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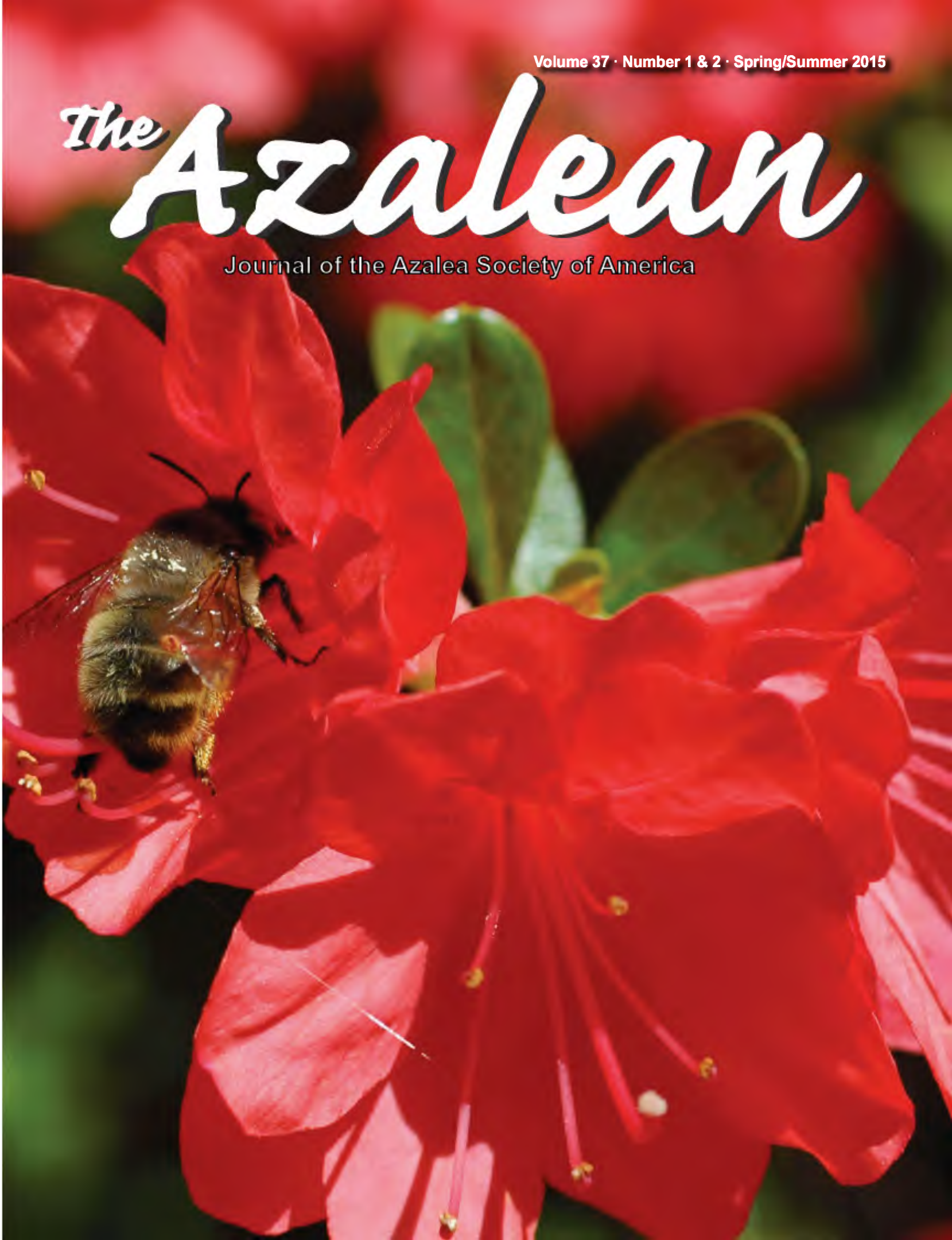
The Azalean

Journal of the Azalea Society of America



President's Letter

J Jackson — Trade, Tennessee

Dear Azalea Friends,

Spring in the Blue Ridge was spectacular and has already moved toward summer. The convention in Nacogdoches was great fun, with lovely gardens to visit. The annual meeting of the Board of Directors (BOD) was considered a success and several important business items were discussed and settled. ***The Azalean*** Advisory Committee met in person for the first time to put in place more efficient and supportive procedures for producing the journal. The BOD approved moving forward with the digitization of past articles from ***The Azalean***. A complete index of ***The Azalean*** articles is now available on the website (azaleas.org). These articles constitute one of the assets of our society. The wealth of information is very impressive, and we hope to be able to share this asset with our membership. Back issues of ***The Azalean*** are also very valuable assets, and the pricing structure needs to be revisited. Having an index of these back issues available should generate new interest. I have ordered several back issues for my own library and to share with family and friends.

The membership directory is now available on our website for active members. The Website Committee continues to update and improve our site. The Membership Committee is being reformed and more clearly defined. **Chris Wetmore** is interim membership chair and is actively seeking feedback and information from all our chapters.

The BOD has approved an investment policy that more clearly defines how society assets can be invested. By-laws relating to this issue were amended by a vote of the membership.

The Azalea Research Committee chair has been added as an ex-officio member of the BOD, as well as a member of the Finance Committee. These changes were also voted on by the membership as amendments to the by-laws.

Lindy and I recently had the pleasure of joining the semi-annual mountain tour with members of the Northern Virginia, Oconee, Vaseyi, Central Carolinas and Louisiana chapters. We were also accompanied by Dr. Ralf Bauer from Germany. **Don Hyatt** and **George McClellan** are two treasures of our society, and they lead wonderful tours. We saw incredible native plants and vistas on Roan Mountain, Wayah, Winespring and Hooper Balds.

The Louisiana Chapter has voted to be our host for the 2017 ASA Convention. Details will be shared as their planning moves forward.

Best regards,

J Jackson

Azalea Society of America

The Azalea Society of America, organized December 9, 1977 and incorporated in the District of Columbia, is an educational and scientific non-profit association devoted to the culture, propagation, and appreciation of azaleas which are in the subgenera *Tsutsusi* and *Pentanthera* of the genus *Rhododendron* in the Heath family *(Ericaceae)*.

Regular membership is open to all interested parties for an annual amount of $30; life-membership for one or two persons at the same address is $600. Members receive ***The Azalean*** and are eligible for participation in all activities of the Society including those of the chapter with which the member affiliates. For information and a membership application, write to Leslie Nanney, Secretary, 8646 Tuttle Road, Springfield, VA 22152 or visit **www.azaleas.org**.

The Azalean
Journal of the Azalea Society of America

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Opinions and views expressed in ***The Azalean*** are those of the contributors or editor, not necessarily those of the Society, and are presented to foster a wider appreciation of and knowledge about azaleas. Advertisements are presented as a service to our readers and do not imply endorsement by the Azalea Society of America. Advertising and other contributions to ***The Azalean*** are used exclusively to help defray the costs of publishing ***The Azalean***.

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ON THE COVER

The exotic hairy-footed flower bee, *Anthophora plumipes* (Apidae), is a species of bee that mimics bumble bees and feeds on nectar and pollen from azaleas and other early-flowering plants. Image by Mike Raupp, University of Maryland.
See the article on protecting pollinators on page 25.

2015 Convention
Texas Forest Country – Azalea Trails and Gardens

Connie Cottingham and **Mike Sikes**, Athens, Georgia

In March, ASA Members converged in the Zone 8b Texas Forest Country for the 2015 National Azalea Society Convention. Thursday night we boarded the busses for a reception, plant sale, and talks at the new Ina Brundrett Conservation Education Center in the Pineywoods Native Plant Center. We took busses to most events, and chatting with folks while waiting on and riding the buses turned out to be one of the best ways to meet new people. At Pineywoods, David Creech, Director of the Stephen F. Austin State University's SFA Gardens, introduced us to the area and the SFA Gardens, which are seven distinct gardens. It was good to get the history and overview before walking through these gardens. Bart Bretcher then spoke about Bayou Bend Gardens, created by Ima Hogg in the 1920s and now home to over 20,000 azaleas and a decorative arts collection second only to Winterthur in the U.S.

Jo Anne Sallom arriving in style.

The next day we visited the Ruby M. Mize Azalea Garden and Mast Arboretum. The famous 'Koromo- shikibu' azaleas that graced the Fall 2014 cover of this journal were in full bloom and much photographed. Mother Nature did not follow our schedule and decided not to arrange for the garden's over 7,000 azaleas to be in full bloom while we were visiting, but there were some azaleas in bloom and the deciduous magnolias were in full glory. It was a treat to hear about the gardens during a tour led by Barbara Stump, since she was so instrumental in the development of this garden. Barbara must have made a mad dash to get home after the tour, to meet the group at her historic home and beautiful gardens for lunch before touring the garden of Mary Beth and Jim Haygood. Many of us took the

Above: Donna and Ronnie Palmer speak with Dr. David Creech.
Below: Barbara Stump leading a tour.

time on our own to discover the restaurants in Nacogdoches; a few of us became regulars at The Liberty Bell downtown.

On Friday evening, Ronnie Palmer of Azalea Hill Gardens & Nursery in Arkansas explained Huang azaleas. Instead of a name, Huang azaleas use a numbering system in which every digit has a meaning. He also discussed the azaleas of Earl Sommerville of Georgia, and Satsuki azaleas. Buddy Lee spoke about deciduous azaleas and new Encore azaleas, then gifted an Encore® AUTUMN FIRE™ 'Roblez' PPAF to everyone attending. Buddy Lee and David Creech conducted the plant auction, which included some lively bidding.

Saturday was a day of touring mainly private gardens, starting with the Furniss garden, a well-landscaped home surrounded by rolling pastures. The Gayla Mize Garden, a forest garden showcasing many understory trees as well as deciduous azaleas, is one of the newest additions to the SFA Gardens. We wandered the extensive trails there before heading to the Pineywoods Center for lunch and the plant sale. Afternoon tours included the Elliott and the Durr Gardens. Meeting Gloria Durr and experiencing her garden, built on 3-1/2 lots and around a city drainage ditch by the owners themselves over several decades, was a highlight of the trip. What an amazing lady and garden!

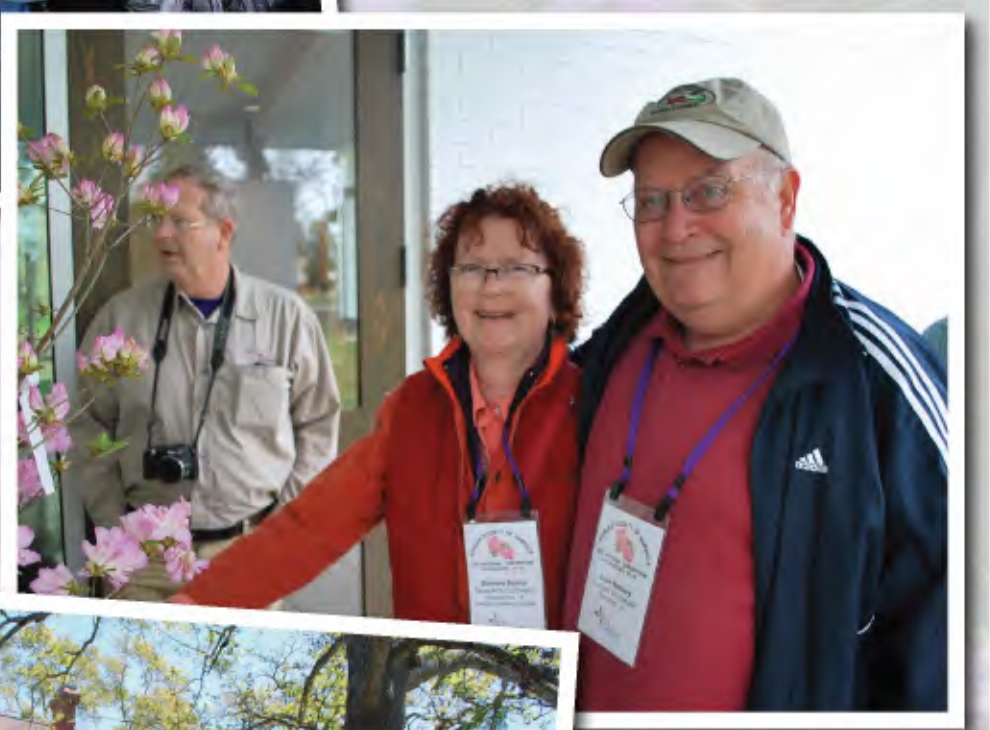
On Saturday night the awards ceremony was held at historic

Continued on page 6

Mrs. Durr and Miss Margie. Photo by Rick Bauer.

Plant Sale

Vincent Ciolino with Margie and Mark Jenkins.



Barbara Stump and Dave Nanney.

Gathering at Barbara Stump's home.

Continued on page 8

Mast Hall in downtown Nacogdoches. Barbara Stump acknowledged the many people and organizations that helped to create this year's inspiring meeting, including the Nacogdoches Convention and Visitors Bureau and area garden clubs. SFA's newest assistant professor of horticulture Dr. Jared Barnes took us on a virtual PowerPoint tour of botany trips through the Southeast, including the largest population of *Rhododendron vaseyii* at Southern Highlands Reserve, and among wild miniature horses roaming Grayson Highlands, both in North Carolina.

Awards were then presented:

- John Migas, Outstanding Service Award
- Bart Brechter, Outstanding Service Award
- Dr. David Creech, A Special Friend of Azaleas Recognition
- Barbara Stump, Exceptional Service Award
  Also referred to as the "Azalea Guru of East Texas" Award.

New officers were announced:

Barbara Stump, Vice President
Paul Beck, Treasurer
Miles Beach, Director 2015-2017
Bart Brechter, Director 2015-2017
Joe Coleman, Director 2015-2017

Dave Banks, ASA webmaster, announced that **Susan Bauer** led the team of **Dave Banks, Paul Beck,** and **Rick Bauer** that digitized and obtained rights allowing for ***The Azalean*** to be online (see related story on page 7.) ***The Azalean*** index is online thanks to **Bill Miller**.

J Jackson read the four motions as printed in the Summer 2014 issue of ***The Azalean***, and all passed without any objections.

We hope you enjoy these photos of the convention!

Mary Beth Haygood chatting before the banquet.

J Jackson and Jared Barnes stand with award winners Dr. David Creech and Barbara Stump.

Northern Virginia chapter members at the banquet.

The Azalean Articles will be Available on the ASA Website

Susan Bauer, Yorktown, Virginia

The ASA Board of Directors (BOD) approved the recommendation presented by a research team (**David Banks**, **Paul Beck**, and **Rick and Susan Bauer**), now called the Digitization Team and chaired by **Susan Bauer**, to place ***The Azalean*** articles on the ASA website. The Digitization Team will implement this project.

The BOD also established a Digitization Committee, chaired by **David Banks**, the ASA Webmaster, to facilitate future management and maintenance of ***The Azalean*** articles on the ASA website.

The Azalean journal articles, from the latest issues to the oldest, are to be placed on the ASA website as soon as necessary copyright agreements are obtained. Log-in control will limit access to members only for the most recent 12 issues of the journal. In order to provide website access to the journal articles, without legally endangering the ASA due to copyright infringement laws, the ASA must request that authors/photographers provide written publication permission.

The Digitization Team is currently preparing letters including the ASA's copyright policy and its copyright agreement for forwarding to all authors or their estate/next of kin. The ASA website already contains a complete journal index with article titles and associated author(s). It is located under ***The Azalean*** menu. As articles are digitized and made available on the ASA website they will be accessible through the index (providing copyright release has been obtained) by double clicking on the article title. The index includes title, keyword, author and date search capabilities. Eventually, the entire collection of ***The Azalean*** articles may be searched based on specific word requirements.

We invite you to check the ASA website to view the Digitization Team's progress.

The Hanners of Azalea Trace

Barry Sperling, Alexandria, Virginia

This article was first printed in the June 2014 Azalea Clipper (Northern Virginia Chapter newsletter).

Many of us in the Washington, D.C., area have a pleasant memory of a trip to Azalea Trace nursery, where great plants that couldn't be found at the garden centers were in abundance. Even better, Charles and Wanda Hanners, the proprietors, were knowledgeable, enthusiastic, and could easily be prodded to take us on a tour of their greenhouse. Every shopper was asked about their soil type and shade situation while the Hanners walked around looking for the perfect plant.

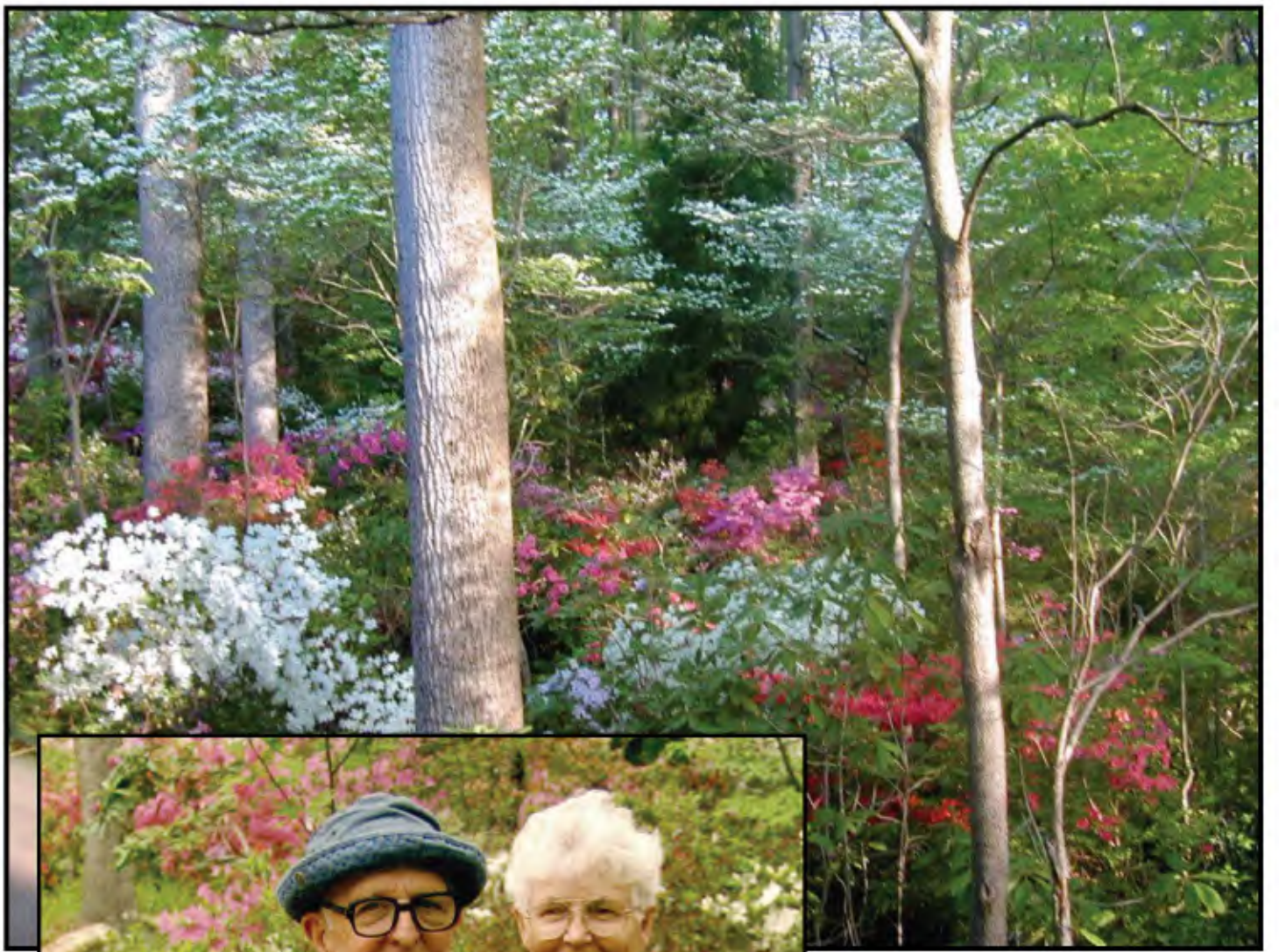
An easy drive out Pennsylvania Avenue to Huntingtown, Maryland, takes you to their semi-rural setting of 5,000 azaleas of 1,700 varieties planted in a naturalized setting. Filling up a moving van with their offerings would only put a slight dent in their stock!

Sadly, time passes for us all and the Hanners decided to let the business go in 2007, 20 years after moving the operation from Bowie, Maryland. Wanda still has trouble restraining her desire to take cuttings!

I spoke with Wanda in March 2014 and she reminisced about the years with the growing body of plants and the work she shared with Charles.

Charles' grandfather from England, Charles Read, was the head gardener at Hammel Estate in Bexley, Ohio. Hanners began weeding, mowing and learning the other essentials that every gardener must understand by age six. He went into the Air Force and then the NSA, always keeping gardens where they lived.

A nursery that was closing in Howard County gave them truckloads of plant materials, including azaleas. Then they contacted Frank White, who helped them identify plants, as many tags were missing or undecipherable. Gordon Severe, from the Eastern Shore of Maryland, also helped. White and Severe had provided the Hanners with 4" pots of Glenn Dale and Back Acre azaleas when they were located in Bowie, filling the one acre



they maintained and teaching them how to take cuttings. Bea and Bob Hobbs introduced them to the young ASA, which they joined in the early 1980s.

Though they sold a few plants from their home in Bowie, Azalea Trace, the commercial operation, was started once they moved to Huntingtown in Calvert County and Charles and Wanda, a special education teacher, retired. "Trace" was used in the older sense of a "path."

Cuttings and open pollinated seeds provided much of the available material, along with some cross-breeding that they did themselves. Recording the plants on maps, they lined up the babies behind each parent. Wanda notes that it was amazing to see the differences in the children. The plantings were on 3-½ foot centers on terraced hillsides and

were neither fertilized nor watered once they matured. Benches, crafted by their son Charles, were scattered around the shady property for everyone's enjoyment.

Favorites? Charles leans toward the bold red and white 'Janet Rhea' while Wanda prefers the more subtle Satsuki 'Haisei'. In general, they favor the Glenn Dales and all of the Pete Vines productions.

Auburn University requested many Glenn Dale and Robin Hill azaleas, which they provided. The U.S. National Arboretum would send people down for specific plants, not wasting a worker's time looking elsewhere if they couldn't find them at Azalea Trace. After an ice storm Barbara Bullock came down to replenish the Arboretum's stock. Other requests came in from all over the world after Adrian Higgins wrote an article about them in the Washington Post (also picked up by the Los Angeles Times).

They still get requests for plants, though the business has closed, and people in area stores often call Wanda "Mrs. Trace" (Charles was called "Mr. Azalea")! Every spring they continue to enjoy the 45 beds of 300-500 plants each (though Wanda says that bed #19 has 1,900).

While most of us have a great-looking back yard as a final goal, the Hanners went beyond that to make their mark on the azalea community and widen the horizons for all of us!

***Barry Sperling** is the Corresponding Secretary and newsletter editor for the Northern Virginia Chapter.*

Join the Azalea Society of America

The Azalea Society welcomes membership by anyone interested in azaleas, from all cultures and disciplines. We invite those who wish to learn, and those who know and wish to share their knowledge.

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Member Name

_____
Street Address

_____
City, State, Nine-Digit Zip Code

_____
Area Code and Telephone Number / Private ( )

_____
E-Mail Address / Private ( )

Type of Membership:

- □ Individual ($25 U.S., Canada, Mexico / $40 International)
- □ Contributing ($50)
- □ Supporting ($100)
- □ Endowment ($200)
- □ Lifetime ($500 U.S., Canada, Mexico / $800 International)

Chapter Affiliation:

- □ Alabamense (AL)
- □ Ben Morrison (MD)
- □ Cape Fear (NC)
- □ Central Carolinas
- □ Lake Michigan (MI, IL, IN)
- □ Louisiana (LA)
- □ Northern Virginia (VA)
- □ Oconee (GA)
- □ Rev. John Drayton (SC)
- □ Southern California (CA)
- □ Texas (TX)
- □ Tri-State (IN, IL, KY)
- □ Vaseyi (NC, SC, TN)
- □ At-Large (no affiliation)

Mail membership application form along with your check or money order to:

Paul Beck
ASA Treasurer
2963 Fort Lee Street
Oak Hill, VA 20171-1812

Privacy Notice: Membership information is published in the society's membership roster and quarterly journal, The Azalean. Information may also be published in a password-protected online Roster available only to society members. If you mark ("X") private on your telephone number and/or e-mail address, it will only be used for official society business and will not be published.

Chapter News

Alabamense Chapter by Patrick Thompson

We had a great spring field trip this year. Instead of tracking down wild specimens, we opted to seek out the most recently described native azalea species in garden settings. The day started at Callaway Gardens where we were joined by the Azalea Chapter of the American Rhododendron Society. Throughout the garden we enjoyed the large mature specimens of Red Hills azaleas, *Rhododendron colemanii*. The species was named for Georgia nurseryman S. D. Coleman who sold the Callaways many of the plants we observed in bloom during this first stop on our field trip. For the second half of the trip we went back across the border into Alabama to see azaleas blooming at the Donald E. Davis Arboretum at Auburn University. It was graduation day on campus, and the College of Science and Mathematics was generous enough to invite our whole group to enjoy their barbecue picnic! Some of the red hills azaleas held onto their flowers just long enough for this group to see them. We also saw *R. viscosum, R. cumberlandense*, and many other Southeastern native plants.

Central Carolinas Chapter by Chris Wetmore

Upcoming events:

September 19, from 10 a.m. to 12 p.m. - **Dr. Joe Coleman** will be giving a presentation on Hurricane Creek Native Azaleas in Lumpkin County, Georgia. These naturally occurring hybrids have many exceptional forms and a wide range in color variation. This is also our annual cutting exchange. CPCC Cato Campus, 8120 Grier Road, Charlotte, North Carolina, in the Horticulture Building.

November 21, from 10 a.m. to 1 p.m. - Annual banquet and silent plant auction. Stan Southerland will be giving a presentation on rhododendron hybridizing and heat tolerant rhododendrons. Lunch to follow the meeting. CPCC Cato Campus, 8120 Grier Road, Charlotte, North Carolina, in the Horticulture Building.

For more info on any events visit
www.centralcarolinasazaleasociety.org

Louisiana Chapter by Allen Owings

The Louisiana Chapter had a good number of members that enjoyed the national convention in Nacogdoches, TX. We are also pleased to welcome new members – **Martina Ellis** and **Nancy Ellis** of Amite, LA, **Wayne and Cheryl Stromeyer** of Baton Rouge, LA and **Eddie Martin** of Belle Chasse, LA.

Our spring meeting was held on Saturday May 23rd at the LSU AgCenter's Hammond Research Station. The station recently hosted the 3rd annual Margie Jenkins Azalea Garden Horticulture Lecture Series featuring speakers Rick Webb of Louisiana Growers in Amite, LA and Mark Windham, plant pathology professor from the University of Tennessee in Knoxville. Crawfish were enjoyed by everyone and members toured the Margie Jenkins Garden and Piney Woods Garden at the station. Discussion was held about the Louisiana chapter submitting details to the national board of directors in regard to possibly hosting the ASA National Convention in 2017. A donation of $1000 was made to the LSU AgCenter for the gardens in Hammond. Our fall meeting will be a barbeque at the station in October.

Northern Virginia Chapter by Rick Bauer

We have had a busy spring. A number of our chapter members attended the national convention in Nacogdoches and had a great time. On 12 April we had a chapter meeting where Mary Olien gave us an update on Green Spring Gardens and the White Garden. She detailed the history and possible future of both gardens. Our chapter has been contributing to these gardens and

the Title I program (subsidies for garden programs for lower income children) over the past several years. Mary's talk included discussing the impact our donations have had. We also had a plant exchange which is always popular with our members.

In April we had an azalea sale in Charlottesville in conjunction with Garden Week and in May we had a sale at Green Spring Gardens in Alexandria. These sales allow us to raise funds, make the public aware of our chapter and promote our Legacy Program by featuring the hybrids of our member hybridizers. Both sales were very successful and we also gained six new members at the sales.

Some of our members also went to **Mike and Debbie White**'s nursery in Germantown, MD for a picnic on 17 May. Mike and Debbie had invited a number of plant societies to visit the nursery and purchase some of their beautiful azaleas. It was also a good opportunity for members of the 2016 convention planning committee to meet.

Join us, if you can, for the annual Cutting Exchange on July 26 and the annual auction on September 26. See our website, created and maintained by **Paul Beck**, at www.nv-asa.org for details about both of these events where you are welcome to join us!

Reverend John Drayton Chapter by Linda Wood

In February we discussed our trip to Callaway Gardens in Georgia. Details were coming together and members getting on board. Our speaker for the evening was John Barrineau from Stacks Nursery.

At the March meeting we lined up the schedule of activities for the spring months.

Our trip to Callaway on April 17-19 was a great success with 15 members attending. We were fortunate to be given a tour of the entire gardens by Ernest Koone who knows the gardens well. We also visited the Little White House, Roosevelt's home nearby. Unfortunately it was a rainy weekend so we did not walk the gardens as we would have liked and we had to cancel our visit with Mr. Koone to his Lazy K Nursery for Sunday. In spite of the rain a good time was had by all. Thanks to **Tom and Mary Ann Johnson** for arranging and hosting our trip.

In early May the Azalea Society members were invited to join the Camellia Society for a picnic held at Magnolia Plantation and Gardens. We shared great food followed by a fun plant auction. After the picnic **Tom Johnson** was available to assist our members with taking native cuttings.

At our May meeting new officers were announced for next year. They are: **Lynda Creek**, President; **Tom Johnson**, Vice President; **Linda Wood,** Treasurer.

A Saturday in late June is set aside for an opportunity to take cuttings of evergreens.

We will take the summer off and start up again at the end of August.

Vaseyi Chapter by Audrey Stelloh

The Vaseyi Chapter was invited to join the Southeastern Chapter of the American Rhododendron Society for their annual March meeting at the Chariot Restaurant in Hendersonville. First on the agenda was a silent auction of 43 choice plants, many of which were donated by Vaseyi members. Then we were treated to a delicious banquet and socializing. Our speaker was Ed Davis, Horticultural Director of the UNC Charlotte Botanical Gardens.

On April 18 we had garden tours. The Stelloh garden was visited by about 15 garden enthusiasts who rarely get to see the early blooming azaleas, rhododendrons, trilliums, anemone, Virginia bluebells and countless other spring wildflowers which have proliferated over the years. Despite the start of rain, most attendees trekked to view a neighbor's artfully designed conifer and rock garden.

Several members accepted the invitation by the Mr. Maple Japanese Maple Nursery to attend their May 25 open house celebration. We were all impressed with the beauty and selection of over 1,000 maple cultivars.

In July or August, members are invited to return to the Stelloh garden for azalea cuttings. By appointment, 828-697-9959.

Our meetings are open to all garden lovers, so feel free to come. On September 27, local newspaper garden columnist and Vaseyi member, **Betty Montgomery,** will present a program based on her new book A Four-Season Southern Garden. Betty will share her 40 years of gardening experience in Zone 7 with emphasis on plants that flourish and are colorful. On November 8, **Lindy Johnson**, co-founder of Appalachian Native Plants Nursery, will teach us How to Grow Native Azaleas from Seed. This is also our annual potluck luncheon, and seed exchange. Lindy reminded us last year that many people have asked for seed from evergreen azaleas, which should be ripe in late summer.

A Road Map Towards High pH Adaptability: Phenomic and Genomic Approaches to Azalea Breeding (*Rhododendron sp.*)

Alexander Susko, St. Paul, Minnesota

*From **Hale Booth**, Chair, Azalea Research Foundation Committee:*

In the fall of 2013, the ASA Azalea Research Committee funded a $2,000 research grant to Alexander Susko, a graduate student at the University of Minnesota, to help underwrite his research into genome-wide association mapping of Rhododendron viscosum, a widely dispersed native azalea. Your ASA research committee thought this project was particularly important because the results may produce important research for future development of azaleas that are more tolerant of alkaline soils, thus potentially opening up new geographic areas for growing and enjoying azaleas. The research project will span more than one year and is not complete, but Mr. Susko has provided the following interim report on the progress to date.

A research grant from the Azalea Society of America has enabled me, Alex Susko, and my advisors (listed in my bio below) to collect and begin evaluating diverse *Rhododendron viscosum* germplasm to identify genetic and phenotypic variations for pH adaptability. During the Spring of 2014, I developed novel, in vitro screening methods for Rhododendron to test seedlings at a young age for their ability to withstand higher calcium carbonate concentrations at elevated pH. I then searched for *Rhododendron viscosum* populations through historical herbarium records and a

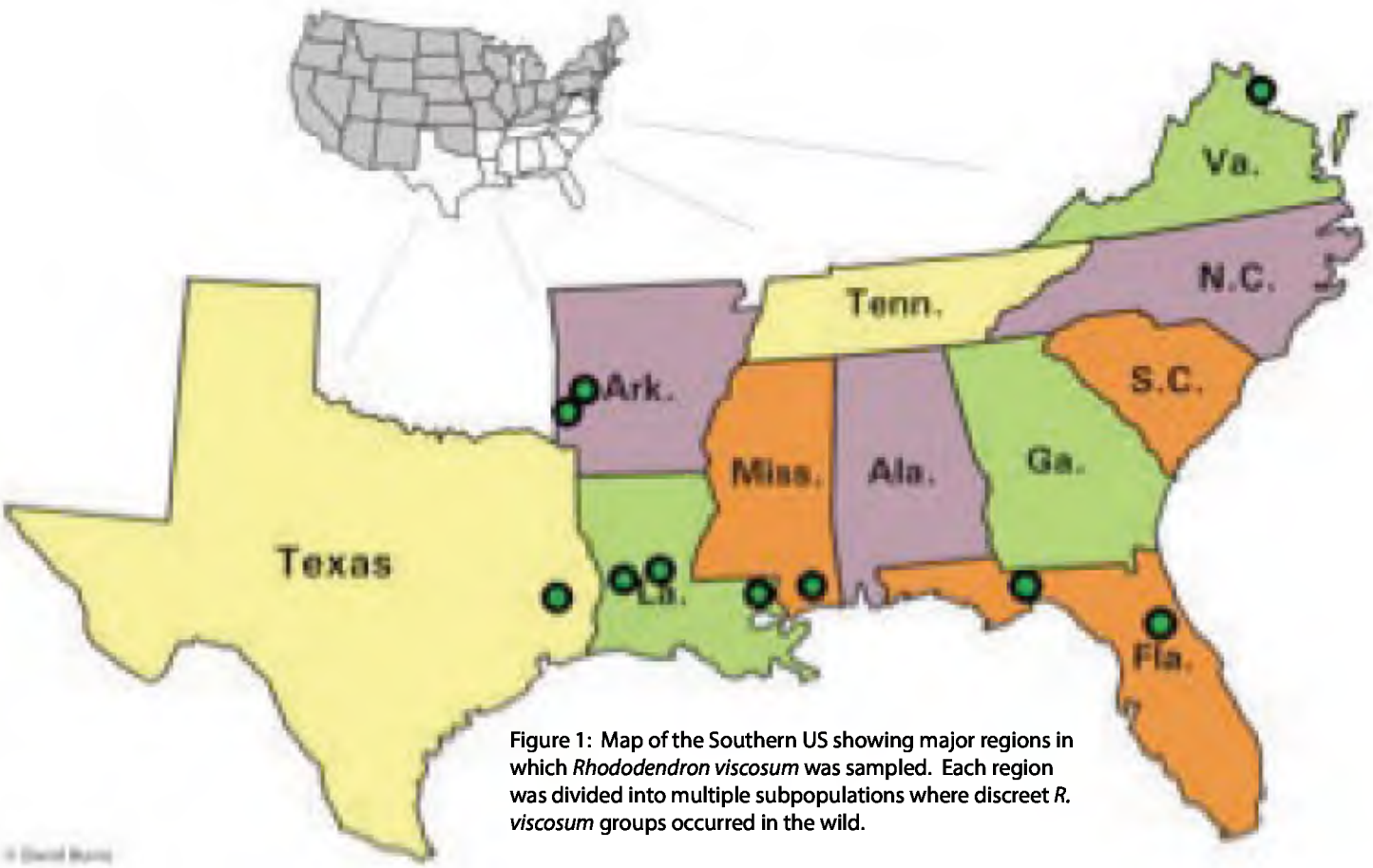

Figure 1: Map of the Southern US showing major regions in which *Rhododendron viscosum* was sampled. Each region was divided into multiple subpopulations where discreet *R. viscosum* groups occurred in the wild.

two-month collection expedition from Arkansas to Florida in national forests between May and July of 2014. Populations were chosen to be a part of the study based on their isolation from human activity and occurrence in representative environments for each region along the Gulf Coast. Cuttings successfully rooted from each population are now housed at the University of Minnesota Landscape Arboretum's Horticultural Research Center. Seed retrieved from wild populations in late October 2014 is currently undergoing germination testing. Seed from wild, half-sibling families will be grown and phenotyped in the spring for pH tolerance incorporating genetic relatedness into a model to determine the relative performance of each wild population for our candidate traits. We also hope to determine the genetic effect on pH adaptability in deciduous azaleas to inform future breeding efforts in these and other woody species, while evaluating for other horticultural qualities important to Minnesota growers.

Figure 2: *R. viscosum* maternal parent tagged for future seed collection and genotyping. Near Boles, Arkansas, on the Fourche la Fave River. Ouachita National Forest.

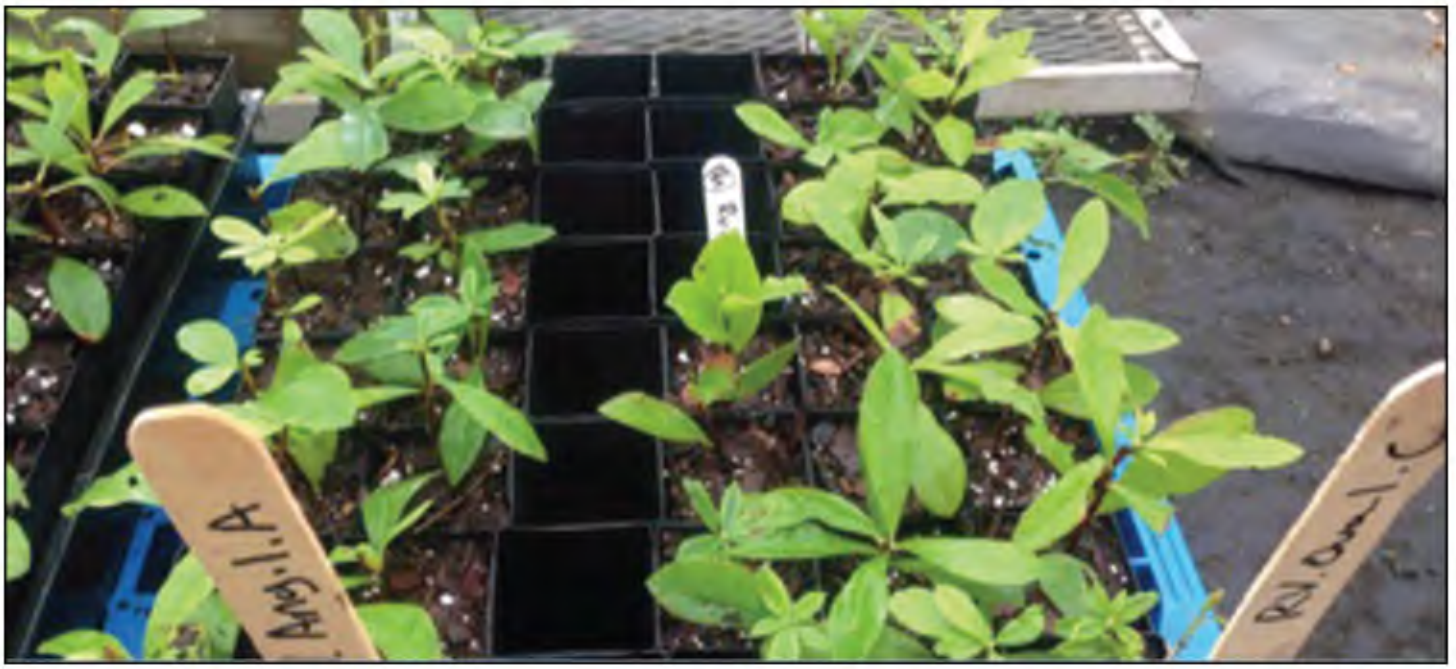

Figure 3: *R viscosum* rooted cuttings from wild populations at the Horticultural Research Center in Excelsior, Minnesota. This material will serve as parents and sources for new cuttings in future breeding efforts.

Alex Susko is a master's degree student studying plant breeding and molecular genetics at the University of Minnesota Twin-Cities and advised by Stan Hokanson (professor of Woody Plant Breeding and Genetics), Jim Bradeen (professor and head, Department of Plant Pathology), and Tim Rinehart (Research Plant Molecular Geneticist, USDA-ARS in Poplarville, Mississippi. Susko has been interested in woody plants throughout his academic career, and looks forward to continued research within the genus Rhododendron as he begins his doctoral research in the near future.

New Members

At Large
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Charlotte, NC 28226-7640

Lake Michigan
Misty Heeter

Northern Virginia
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Al and Alba Shank
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13030 Ed Freeman Rd
Norwood, LA 70761-3421

Kathy Kinsel
1250 US Highway 287 North
Woodville, TX 75979-3720

ASA Financial Position December 31, 2014
Paul A. Beck, Treasurer

INCOME	
The Azalean Income	$3,170
Dues Income (Life & Regular)	
Investment Income	$2,493
Seed Exchange $374	
Total Income	**$44,102**
EXPENSES	
The Azalean Expenses	$14,978
Chapter Dues Expense	$2,300
Dues Expense (Mailings)	$298
Website Expense	$107
ARF Grants	$2,000
Bank & PayPal Charges	$87
Corporate Fees	$120
Awards & Memorials	$100
Other Postage	$105
Other Expenses	$486
Total Expense	**$20,581**
INCOME – EXPENSES	**$23,521**
Operating & Endowment Only	$4,122*

BALANCE SHEET
December 31, 2014

ASSETS	
Checking	$13,164
PayPal	$2,600
CDs	$28,725
ARF Stock Investments	$151,918
Total Assets	**$196,407**
LIABILITIES AND RESERVES	
Operating Fund	$16,035
General Endowment	$73,125
Research Fund	$106,837
Miscellaneous Liabilities	$410
Total Liabilities and Reserves	**$196,407**

* Only three ***Azaleans*** were published in 2014; if four had been published, there would have been an approximate $1,000 loss. Complete financials available on the ASA website under Archives.

Recognizing Generous ASA Members

Dan Krabill, *Treasurer*

I would like to recognize and thank the following members who made donations to the Operating Fund of the Azalea Society of America in 2015 by paying dues in excess of the $30 annual regular amount or by making direct payments to the ASA. We have three categories for donations – Contributing (payment of $50 to $99 for the year), Supporting ($100 to $199), and Endowing ($200 or more). These payments provided more than 5 percent of our income and are very important in carrying out the work of the ASA. My apologies if I missed anyone.

Contributing Members

Parker Andes
Miles & Brenda Beach
BoxLee Azaleas
Dianne Gregg
Joseph Gutierrez, MD
Harold & Caryl Hall
Jeanne Hammer
Nancy & Herbert Hargroves
James & Diana Hayden
Bob Head
Calvin & Linda Hill
Hillwood Museum & Gardens
Bob & Martha Kelly
Dr. Alan R. Kilvert
Donna Kuhn
Magnolia Plantation & Gardens
Jane Perry McFadden
Dr. Patrick McKenna
H. M. Fuzzy Perritt
The Polly Hill Arboretum
Cecil & Gloria Settle
Debbie Sheehan
David & Joan Taylor
Roger A. Thompson
Billie Trump
Valley Forge Chapter, ARS
Cathy Walgate

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Louis J. Appell
Stephen Ash
Virginia & Samuel Burd
Suzi & Nelson Du Rant
Betsy Ellis
Kinney Nursery
Dan & Barbara Krabill
Mrs. Lawrence Nachman
River Oaks Garden Club
Shane Roop
Barbara Stump
David Wertz

Endowing Members

Chen Nien-Chou

Recognizing Other Donations

In addition to the donations as part of membership renewal, the ASA has also received the following special donations, for which we are very grateful.

To support *The Azalean* Digitization Project: J Jackson & Lindy Johnson.

In memory of Bob Stelloh: Bob & Eve Harrison, Hale & Susan Booth, Oconee Chapter; Ben Morrison Chapter, Carol & Dale Flowers, Barbara & Robert Wetzel, Dan Krabill.

In memory of Frances Louer: Bob & Eve Harrison.

Azalea Research Committee: Frances Jones, Barbara Wetzel, Rev. John Drayton Chapter.

Caring for a Potted Azalea

Rosalie H. Davis

*This article first appeared in **The Azalean** Volume 7, 1985.*

December brings ice-white chrysanthemums, turned-back cyc lamens, and pointy-leaved poin settaias to the florist's window. These winter bloomers look beau tiful now, but it will be next to impossible to bring them round again. A forced azalea, however, is a long-lived specimen. Give this small shrub with its pretty, fluted flowers and dark evergreen leaves the care it needs, and it will bloom each winter for many years to come.

Pick out an azalea with lots of flower buds beginning to show color. Pass up those with tight, unbroken buds, or those in full bloom. The former may never open and the latter's blooms will go by before long. The breaking buds may drop their light-brown scales on the surface of the soil, which is fine, but beware of peat littered with yellow leaves, which may indicate that the plant has been poorly watered.

A healthy azalea has dark-green leaves without any cob webby strands left by red spider mites, which lurk on the under leaves. When not in bloom, the plant benefits from an occasional mild bath in slightly soapy water, followed by a clear, lukewarm rinse to wash off intruding mites.

1. When in bloom, the azalea doesn't need fertilizer. Pinch off the fading blossoms and the whorls of lighter-green new shoots that appear before the blooming period is over.

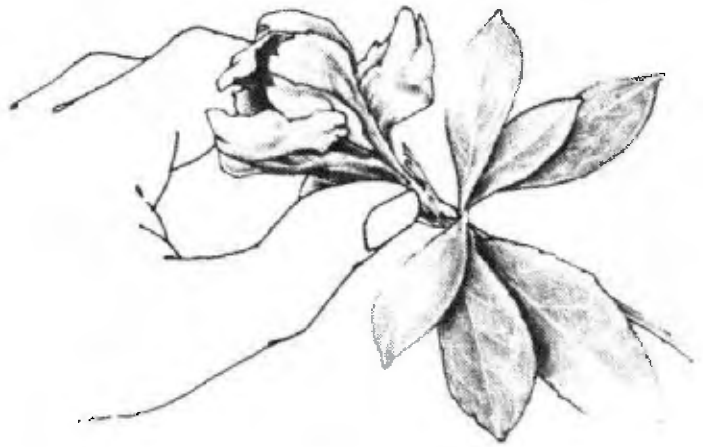
If you purchase your azalea on a cold day, be sure to swaddle it in paper before you leave the shop, to protect it from freezing. Many indoor azaleas will not be hardy in the colder climates of the temperature zone.

Like other Rhododendron species, a florist's azalea likes an acid potting medium and good drainage. It needs at least four hours of bright, indirect sun every day, and cool room temperatures. Night temperatures ranging between 40 and 55 degrees Fahrenheit with day temperatures not higher than 68 are generally considered ideal for an azalea grown indoors.

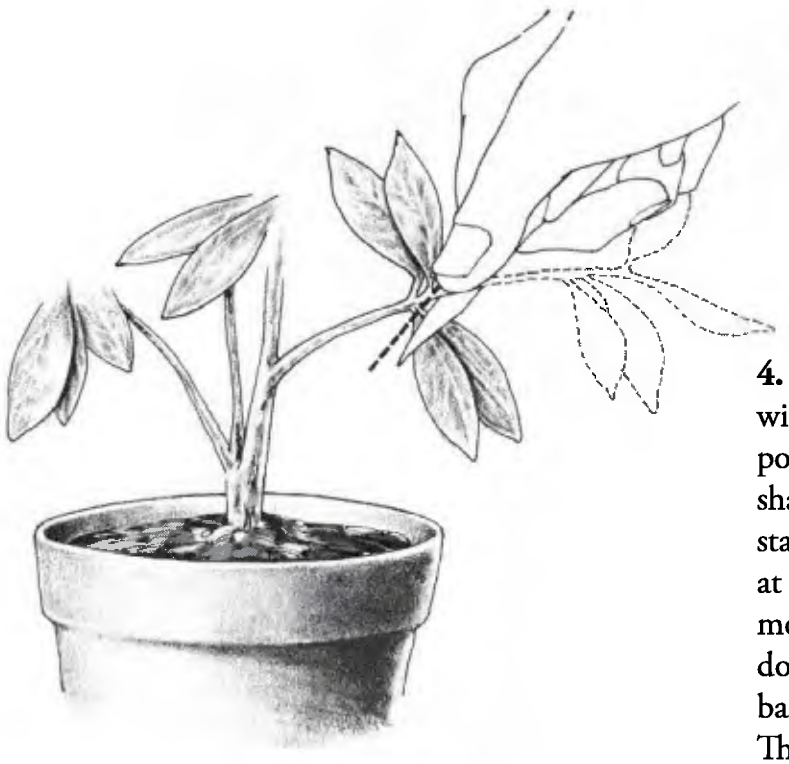
2. When all the blooms have gone by, prune the leaves and branches lightly to shape. Take off about an eighth of the length of old branches, cutting just above a side shoot.

Keep the azalea on the warm side of the range to force the buds open, and to encourage new roots just after repotting. Keep it on the cool side of these temperatures before setting it out in spring and after bringing it indoors in fall.

The blooms should last from two to four weeks. The warmer the room, the briefer the season of bloom. Keep the plant out of warm drafts and direct sunlight. A tray of pebbles filled with water and placed under the pot will improve humidity. Water the aza lea regularly. It is a fibrous and shallowly rooted plant,



and will not tolerate drought for long. An extremely dried-out azalea with limp, drooping leaves should be immersed in water until air bubbles cease, then drained and returned to the window sill. Check your azalea daily to see if it needs water. Heft the pot; the heavier it is, the wetter the soil. With a clay azalea pot, the cooler the pot feels and the darker its color, the damper the potting medium is. Look at the azalea's trunk; the water line on it should be visible about half an inch above the level of the medium. Finally, touch the soil. It should be neither dusty nor sod den but cool and damp.



Pruning encourages new floral and veget ative growth.

3. About every other year, the azalea should be root-pruned as well. Remove it from its pot, and with a clean sharp stick crumble away some of the peaty medium from the top and sides of the root ball.
An indoor azalea should be slightly pot-bound, but unless you free up the roots from time to time they will strangle the plant. With the stick or a knife, sever any roots that are girdling the root ball and take out any dying roots. Pick out pieces of crockery that have become entangled in the bottom of the root ball

Lightly prune all around to invigorate old roots and encourage new ones.

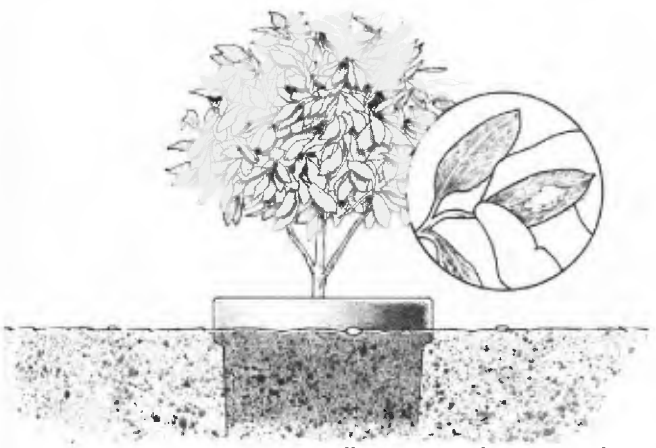
4. This first year, pot the azalea on, into a pan an inch wider at the top. (An azalea pan is a clay or plastic pot that is 1½ times wider than its height. Its shallow shape accommodates the azalea's roots better than a standard pot can.) Add some new crocks and medium at the bottom of the pot, and with the stick pack in more firmly around the entire root ball. Hereafter, don't move the azalea into a bigger pot unless the root ball is crowded-perhaps only every two to four years. The spotting medium should be about 1 part peat, 1 part sand, and 1 part leaf mold.

5. In spring after the frosts are past, plunge the azalea up to its pot's neck in a protected (indirect light or dappled shade) spot in the garden-under a tree, say, nestled in among English ivy. It should not receive direct sun. A light bark mulch over the soil surface will help retain moisture in the root ball. Check it every day and see to its watering needs. Fertilize about once a month, with a 4-12-4 formulation of azalea fertilizer if possible. The organic fertilizer Electra is also good. Twist the pot every now and then to keep its roots from striking out into the surrounding garden.

During prolonged damp spells, azaleas in the garden may get gall. Azalea galls are waxy, whitish or light-green blis ters that grow on the leaves They can be as small as a peppercorn or as big as the end of your thumb. Ripe, they burst and send forth plumes of white spores, like so much chalk dust. The disease spreads quickly from one plant to another; all galls should be cut off and destroyed as soon as found. If you can't stop the infestation this way, spray with a fungicide like ferbam or zineb.

The azalea may need a little less water after flowering, but continue to check it daily. After repotting, it will send up more new growth, which should be left to grow, as it will produce next year's flowers.

Before autumn's first frost, bring the azalea in and stop feeding it. It should have set some soft incipient flower buds; they need cool nights and warmer days to develop. A cool hallway, breezeway, cold pit, cold frame, or cloche can provide the proper environment. When the buds are full, bring the azalea into a slightly warmer room to encourage them to break.



Illustrations by Ray Maher

Society News

I don't have Facebook. How do I join?

To sign up for a brand new account, enter your name, birthday, gender, and email address into the form on **www.facebook.com.** Then pick a password.

After you complete the sign up form, Facebook will send an email to the address you provided. Just click the confirmation link to complete the sign up process.

How do I get to the ASA Facebook?

From any page on Facebook you will see a Facebook search bar at the top of the page, similar to that of the Google search bar. Click in this box and type in **Azalea Society of America**.

How do I "Like" the ASA Facebook page?

Once on the ASA page, you will see the page name **Azalea Society of America**. To the right of this is a button titled "Like". Click on this button. This is the first step to give ASA more visibility!

How can I post a photo on the ASA Facebook page?

A little bit down on the left you will see a white box that has "Photo/Video" in the right corner. If you want to share a photo of an azalea or an ASA gathering click on photo. The box will expand and you will see, "Select an image or video file from your computer.", click on the word "Browse" just below. You can search for a photo and attach the same way most email programs operate. Just above in the same box where you see "Write something…" in italics, you can comment on each photo.

How can I quickly share "posts" with other people without having to direct them to the ASA page?

There's a "Share" link under content people post. You can use this link when you see something interesting and you want others to see it.

There is an event I want people to know about. How can I get it featured on the ASA Facebook page?

Whether it is a chapter plant sale, hike to a bald to see azaleas, or a feature presentation at your chapter's ASA meeting, let us know! Located just to the right of where you "Like" the ASA page there is the option to "Message." The message will go to ASA Facebook managers.

Facebook is a great way to connect with ASA members, family, and friends!

In Memory

Jean (Larcombe) White

Jean White passed away at the age of 99 on December 2, 2014, at Washington Adventist Hospitalin Takoma Park, Maryland. She was the widow of Frank B. White, Jr. to whom she was married for 59 years. Frank White was a founding member of the Brookside group that eventually created the national ASA with Buck Claggett, Emil Deckert, etc. Jean and Frank loved raising and developing new varieties of the thousands of beautiful azaleas and rhododendrons that surrounded their home, Azalea Acres, in Lanham, Maryland. Jean White kindly and thoughtfully left money in her will to the Ben Morrison Chapter.

The Azalean Publication Schedule	ISSUE	DEADLINE	PUBLISHED
	Fall 2015		November 2015
	Winter 2015	1 October 2015	January 2016
	Spring 2016	15 December 2015	March 2016
	TBD	TBD	TBD

Protecting Pollinators: What is going on with pollinators, what role do pesticides play, why should you care, and what can you do?

Paula Shrewsbury and Stanton Gill, University of Maryland Extension

Note from the authors: This article was originally written in April of 2014 for the members of the green industry to inform them of current issues associated with bee pollinators and pesticides. We have revised the article somewhat with the publication of new research-based information and to address the readers of ***The Azalean****. Azaleas are one of the most commonly grown shrubs in residential and commercial landscapes. They produce flowers that are present for specific times of the season, and the newer everblooming varieties flower for most of the season. Moreover, azaleas are visited by bees that feed on their floral resources, and azaleas are treated with pesticides to manage lacebugs and other pest problems. There is potential for these treatments on azaleas to pose a threat to pollinators. Anyone who gardens, maintains, and/or produces plants should be conscious of protecting pollinators.*

What is the problem?

Pollinator health has recently been the focus of popular media, environmentalists, apiary specialists, scientists, farmers, horticulturists, and the public in general. Unusually high honeybee colony losses were reported by beekeepers in the United States in 2006, and in other countries over the last decade. This syndrome became known as Colony Collapse Disorder. In addition to issues with honeybee health, research on bumblebees and other solitary bees has raised concerns of declines in the number of species and abundance of these pollinators. Most data on bee decline is on honeybees, less so on bumblebees, and even less on solitary or wild bees. However, the consensus is that pollinators are at risk.

What is causing the problem?

Numerous scientific studies, both laboratory and to a lesser extent field studies, have been conducted to identify causal factors relating to declines in honeybee and bumblebee populations. Causal factors likely vary in their impact between honeybees and bumblebees. In recent reviews of the data, scientists have identified multiple factors or "stressors" that affect honeybee or solitary bee health, including parasites (Varroa mites), pathogens (fungi, viruses), poor nutrition, habitat loss (limited floral resources and nesting sites), management stress, and pesticides. Native bee declines and honeybee colony loss may be the result of the above stressors working independently, but most evidence demonstrates that these factors interact in combination or synergistically to impact the health of bees. For example, exposure of bees to certain fungicides can increase the toxicity of pyrethroids to bees; poor diet due to limited floral resources can compromise a bee's immune system, making it more susceptible to parasites and pathogens; and pesticide exposure can affect a bee's disease tolerance and susceptibility to disease.

Data suggest that pesticides in general and neonicotinoids in particular are not primary factors in honeybee decline or "colony collapse disorder." For bumblebees, pesticides may play a larger role, but there is still a need for more field studies evaluating impacts on bees. Little is known about the effects of pesticides on solitary bees. There are many issues associated with the interpretation of the data from research studies. For example, laboratory studies sometimes evaluate levels of pesticides that are greater than bees would likely be exposed to under field conditions. Bee biology and behavior can influence the actual levels of pesticide exposure that bee or bee colonies encounter. This questions the accuracy of inferences from lab to field situations and emphasizes the need for more field studies with field-relevant exposure levels.

What about neonicotinoid insecticides?

Some groups have focused on the class of insecticides called neonicotinoids, citing them as a major cause of problems with bee health.

Regulations restricting the use of neonicotinoid insecticides in Europe have been implemented. In the U.S. large box stores have responded to pressure from environmental groups by requiring all flowering plants treated with neonicotinoids be labeled as such. The EPA has accelerated reviews of neonicotinoid insecticides and mandated the addition of a "bee advisory box" on all products containing neonicotinoids. There is pressure from various groups to remove or further restrict the use of neonicotinoids, especially from ornamental and turfgrass systems.

What are neonicotinoid insecticides and their potential risks?

Neonicotinoid insecticides are insect neurotoxicants. In the green industry, these include imidacloprid, thiamethoxam, clothianidin, acetamiprid, and dinotefuran. They have many desirable features such as broad-spectrum activity, low application rates, low mammalian toxicity, systemic movement upward in plants, and multiple application methods (soil drenches, foliar sprays, or injection into plants). They have proven very effective and generally safe in controlling many sucking, plant boring, and turf-feeding insects. Their distribution throughout the plant and their long residual activity have contributed to effectiveness in controlling plant-damaging insects. Because of these benefits neonicotinoids are widely used in the green industry (and agriculture) for managing many potential pest insects. Neonicotinoids are especially useful for tree conservation and invasive insect species management. For invasive species such as emerald ash borer, Asian longhorned borer, and hemlock wooly adelgid, neonicotinoids are one of the most effective tools for preventing massive loss of trees in urban forests and landscapes. Neonicotinoids have been effective in controlling numerous landscape and turf pests.

However, neonicotinoids, like several other classes of insecticides, are toxic to bees. Misapplication to trees in bloom when bees are foraging (against label directions) has resulted in massive bee death. Laboratory studies have indicated that acetamiprid is less toxic to bees than the other neonicotinoids. In general, application rates are higher for ornamental plants than for agricultural crops. Statements have been made that the higher rates and the systemic activity of neonicotinoids increase the likelihood that toxins will end up in pollen and nectar at levels toxic to bees--a concern is when neonicotinoids are sprayed on open flowers of insect-pollinated plants. Also, neonicotinoids have the potential to move systemically into pollen, nectar, and guttation fluids in some plant species, posing particular concern for exposure to pollinators. There is still a lot we do not know about the effects of pesticides, including neonicotinoids, on pollinators and other beneficial insects, and movement of the pesticides into and residual activity in various plant parts. Also, bee behavior can affect actual exposure of bees on these plants. Therefore, more research is necessary before it can be said how pesticide residues in ornamentals and turf affect pollinator health.

What course of action and factors should be considered when managing potential pests in ornamental and turf systems?

First, neonicotinoid insecticides are in the spotlight as a major factor affecting bee health, regardless of what the data suggests. In addition, complete information is still lacking on their impacts on pollinators, especially for bumblebees and solitary bees. Second, the green industry tends to rely on products that contain neonicotinoids for managing a wide array of pests. In some situations, these are the best or only choices; for other pests there are alternatives management tactics that could be used. Third, there is the potential for EPA, or even specific counties within states to remove or greatly restrict the use of neonicotinoid insecticides, especially their use in ornamental and turf systems. Therefore, it would be wise for the green industry to reduce the use of and reliance on neonicotinoid insecticides and to be sure employees are aware of potential risks to pollinators and non-targets in general of the insecticides they are applying. Many other insecticides are also toxic to pollinators and non-targets. Be sure to READ THE LABEL

thoroughly and follow the directions.

Consider the following when making plant and pest management decisions. Implement Integrated Pest Management (IPM) practices. Choose non-chemical management tactics whenever possible. Select pesticides that have low impact and risk to pollinators. Only use neonicotinoids when other effective products do not exist (reduce reliance on neonicotinoids). Avoid prophylactic use of neonicotinoids (i.e., do not make applications unless you have an insect at levels likely to cause damage to the plant or turf). Know which plants are wind-pollinated vs. insect-pollinated. Avoid using neonicotinoids on insect-pollinated plants in general. Similarly, try to avoid trunk and soil injection of neonicotinoids on insect-pollinated plants (not enough is known about residual levels of neonicotinoids in the nectar and pollen over time to assess risk). Do not apply foliar sprays to flowering plants until after petal drop. If a neonicotinoid is needed, use a product with acetamiprid before other active ingredients. Be sure to mow turfgrass to remove flowers from weeds (i.e., .clover) immediately before or after an application of a neonicotinoid.

What can you do towards conserving pollinators?

We need to conserve pollinators to ensure that pollinator populations are diverse and abundant enough to meet food crop pollination needs and ensure the integrity of natural ecosystems. Plant a diversity of flowers that are known to provide adequate floral resources to pollinators in flower beds or conservation strips. Maintain natural areas. Provide nesting habitat for solitary bees such as bundles of hollow reeds or canes, or commercially purchased bee tubes or "hotels," and bare patches of soil. Reduce exposure of bees and flowering plants to pesticides.

Information and comments provided in this article are based on scientific information currently available to the best of the author's knowledge (written May 2015).

Article revised from S. Gill and P. Shrewsbury, *Protecting Pollinators* – Part 1, April 2014, Commercial Ornamental Horticulture, Focusing on IPM website, University of Maryland Extension, http://extension.umd.edu/ipm).

Paula M. Shrewsbury, Ph.D. is an Associate Professor and Extension Specialist in Ornamental and Turf IPM in the Department of Entomology at the University of Maryland.

Stanton A. Gill is an Extension Specialist in IPM and Entomology for Nurseries and Greenhouses at the Central Maryland Research and Education Center and Professor in Landscape Technology at the Germantown Campus of Montgomery College.

More Weighings: Exploring the Ploidy of Hybrid Elepidote Rhododendrons

Sally Perkins and **John Perkins**, Salem, New Hampshire

Mariana Castro, José Cerca De Oliveira, Sílvia Castro, and João Loureiro Plant Ecology and Evolution Group, Centre for Functional Ecology, Department of Life Sciences, Faculty of Science and Technology, University of Coimbra, Portugal

Rhododendron enthusiasts may not know it, but they love polyploid hybrid elepidotes. Check any flower show bench and look at the finalists for awards. Mention *Rhododendron* 'Cynthia', 'Gomer Waterer', 'Grace Seabrook', 'Horizon Monarch', 'Marinus Koster', 'Pink Pearl', 'Phyllis Korn', 'Point Defiance', 'Taurus', or 'Trude Webster', and gardeners quickly declare these as among their favorite rhododendrons or high on their wish list. Yes, these rhododendrons all display "something different" and are "highly desirable". They have larger than normal levels of genetic material. They are polyploids.

More than 80 rhododendrons with larger than normal ploidy levels are revealed below. We hope gardeners will see the connection of polyploidy to characteristics of thickness in the stem, leaf, and leaf petiole, along with firmness in flower substance. Indeed, remarkable vigor and substance overall, coupled with an outstanding floral performance at a young age, are often associated with a higher ploidy level. Even gardeners who never want to hear about ploidy love talking about their polyploid hybrid elepidote rhododendrons.

We (**Sally** and **John Perkins**) are not geneticists. We do have science backgrounds, combined with a passion for knowledge. Our ploidy journey began as simple curiosity combined with a willingness to coordinate with others, to scour the Rhododendron literature and the Web, and to do some field work, leading to more discoveries than we ever imagined. Engaging the expertise of João Loureiro and his research team from the University of Coimbra, Portugal, transformed this journey. We have continued this journey further, exploring the interesting comments and conclusions from multiple rhododendron breeders and enthusiasts. We hope you will attempt to grow the newer polyploid elepidotes, take up the challenge of hybridizing even more, and take an interest in the history of their development.

We keep a running list of possible higher ploidy hybrids that could be worthwhile testing should we find a source of samples for testing. These are parents, siblings, or progeny of known polyploid hybrids, visually suspicious plants, or plants suggested by knowledgeable rhododendron people. Thankfully, at the 2011 American Rhododendron Society Conference in Vancouver, Washington, Steve Hootman of the Rhododendron Species Botanical Garden in Federal Way, Washington, introduced us at the banquet table to Hartwig Schepker. Hartwig gave a talk the following evening and as Scientific Director of the Botanic Garden and Rhododendron-Park Bremen, Germany, home of one of the largest Rhododendron collections in the world, we immediately realized that here was a person who had access to additional rare material. Our ongoing polyploid journey would not have to end with so many unanswered questions. Hartwig also realized that this too could be the beginning of a mutually beneficial relationship, and all he needed to provide would be three floral buds per hybrid for flow cytometry testing by the research team at Portugal's University of Coimbra.

Background In Ploidy terms

When we refer to ploidy we mean the "size" of the plant's genetic material. In seed-bearing plants, the genetic material is found in the nucleus of the cell, packed into structures called chromosomes. There are two different techniques used to determine how much genetic material is in a cell and therefore, an estimate

of the number of chromosomes that are present in that cell. One can "count the ways" or "weigh the counts".

Count the ways: The classic way to determine the number of chromosomes in a plant is to "visualize" the chromosomes with stain where they are actively growing, as in a root tip, and then count the different pairs under the microscope. Reports are that this is very tedious (more so in rhododendrons), subject to error, and even eager graduate students are reluctant to cooperate. Chromosome counts are often not duplicated and rarely use multiple specimens.

Weigh the counts: With flow cytometry, it is possible to weigh the genetic material by taking healthy plant tissue (such as leaf, flower or seed) and measuring the "weight" of the genetic content. This technique is much less time consuming and, therefore, easier to verify by duplicating results.

Flow cytometry was developed to detect cancer cell mutations in humans. If the cells are normal and growing, a weighted value representing the normal number of chromosomes would be dominant. There also would be a small number of cells with double the weight of their chromosomes, the ones in the duplicated state, just prior to cell division. Any cells with less than or more than either of those two weights would be an indication of mutations of the amount of genetic material in the cell (i.e. cancer). Flow cytometry is used in this paper to detect the normal weight of genetic material in different *Rhododendron* species and elepidote hybrids.

Polyploidy: Beginning with 1, 2, 3, 4, and 5.

In most plant cells, i.e. leaves, stems, roots and some parts of the flower, the chromosomes are paired with a matching chromosome to form the **diploid** state. We say *most* cells because when it comes time to sexually reproduce, the gametes (cells that fuses with other cells during fertilization) that are the unfertilized seed and the pollen are formed by the splitting apart of the paired chromosomes during a process called meiosis. This forms a nucleus with a single set of chromosomes, the unpaired or **haploid** state. And just to make things complicated, "true seeds" undergo double fertilization, so that they have two haploid nuclei from the seed parent that are fertilized with a haploid pollen nucleus to form the endosperm of a seed. The fertilized endosperm therefore has three sets of chromosomes (two from the seed mother and one from the pollen father) and is triploid. This **triploid** material nourishes the germinating seedling's growth.

Most rhododendrons get one set of 13 chromosomes, denoted as 1x, from each parent (female and male) resulting in two sets of chromosomes. The **diploids** formed in this manner are denoted as 2x (1x + 1x = 2x = 26 chromosomes). However, some rhododendrons have four sets of chromosomes. These are commonly referred to as **tetraploids**, and denoted as 4x (2x + 2x = 4x = 52 chromosomes). **Triploids** have three sets of chromosomes and are denoted 3x. **Pentaploids** have five sets of chromosomes and are denoted 5x. Rhododendrons having more than two sets of chromosomes are referred to as **polyploid** rhododendrons (Ranney et al. 2008).

All species of elepidote rhododendrons that we have tested have been confirmed to be diploid with the noteworthy exception of *R. decorum* ssp. *diaprepes* 'Gargantua'. However, there is no evidence that the subspecies *diaprepes* is tetraploid; **only** the named form 'Gargantua' (selected from seed raised from Forrest 11958) has tested as tetraploid. To date, no wild elepidote population has tested as tetraploid, but this could change. We were hopeful and then disappointed that two relatively new species with stiff, thick leaves, *R. platypodum* and *R. yuefengense*, both tested as typical diploids.

In very rare instances, a parent will not go through the normal splitting process of meiosis and, as a result, the gametes are unreduced. Unreduced gametes donate the plant's full complement of chromosomes to the fertilized embryo. We are very interested in those rare occurrences. It is also possible to artificially induce a higher ploidy with chemicals that interfere with normal chromosome splitting. For example, Augie Kehr in North Carolina was able to form a tetraploid elepidote *R. maximum* 'Summer Joy' * and a lepidote *R. minus* 'Epoch' using colchicine. The terms **neotetraploid** or **neopolyploid** refer to a recent hybrid, whether man-made or natural, that is

a higher ploidy than the diploid state.

Although most rhododendron species are diploid, stable populations of tetraploid *Rhododendron* species do exist within deciduous azaleas and lepidotes (Zhou et al.2008). An individual triploid rhododendron can occur naturally where diploid and tetraploid species of Rhododendron are co-located, and they appear to be hybrids (Perkins et al.09/2010). For example, natural triploid deciduous azaleas exist in Audra State Park in West Virginia, Hurricane Creek in Georgia, and Wayah Bald in North Carolina.

Exploring: the Journey

In the fall of 1989, our Rhododendron polyploidy journey unknowingly started when we overheard at a local rhododendron meeting a statement that Frank Mossman wrote in 1972 concerning his hybridization efforts with *Rhododendron occidentale*:

> "We have found that *Rhododendron occidentale* will cross with many other rhododendrons or azaleas if *occidentale* is the seed parent, but *occidentale* as a pollen parent produces few seed." (Mossman 1972).

We wondered, "Why?"

In the fall of 2011 we read in the ARS online ejournal that in 1972 **Harold Greer** wrote the following concerning his hybridization of 'Countess of Derby' to produce 'Trude Webster':

> "If you are one of those who feels that there could be nothing outstanding produced in a pink rhododendron I would have been the first to agree with you. That was until I saw the first bud unfold on the original seedling of 'Countess of Derby' selfed" (**Greer** 1972).

Both Mossman and Greer had encountered the wonder accompanying the many puzzles presented by polyploid rhododendrons, so we were in good company.

Starting in the early 1990s, we unknowingly crossed deciduous azaleas involving different ploidy levels, leading in 2010 to collecting samples of diploid, triploid and tetraploid rhododendrons for ploidy testing at the University of Coimbra in Portugal. Each step on this pathway revealed more about the wonderful world of ploidy in our own rhododendron garden. Below is a summary of what we discovered, often based on the research, observations, and documentation of many others, about the ploidy of hybrid elepidote rhododendrons and the people encountered on our slow but wondrous journey.

Imagine if you will the following:

It is 1913 and a beautiful spring day in England, so what do you do? George V is the first Windsor King, Woodrow Wilson is serving his first term as President of the United States, and World War I is a future event. In bloom are the two most popular rhododendrons in the world at that time, 'Pink Pearl', an 1890s Waterer hybrid, and 'Cynthia', an 1850s Standish & Noble hybrid. On a beautiful spring day in 1913, if you were Henry 'Harry' White, a nursery manager in Sunningdale, England, you would have crossed 'Pink Pearl' with 'Cynthia', and later named a seedling from this cross 'Countess of Derby'.

It is spring 1961; John Kennedy is the handsome young President of the United States and Vietnam is a country unknown to most Americans. On a beautiful spring day in 1961, if you were **Harold Greer**, living in Eugene, Oregon, you selfed 'Countess of Derby' and later named a seedling from this cross 'Trude Webster'.

It is spring 1969; Richard Nixon is now the President of the United States, and Watergate is simply an office building in the DC area. On a beautiful spring day in 1969, if you were Robert Korn in Renton, Washington, you placed the pollen from 'Gomer Waterer', a 1900 Waterer 'Pink Pearl' hybrid, onto 'Diane' and later named a seedling from this cross 'Phyllis Korn'.

It is spring 1988; George H. Bush is the Vice President of the United States, and Iraq is simply a country somewhere in the Middle East. On a beautiful spring day in 1988 if you were Jim Barlup, living in Bellevue, Washington, you crossed 'Whitney's Late Peach' by 'Phyllis Korn'. You later named a seedling from this cross 'Summer Peach'.

It is spring 2001, George W. Bush is the President

of the United States and the Twin Towers in New York City are still standing. On a beautiful spring day in 2001 if you were Jim Barlup, living in Bellevue, Washington, you crossed 'Phyllis Korn' by 'Trude Webster' to create several viable offspring. You later named a seedling from this cross 'White Ginger'.

So what have you done by starting all this in 1913?

Well, you took two fertile triploids from the 19th century, namely 'Pink Pearl' and 'Cynthia' and pentaploid seedlings and from these selected 'White Ginger' (Fig. 1).

By doing so, you ended the myth that triploids are always sterile and showed that triploids can, in fact, be both seed and pollen parents. Moreover, triploids, when used in hybridization, produce **mostly reduced but some unreduced gametes**. You demonstrated that triploids provide a pathway for the bi-directional transfer of genes between diploids, triploids, tetraploids, and pentaploids. It took your imagination a few beautiful spring days

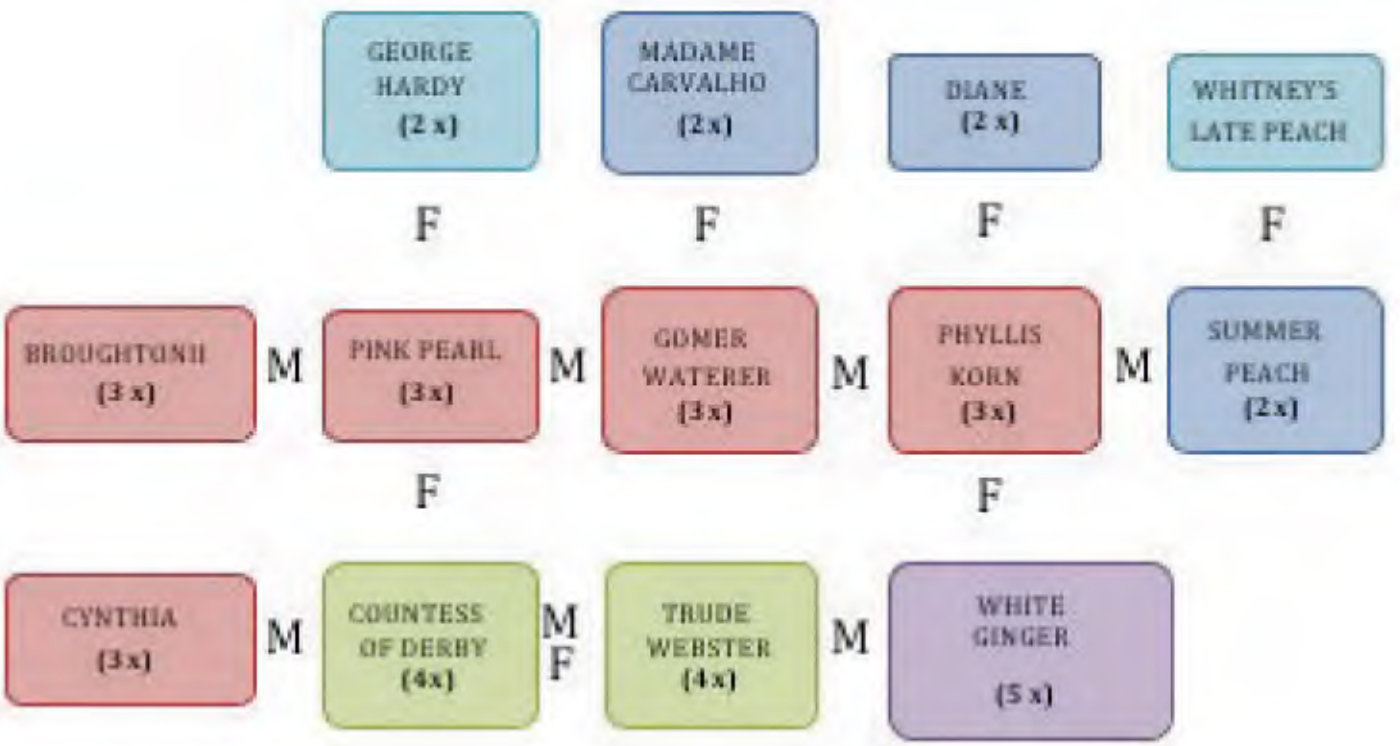


Figure 1: GENERATIONAL BREEDING OF POLYPLOID HYBRID ELEPIDOTES demonstrating that triploids can be fertile and can create a bi-directional pathway between ploidy levels.

created a tetraploid, namely 'Countess of Derby'. You then selfed the tetraploid 'Countess of Derby' creating another tetraploid, namely 'Trude Webster'. You then placed pollen from the triploid 'Gomer Waterer' onto a diploid seed parent, namely 'Diane' and created a triploid, namely 'Phyllis Korn'. You then used the pollen of that triploid, 'Phyllis Korn' and crossed it with 'Whitney's Late Peach' (untested but probably a diploid) to create a diploid, namely 'Summer Peach'. You then placed the pollen of the tetraploid 'Trude Webster' onto the triploid seed parent 'Phyllis Korn' and produced a series of doing crosses, a few changes of names and addresses, nearly 90 years, and a team of young researchers at the University of Coimbra in Portugal to confirm your results, but all in all not a bad piece of work!

The following ploidy list of named hybrid elepidote Rhododendrons as determined using flow cytometry, all by João Loureiro, Silvia Castro, José Cerca Oliveira, and Mariana Castro, Plant Ecology and Evolution Group, Centre for Functional Ecology, Department of Life Sciences, Faculty of Science and Technology, University of Coimbra, Portugal, unless otherwise indicated.

Summary of Ploidy

Key:

F indicates a fertile triploid.
T indicates a chemically induced tetraploid.
P indicates a diploid with a polyploid ancestor.
S indicates a diploid with a tetraploid parent.
U indicates a diploid with a tendency to produce unreduced gametes.
DM indicates a triploid resulting from a triploid parent.
NM indicates a triploid resulting from a tetraploid parent.
UM indicates a triploid resulting from 2 diploid parents.
2X4 or 4X2 indicates a tetraploid resulting from a diploid and a tetraploid parent.
3X2 indicates a tetraploid resulting from a triploid and a diploid parent.
3X3 indicates a tetraploid resulting from 2 triploids parents.
3XQ indicates a tetraploid resulting from at least one triploid parent.
4X4 indicates a tetraploid resulting from 2 tetraploid parents.
4X3 indicates a tetraploid or pentaploid resulting from a tetraploid and a triploid parent.
4XQ indicates a tetraploid or pentaploid resulting from a tetraploid parent.
% indicates flow cytometry ploidy testing was done by research team led by **Tom Ranney.**
# indicates flow cytometry ploidy testing was done by Tom EeckHaut.
(,) indicates the name of the hybridizer and date of cross related to use or production of a polyploid.
* indicates not registered.

2x Diploids (89 Total, 22 from Polyploid Parents)

'1000 Butterflies'
'Adriaan Koster'
'Alice '
'Anna' (Lem, 1952) U
'Bethany Jade'
'Betty Hume'
'Bibiani'
'Bruns Sirius' (Bruns, 1955) P
'Cheyenne'
'Colonel Coen'
'Countess of Athlone'
'Dagmar' (Kavka, 1965) P
'Diane'
'Doctor H.C. Dresselhuys'
'Doctor V.H. Rutgers'
'Donald Waterer' (Waterer, 1916) P
'Don Juan'
'Double Besse'
'Duke Of York'
'Elegans'
'Everlasting' %
'Fantastica' %
'Furnivall's Daughter'
'George Hardy' (Mangles, 1884) U
'Gillii'
'Gill's Triumph'
'Goldflimmer' %
'Goldsworth Orange' #
'Gotham Rheingold'
'Graf Zeppelin' (van Nes, 1934) P
'Gunborg' (Sagemuller, 1964) P
'Heinje's Venezia' (Sagemuller, 1964) P
'Horizon Lakeside'
'Hotei'
'Hurricane' (Whitney, 1960) P
'Irmelies' (Hachmann, 1962) P S
'Isabel Pierce'
'Isadora' (Sagemuller, 1962) P
'Janet Blair' %
'J.G. Millais' (Waterer, 1915) P
'Jingle Bells' #
'Käthe Heinje' (Heinje, 1964) P
'Kathy Van Veen'
'Kupferberg' #
'Lady Bligh'
'Lady de Rothschild'
'Lady Eleanor Cathcart'
'Lady Longman' (White, 1929) P
'Lem's Cameo'
'Loderi Venus'
'Loder's White'
'Madame Carvalho'
'Maxecat' %

R. maximum 'Kalamity'
R. maximum 'Delp's Red Max'
'Mindy's Love'
'Mother of Pearl' ('Pink Pearl' sport, 1925) P
'Mrs A.T. de la Mare'
'Mrs E.C. Stirling' (Waterer, 1906) P
'Mrs Furnivall'
'Mrs Lindsay Smith'
'Nancy Evans'
'Naselle'
'Norman Gill'
'Nova Zembla' %
'Olin O. Dobbs'
'Orange Leopard' (Brack, 1988) P S
'Peach Charm'
'Peach Recital' (Barlup, 1996) P
'Phipp's Yellow'
'Pink Prelude'
'Polar Bear' %
'Professor J.H. Zaaijer' (Endtz, 1958) P
'Puget Sound' %
'Red Olympia'
'Rendezvous' (Hachmann, 1968) P S
'Scandinavia' (Koster, 1950) P
'Shoreham'
'Sir Robert Peel'
'Stony Brook' (Brack, 1988) P S
'Summer Peach' (Barlup, 1988) P
'Summer Wind' (Barlup, 1996) P
'The Honourable Jean Marie de Montague' (van Nes, 1901) U
'Voluptuous'
'Vulcan' %
'Vulcan's Flame' %
'Wanna Bee'
'White Pearl' (syn 'Halopeanum')
'Wild Affair'

3x Triploids (51 Total)

'Anita Gehnrich' (Gehnrich) UM
'Anna Rose Whitney' (Van Veen, 1954) F NM
'Annie E. Endtz' (Endtz, 1939) DM
'August Lamken' (Hobbie, 1942)
'Beauty of Littleworth' (Mangles, 1884)
'Betty Wormald' (Koster, 1907) F
'Broughtonii' (Broughton, 1840) F
'Caruso' (Hachmann, 1990) NM
'Charis' (Hachmann, 1990) NM
'Cotton Candy' (Henny & Wennekamp, 1958) F UM
'Cynthia' (Standish & Noble, 1856) F
'Dame Nellie Melba' (Loder, 1926)
'Denali' (Elliott, 1987) NM
'Django' (Hachmann, 1985)
'Ebony Pearl' ('Pink Pearl' sport, 1966)
'El Camino' (Whitney, 1976) NM
'Frentano' (Hachmann, 1989) NM
'Gartendirektor Rieger' (Hobbie, 1947)
'Gomer Waterer' (Waterer, 1900) F DM
'Grace Seabrook' (Seabrook, 1965) UM
'Halfdan Lem' (Lem, 1967) UM
'Hallelujah' (Greer, 1958)
'Hank's Folly' (Schannen) NM *
'Hollandia' (Endtz, 1938) DM
'Johnny Bender' (Seabrook, 1960) F UM
'Julia Caroline' (Brockenbrough, 1990) NM
'Lady of Spain' (Lofthouse, 1966) NM
'Lucky Strike' (Van Veen, 1958) NM
'Lydia' (Greer, 1963) F NM
'Markeeta's Flame' (Markeeta, 1960) UM
'Markeeta's Prize' (Markeeta, 1970) UM
'Newcomb's Sweetheart' (Newcomb, 1968) NM
'Opal Thornton' (Thornton) NM
'Pearce's American Beauty' (Pearce, 1930) F
'Phyllis Korn' (Korn, 1969) F DM
'Pink Pearl' (Waterer, 1892) F DM
'Platinum Pearl' (Greer, 1983) F NM
'Queen Mary' (Felix & Dijkhuis, 1950) DM
'Romilda' (Hachmann, 1990) NM
'Rothenburg' (von Martin, 1944)
'Rwain' (Colombel, 1993) F NM
'Solidarity' (Schannen, 1969) F UM
'Souvenir de Doctor S. Endtz' (Endtz, 1924) DM
'Steredenn' (Colombel) NM
'Sugar Pink' (Greer, 1960) NM
'Super Dog' (Bones) NM *
'Taurus' (Mossman, 1962) F UM
'Topsvoort Pearl' ('Pink Pearl' sport, 1935)
'Val d'Aulnay' (Croux & Fils, 1984) F

'Van' (Van Veen, 1930) NM
'Viscy' (Hobbie, 1950) UM

4x Tetraploids (31 Total)

'Antoon van Welie' (Endtz, 1930) 3X2
'Aristide Briand' (Endtz, 1950) 3XQ
'Brigg's Red Star' (Briggs) T
'Cherry Cheesecake' (Briggs) T % *
'Countess of Derby' (White, 1913) 3X3
R. diaprepes 'Gargantua' (Stevenson, 1923)
'Doctor A. Blok' (Endtz, 1937) 3XQ
'Doctor Arnold W. Endtz' (Endtz, 1927) 3XQ
'Doreen Gale' (Sanders) 4X4
'Friesland' (Endtz, 1958) 3XQ
'Gentle Giant' (Sanders, 1992) 4X3
'Germania' (Hobbie, 1956) 4X2
'Gorgeous George' (Sanders) 4X4
'Grand Slam' (Greer, 1982) 4X3
'Horizon Jubilee' (Brockenbrough) % *
'Horizon Monarch' (Brockenbrough, 1981) 2X4
'Jan Dekens' (Endtz, 1940) 3XQ
'Le Fouesnantais' (Colombel, 1997) 4XQ
'Legend' (Barlup) 4X4
'Lem's Monarch' (Lem, 1965) 2X4
'L'Engin' (de la Sablière) 4X2 *
'Marinus Koster' (Koster, 1937)
'Pink Goliath' (van Nes, 1958) 4XQ
'Point Defiance' (Lem, 1970) 2X4
'Professor Hugo de Vries' (Endtz, 1958) 3X2
'Reverend Paul' (Sumner, 1975) 4X4
'Summer Joy' (Kehr) T *
'Supernova' (Briggs) T %
'Trude Webster' (Greer, 1960) 4x4
'Very Berry' (Greer, 1988) 4X2
'XXL' (ID'Flor) *

5x Pentaploids (2 Total)

'Haithabu' (Hachmann, 1991) 4XQ
'White Ginger' (Barlup, 2001) 4X3

'Pink Pearl' a triploid, won the first Award of Merit in 1897 and continues as a garden-worthy plant as Rhododendron of the Year in 2006 by the Southwestern Chapter of the American Rhododendron Society. In 1950, a large 'Cynthia', a triploid originally bred in 1858, was the first rhododendron planted in Portland Chapter's Crystal Springs Rhododendron Garden. 'Trude Webster', a tetraploid, won the American Rhododendron Society's first Superior Plant Award in 1971 and is still found on lists of Proven Performers for the West Coast. 'Broughtonii', a triploid bred in 1840, is still considered to be among the best warm weather rhododendrons according to Don Burke, who gardens in Australia.

Historical evidence indicates that by 1910, the triploids 'Betty Wormald', 'Beauty of Littleworth', 'Broughtonii', 'Cynthia', 'Gomer Waterer' and 'Pink Pearl' would have been on most lists of best elepidote rhododendrons. In 1958, George Grace's list of best elepidote rhododendrons included all but one of these triploids plus the tetraploids 'Countess of Derby' and 'Marinus Koster'. In 2008, the Siuslaw Chapter of the American Rhododendron Society included on their list of best elepidote rhododendrons the triploids 'Cynthia', 'Dame Nellie Melba', 'Grace Seabrook', and 'Taurus', and the tetraploids 'Grand Slam', 'Lem's Monarch', Horizon Monarch', 'Point Defiance' and 'Very Berry'.

By 2011, Rhododendrons of the Year, Proven Performers, Awards of Garden Merit and Best in Show trusses were added to the 'bests' mentioned above, taking in the triploids 'Anita Gehnrich', 'Anna Rose Whitney', 'Cotton Candy', 'Ebony Pearl', 'Gartendirektor Rieger', 'Hallelujah', 'Markeeta's Prize', 'Platinum Pearl', 'Solidarity' and 'Super Dog', and the tetraploids 'Gentle Giant' and 'Trude Webster'. In fact, over 30 of the 84 confirmed polyploid elepidote rhododendrons have appeared on lists of the best rhododendrons. Once these polyploids appear on such lists, they are likely to stay.

The following hybridizers have worked with or produced polyploid elepidote hybrids:

Arends, Barlup, Blaauw, Bohlken, Bones, Boulter, Bovees, Brack, Briggs, Brockenbrough, Broughton, Bruns, Colombel, Croux et Fils, de la Sablière, Drake,

Dürre, Elliott, Endtz, Evans, Farewell, Felix & Dijkhuis, Fennichia, Fujioka, Gehnrich, Gill, Grall, Greer, Guyens, Hachmann, Hall, Hartman, Heinje, Henny & Wennekamp, Hobbie, Horlick, Horsley, Hübbers, Johnson, Kavka, Kehr, Korn, Koster, Larson, Laxdall, Lem, Loder, Lofthouse, Mangles, Markeeta, McCullough, Moynier, Mossman, Murcott, Naylor, O'Rourke, Ostler, Patterson, Pearce, Perkins, Peste, Poulsen, Rabideau, Ragans, Reuthe, Sagemuller, Sanders, Schannen, Schnupper, Seabrook, Shapiro, Smith, Standish & Noble, Stead, Stevenson, Stockman, Sumner, Thacker, Thornton, van Nes, Van Veen, Vinson, von Martin, Waldman, Walton, Waterer, Wieting, White, Whitney, Wilson, Winberg & Smith, and Woodward.

It is noted that nearly as many hybridizers have worked with confirmed elepidote polyploids as there are confirmed polyploid hybrids. More importantly, some of the hybridizers on this list are best known for the polyploid elepidotes they have created. In fact, polyploid elepidotes have been named in honor of wives, mothers, grandparents, and queens.

Incidentally, Mossman, working with the diploid deciduous azalea species *R. occidentale,* discovered what Barlup later discovered working with hybrid elepidotes: diploids are much more likely to accept pollen from tetraploids than tetraploids are to accept pollen from diploids. We found this to be true for our crosses and have addressed this topic in more detail elsewhere(**Perkins** et al. 12/2009). Breeding with polyploid elepidotes is not an easy task, and is fraught with low fertility in seed set and low viability in seed germination. This explains why so few polyploids have been created to date, despite so many hybridizers having attempted to use them as parents.

Jim Barlup wrote the following about using polyploid elepidotes as parents:

> *"I continue to test the pollen and plants which I doubt for 3 or 4 years to determine their fertility or sterility. If you cross a diploid with tetraploid pollen you can achieve beautiful seedpods but their germination is very difficult. 3% seed germination for 'Point Defiance'. Obtained are both diploid or tetraploid offspring.'*(Barlup 1999)

Ron Naylor wrote the following about his best plant, 'Francis Augustus Storey', from a cross involving the tetraploid 'Point Defiance':

> *'Francis Augustus Storey' - Best of grex of four plants from weak germination. One died in 2000 and another in 2001.'* (Naylor 2010)

Dick Murcott wrote the following about the plant he called 'TT116'*:

> *'TT116 – [('Jean Marie de Montegue' X degronianum var. yakushimanum) X 'Grand Slam']. Only one seed from this cross germinated. Looks like a tetraploid. Pink. Looks like 'Trude Webster' but is definitely a seedling.'* (Murcott 2010)

Barlup, Murcott, and Naylor each encountered both the wonder and puzzlement presented by polyploid rhododendrons. We have discovered for deciduous azaleas that seed produced from tetraploid X tetraploid normally has high rates of germination, but germination from diploid X tetraploid crosses varies greatly **but** is often poor. To read about Frank Abbott's encounter with the wonders of working with deciduous azaleas of different ploidy levels see 'Frank Abbott's Village of Azaleas' (Perkins et al. 09/2009) or 'Margaret Abbott' is a Tetraploid' (Perkins et al. 2011).

The following people and organizations donated samples for this research without whose generous donation of time and material this work could not have progressed:

John Abbott, Jane Adams of White Cloud Nursery, **Charles Andrews**, Vivian Abney of East Fork Nursery, Living Collection of **Arnold Arboretum**, Natural Collection of Audra State Park, Living Collection of Bartlett Arboretum, Jim Barlup, Norman Beaudry of American Rhododendron Society Seed Exchange, Jane Brooks, Joe Bruso, Werner Brack, Ned Brockenbrough, Natural Collection of Canobie Lake NH, Dick Cavender, Clarice Clark of Western North American Rhododendron Species Project, Living Collection of Connecticut College Arboretum, Marc Colombel, Alfred Cook, **Mike Creel, Bruce**

Untested Named Elepidote Hybrids We Suspect of Being Polyploid:

'Adelheid' *
'Aggie'
'Aibette'
'Alibaby'
'Andantino'
'Aperitif'
'Arden Primrose'
'Ariel Sherman'
'Arnold Piper' ##
'Arthur Ostler'
'Babar'
'Bel Air'
'Bellevue'
'Bernard Crisp'
'Bernard Shaw'
'Bohlken's Kronjuwel'
'Boskoop Concorde'
'Canadian Beauty' ##
'Cara Meg'
'Castanets'
'Comte du Parc'
'Courtenay Duke'
'Diane Marie'
'Diane Titcomb'
'Diderk'
'Direktor Siebert'
'Doris Nolan'
'Dorothy Peste Anderson'
'Double Drake'
'Edward Cornelius'
'Elizabeth Titcomb'
'Ester Grace'
'Eureka Maid'
'Fiona Wilson'
'Flensburg'
'Forever Violet'
'Fragrant Sensation' ##
'Francis Augustus Storey' ##
'Garnet'
'Gill's Gloriosa'
'Ginette'
'Goliath'
'Grab Ya' ##
'Gwen Bell'
'Hachmann's Anastasia'
'Hachmann's Kristina'
'Hachmann's Pinguin'
'Hachmann's Veronika'
'Heat Wave'
'Heinje's Schneewittchen'
'Heinje's Venezia'
'Helen Druecker'
'Horizon Serenity' ##
'Humoreska'
'Ilam Apricot'
'Ilam Orange'
'Inheritance'
'Isobel Baillie'
'Janet Ward'
'Jean Lennon'
'Jean Marie Variegated'
'Jeanne Yvonne'
'Jenice Coffey'
'Julie Titcomb'
'Justa Pink'
'Kareness'
'Kathy Ann Pieries'
'Kay Too'
'Kranenburg'
'Kranenkorn'
'Kranenrosette'
'KSW'
'Leonardslee Giles'
'Lilian'
'Lou-John Gem'
'Madah Jean'
'Maimorgen'
'Malaga'
'Margaret Mack'
'Marie Oliva Schlicková'
'Marion'
'Mary-Ed'
'Maureen Ostler'
'Melville'
'Miss Kitty'
'Mistake'
'Nicandra Newman'
'Onkel Dines'
'Orrie Dillie'
'Patricia Jacobs' ##
'Peggy Bannier'
'Pink Perfection'
'Pink Petticoats'
'Pink Titan'
'President Kennedy'
'Pride of Roseburg' ##
'Princess Debiann'
'Prinzessin Inka'
'Professor Horst Robenek' ##
'Qualicum's Pride'
'Record'
'Red Walloper' ##
'Rheinzauber'
'Robert Korn'
'Rosandra'
'Rosa Millennium'
'Rose Marie'
'Rotha'
'Rubinpracht'
'Seraphine'
'Serengeti'
'Shalom'
'Shari Laurel'
'Sheer Enjoyment' ##
'Siegfried Sommer'
'Sierra Sunrise'
'Sigrid'
'Standishii'
'Tausendschön'
'The Duchess'##
'Titness Belle'
'TT 116' *
'Twins Candy'
'Vincent Van Gogh'
'Virgo' #
'Vonnie Stockman'
'Walküre'
'Walloper' ##
'Whidbey Island'
'White Swan'
'Wilhelm Schacht'
'William Avery' ##

- Almost certainly polyploid based on parentage and/or fertility

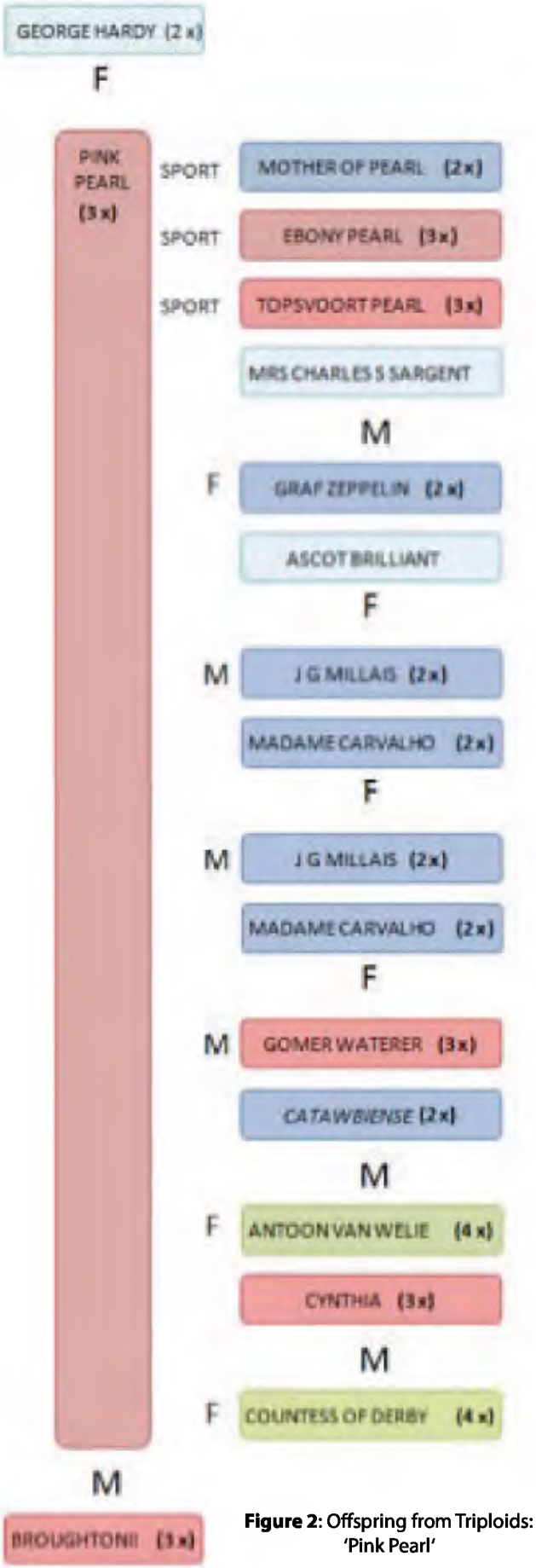


Figure 2: Offspring from Triploids: 'Pink Pearl'

Clyburn, Hans Eiberg, Al Fitzburg, Robert Fox, **Harold Greer of Greer Gardens**, George Hibben, Living Collection of Highstead Arboretum, Steve Hootman of Rhododendron Species Botanical Garden, **Don Hyatt, J. Jackson of Appalachian Native Plants, Lindy Johnson of Azalea Society of America Seed Exchange,** Richard Jaynes of Broken Arrow Nursery, Doug Jolley, Fred Knippel, Johnny Larsen, Living Collection of **Longwood Gardens**, Robert MacIntyre, Ron Miller, Dick Murcott, Michael Medeiros of Planeview Nursery, Wayne Mezitt of Weston Nurseries, George Newman, Peter Norris, **John and Sally Perkins, Ron Rabideau of RareFind Nursery**, Ellie Sather of Whitney Gardens, Hartwig Schepker of Rhododendron-Park Bremen, Natural Collection of Stoddard Bog NH, Kristian Theqvist, Patrick Thompson of Donald E Davis Arboretum, **John Thornton**, Hendrik Van Oostand of Azaleatuin, **Kathy Van Veen of Van Veen Nursery.**

Despite having created this new suspected polyploid list, our four-year journey of testing suspected polyploids has shown that only about half will turn out to be polyploids. Some such as 'Fragrant Sensation', 'Grab Ya', 'Pride of Roseburg', and 'Sheer Enjoyment', having both parents as tested tetraploids, are almost certainly polyploids. In the list above,. we have marked, using the double pound sign (##), a dozen or so we think are the most likely polyploids based on parentage and fertility. The only way you can know for certain whether a plant is an actual polyploid is to obtain a fresh sample from a reliable source and test it under laboratory conditions.

Most in this suspected list are known to have at least one polyploid parent, be a sibling of a polyploid, or be a parent of one or more polyploids. However, both triploid and tetraploid hybrid elepidotes have been shown to be capable of producing diploid offspring when the other parent is a diploid. Many hybrids on our suspected polyploid list do have one parent suspected of being a diploid. In other words, a diploid can have a polyploid parent or sibling. Moreover, two diploid parents can produce a polyploid offspring, so having a polyploid offspring does not ensure either parent is a polyploid. Having a polyploid parent or

Figure 3: The pedigree of 'The Duchess', a suspected polyploid, showing the 23 non-distinct polyploids in its ancestry.

sibling greatly increases the chances that a plant is a polyploid but is no guarantee. Whereas, being highly fertile reduces the chances that a plant is a polyploidy, especially if one of that plant's parents is a known diploid. A popular hybrid with polyploid ancestry and few named offspring is an excellent candidate for our list of suspected polyploids.

Based on looking at parentage and the number of offspring of named hybrids plus confirming 24 polyploid hybrids with research done on 48 additional suspected polyploids in 2012, we conjecture that our lists of known (84) and suspected (132) polyploids contain the vast majority of what is almost certainly less than 200 polyploid elepidote hybrids registered prior to 2000.

In short, there are no rules of thumb for "knowing" the ploidy of the offspring for hybrid elepidotes if the parents are of mixed ploidy levels or either parent is a triploid or pentaploid. Diploid X diploid will almost always (but not always) create diploid offspring. Tetraploid X tetraploid will almost always (but not always) create tetraploid offspring. However, diploid X tetraploid and tetraploid X diploid, which are normally associated with producing triploid offspring, have been shown to produce a combination of diploids, triploids, and tetraploids when working with hybrid elepidotes.

Triploids, Fertile Triploids and Triploids as the Progeny of Triploids

Triploids are normally believed to be produced by one of two mechanisms. Two diploids can cross where one diploid parent, instead of providing one set of chromosomes, provides two, resulting in an offspring that has three sets of chromosomes. This is commonly referred to as the **unreduced mechanism for creating triploids.**

Ploidy results suggest that triploids such as 'Anita Gehnrich', 'Grace Seabrook', 'Markeeta's Flame', 'Markeeta's Prize', 'Solaridity', and 'Taurus' were most likely created by this unreduced mechanism.

On the other hand, a diploid parent and a tetraploid parent can cross where the diploid parent provides one set of chromosomes and the tetraploid parent provides two sets of chromosomes, resulting in an offspring with three sets of chromosomes. This is referred to as the **normal meiosis interploidy mechanism for creating triploids**. Ploidy results suggest that triploids such as 'Anna Rose Whitney', 'Cotton Candy', 'El Camino', 'Hank's Folly', 'Julia Caroline', 'Lady of Spain', 'Lucky Strike', 'Lydia', 'Opal Thornton', 'Platinum Pearl', 'Rwain', 'Steredenn', 'Sugar Pink', 'Super Dog', and 'Van' were most likely created by this normal meiosis interploidy mechanism.

Offspring are documented for the following triploids: 'Anna Rose Whitney', 'Betty Wormald', 'Broughtonii', 'Cotton Candy', 'Cynthia', 'Gomer Waterer', 'Lydia', 'Pearce's American Beauty', 'Phyllis Korn', 'Pink Pearl', 'Platinum Pearl', 'Rwain', 'Solidarity', 'Taurus', and 'Val d'Aulnay' (Fig. 1). The common belief that triploids are always sterile as both seed parents and pollen parents is challenged by these findings. Triploids such as 'Pink Pearl', 'Phyllis Korn', 'Rwain' and 'Taurus' appear to be partially fertile as both seed and pollen parents (Fig. 2). In fact, triploids can be the progeny of triploids. Based on parental documentation, 'Broughtonii', 'Pink Pearl, 'Gomer Waterer' and 'Phyllis Korn' represent

four consecutive generations of triploids (Fig. 1).

Three sports of the triploid 'Pink Pearl' were ploidy tested: 'Ebony Pearl' and 'Topsvoort Pearl' tested as triploid whereas intriguingly, 'Mother of Pearl' tested as diploid (Fig. 2).

Diploids can be the progeny of triploids. Diploids such as 'Graf Zeppelin', 'Hurricane', 'J.G. Millais', and 'Summer Peach' are documented to have a triploid parent. In the case of 'Graf Zeppelin', the triploid 'Pink Pearl' is documented as the seed parent (Fig. 2). Although a diploid, 'Graf Zeppelin' exhibits characteristics often associated with named polyploids.

Tetraploids can be the progeny of triploids: 'Countess of Derby', a tetraploid, is documented to have two triploid parents, namely 'Pink Pearl' and 'Cynthia' (Fig.1). Tetraploids such as 'Antoon van Welie', 'Gentle Giant', and 'Grand Slam' are documented to have a triploid parent. In the case of 'Antoon van Welie', the triploid 'Pink Pearl' is documented as the seed parent (Figs. 2 and 3).

Marc Colombel donated some of his suspected polyploid hybrid seedlings for testing. Noteworthy is that four seedlings of 'Rwain' X 'L'Engin' tested as tetraploid. 'Rwain', the seed parent, is a triploid. 'L'Engin', the pollen parent, is a tetraploid. Moreover, three seedlings of the cross of the tetraploid 'Horizon Monarch' with the triploid 'Rwain' tested as tetraploids but one seedling tested as triploid.

Figure 2 suggests that a triploid parent, for example 'Pink Pearl', can produce offspring that are diploids, triploids, and tetraploids. Figure 1 suggests that pentaploids such as 'White Ginger' are also possible from a triploid parent.

In the 1930s, C. D. Darlington showed that triploids could be fertile. Moreover, Darlington confirmed a third mechanism for creating triploids. Darlington showed that the chromosome set in triploids may split unevenly during meiosis to form a bell-shaped curve distribution. This means that most gamete cells form near the midpoint of 1.5x, with a few having 1x and 2x chromosomes. So in a few cases, a triploid parent can act as a diploid contributing one set of chromosomes or as a tetraploid contributing two sets of chromosomes. Our ploidy results, (Perkins et al. 10/2010) when combined with the documentation of parentage, strongly suggest this third distributive meiosis mechanism does occur for fertile triploid elepidote rhododendrons. Hans Eiberg has determined in controlled lab experiments that for rhododendrons, hybrid triploid pollen is sometimes just as viable as any hybrid diploid pollen.

Tetraploids and Diploids as the Progeny of Tetraploids

Tetraploids such as 'Doreen Gale', 'Gorgeous George', and 'Legend' have been created by the normal meiosis mechanism where both parents are tetraploids. Tetraploids such as 'Horizon Monarch', 'Lem's Monarch', 'L'Engin', 'Point Defiance', and 'Very Berry' may have been created by the unreduced mechanism of a diploid parent with the other parent being a tetraploid.

Justin Ramsey's work with newly created neotetraploids suggests that such neotetraploids may experience irregular meiosis. Ramsey suggests that in some instances a **neotetraploid** may contribute only one set of chromosomes to the offspring. For the purposes of this article, we refer to this as the **super-reduced mechanism.**

Diploids such as 'Rendezvous', 'Irmelies', 'Orange Leopard', and 'Stony Brook' may have been created by this super-reduced mechanism. In the case of 'Rendezvous', the tetraploid 'Marinus Koster' is documented as the seed parent.

Noteworthy is that one seedling of 'Horizon Monarch' that had been open-pollinated tested as diploid. The actual plant of 'Horizon Monarch' that was the parent of this particular diploid seedling tested as tetraploid. Other seedlings from the same seedpod tested as tetraploid. 'Pink Goliath', a tetraploid (4x), is the result of (['Antoon van Welie' (4x) X 'Professor J. H. Zaaijer' (2x)] X 'Annie E. Endtz' (3x)), where each parent contains 'Pink Pearl' (3x) in its heritage.

The pentaploids, 'Haithabu' and 'White Ginger', have a tetraploid parent. Our ploidy results suggest that tetraploids may produce diploid, triploid, tetraploid, and pentaploid offspring.

Normal, Unreduced, Super-reduced, and Distributive Meiosis: By the Numbers

A diploid rhododendron has 26 chromosomes. Normally a diploid rhododendron as a parent splits in half during meiosis, contributing 13 chromosomes to the offspring. A tetraploid rhododendron has 52 chromosomes. Normally a tetraploid rhododendron as a parent splits in half, contributing 26 chromosomes to the offspring. A triploid rhododendron has 39 chromosomes. Half of 39 is between 19 and 20. Darlington showed that if a triploid having 39 chromosomes were to split, it would split mainly 19/20 but also, to ever decreasing occurrences, 18/21, 17/22, 16/23, 15/24, 14/25, and 13/26, where the splitting as 13/26 occurs the least frequently. This splitting would form a bell shaped curve between 13 and 26.

Thus, in principle, for rhododendrons:

diploid x diploid usually results in a diploid since 13 + 13 = 26.
tetraploid x tetraploid usually results in a tetraploid since 26 + 26 = 52.
diploid x tetraploid usually results in a triploid since 13 + 26 = 39.
diploid x unreduced diploid can in a few instances result in a triploid since 13 + 26 = 39.
unreduced diploid x tetraploid can in a few instances result in a tetraploid since 26 + 26 = 52.
diploid x super-reduced tetraploid can in a few instances result in a diploid since 13 + 13 = 26
diploid x triploid can in a few instances result in a diploid since 13 + 13 = 26 or in a triploid since 13 + 26 = 39.
triploid x tetraploid can in a few instances result in a triploid since 13 + 26 = 39 or in a tetraploid since 26 + 26 = 52.

Noteworthy, other researchers have found that the offspring of triploids are often **aneuploids**. For rhododendrons, an aneuploid would have a chromosome count slightly more or less than 26 (2x), 39 (3x), 52 (4x), 65 (5x) or other multiples of 13 (x = 13). The unstable meiosis associated with triploids and neotetraploids most likely means that some of the rhododendrons listed above as diploid, triploid, or tetraploid do not have exactly 26, 39, or 52 chromosomes but instead, have close to these counts. Flow cytometry being a method of weighing sets of chromosomes rather than counting the number of chromosomes is not well suited to separating **euploids,** which have a normal chromosome count, from aneuploids.

Summary

Named hybrid elepidote polyploid rhododendrons have played an important role in the garden for more than 150 years. The physical characteristics associated with polyploid rhododendrons have proven to be highly desirable by gardeners since their introduction by Broughton, Standish & Noble, and Waterer. The ploidy of more than 170 named elepidote rhododendrons is listed above. Although all species of elepidote rhododendrons have tested as diploid to date, more than 80 named hybrid elepidote rhododendrons have tested as polyploid. Eighty-nine samples tested as diploid, 51 as triploid, 31 tested as tetraploid, and two as pentaploid. Twenty-two tested diploids are documented to have a polyploid parent. Four tested diploids are documented to have a tetraploid parent.

Triploids can be fertile as both seed and pollen parents, and triploids are able to produce diploid, triploid, tetraploid, and pentaploid offspring. Tetraploids also are able to produce diploid, triploid, tetraploid, and pentaploid offspring. The mechanisms of normal, distributive, **unreduced and super-reduced** meiosis are discussed. All ploidy results presented here are based on flow cytometry.

This research was guided by the work contained in the following:

Hybridization of Rhododendron Elepidote Polyploids by Jim Barlup pg 1-4 1999
http://www.rhododendron.fr/articles/article35c.pdf

Rules of Engagement: Have Pollen - Will Travel by John and Sally Perkins 2009
http://rosebayblog.blogspot.com/2009/12/rules-of-engagement.html

Ploidy Levels and Relative Genome Sizes of Diverse Species, Hybrids, and Cultivars of Rhododendron by Jeff Jones, Thomas G. Ranney, Nathan P. Lynch, and Stephen L. Krebs pg 1-8 2007 http://www.holdenarb.org/education/documents/Jonesetal2007.pdf

Ploidy Breeding and Interspecific Hybridization in Spathiphyllum and Woody Ornanamentals by Tom Eeckhaut pg 1-184 2003 http://lib.ugent.be/fulltxt/RUG01/000/788/476/RUG01-000788476_2010_0001_AC.pdf

Meiosis in Polyploids Part I. Triploid and Pentaploid Tulips by W. C. F. Newton and C. D. Darlington pg 1-15 1929 http://www.springerlink.com/content/d017424p78822ll3/

Neopolyploidy in Flowering Plants by Justin Ramsey and Douglas W. Schemske pg 1-52 2002 http://www.botany.wisc.edu/courses/botany_940/07Polyploidy/papers/RamseySchemske02.pdf

Posts for each sample ploidy tested are available on the Rosebay Blog. Posts have been grouped using tags to promote easy viewing of related posts. Please weigh in by exploring these posts to discover the wonderful world of ploidy in the Rhododendron Garden. 2012
http://rosebayblog.blogspot.com/search/label/U of Coimbra/

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Sally and John Perkins *are members of the ASA Vaseyi Chapter and the ARS Massachusetts Chapter.*

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Call for Articles

The Azalean needs good articles about azaleas, their care, and their use in the landscape. Ideas include:

- Articles describing new public gardens or special azalea
- collections being created in your area.
- Descriptions and photographs of Society members' gardens.
- Information about azalea festivals and sales.
- Historic garden restoration stories.
- Articles about noteworthy azalea hybrid groups or new species or cultivar introductions.

Submit articles as Microsoft Word documents. Illustrations are highly encouraged and at least 4 x 6 inches at 300 dpi. Please include photo credits. Submit to theazalean@gmail.com.

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Tri-Cities Receive the Azalea City Award

John Migas, Saugatuck, Michigan

On April 27, 2015, three cities of the Tri-State Chapter of the Azalea Society of America received the Azalea City Award. **Buddy Lee** and **John Migas,** past presidents of the ASA, presented the award to the cities of Mt. Vernon, Princeton, and Petersburg, Indiana.

The ASA recognizes cities that promote azaleas by having festivals, public events and other activities throughout the season. The award ceremony for the Tri-Cities of Indiana has been in the making for well over three years. Finally, the ASA and the three recipients of the Azalea City Award were able to set the date for the presentation.

The day could not have been any better. The weather was perfect with sunny skies and 70°. Well over 100 guests were present for the ceremony along the Ohio River in Mt. Vernon, Indiana. Afterward, a walk through gardens newly built by the city of Mt. Vernon ended with lunch just across the street.

On March 28, 2015, the Azalea Society of America awarded me the Exceptional Service Award at their annual meeting in Nacogdoches, Texas. I was not present due to a number of unfortunate reasons. But on April 27 the ASA was hosting a ceremony for the Azalea City Award in Mt. Vernon, Indiana. There, the award was presented to me by Buddy Lee.

I thank all involved for thinking of me on receiving the award. This is the highest honor given by the Society, and one for which I will always be thankful to all the members. Words cannot explain how humble I am to be included in this group. I will remain working with the ASA to make it the great society it is.

Thank you ASA,

John Migas

Buck Clagett

Barry Sperling, Alexandria, Virginia

Not far across the Potomac from the Northern Virginia Chapter lives an accomplished hybridizer who has been active for 50 years. Derwood, Maryland resident Buck Clagett has produced a large number of beautiful evergreen azaleas under the Bowie Mill designation, many available from White's Nursery in Germantown, Maryland.

Clagett and Elizabeth Ann.

His goals have been to produce flowers with more petals and more colors than have been available. With Tina's Whorled and Tissie in his garden, I will attest to Clagett's success in those goals.

Both sides of his family had an interest in horticulture and growing seedlings so it is no wonder that he tended in that direction. His Aunt Dorothy knew Dr. Wilson from the USDA, a friend of Ben Morrison. Dr. Wilson brought to her some original Glenn Dales: Festive, Fashion, Corsage, etc. About 1962 Buck started a collection from Lyon's Nursery: Hahn's Red, Ambrosia and Martha Hitchcock. Some Gables came from a Hyattsville nursery and Gold Cups from Nuccio's in California.

Liz 3.

Within a few years he started azaleas from seed, with the first crosses attempted in the late '60s. Stacy Lynn (a very small, early, strong pink double) and Tissie (a very late, large flowered strong purple hose-in-hose) were his first successes. Currently, seedlings are started under lights in his basement just after Christmas, then after being transferred to his cold frames they spend the rest of their lives outdoors. The cold frames are 2' x 6', glass topped and shaded. Clagett doesn't use a greenhouse. Plants are sprayed three times a day inside the cold frames in the summer. In addition to a seven-foot deer fence (and Liquid Fence®) he sprays for insects and poisons slugs.

Looking back, Buck especially enjoyed spending time with George Harding and Bob Stelloh. He was in on the early activity of the ASA about 1978, attending a meeting prior to the first official meeting. This early meeting included Bill Parsons, Nate Fitts, George Harding, Frank and Mike White and Bob Mallet. Soon after, this continued with the first official meeting of the ASA, which was attended by Buck, George Harding, Frank White, Emile Deckert, Bob Mallet, Ty Spencer, Bill Parsons, Warren and Judy Grooms and Alice Holland. At this meeting they collected information about suppliers and made the first logo (a flower and a leaf).

Buck Clagett has been involved with the rich history of azaleas, from hybridizing to founding the ASA and is a great resource for our little hobby. If you would like cuttings from his collection he invites you to contact him at bclagett2@verizon.net.

***Barry Sperling** is the Corresponding Secretary and newsletter editor for the Northern Virginia Chapter.*


Gracie Girl
Gracie Girl


Li'l Fella
Li'l Fella


Li'l Sweetie Pie
Li'l Sweetie Pie


Miss Curlicue
Miss Curlicious


Dottie Ann