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The Azalean

Journal of the Azalea Society of America



President's Letter

John Migas — Saugatuck, Michigan



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*).

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The fall season is upon us and it seems that I completed very little this year. Summer has come and gone, which I'm extremely grateful for. The fall colors are completed and now there are leaves to rake, many leaves to rake. During the summer, West Michigan had a severe drought with no measurable rain for three months. Sure it sprinkled, and the out of towners commented that they can't understand why their plants are dying. They would say "the radar showed it rained," or "it was raining in Chicago," which is 150 miles away.

It's hard to believe that we have just had one of the most unusual seasons for growing, reports show that the corn crop yield is down, there were very few apples due to the frost back in late April. We had 90 degree temperatures in late March and early April, which triggered the azalea and rhody blooms, then in late April killer frosts which wiped out any blooms, followed by a drought.

Our Lake Michigan Chapter organized a garden tour for mid May, moved it up three weeks due to the warm weather, and it poured that day well over three inches of rain, followed by a killer frost. Summer came with no rain, over 50 days of 90 degrees, and a few 100 degree days. Just to mention, here in Martin, Michigan they host an annual Drag Race event which is once a year. This is their main event, including Nitro dragsters and funny cars, attended by well over 25,000 people a day. Well it poured, sun up to sun down.

Talk about wanting to throw in the towel. Irrigation was the only way to survive this summer. Even with all the heat, the bud set on both azaleas and rhododendrons was excellent. I did not fertilize this year, and the plants still look great.

Getting to Society business, our Editors are trying to catch up on the timing of Azaleans. In early spring Bonnie and Preston made a move from South Carolina to Texas, which put them behind on everything in their lives. Trying to get settled in had taken its toll. They ask that articles of any kind be submitted being that they have very little to use for printing. They hope to get the Journals back to schedule by springtime.

Eve Harrison is heading the Membership Committee and anyone willing to volunteer please contact her. Eve and Dan Krabill will be working on renewals for the 2013 season. J Jackson and Lindy Johnson are still willing to donate a seedling to new members for joining. Jim Thornton is busy with the 2013 convention plans being held in Athens, Georgia.

I hope that all have had a good summer, and look forward to seeing everyone in Georgia.

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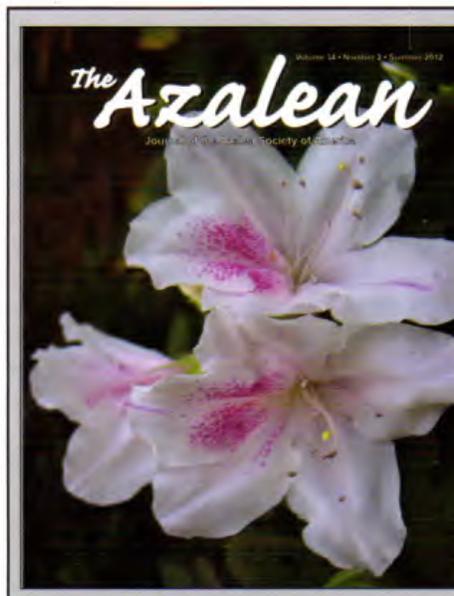
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Thoughts on Azalea Hybridizing

Don Hyatt—McLean, Virginia

A primary goal for many azalea hybridizers has been to improve winter hardiness. Achieving that goal, however, has not always been straightforward. Two of the hardiest species known to date are *Rhododendron poukhanense* (*R. yedoense* var. *poukhanense*) and *Rhododendron kiusianum* and they have figured prominently in many hardy hybrids. Although both can withstand significant cold, they have some drawbacks. They have sparse winter foliage and their dominant purple genes are problematic for hybridizers since it can take many generations to get colors other than purple in the progeny. Perhaps the hardiest hybrid to date is Orlando Pride's 'Pale Lilac' (*kaempferi* x *poukhanense*). It has bloomed in Ontario after winter temperatures of -31° F (-37° C). [1]

It is often wise to build on the success of others, and this is true with hybridizing. One azalea hybrid that has been very successful in producing many hardy hybrids is the semi-double lavender, 'Elsie Lee' ('Desiree' x Gable's 'Rosebud') by Tony Shammarello. 'Desiree' is a single white and Gable's 'Rosebud' is a compact double pink, and even though 'Elsie Lee' is purple, it has some hidden strengths. The plant is hardy with good winter foliage and its flowers are fertile in both directions. Not only can it pass those traits to its progeny, it can also produce seedlings with colors other than purple in a primary cross. For instance, Schroeder's blush pink, 'Eliza Hyatt', came from the cross ('Elsie Lee' x 'Robin Hill Frosty'). The cross of ('Elsie Lee' x *R. kiusianum*) produced a very hardy pale pink with a deeper edge called 'Al's Picotee'.

Foliage: Leaf Color and Retention

Since the flowering season lasts but a short time, gardeners are interested in the year-round landscape effect of their plants. Quality foliage is very impor-



Photo: Donald Hyatt

▲ 'Elsie Lee', a Parent of Many Hardy Hybrids

tant! There are many different leaf types in evergreen azaleas, and this offers many options for developing unusual foliage forms.

Azaleas with persistent, glossy evergreen winter foliage like 'Glacier' and 'Dreamsicle' are preferred to plants with sparse winter foliage like *R. poukhanense*. Gable's 'Stewartstonian' has excellent dark winter foliage, as does the Vuyk hybrid 'Johanna'. A descendant of 'Johanna', Hachmann's 'Marushka', is highly prized in Europe and in my opinion holds the current standard for foliage quality. Its glossy leaves turn to a deep, burgundy-chocolate color in winter, which makes a striking display on a very compact plant.

Azaleas with variegated leaves like 'Red Lustre' and Girard's 'Silver Sword' are popular, but such plants may not be useful in hybridizing if that characteristic is not passed to the prog-

eny. *R. stenopetalum* var. *linearifolium* with its long, narrow leaves does offer potential as a parent for new leaf forms, though. That lacy foliage in the garden provides a very lovely soft texture, and I think we should try to use it more in breeding to produce hybrids with that similar foliage but ones that have showier flowers in different colors and plants with improved hardiness.

Dwarf and Compact Plant Habits

Some evergreen azaleas like 'Dream' and 'Corsage' become huge, so without constant pruning they can quickly outgrow a small garden. Most homeowners prefer plants of modest stature that do not require so much maintenance. The hardy Back Acres hybrid, 'Bouffant' ('Dream' x 'Gunrei'), is a much more compact plant than 'Dream' and has large flowers of soft pink and never seems to need pruning in my garden. George Ring's 'Fairfax' is another excellent compact hybrid with huge flowers of pale pink and white.



▲ Foliage of Hachmann's 'Marushka'

Photo Donald Hyatt



▲ *R. stenopetalum* var. *linearifolium*

Photo Donald Hyatt

Dwarf azaleas are useful in hybridizing, but commercial nurseries rarely carry them due to the time required to produce a marketable plant. George Ring raised a very dwarf *R. kiusianum* from seed that was only 8 inches tall (20cm) after 25 years. Other slow growing azaleas include the Beltsville Dwarfs, 'Leprechaun' and 'White Elf', and many Satsukis including 'Kazan' ('Rukizon'). Those could be useful as parents.

R. nakaharae and *R. kiusianum* are proving to be good parents for reducing the stature of many modern hy-

brids. Crosses using these two compact and hardy species are producing some excellent new hybrids in Europe. [2] Glendoick's white flowered 'Panda' is a primary *kiusianum* hybrid and 'Squirrel' is a primary hybrid with *R. nakaharae* and has red flowers.

Double Flower Forms

There are many flower forms in evergreen azaleas, but doubles are extremely popular. 'Anna Kehr', 'Secret Wish', and 'Sandra's Green Ice' are all known for very high petal counts. 'Caitlin Marie' is a very double deep pink Joe Klimavicz developed from the cross

('Elsie Lee' x 'Satellite').

Hybridizers are seeking a hardy azalea that has double white flowers edged in red like 'Leopold-Astrid' or 'Cabaret', but those are far too tender for most azalea gardens. Bob Stewart's 'Ashley Ruth' has semi-double white flowers shading to a rose pink at the edge. Harry Weiskittel's 'Marshy Point Fancy Pants' has double blush-white flowers bordered in purplish-red and it has glossy dark green leaves. Breeding for doubles can be problematic, though, since some plants may be sterile because those extra petals are frequently just deformed flower parts. Some doubles may not have viable pollen or a functional pistil.

Petaloid and Spider forms

An azalea flower form gaining popularity is the strap-petal, or "spider" type, where the corolla is separated into distinct petals. The popular lavender spider, 'Koromo-shikibu', has been used frequently in hybridizing. A Maryland hybridizer, Dave Wagner, did some breeding with 'Koromo-shikibu' and produced some nice strap petal forms. He gave me permission to introduce a white selection he exhibited in our flower show. We called it 'Wagner's White Spider' but it has been sold as 'Koromo-shikibu White'. It has airy, delicate blossoms of pure white and good plant habit. Although there are some other strap-petal whites in the trade including Dodd's 'Primitive Beauty' and the Switzer's 'Nannie Angell', I feel 'Wagner's White Spider' is the best so far.

Buck Clagett's 'Tina's Whorled' is a slightly deeper, reddish purple version of 'Koromo-shikibu' and it is quite nice. 'Walter's Pinwheel' (*R. nakaharae* 'Mt. Seven Star' x 'Koromo-shikibu') has strap-like petals in pinkish lavender on a compact, mounding habit. Other spider types include the reddish-orange 'Polypetalum', and several Satsukis including 'Shiryu-no-homare,' a purple with unusual curled foliage.

Interestingly, strap-petal hybrids can arise when neither parent shows that tendency. I made a cross of (*R. naka-*



'Secret Wish'



▲ 'Wagner's White Spider'

▼ Hyatt hybrid: 'Cardinal's Crest'



harae x 'Anna Kehr') which produced the compact double pink I expected and named 'Ginny Grina'. It also produced a plant with red petaloid flowers that I call 'Cardinal's Crest'.

Striped and Bordered Flowers

Some evergreen azaleas have flowers with stripes or sectors of contrasting color that can add significant horticultural interest. This tendency is com-

mon among many Glenn Dale hybrids, especially those having 'Vittatum' as a parent. The trait is also common among many Satsukis.

The Glenn Dale 'Cinderella' ('Vittatum' x 'Louise') has white flowers striped with red. Satrap Sport is a different sport from the same plant, but has light red flowers with an irregular white border. Neither form is stable,

though, and either one can revert to the other, or even throw a solid color red sport as well. The problem with such highly variable forms is one must be very careful to select propagation material from the desired flower form.

Azaleas flowers where the corolla has a contrasting border color are also very popular and can arise from crosses using parents showing that tendency. The Satsuki 'Shinnyo-no-tsuki' was used to produce several bordered Glenn Dales like 'Martha Hitchcock', 'Luna', and 'Welcome'. Bordered flowers can arise as sports from other forms, especially among azaleas with stripes or colored sectors. Bordered flowers are common among Satsukis, such as 'Kingetsu' and 'Meicho'.

Flower Color – The Perfect Red

Some nurserymen are still looking for the perfect red azalea, and I am not sure we are there yet. The ideal plant would have compact habit, large flowers, superb foliage, rock hardiness, and a pure, bright red color. 'Ward's Ruby' and 'Redwings' are great reds but too tender for colder gardens. 'Stewartsonian' and 'Girard's Hot Shot' are hardy but have too much orange in the red. 'Hino-crimson' is one of the most popular reds in the eastern United States but its single flowers are rather small and uninteresting and 'Hino-degiri' has too much blue in the color. 'Vuyk's Scarlet' and 'Johanna' are old Dutch hybrids and seem to be gaining in popularity. Some very deep reds being used in breeding today include 'Midnight Flare' and 'Karafune.' Perhaps we can cross those with hardy doubles to get the perfect red.

Of course, the most elusive flower color in evergreen azaleas is yellow, and we have much farther to go to reach that ideal. I will discuss that in more detail in a separate article.

Extending the Season of Bloom

Perhaps one of the most prominent successes for any amateur hybridizer is the story of our own Buddy Lee and the Encore® azaleas. They have become among the most popular azaleas in garden centers all across the southern states, and we applaud Buddy for his work.

A common parent in Buddy's hybridizing program was *R. oldhamii* 'Fourth of July', a species that tends to throw off-season flowers. William R. Brown at the Louisiana Agricultural Experiment Station had experimented with repeat-bloom azaleas using *R. oldhamii* and other fall blooming azaleas. [3] Buddy has now succeeded in creating a race of azaleas that are reliable rebloomers in climates where summers are warm and the growing season is long. Not all of them re-bloom in northern gardens with shorter growing seasons, but Encore® Autumn Rouge™ ('Conlea'), a deep rose pink with double flowers, seems to be one of the best performers in the western suburbs of Washington, D.C.

There are other azaleas like 'Opal' and *R. kaempferi* 'Indian Summer' that are reliable rebloomers for us in more northern gardens. Perhaps we should be using them as parents for repeat bloom. There is another very interesting plant derived from 'Mucronatum' by the late Dr. Marion B. Matlack of Virginia. This azalea blooms on the new wood, as soon as the flower buds are formed. It seems to be the best summer and fall bloomer in the Washington, D.C., region with large white blossoms which start opening in August and continue until terminated by a freeze, hence the name, 'August to Frost'. The plant is hardy, but unopened buds are usually killed during the winter so there is no spring bloom. 'August to Frost' has thrown several sports including a purple selection and a white with red blotch.

There is still much unrealized potential in the evergreen azalea. Through hybridizing, we should be able to develop plants with exciting new foliage forms, variations in plant habit, new flower shapes, unusual colors, improved hardiness, increased fragrance, and extended blooming seasons. Unless we make the crosses though, and grow out lots of seedlings, we may never know what secrets are hiding in the genes of these marvelous and versatile plants.

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Photo Donald Hyatt

▲ 'August to Frost' – Plant

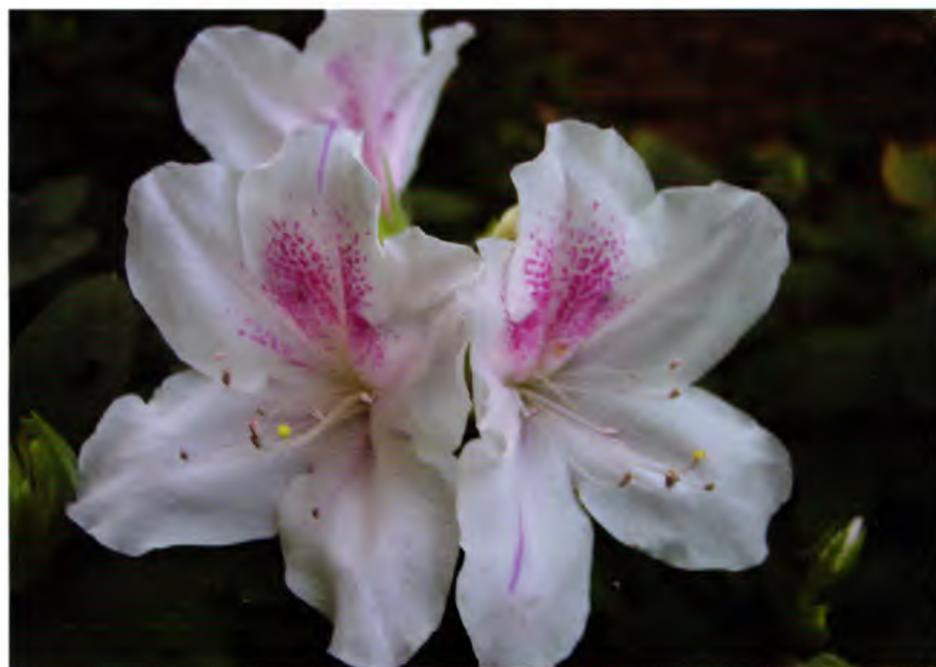


Photo Donald Hyatt

▲ 'August to Frost' – Sport

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Volume 13, No. 3, September 1991.

Don Hyatt has been an avid hybridizer of azaleas and rhododendrons for more than 30 years, with a particular interest in deciduous azaleas, and has taught mathematics and computer science for more than 35 years.

Chapter News

Lake Michigan: *Linda Lanning- Secretary*

April 28, 2012 - The Lake Michigan Chapter of the Azalea Society of America held a spring get-together in the Holland, Michigan area and toured six gardens. They met in Holland and toured the beautiful garden at the home of members Jim and Karen Ellis, then to Zeeland to see Dan Migas' garden, along with his neighbor Tom and Jen Ritsema. From there they traveled to Fennville, MI. to see Arthur Frederick's beautiful property. Once in Saugatuck the group toured Dick Bont's and Stacy Honson's gardens. We stopped by the Historical Society of Saugatuck's, Douglas project on Center Street in Douglas. The tour finished at John Migas' garden and Nursery. Although it was cold and rainy, the group enjoyed the foliage and beautiful blooms.

John Migas discussed a project he has been working on. John, a member of the Saugatuck/Douglas Historical Society, has lent his time and talents to landscape the Historic 1866 School grounds with rhododendrons and azaleas plantings. The Society is putting in walking paths with plantings, a children's area for hands-on activities with plants and a hop scotch area. They want to bring the school back to life, like the original, even down to the peach trees, as this area used to have peach orchards. He told us about the School preservation as we toured the property. Located at 135 Center Street Douglas, Michigan, built in 1866, this is the oldest existing multi-classroom school in the state of Michigan. The school is currently being used by the community for multiple functions.

August 4, 2012 - We met at the home of members You Ying and Dr. Andy Whipple in Upland, Indiana. Andy provided us with tissue culture starts from cuttings he gathered on the balds of North Carolina. We began our cutting party with Andy opening his sterile jars of azalea starts and rinsing them. He put each kind on a separate plate, which the members shared, carefully putting each tiny start into the medium Andy provided for us. We sprayed each container with a mild fertilizer before sealing with plastic wrap. We will leave them for 6 weeks before transplanting into larger containers. We also did azalea cuttings in our usual method, so each member had some treasures to take home. After lunch at Ivanhoe's in Upland, Andy took us on a tour of the brand new Science Building on the Taylor University campus where he is a professor. We saw his new lab, classrooms, and the beautiful interior of the new structure. This lab is where he

teaches and does tissue culturing of native azaleas. The building will be occupied for the first time this fall.

Northern Virginia

Barry Sperling- Corresponding Secretary

The Northern VA Chapter continued a full slate of activities with the annual cutting exchange, this year at the home of Carolyn and Paul Beck. Secretary Mary Hoioos writes: "After a Pot Luck lunch, a short meeting and homemade ice cream (furnished as always by Carol and Lee McElvain), we journeyed to the garage where cuttings were spread out on many tables. There were over two hundred different handpicked varieties. We took turns at choosing our favorites. Don Hyatt presented a PowerPoint program on "Rooting Cuttings". He handed out a DVD to those who wanted them. As usual, we had an interesting and informative afternoon."

Texas

Sherrie Randall- Corresponding Secretary

The Texas chapter held their summer meeting at the Texas AgriLife Research and Extension Center, Texas A&M system, in Overton, Texas. This horticulture field day allows the public to tour their field trials, demonstration garden and container garden trials. The trials include thousands of square feet of plots planted with purple, pink, red and white flowers. This year's field day featured 400 bedding-plant entries, everything from geraniums to petunias to verbena were on display in outdoor plots. Dr. Brent Pemberton has conducted bedding-plant trials at the center since 1994.

The chapter held a working meeting during the sponsored barbeque lunch. Barbara Stump gave a recap of the Appalachian Spring joint convention between ASA and ARA as not all members present attended the event. As a national board member she was also able to highlight some of the activities at the national level. Group discussion followed concerning our hosting of the ASA convention in 2015. Members and guests departed the meeting with a birdfeeder in hand thanks to President Jo Ann Smith.

After lunch we rejoined the field day activities by attending the indoor presentations by Pemberton and Dallas Arboretum representatives Jimmy Turner and Jenny Wegley, who discussed the 2012 California Spring Showcase, also known as Pack Trials, as well as top performers for 2011.

New Members

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Call for Articles

The Azalean needs more 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. Submit to: Preston and Bonnie Cooley, Editors, 6900 Skillman St., Unit 304C, Dallas, TX 75231,

E-mail: theazalean@gmail.com.



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Society News

Membership Renewals Due

Dan Krabill, ASA Treasurer

It is almost time for most of us to renew our memberships in the Azalea Society of America. Your membership expiration year should appear on the top line of the address label for this issue of *The Azalean*. If the year 2012 appears on that line, your membership expires at the end of this year.

Please review the information on your address label and make any needed corrections. Also, if your telephone number or e-mail address has changed, please provide us with the correct information.

Then, circle an amount in the table below to show the number of years and the type of membership you would like. The table includes a \$1 discount for each year paid in advance, up to \$5 per year. Those years are paid in full, even if the dues are increased later. For example, to renew for four years as a Regular Member, circle \$94 in the table.

| Years | Regular | Contributing | Supporting | Endowment |
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| 2 | \$49 | \$99 | \$199 | \$399 |
| 3 | \$72 | \$147 | \$297 | \$597 |
| 4 | \$94 | \$194 | \$394 | \$794 |
| 5 | \$115 | \$240 | \$490 | \$990 |
| 6 | \$135 | \$285 | \$585 | \$1185 |

Or, consider joining for life, for the one-time payment of \$500 or five consecutive annual payments of \$100 each. Sorry, this is not available for organizations or overseas members.

Finally, write your check or money order in US dollars for the total amount, payable to the "Azalea Society of America." Mail it by December 31 along with a copy of this page to:

Dan Krabill, ASA Treasurer
6009 Copely Lane
McLean, VA 22101-2507

Alternatively, you may pay your dues with a credit card online through PayPal (<http://www.paypal.com>). Send your dues payment to: PayTheASA@aol.com. You can open a PayPal account in minutes (and if it asks, please mention PayTheASA@aol.com as the person who referred you). Then describe your changes, your membership type, and the number of years you are renewing for in the comments section.

If you know you are not going to renew, please let us know by letter or e-mail to dkrabill@gmail.com, so we will not have to mail you dues notices.

Lyme Disease - A Clear and Present Danger

William C. Miller III - Bethesda, Maryland

Lyme disease or Lyme borreliosis is the most common tick-borne disease in the northern hemisphere (North America, Europe, and Asia) with more than 20,000 new cases being reported annually in the U.S. alone, according to the Centers for Disease Control and Prevention (CDC). While Lyme disease has been found in nearly all of the fifty states, it is considered endemic in the northeast (Maine to Virginia), the upper midwest (Wisconsin and Minnesota), and the Pacific coast (Oregon, northern California and parts of Nevada, Arizona, and Utah). Rarely fatal, Lyme disease is a major concern because it is difficult to diagnose and delayed or inadequate treatment can lead to extremely serious, difficult to treat, and disabling consequences. It is caused by the bite of a tick infected with *Borrelia burgdorferi* which is a spirochete form of bacterium that is similar to the organism that causes syphilis.

Lyme disease was first recognized in the United States in 1975 when Dr. Allen Steere, who was studying rheumatology at Yale University, was called in by Connecticut's chief epidemiologist to investigate a mysterious outbreak of juvenile rheumatoid arthritis in three small, rural communities — Lyme, Old Lyme, and East Haddam. Here was a "cluster" of individuals, 39 children and 12 adults, with a comparatively rare disease where statistically one might expect to see only a single occurrence. After interviewing the families to determine what they might have in common, Dr. Steere ruled out the nearby nuclear power plant, the drinking water, the local swimming pool, something that they had all eaten, or some communicable disease. Noting the rural setting, that most of the afflicted were children who lived and played near wooded areas, and that the onset of illness consistently came during the summer and early fall, it was concluded that the transmission of the disease might involve an arthropod vector (i.e., insects and ticks that transmit disease from one organism to another), much the way mosquitos are responsible for malaria and yellow fever, and ticks are responsible for Rocky Mountain spotted fever and tularemia. In the interviews, some patients recalled being bitten by a tick and others remembered a skin rash (erythema migrans or EM) which developed just prior to their arthritis symptoms. Steere recognized that the "bull's-eye" rash was a significant manifestation of the disease. A researcher from Europe, who was visit-

ing Yale, remarked that the rash was similar to a condition frequently encountered in northern Europe. Early in the 20th century, European researchers (Afzelius in Sweden and Lipschutz in Austria) had linked the northern European rash phenomenon to a tick bite. When it was learned that the rash was responsive to penicillin, it was evident that the rash was a consequence of a bacterium rather than a virus. Further, that the rash was usually found somewhere on the torso suggested a crawling vector rather than a flying one. What was previously named "Lyme Arthritis" was changed to "Lyme Disease."

It was not until 1982 that Dr. Willy Burgdorfer, at the Rocky Mountain Laboratory in Hamilton, Montana, isolated the spirochete cause of Lyme disease from the mid-gut of *Ixodes* ticks. In addition, Dr. Burgdorfer tested sera from patients with clinically diagnosed Lyme disease and found antibodies that reacted to the bacterium. The dots were beginning to connect, and a number of world wide syndromes dating back to colonial days were now linked to this newly identified spirochete bacterium.

Lyme Disease

Lyme disease has three stages. The first stage, or early localized stage, is characterized by the appearance of a "bull's-eye" type of skin rash (EM) and flu-like symptoms anywhere from three days to four weeks after the tick bite. Joint pain, muscle aches, depression, swollen lymph nodes, and severe fatigue are common. Fortunately, prompt treatment with an appropriate antibiotic is curative in the majority of cases. The second stage, or early disseminated stage, occurs when the bacterium slowly begins to disperse to multiple sites throughout the body via the blood stream. Symptoms include a recurrence of the rash (distant from the tick bite), facial or Bell's palsy, pain and swelling in the larger joints (particularly the knees), heart palpitations, meningitis, and dizziness. The third stage, or late disseminated stage, occurs months to years after the tick bite. The symptoms include chronic arthritis, fatigue, and neurological problems like numbness or tingling in the hands or feet, memory loss, mood changes — and in the most severe of cases — permanent paraplegia (paralysis of the lower part of the body).

As mentioned earlier, Lyme disease is difficult to diagnose. The symptoms are quite common and mimic many other diseases (e.g., "summer flu"). The symptoms are

not always neatly confined to their respective stages, not every symptom is experienced in every stage, the severity goes from relatively mild to conditions that require hospitalization, and the diagnostic tests are not 100% reliable.

Ticks

Worldwide, there are 850 species of ticks. There are hard ticks which possess a hardened dorsal shield and there are soft ticks which lack a dorsal shield. In the U.S., there are about eighty species of ticks, of which only about a dozen or so represent a major public health or veterinary concern. Of that dozen, only two hard ticks are related to Lyme disease: the blacklegged tick, *Ixodes scapularis*, (aka deer tick or bear tick) in the north-east and north central states (Fig. 1) — and the western blacklegged tick, *Ixodes pacificus*, on the pacific coast and parts of Nevada, Arizona, and Utah.

Ticks are not insects. They are grouped with spiders and mites, and are found around the world in warm, humid climates. Both males and females are obligate ectoparasites which means they are dependent upon and live on the exterior of the host organism (e.g., fleas and lice). They meet their nutritional needs by drawing blood from the host (hematophagy), which may be a mammal, a reptile, or a bird. In general, ticks have four stages: egg, larva (infant), nymph (immature), and adult (mature), and a two year life cycle which involves three hosts. Curiously, the larva has three pairs of legs, while the nymphs and adults have four pairs of legs. Ticks are most active during the spring and summer. They do not jump, fly, climb trees, or blow around in the wind. They frequent animal trails and perch at the top of grass blades or low growing bushes. They assume a “questing” pose where they cling to the vegetation with their hind legs and extend their front legs forward — waiting for a prospective meal to wander by — literally within

Blacklegged Tick (*Ixodes scapularis*)



▲ Figure 1: This shows the relative sizes of the respective life stages compared to a dime. The nymph and adult stages of the deer tick have been described as approximately the size of a poppy seed and a sesame seed respectively.



Photo CDC/James Gathary, William Nicholson

▲ Figure 2: This shows a female deer tick (*Ixodes scapularis*) “questing” for a host.

reach (Fig. 2). Once onboard a host, the tick may wander over the host for one to three hours before attaching and feeding. Ticks feed slowly and may remain attached to a host for several days. It’s during the feeding portion of the life cycle that the ticks either pick up the disease from an infected host — or they pass the infection on to an uninfected host. It often takes several hours of feeding before the disease organism is transmitted to the host, so that means that a tick bite does not necessarily guarantee an infection. Because the nymph is smaller (the size of a poppy seed) than the adult, it has the greater chance of going unnoticed, attaching, feeding, and successfully conveying the disease to a host.

Favorite reservoirs for *Ixodes scapularis* are the white-footed mouse (*Peromyscus leucopus*) and the white-tailed deer (*Odocoileus virginianus*) (Fig 3). In the west, *Ixodes pacificus* seems to favor the western fence lizard (*Sceloporus occidentalis*), the dusky-footed woodrat (*Neotoma fuscipes*), the deer mouse (*Peromyscus maniculatus*) and the black-tailed deer (aka mule deer, *Odocoileus hemionus*). Fifty-two mammals, forty-eight birds, and eight reptiles were identified as hosts for at least one stage of the tick life cycle. In other words, the tick is not limited when it comes to selecting a host.

Borrelia burgdorferi

Borrelia burgdorferi is the causative agent of Lyme disease. The generic epithet is derived from Am’ed’ee Borrell (1870 - 1961), a famous French bacteriologist at the Pasteur Institute in Paris. The specific epithet comes from Willy Burgdorfer (1932 -), a Scientist Emeritus at



Photo William C. Miller III

▲ Figure 3: A beautiful, male, white-tailed deer (*Odocoileus virginianus*) sampling a neighbor's daylilies.

the Rocky Mountain Laboratories in Hamilton, Montana who made a career of investigating vector-borne bacterial and viral diseases.

B. burgdorferi is a tick-borne spirochete bacterium with an average diameter of 0.2 - 0.3 microns and a length of 20-30 microns. For comparison, the human red blood cell is about eight microns, the human hair is about 100 microns, and there are 25,400 microns in an inch. Like its tick host, it is an obligate parasite (one which cannot complete its life cycle without a host). Depending on the conditions, it can assume two additional forms: a cell-wall-deficient form and a cyst form. Each form has different characteristics, advantages, and vulnerabilities. The spirochete form is very mobile and is capable of penetrating dense tissue where it can transform into one of the other forms when conditions become less positive. Within a cell, the cell-wall-deficient and cyst forms are less vulnerable to antibiotics.

Untreated, its size, structure, and motility (a corkscrew-like motion) facilitate its dissemination throughout the body where it readily impacts almost all of the major systems in the human body. Its ability to cross the blood-brain barrier accounts for the many neurological consequences, and Lyme disease acquired during pregnancy can lead to infection of the placenta and still birth.

Diagnosis

The appearance of the EM rash occurs in 80 - 90 percent of patients with Lyme disease and is sufficient to proceed with treatment without additional testing. In some patients, the rash is not evident and serologic tests are recommended.

The problem with the serological tests is that timing is critical. False positives and false negatives are common. It takes time for the body to recognize and generate antibodies to a pathogen. If the tests are performed too soon, a false negative may occur. If the tests are performed after the spirochete has disseminated and left the blood stream, a false negative may occur. A false positive can occur when antibodies from a previous infection are recognized. So, if you ever had it, you will likely always test positive even though you don't currently have an active case.

When presented with a tick, it is imperative for the medical professional to be able to classify it since the type of tick can make or break a diagnosis. The Armed Forces Pest Management Board has produced a DVD entitled "Interactive Program for Teaching Tick Morphology." It is a self-paced course of instruction that is designed to train medical personnel (or anybody for that matter) to identify ticks in the absence of a professional tick taxonomist. It is an excellent resource, and it is distributed free of charge (Fig. 4).

Another resource is the LymeMD Web page of the Lyme Disease Research Foundation (<https://www.surveymonkey.com/s/LymeMdRashQuiz>). They have developed an instructional Web page in the form of a quiz — the goal of which is to enable one to distinguish the EM rash associated with Lyme disease from other conditions like spider bites.

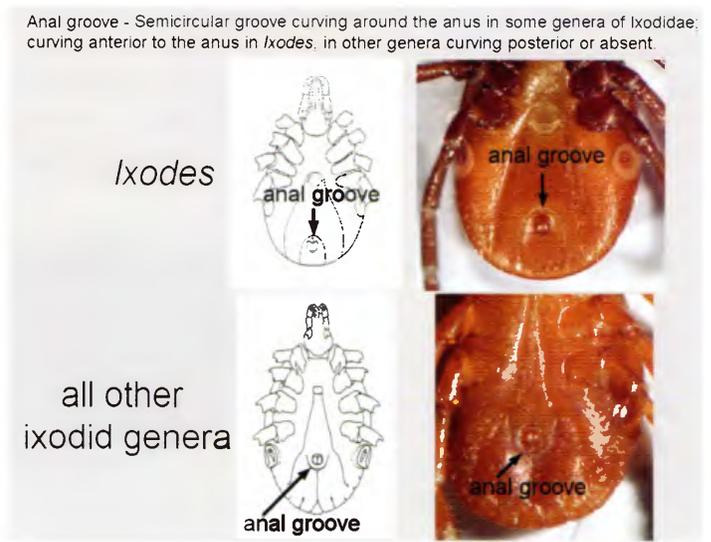


Photo DOD, Armed Forces Pest Management Board, Richard G. Robbins and George W. Schultz

▲ Figure 4: Plate from CD: "Interactive Program for Teaching Tick Morphology," explaining a definitive morphological feature that distinguishes *Ixodes* species.

Treatment

While the treatment information presented herein is believed to be current, the reader is warned that it is retrospective. Only a medical physician can diagnose and prescribe treatment for Lyme disease. In the time that it has taken for this article to be published, the treatment recommendations could have changed or be in the process of changing. Nevertheless, the information is offered with the hope of presenting as complete a picture as possible. It is not unusual for treatment protocols to change as more knowledge is obtained, and your personal physician would be a more current source for such information.

According to the National Institute of Allergy and Infectious Diseases (NIAID), a three to four weeks course of oral antibiotics cures the majority of cases. Doxycycline, a synthetic derivative of tetracycline, is the drug of choice although amoxicillin is recommended for children younger than eight years of age — and for pregnant and lactating women. For early Lyme disease or patients in Stage 1, ten days of antibiotic therapy is sufficient. Patients in Stage 2 may expect a 20 to 30 day course of antibiotic therapy. In the presence of early neurologic or cardiac manifestations, a course of ceftriaxone or cefotaxime, administered intravenously, is recommended. The literature is a bit murky when it comes to recommending treatment for phase 3 patients, there is not complete agreement in the medical community, and it underscores the rationale for not letting the disease progress to that point.

Chronic Lyme disease vs. Post-treatment Lyme Disease Syndrome vs. Late Stage Lyme Disease

In the mid 1990s, Dr. Steere became concerned that Lyme disease was becoming a handy “junkdrawer diagnosis” (his term) for everything from fibromyalgia to chronic fatigue syndrome to hypochondria. In his view, it was not appropriate for patients with no evidence of past or present Lyme disease to be treated with antibiotics which in and of themselves are not without risk. By speaking up, he created something of a fire storm and was severely criticized by the advocacy groups that had sprung up — including death threats. Advocacy groups can have a very dark side.

Chronic Lyme disease is a term used to describe three patient populations: patients with Late Stage (disseminated) Lyme disease; patients with Post-Treatment Lyme disease; and patients with Lyme-like symptoms but no evidence of Lyme disease.

The CDC estimates that ten to 20 percent of the patients treated for Lyme disease with the recommended antibiotics will later experience lingering symptoms of pain, fatigue, and muscle aches which can last for more than six months. The CDC prefers to call this “Post-Treatment Lyme Disease Syndrome (PTLDS). The cause is not known, but many medical experts believe that these late stage symptoms reflect residual damage to tissues and the patient’s immune system during the initial infection rather than a continuation of the infection. Other experts, pointing to the ability of *B. burgdorferi* to encyst and otherwise alter its gene expression, suggest that it is a continuation of the disease based on the spirochete’s ability to persist by sequestration.

Lyme Disease in Animals

Lyme disease has been reported in cows, horses, and goats. Companion animals or cats and dogs are also at risk to Lyme disease and should be monitored periodically since they are in a position to convey ticks into the family living quarters. Pets experience many of the same symptoms but lack the ability to communicate their situation — so one must be alert to subtle changes in the animal’s behavior. Symptoms include fever, joint soreness, swelling, loss of appetite, swollen glands, depression, weight loss, and fatigue. Nephritis (kidney inflammation) in dogs often results in the death of the animal. Fortunately, there are several Lyme vaccines for dogs: LYMEVAX® from Pfizer, Nobivac® Lyme from Merck Animal Health, and RECOMBITEK® Lyme by Merial. Unfortunately there is not a safe and effective vaccine for Lyme disease in cats. Merial also produces the Frontline® brand of products which provide fast-acting, long-lasting, and waterproof control of fleas and ticks in cats and dogs.

Preventing Lyme Disease

The best methods to avoid Lyme disease are: (1) limiting your personal exposure to tick infested areas; (2) walking in the center of trails when hiking; (3) wearing light colored, protective clothing and using products that contain permethrin on clothing and gear; (4) applying insect repellents containing 20% or more DEET (N,N-diethyl-m-toluamide) on exposed skin; (5) reducing tick habitat in your landscape by keeping grass short around your house and removing old log piles and leaf debris; (6) “treating” your landscape with an approved acaricide to significantly reduce the tick population; (7) discouraging deer from congregating on the property; (8) avoiding letting your dog (family pets in general) wander through

prime tick environments; and (9) after a pleasurable hour or so of gardening — performing a thorough, personal, tick check to make sure those “freckles” aren’t moving.

Tick Removal

The straight forward approach to tick removal is the best. Folk and exotic methods for removing ticks (e.g., nail polish, gasoline, petroleum jelly) can be quite counter productive. Grasping the tick as close to the skin as possible with fine tipped tweezers and gently pulling without twisting will result in the best outcome. You want to avoid crushing the tick or separating the head from the tick’s body since rough handling increases the risk of infection. After removing the tick, clean the bite area with rubbing alcohol, another disinfectant, or soap and water.

Conclusion

In the title, Lyme disease was characterized as a “clear and present danger.” The logical question then is: to whom? The short answer is that it depends on how many of the risk factors you can relate to. Do you live or work in, vacation, or recreate in areas endemic for Lyme disease? Does your vocation involve clearing brush, landscaping, forestry, farming, or wildlife and parks maintenance or management? Do you enjoy hiking, gardening, hunting, fishing, and camping? Is your region or your neighborhood overrun by deer? If you answered yes to any of these questions, then you are at risk for Lyme disease and you should exercise care.

Where are we now — some 30 years since Drs. Steere and Burgdorfer made the connection between the mysterious malady in rural Connecticut and a spirochete bacterium? Consulting the National Institutes of Health (NIH) Research Portfolio Online Reporting Tools (<http://report.nih.gov>) system, there were 84 research projects in 2011, both intramural and extramural, basic and applied, that were supported by NIH, at some of the premier biomedical research institutions in the U.S. The grants are focused on learning more about the bacterium and the disease, developing improved diagnostic methodologies, and developing a new, second generation vaccine for human Lyme disease.

From a public health point of view, more research into Lyme disease is needed. There is still much to learn, and progress will come as the investigators successfully unravel the secrets of the spirochete’s genome and develop new tools and more accurate diagnostic methodologies to ultimately improve the treatment and prognosis of Lyme disease.

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Mount Cheaha, the Southernmost Location for *Rhododendron cumberlandense*

by Charles Andrews - Oconee, Georgia

Several members of the Azalea Chapter ARS, who are also members of the Oconee Chapter ASA, have been visiting Mount Cheaha State Park in Alabama to study native azaleas.

On May 18, 2011, Charlie Andrews, Ken Gohring, Hugh Denny, and Joe Coleman visited Mount Cheaha State Park in Alabama to see *Rhododendron cumberlandense*. Normally around Memorial Day is the best time to go, but bloom time in the South was early that year. Danny Hall of Birmingham was our guide. Mount Cheaha, south of Interstate 20, which runs between Birmingham, Alabama, and Atlanta, Georgia, is the southernmost location for *R. cumberlandense*. It is not part of the Cumberland Plateau but the southern end of the Appalachians.

We seemed to have hit the peak. The biggest surprise was the large numbers of *R. cumberlandense* that grow on the mountain. I expected to see a few plants. We saw hundreds and hundreds of spectacular plants. They grow like weeds among the thick blueberry groundcover. The ground is highly rocky. Danny Hall says there are other mountains (hills) around Cheaha that also have *R. cumberlandense*. I think their red color was not as strong as the pictures suggest. It was more orange-red – of course to varying degrees.

We think there also may have been some *R. calendulaceum* blooming because of large blossom size and glandular hairs on the corolla tube. There were some *R. periclymenoides* blooming and some that had already bloomed. We were not surprised to see what we thought might be hybrids.

In another little draw down the mountain, with a small spring branch flowing, *R. arborescens* was flourishing next to the water and large quantities of *R. minus* filled the hillside.

In May 2012 members returned, accompanied by J Jackson and Lindy Johnson. In October 2012 we traveled back to the mountain to collect seed. Mount Cheaha is an incredible site for a field trip.

Charles Andrews is a member of the Oconee Chapter of ASA and president of the Azalea Chapter ARS. He has a passion for native azaleas and lives in Georgia where most of the North American species can be found.



▲ Charlie Andrews, Ken Gohring, Hugh Denny, and Joe Colman



▲ *R. cumberlandense*



▲ possibly *R. periclymenoides* x



▲ *R. minus*

Photo Charles Andrews

Photo Charles Andrews

Photo Joe Coleman

Photo Charles Andrews

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