washington



Glen Jamieson
Parksville, BC
Canada



This article is the third in a series on the rhododendron hybridization efforts of Frank Fujioka who for many years has been trying to produce elepidote rhododendron cultivars that offer both exceptional foliage and flowers. Together we have produced this text to illustrate some of his efforts that are focused more on foliage and plant shape than flower characteristics.

Rhododendron enthusiasts who enjoy leaves often like to turn a leaf over to check for indumentum (the fine mass of dense hair on the underside of a leaf). They also appreciate tomentum (a similar hairy presence on the upper leaf surface), especially in the late spring, summer or fall because the leaves are most evident with rhodos and so these plants then particularly stand out in a garden. Indumentum stays throughout the year but tomentum usually washes off relatively quickly on new leaves because of heavy rains or frequent overhead watering.

To create hybrids with tomentum and/or indumentum, the following species or their hybrids were used: *R. degronianum* ssp. *yakushmanum*, *R. pachysanthum*, *R. coriaceum*, *R. bureavii*, *R. rex*, *R. pseudochrysanthum*, *R. wardii* and *R. macabeanum*. Photos of most of these species were shown in the first article of this series (*JARS* 66(2), pp.101-103.) Photos of *R. wardii* and *R. coriaceum* are in this article.

Some of the hybrids produced here with the heaviest tomentum have combinations of *R. degronianum* ssp. *yakushmanum*, *R. pachysanthum*, *R. bureavii* and *R. pseudochrysanthum*. Hybrids using Warren Berg's *R. 'Golfer'* (*R. degronianum* ssp. *yakushmanum* × *R. pseudochrysanthum*) gave excellent results.

Obtaining yellow rhododendrons with indumentum was a goal that was achieved by using later generation hybrids of *R. degronianum* ssp. *yakushmanum* and indumented species.

Example crosses:

Cross 1, photo #1

The indumentum probably results from *R. bureavii* and *R. degronianum* ssp. *yakushmanum*. The yellow flowers would come from a combination of *R. macabeanum* and *R. wardii* together with a complex yellow hybrid.



Cross 1, Photo #1. *R. bureavii*, *R. degronianum* ssp. *yakushmanum*, *R. macabeanum* and *R. wardii*. Photo by Frank Fujioka.

Cross 2, photo #2

The flower color probably comes from a combination of *R. dichroanthum* and a complex yellow hybrid. The indumentum stems from *R. degronianum* ssp. *yakushmanum* and the complex yellow hybrid which has a parentage of *R. degronianum* ssp. *yakushmanum*.



Cross 2, Photo #2. *R. degronianum* ssp. *yakushmanum*, *R. calophyllum* and *R. dichroanthum*. Photo by Frank Fujioka.

Cross 3, photo #3

This is a cross of the two species *R. degronianum* ssp. *yakushmanum* and *R. coriaceum* resulting in the indumentum and flower color shown.



Cross 3, Photo #3. *R. degronianum* ssp. *yakushmanum* and *R. coriaceum*. Photo by Frank Fujioka.

Cross 4, photo #4

The heavy tomentum results from the combination of three species: *R. degronianum* ssp. *yakushmanum*, *R. pachysanthum*, and *R. rex* ssp. *fictolacteum*. The brown indumentum is an influence of *R. pachysanthum*.



Cross 4, Photo #4. *R. degronianum* ssp. *yakushmanum*, *R. pachysanthum*, and *R. rex* ssp. *fictolacteum*. Photo by Frank Fujioka.

Cross #5, photo #5

The tomentum and indumentum are from *R. degronianum* ssp. *yakushmanum*, *R. pseudochrysanthum*, and *R. rex* ssp. *rex*. The leaf texture from *R. rex* ssp. *rex* and *R. arboreum* ssp. *zeylanicum*.



Cross 5, Photo #5. *R. degronianum* ssp. *yakushmanum*, *R. pseudochrysanthum*, *R. rex* ssp. *rex* and *R. arboreum* ssp. *zeylanicum*. Photo by Frank Fujioka.

Cross 6, photo #6

The parentage containing *R. degronianum* ssp. *yakushmanum*, *R. rex* ssp. *rex* and *R. bureavii* give the heavy indumentum. The flower color most likely comes from *R. arboreum* ssp. *zeylanicum*.



Cross 6, Photo #6. *R. 'Chemainus'*, a registered hybrid of 'Noyo Brave' ('Noyo Chief' X *R. degronianum* ssp. *yakushmanum*) X (*R. rex* ssp. *rex* X 'Hansel'). Photo by Frank Fujioka.

Cross 7, photos #7 and #8

This hybrid has tomentum that remains until fall when the rains come in Washington State. The combination of *R. degronianum* ssp. *yakushmanum*, *R. pseudochrysanthum*, *R. rex* ssp. *rex* and *R. bureavii* gives this plant the heavy tomentum and indumentum. The plant is about nine years old and has not flowered yet!



Cross 7, Photos #7 and #8. *R. degronianum* ssp. *yakushmanum*, *R. pseudochrysanthum*, *R. arboreum* ssp. *zeylanicum*, *R. rex* ssp. *rex* and *R. bureavii*. Photos by Frank Fujioka.



The species *R. wardii*, at the top, is involved in Cross #1, and the species *R. coriaceum*, at the bottom, is involved in Cross #3. Photos by Steve Hootman and Glen Jamieson respectively.

Frank Fujioka is a member of the Whidbey Island ARS Chapter. Glen Jamieson is Editor of the ARS Journal.

Newly Registered Rhododendron Cultivar Names

Michael Martin Mills
North American Registrar of Plant Names
Philadelphia, Pennsylvania

The following rhododendron and azalea names were approved and added to the International Rhododendron Register before February 13, 2013, by the Royal Horticultural Society, which serves as the International Cultivar Registration Authority for the genus *Rhododendron*. (Information on the registration process follows the descriptions of cultivars.)

Key

(a) – deciduous or evergreen azalea

(r) – elepidote or lepidote rhododendron

(v) – vireya rhododendron

(z) – azaleodendron

X – primary cross

(s) – seed parent of cross, if known

x – cross of an unnamed parent

* – not registered

H – hybridized by

G – grown to first flower by

R – raised by

S – selected by

N – named by

I – introduced commercially by

REG – registered by

Royal Horticultural Society color numbers in parentheses, unless another system is noted

(r) ‘Amber Waves’

Elepidote rhododendron: ‘Amber Touch’ (s) X ‘Janet Blair’. H (1996), G (2002), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 22/ball truss, broad funnel, 2.25 inches (57mm) long x 3.5 inches (89mm) wide with 5 frilly lobes. Buds: strong purplish red (54A). Inside of corolla: pale yellow (12D) center, with upper third of lobes light yellow (12C), changing to strong pink (54C) at outer 0.25 inch (6mm)

of all petals; moderate orange (166D) spotting on upper lobes, starting 0.5 inch (13mm) from base and extending 1.25 inch (32mm). Outside of corolla: pale yellow (12D) with upper portion of lobes light yellow (12C), changing to strong pink (54C) at outer 0.25 inch (6mm) of all petals. Truss 6.75 x 6.75 inches (171 x 171mm). Lvs 5.5 x 1.75 inches (140 x 44mm), elliptic, rounded base, broadly acute apex, wavy margins, moderate olive green (147A) above, matt. Shrub 4 feet (1.2m) high x 3 feet (0.9m) wide in 9 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason. (Photo p. 118.)



Amber Waves'. Photo by Jim Barlup.

(r) 'Carol's Candy'

Elepidote rhododendron: 'Lem's Tangerine' (s) X 'Tia'. H (2000), G (2005), N (2010), REG (2013): Jim Barlup, Bellevue, WA. Flrs 14/dome truss, open funnel, 2 inches (51mm) long x 2.75 inches (70mm) wide with 7 wavy lobes. Buds: Moderate yellowish pink (38B). Inside flower: Pale orange yellow (159C) with strong red (53D) spinal lines from base to edges. Petal edges strong pink (54C). Upper lobes deep purplish pink (54B); strong red (53B) flare on upper lobe, 1.25 inch (32mm), with 0.25 inch (6mm) strong red (53B) stripes on each lobe. Outside flower: Pale orange yellow (159C), with strong red (53D) spinal lines; deep purplish pink (54B) upper lobes. Truss 5 x 5

ARS SEED EXCHANGE

The Seed Exchange still has rhododendron seed available and is accepting orders until
May 1st, 2013

A listing of seed availability can be viewed at the ARS web page:
<http://www.rhododendron.org/seedexchange.htm>

- and at the Danish web page http://www.rhododendron.dk/ARS_seed-2013.html.
- Catalog open to non-ARS members after March 15th.

Norman Beaudry, Chairman
ARS Seed Exchange

inches (125 x 125mm). Lvs held # years, 4.75 x 2 inches (120 x 50mm), elliptic, with rounded base, broadly acute tip, downcurved margin, moderate olive green (147A) above. Shrub 3.5 x 3.5 feet (1.1 x 1.1m) 12 years; intermediate habit, leaves held 2 yrs. Plant hardy to +5°F (-15°C). Flowering midseason. Etymology of name: Carol, a friend of the hybridizer, likened the truss to candy.

(r) 'Catherine White'

Elepidote rhododendron: Parentage unknown. S (c. 1995), N (2012): Richard H. White, Sandwich, Ma.; REG (2012): John Delano, Duxbury, Ma. Flrs 11/conical truss, broad funnel, 2.5 inches (63mm) long x 4 inches (100mm) wide with 6 frilly lobes. Buds: moderate yellowish pink (38B). Inside of corolla: pale orange yellow (159C) with pale greenish yellow (2D) throat area; moderate red (47A) spotting on three upper lobes emanating from throat. Pale orange yellow (159C) stamens, brilliant yellow green (150B) style, strong red (46A) stigma. Outside of corolla: pale orange yellow (159C). Truss 7 inches (180mm) high x 6 inches (150mm) wide. Lvs 6 x 2 inches (130 x 50mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, dull. Shrub 8 feet (2.4m) high x 9 feet (2.7m) wide in 17 years; intermediate habit, floriferous. Plant hardy to -10°F (-23°C), bud hardy



'Catherine White'. Photo by John Delano.

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to -5°F (-21°C). Flowering in May. Etymology of name: wife of selector/grower and friend of the registrant. Note: limited previous propagation under the name RHW12. (Photo p. 118.)

(r) ‘Champagne Lace’

Elepidote rhododendron: ‘Glenna’ (s) X ‘Janet Blair’. H (1996), G (2001), N (2012), REG (2012): Jim Barlup, Bellevue, Wash. Flrs 19/ball truss, broad funnel, 2 inches (51mm) long x 3.5 inches (89mm) wide with 5 frilly lobes. Buds: strong purplish red (54A). Inside of corolla: light greenish yellow (4C) at the center blending to pale yellow green (4D) toward the edge, upper lobes light greenish yellow (4B), with moderate yellow (162B) flare on upper lobes. Outside of corolla: pale yellow green (4D) with a light greenish yellow (4C) base. Truss 6 x 6 inches (150 x 150mm). Lvs 5 x 1.8 inches (125 x 45mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, semiglossy. Shrub 3 x 3 feet (0.9 x 0.9m) in 7 years; intermediate habit. Plant hardy to 0°F (-18°C). Flowering late.

(r) ‘Copper Canyon’

Elepidote rhododendron: ‘Amber Sun’ (s) X ([‘Jalisco’ x *R. degronianum* ssp. *yakushimanum*] x ‘Joanita’) x [‘Goldfort Group’ x ‘Odee Wright’]. H (2000), G (2005), N (2012), REG (2013): Jim Barlup, Bellevue, WA. Flrs 12/dome truss, open funnel, 2.38 inches (60mm) long x 3.5 inches (89mm) wide with 5 wavy lobes. Buds: strong red (53B). Inside of corolla: light orange yellow (16C) fading to pale orange yellow (16D) on outer petals, with light orange yellow (16B) upper lobe; strong red (53C) 0.5-inch (13mm) flare changing to strong red (53C) spotting on upper 3 lobes extending 1.5 inches (38mm) above flare. Outside of corolla: pale orange yellow (16D), light



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orange yellow (16B) on upper lobe fading to pale orange yellow (16D) on petal edge. Calyx: 1.5 inches (38mm), light orangish yellow (16C) with strong red (53C) flaring. Truss 5 inches (127mm) high x 5.5 inches (140mm) wide. Lvs 5 x 2.25 inches (127 x 57mm), elliptic, with rounded base, broadly acute tip, flat margins, moderate olive green (147A) above, semiglossy. Shrub 3.5 feet (1.1m) high x 4 feet (1.2m) wide in 11 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason.

(r) 'Dalette Atkins'

Elepidote rhododendron: 'Janet Blair' (s) X 'Helen Vieira'. H (2002), G (2005), N (2012), REG (2012): Delbert Brim, Mount Airy, N.C. Flrs 18/ball truss, open funnel, 2.25 inches (57mm) long x 3 inches (75mm) wide with 6 wavy lobes. Inside of corolla: pale purplish pink (56D) with strong red (53B) blotch. Outside of corolla: light purplish pink (55C). Truss 7 x7 inches (175 x 175mm). Lvs 8 x 2.5 inches (20 x 6.4cm), oblong, cuneate base, obtuse apex, downcurved margins, moderate olive green (137B) above, semiglossy. Shrub 4 feet (1.2m) high x 5 feet (1.5m) wide in 10 years; intermediate habit, lvs held 2 years. Plant hardy to -12°F (-24°C), bud hardy to -3°F (-19°C). Flowering midseason. Etymology of name: daughter of the hybridizer/registrant.

(r) 'Fancy That'

Elepidote rhododendron: 'Kera' (s) X 'Christina Dee'. H (2006), G (2010), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 13/ball truss, broad funnel, 2 inches (50mm) long x 3 inches (75mm) wide with 5 wavy lobes. Buds: Deep pink (52B).

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Inside flower: Pale yellow (11C) fading to pale yellow (11D) toward margin, with pale yellowish pink (36D) margin line; strong red (53C) flaring on all segments, 0.25 inch (6mm), changing to spots extending 1.37 inch (35mm) from base on upper lobes. Outside of flower: Pale yellow (11C) fading to pale yellow (11D) at outer petals. Truss 5.5 x 5.5 inches (140 x 140mm). Lvs 4.25 x 1.75 inches (108 x 44mm), elliptic, with rounded base, broadly acute tip, flat margins, moderate olive green (147A) above. Shrub 2 feet (0.6m) high x 2.8 feet (0.8m) wide in 5 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason.

(r) 'Farewell Bend'

Elepidoterhododendron: 'Mrs. Furnival'
 (s) X 'One Thousand Butterflies'. H (1989), G (1995), N (1999), REG (2013): Jim Barlup, Bellevue, WA. Flrs 15/dome truss, saucer, 2.75 inches (70mm) long x 4 inches (102mm) wide with 6 wavy lobes. Buds: deep purplish pink (68A). Inside of corolla: very pale purple (69D) center, fading to very pale purple (75D) toward margins, with very light purple (75C) upper lobes; moderate red (182A) spotting on upper lobe, extending 1.88 inches (48mm) from base. Outside of corolla: very pale purple (75D) with very light purple (75C) mid veins and very light purple (75C) margins. Truss 6 x 6 inches (152 x 152mm). Lvs 5 x 2.12 inches (127 x 54mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, matt. Shrub 3.5 feet (1.1m) high x 3 feet (0.9m) wide in 7 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason. Etymology of name: After Farewell Bend State Recreation Area, Snake River, Oregon.

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(r) 'Frosted Lemon'

Elepidote rhododendron: 'Scintillation' (s) X 'Recital'. H (1996), G (2001), N (2012), REG (2013): Jim Barlup, Bellevue, WA. Flrs 19/ball truss, broad funnel, 1.75 inches (44mm) long x 2.75 inches (70mm) wide with 6 frilly lobes. Buds: brilliant greenish yellow (4A). Inside of corolla: yellowish white (155D) blending to light greenish yellow (4C) on upper lobes; brilliant yellow green (154C) rays on upper lobe extending 0.5 inch (13mm) from base; moderate red (185B) flare on upper lobe changing to brilliant yellow green (154C) with age. Outside of corolla: yellowish white (155D) blending to light greenish yellow (4C) on upper lobes. Calyx 1 inch (25mm), yellowish white (155D) with brilliant yellowish green (154C). Truss 5 x 5 inches (127 x 127mm). Lvs 4.25 x 2 inches (108 x 51mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, semiglossy. Shrub 2.5 feet (0.8m) high x 3 feet (0.9m) wide in 6 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering late.



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(r) 'Ivory Dream'

Elepidote rhododendron: (*R. degronianum* ssp. *yakushmanum* x *R. lacteum*) (s) X (*R. degronianum* ssp. *yakushmanum* x *R. macabeaenum*). H (1992), G (1998), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 18/dome truss, funnel campanulate, 1.75 inches (44mm) long x 2.25 inches (57mm) wide with 6 wavy lobes. Buds: deep pink (48B). Inside of corolla: pale yellow green (4D) base with light greenish yellow (4C) ridges on each segment; outer 0.5 inch (13mm) of lobes yellowish white (155D); moderate red (181C) semicircular blotch on upper half of corolla, 0.38 inch (10mm) extending from base. Outside of corolla:

pale yellow green (4D) at base changing to yellowish white (155D) at tips of lobes. Truss 4 inches (102mm) high x 5 inches (127mm) wide. Lvs 4.85 x 2.25 inches (120 x 57mm), elliptic, rounded base, broadly acute apex, downcurved margins, moderate olive green (147A) above; yellowish white (155B) hairy indumentum, except on rib, maturing to brownish orange (165B). Shrub 3 feet (0.9m) high x 4.5 feet (1.4m) wide in 19 years; dense habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering early.

(r) 'Judy's Choice'

Elepidote rhododendron: 'Hachman's Charmant' (s) X 'Tia'. H (2002), G (2006), N (2009), REG (2013): Jim Barlup, Bellevue, WA. Flrs 13/ ball truss, broad funnel, 2 inches (51mm) long x 2.87 inches (73mm) wide with 5 wavy lobes. Buds: moderate purplish pink (65A). Interior of corolla: pale yellow (8D) extending 0.5 inch (13mm) from base, then blending to yellowish white (155D); deep yellowish pink (47C) flare on upper lobes extending 1.5 inches (38mm) from base. Outside of corolla: pale yellow (8D) extending 0.5 inch (13mm) from base, then blending to moderate purplish pink (65A), changing to yellowish white (155D). Truss 5.5 x 5.5 inches (140x 140mm). Lvs 5.5 x 2.25 inches (140 x 57mm), elliptic, rounded base, broadly acute apex, upcurved margins, moderate olive green (147A) above, matt. Shrub 4 x 4 feet (1.2 x 1.2m) in 10 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason. Etymology of name: chosen by the wife of the hybridizer/registrant, Judy Barlup.

(r) 'Lady Bug'

Elepidote rhododendron: 'Terra' (s) X ('Berg's Yellow' x *R. proteoides*). H (2004), G (2009), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 20/ball truss,

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open funnel, 2 inches (51mm) long x 2.75 inches (70mm) wide with 5 wavy lobes. Buds: light greenish yellow (4B). Inside of corolla: pale yellow green (4D), deeper on upper lobe, light greenish yellow (4C); strong red (53B) flare on upper lobe, extending 0.68 inch (17mm) from base, surmounted by strong red (53B) spotting reaching 1.5 inch (38mm) from base. Exterior of corolla: pale yellow green (4D), deeper on upper lobe, light greenish yellow (4C). Calyx: 0.37 inch (10mm), light greenish yellow (4B) with strong red (53B) flaring. Truss 5 inches (127mm) high x 5.5 inches (140mm) wide. Lvs 3.25 x 1.25 inches (83 x 38mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, semiglossy. Shrub 2 feet (0.6m) high x 2.5 feet (0.75m) wide in 8 years; dense habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason. Etymology of name: inspired by the flower's spotting.

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(r) 'Lemon Prelude'

Elepidote rhododendron: 'Recital' (s) X 'Bud's Yellow'. H (2000), G (2005), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 13/dome truss, broad funnel, 1.88 inches (48mm) long x 2.88 inches (73mm) wide with 5 wavy lobes. Buds: strong red (51A). Inside of corolla: pale yellow (18C), with light yellow (18A) mid veins and upper lobes; deep red (53A) twine flares on upper lobes with spotting extending 0.5 inch (13mm) above flares. Exterior of corolla: pale yellow (18C) with light yellow (18A) mid veins and upper lobes. Calyx: 0.62 inch (17mm), light yellow (18A) with deep red (53A) spotting. Truss 5 inches (127mm) high x 5.5 inches (140mm) wide. Lvs 3.75 x 2 inches (95 x 51mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, semiglossy. Shrub 3 x 3 feet (0.9 x 0.9m) in 11 years;

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intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason.

(r) 'Makayla Quinn'

Elepidote rhododendron: 'Janet Blair' (s) X 'Helen Vieira'. H (2002), G (2005), N (2012), REG (2012): Delbert Brim, Mount Airy, N.C. Flrs 20/ball truss, open funnel, 2.25 inches (57mm) long x 4 inches (102mm) wide with 6 wavy lobes. Inside of corolla: moderate purplish pink (54D) with deep red (60A) blotch. Outside of corolla: strong pink (54C). Truss 8 x 8 inches (200 x 200mm). Lvs 6 x 2 inches (150 x 50mm), oblong, cuneate base, acute apex, flat margins, dark yellowish green (139A) above, glossy. Shrub 4 feet (1.2m) high x 5.5 feet (1.7m) wide in 10 years; intermediate habit, lvs held 2 years. Plant hardy to -12°F (-24°C), bud hardy to -3°F (-19°C). Flowering midseason. Etymology of name: granddaughter of the hybridizer/registrant.

(r) 'Mary Collins'

Elepidote rhododendron: Unknown parentage. H (1960s): John C. Cowles, Stow, MA. G (c. 1970): Heritage Museum and Gardens, Sandwich, MA. N (c. 2003): Edward W. Collins, Hendersonville, NC. REG (2013): Sandwich Club, Sandwich, MA. Flrs 12-14/ball truss, broad funnel, 2.5 inches



'Mary Collins'. Photo by John Delano.

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(65mm) long x 4.25 inches (110 mm) wide with 7 wavy lobes. Buds: strong red (51A). Inside of corolla: margins strong purplish pink (63C), centers greenish white (155C), throat deep red (53A) extending $\frac{3}{4}$ inch (20mm) toward upper lobes. Strong red (53D) spotting on upper half of all lobes, mixed with strong red (53D) linear segments; colorless striations up the center of all lobes. Outside of corolla: strong pink to moderate purplish pink (54C-54D) with strong red (51A) stripes. Calyx: grayish red (182B) 0.1 inch (2mm). Truss 6 x 6 inches (150 x 150mm). Lvs 5.13 x 2.38 inches (130 x 60mm), elliptic, with rounded base, broadly acute tip, upcurved margin, moderate olive green (146A), dull, above. Shrub 2.5 feet (0.8m) high x 5 feet (1.5m) wide in 7 years; intermediate habit, lvs held 2-3 years. Plant hardy to -10°F (-23°C), bud hardy to -5°F (-20°C). Flowering late. Etymology of name: daughter of Edward W. Collins. (Photo p. 118.)

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(a) 'My Li'l Tonto'

Evergreen azalea: 'Christina' (s) X
 'Shinnyo-no-tsuki'. H (1989), G
 (1994), N (2012), REG (2012);
 William L. Claggett, Derwood, Md.; I
 (2012): White's Nursery, Germantown,
 Md. Flrs 3 per terminal, broad funnel,
 hose-in-hose and double; corolla 1 inch
 (25mm) long x 2 inches (50mm) wide
 with 17-18 frilly-edge lobes. Buds vivid
 red (44A) with deep yellowish pink
 (39B); inside of corolla vivid red (44A)
 with varying amounts of deep yellowish
 pink (39B); outside of corolla vivid

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'My Li'l Tonto'. Photo by William Claggett.

red (44A) with deep yellowish pink (39B) mid ribs. Lvs 0.8 x 0.3 inch (18 x 6mm), elliptic, cuneate base, broadly acute apex, flat margins, moderate olive green (147A) to moderate yellow green (147C) above, semiglossy. Shrub 2 feet (0.6m) high x 1.2 feet (0.36m) wide in 20 years; intermediate habit. Plant and bud hardy to at least -12°F (-24°C). Flowering late May. (Photo p. 118.)

(r) ‘Orange Amber’

Elepidote rhododendron: ‘Dazzler’* (s) X ‘Hill’s Low Red’. H (2006), G (2010), N (2012), REG (2013): Jim Barlup, Bellevue, WA. Flrs 14/dome truss, broad funnel, 2.5 inches (64mm) long x 2.75 inches (70mm) wide with 5 wavy lobes. Buds: moderate purplish red (64A). Interior of corolla: brilliant yellow (11A) blending to deep yellowish pink (41D), with 5 deep red (53A) 0.12-inch (3mm) nectar guides at base; deep purplish pink (54B) spotting on upper lobes 1.5 inches (38mm) from base. Calyx: 0.38 inch (10mm), deep yellowish pink (41D). Truss 5 x 5 inches (127 x 127mm). Lvs 4.5 x 2 inches (114 x 51mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, matt. Shrub 2 feet (0.6m) high x 2.5 feet (0.8m) wide in 6 years; intermediate habit, lvs held 2 years. Plant hardy to +5°F (-15°C). Flowering midseason. * Unregistered Jim Elliot cross described (Greer, 1996) as containing “[R.] *dichroanthum*, *griersonianum* and probably other species ... salmon orange.”

(r) ‘Patricia Hansen’

Elepidote rhododendron: ‘Burgundy Mist’ (s) X ‘Hollis Hope’. H (2006), G (2010), N (2013), REG (2013): Jim Barlup, Bellevue, WA. Flrs 17/ball truss, broad funnel, 1.75

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inches (44mm) long x 2.5 inches (64mm) wide with 5 wavy lobes. Buds: dark red (187A). Inside of corolla: strong purple (83D) blending toward edges to strong purple (83C), with dark greenish yellow (152D) spotting on upper lobe extending 1.12 inches (29mm) from base. Exterior of corolla: strong purple (83D) fading to deep purple (83B) on outer petals, with strong purplish red (71B) rib veins from base to margin. Truss 4.75 inches (120mm) high x 5 inches (127mm) wide. Lvs 5 x 2.25 inches (127 x 57mm), elliptic, rounded base, broadly acute apex, downcurved margins, moderate olive green (147A) above, matt. Shrub 2 feet (0.6m) high x 3 feet (0.9m) wide in 6 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason. Etymology of name: a friend of the hybridizer/registrant.

(r) 'Pilkingtons' Pride'

Elepidote rhododendron: Unknown parentage. H (c1965), G: Tony Consolini, Sandwich Mass.; N (2012): Norman & Jean Beaudry, Bethesda, Md.; I (2006), REG (2012): Sandwich Club, Sandwich, Mass. Flrs 9/lax truss, open funnel, 3.5 inches (90mm) long x 4.5 inches (115mm) wide with 6 frilly lobes. Buds: strong yellowish pink (37B). Inside of corolla: pale yellowish pink (159D), with a moderate yellow (160A) flare and some spotting on the top lobe and partial flare on the flanking lobes; strong yellow green (145A) stigma. Outside




'Pilkingtons' Pride'. Photo by Don Hyatt.

of corolla: pale yellowish pink (27D). Truss 7 x 7 inches (180 x 180mm). Lvs 5.5 x 2 inches (140 x 50mm), oblong, oblique base, broadly acute apex, flat margins, moderate olive green (147A) above. Shrub 17 feet (5m) high x 15 feet (4.5m) wide in 47 years; intermediate habit, lvs held 2 years. Flowering midseason. Etymology of name: Harold and Eveline Pilkington, friends of the hybridizer. Note: limited previous propagation under the name Cream on the Northerly Path.

(r) 'Sandstone'

Elepidote rhododendron: 'Coral Blossom' (s) X ('Bambi' x *R. proteoides*). H (2001), G (2005), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 16/dome truss, funnel campanulate, 1.75 inches (44mm) long x 2.5 inches (64mm) wide with 6 wavy lobes. Buds: dark red (59A). Interior of corolla: pale yellow (11D) fusing with strong pink (50C) streaks, strong pink (50C) at margins; on upper three lobes, solid flare beginning dark red (183A) at base, blending after 0.5 inch (13mm) to moderate red (183C) spotting, extending 1.5 inches (38mm) from base. Exterior of corolla: pale yellow (11D) fusing with strong pink (50C), with strong red (50A) mid veins. Calyx: 1.12 inches (28mm), pale yellow (11D) with moderate red (183C) flaring. Truss 4 inches (102mm) high x 5 inches (127mm) wide. Lvs 5 x 1.88 inches (127 x 48mm), elliptic, rounded base, broadly acute apex, downcurved margins, moderate olive green (147A) above, matt. Shrub 2 feet (0.6m) high x 2.8 feet (0.9m) wide in 11 years; dense



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habit, lvs held 2 years. Plant hardy to +5°F (-15°C). Flowering midseason. Note: Of the hybridizer's multiple seedlings of the pollen parent cross, he has designated the one used here as #8.

(r) 'Summer Sunrise'

Elepidote rhododendron: 'Orange Prelude' (s) X ('Berg's Yellow' x *R. proteoides*). H (2004), G (2009), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 15/ball truss, broad funnel, 1.88 inches (48mm) long x 3.25 inches (83mm) wide with 7 wavy lobes. Buds: strong yellowish pink (31C). Interior of corolla: pale yellowish pink (27C) with pale yellow green (4D) toward center and a tinge of pale yellowish pink (36D) at margins; strong red (53B) circle at base extending 0.38 inch (10mm) from base on all lobes. Exterior of corolla: blend of pale yellowish pink (27C) and pale yellow green (4D), with tinges of pale yellowish pink (36D) on upper lobes. Calyx: 0.63 inch (17mm), pale yellow green (4D) with two 0.25-inch (6mm) strong red (53B) flares. Truss 6 inches (152mm) high x 5 inches (127mm) wide. Lvs 4.75 x 1.88 inches (120 x 46mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, semiglossy. Shrub 2.5 feet (0.8m) high x 3 feet (0.9m) wide in 7 years; intermediate habit, lvs held 2 years. Plant hardy to +5°F (-15°C), bud hardy to #°F (#°C). Flowering midseason.

(r) 'Tangerine Charm'

Elepidote rhododendron: 'Cimarron Sun' (s) X ('September Song' x ['Bambi' x *R. proteoides*]). H (2006), G (2010), N (2012), REG (2013): Jim Barlup, Bellevue, WA. Flrs 11/dome truss, broad funnel, 1.75 inches (44mm) long x 2.25 inches (57mm) wide with 5 wavy lobes. Buds: moderate red (47A). Interior of corolla: pale orange yellow (16D) at base blending to strong yellowish pink (34D) with deep yellowish pink (47C) at margins; no blotch or spotting. Exterior of corolla: pale orange yellow (16D) at base fading to vivid reddish orange. Calyx: 0.68 inch (17mm), pale orange yellow (16D) with a touch of strong yellowish pink (34D). Truss 4.5 inches (114mm) high x 5 inches (127mm) wide. Lvs 4 x 1.5 inches (102 x 38mm), elliptic, rounded base, broadly acute apex, upcurved margins, moderate olive green (147A) above, semiglossy. Shrub 1.3 x 1.3 feet (0.4 x 0.4m) in 6 years; intermediate habit, lvs held 2 years. Plant hardy to +5°F (-15°C). Flowering midseason.

(r) 'Violet Magic'

Elepidote rhododendron: ('Purple Amethyst' x 'Plum Passion') (s) X 'Holli's Hope'. H (2006), G (2010), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 14/ball truss, broad funnel, 2 inches (51mm) long x 3 inches (76mm) wide with 5 frilly lobes. Buds: dark purple (79A). Inside of corolla: strong purplish red (72A), with deep purplish red (71A) petal margins; pale orange yellow (23D) spotting on upper three lobes. Exterior of corolla: strong purplish red (72A) with deep purplish red (71A) midveins and petal

margins. Truss 5 x 5 inches (127 x 127mm). Lvs 5.75 x 2 inches (146 x 51mm), elliptic, rounded base, broadly acute apex, upcurved margins, moderate olive green (147A) above, semiglossy. Shrub 1.5 feet (0.46m) high x 2.5 feet (0.76m) wide in 5 years; dense habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason.

(r) ‘Vyron Minor’

Elepidote rhododendron: (‘Janet Blair’ x *R. decorum* yellow form) (s) X ‘Helen Vieira’. H (2002), G (2005), N (2012), REG (2012): Delbert Brim, Mount Airy, N.C. Flrs 20/ball truss, open funnel, 2.25 inches (57mm) long x 4 inches (102mm) wide with 6 wavy lobes. Buds: strong purplish red (54A). Inside of corolla: moderate purplish pink (54D), with deep red (60A) blotch. Outside of corolla: strong pink (54C). Truss 8 x 8 inches (200 x 200mm). Lvs 7 x 2.5 inches (180 x 63mm), obovate, cuneate base, broad acute apex, moderate olive green (137B) above, semiglossy. Shrub 4.25 feet (1.3m) high x 5.5 feet (1.7m) wide in 10 years; intermediate habit, lvs held 3 years. Plant hardy to -12°F (-24°C), bud hardy to -3°F (-19°C). Flowering midseason. Etymology of name: daughter of the hybridizer/registrant.

(r) ‘White Ginger’

Elepidote rhododendron: ‘Phyllis Korn’ (s) X ‘Trude Webster’. H (1993), G (1999), N (2011), REG (2013): Jim Barlup, Bellevue, WA. Flrs 13/ball truss, saucer, 2.5 inches (64mm) long x 4 inches (102mm) wide with 5 wavy lobes. Buds: moderate purplish pink (68C). Inside of corolla: yellowish white (155D), with split or twin flare of strong purplish red (60B) on upper lobe, extending 1.5 inches (38mm) from base. Exterior of corolla: yellowish white (155D) with pale purplish pink (65D) midribs on upper lobes. Truss 6 x 6 inches (152 x 152mm). Lvs 7 x 3.75 inches (179 x 95mm), elliptic, rounded base, broadly acute apex, flat margins, moderate olive green (147A) above, matt. Shrub 5 feet (1.5m) high x 6.5 feet (2m) wide in 18 years; intermediate habit, lvs held 2 years. Plant hardy to 0°F (-18°C). Flowering midseason.

Correction

(r) ‘Don’s Blue Start’: cf *JARS* 66:4, p231 (2012). The registered name should read ‘Don’s Blue Star’.

References

Names conform to the rules and recommendations of the *International Code of Nomenclature for Cultivated Plants, Eighth Edition* (2009). Color names are from *A Contribution Toward Standardization of Color Names in Horticulture*, R.D. Huse and K. L. Kelly; D. H. Voss, editor (ARS, 1984).

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R. coriaceum*: Subgenus *Hymenanthes*, Sect. *Ponticum*, Subsect. *Falconera

Rhododendron coriaceum (epithet: leathery) was first found by the Abbé Soulié in 1895 in northwest Yunnan, and was described by Adrien René Franchet (National Museum of Natural History in Paris) in 1898. It was introduced into cultivation in 1918 by Forrest, with later introductions by Forrest, Rock and McLaren. It also occurs in mid-west Yunnan and southeast Tibet. It grows in thickets in rhododendron, pine and spruce forests, and among rocks at elevations of 3000 to 4200 m (10,000 to 13,600 ft) and grows as a broadly upright or rounded spreading shrub or tree to 1.2-7.6 m (4-25 ft) in the wild.

The foliage is variable but typically oblanceolate to elliptic, matted olive green on the upper surface and with a thick, soft, smooth, typically creamy, two-layered indumentum on the lower surface. Trusses have 10-20 flowers with five to seven-lobed campanulate white to rose flowers that have a crimson blotch at the base, and are with or without crimson spots.

Two distinct colour forms are grown, white and rose, and the new growth is charmingly white. Most specimens in cultivation are easily grown and are hardy, with flowering in April/May, making it a choice rhododendron. It has not been used much in hybridizing, but the clone 'Morocco' won an Award of Merit in 1953.

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R. decorum: Subgenus *Hymenanthes*, Sect. *Ponticum* Subject.

Fortunea

Rhododendron decorum (epithet: ornamental) was first described by Adrien René Franchet (National Museum of Natural History in Paris) in 1886 from a plant collected in Moupin, western Sichuan in 1869. It was introduced to cultivation in 1887 by Père Jean Marie Delavay. Later introductions by Wilson, Forrest, Kingdon-Ward, Rock, McLaren, and Hu attest to its wide distribution throughout west and south-west Sichuan, south-east Tibet, north-west Yunnan and north-east upper Burma. It grows in pine, spruce, and open deciduous forests, and tolerant of dry, open situations, on grassy mountains and rocky scrub. It is found at elevations of 1800 to 4500 m (6000 to 15,000 ft) and grows between 1-9 m (3 to 30 ft) in the wild and to about 5 m (15 ft) in cultivation.

The foliage is variable but typically oblanceolate to elliptic, smooth green on both surfaces, with rounded ends. The six to eight-lobed openly funnel-campanulate flowers are white to pink to pale lavender, variously marked and quite fragrant. The stamens are more or less hairy at their bases. There are two subspecies, ssp. *decorum* and ssp. *diaprepes*, with the former having smaller leaves and corolla and fewer stamens, by growing further north and east in its natural range, and by having an earlier-blooming time. This species is extremely widespread and common in the wild, and as one might expect given its wide range in elevation, is quite variable in hardiness. Most specimens in cultivation are easily grown and generally bloom floriferously at an early age, and taken together with a late season bloom-time (May/June) and its fine fragrance, makes it desirable in most gardens.

It has found considerable use with hybridisers and many fine hybrids of ssp. *decorum* have been produced, including *R.* 'Caroline', 'Newcomb's Sweetheart', 'Apricot Sherbet', and 'September Song'.

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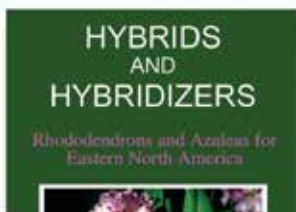
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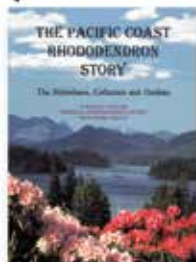
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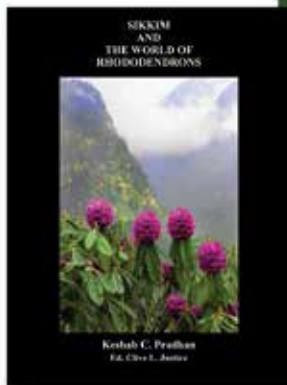
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