THE
Journal
OF THE AMERICAN CHESTNUT FOUNDATION
NOVEMBER/DECEMBER 2011 | ISSUE 6 VOL. 25

Tracking the Hemlock Woolly Adelgid: Will it be Another Chestnut Blight?

Harvesting Rainwater for Chestnut Orchards

With Your Gift, We Can Plant the **Future.**

THE AMERICAN CHESTNUT FOUNDATION®

TACF is on the Brink of Our Long Held Dream – Actual Reintroduction of the American Chestnut to the Forest

This year, our Harvest Appeal will drive the first steps of "One Million and Seven," an ambitious program to plant one million Restoration Chestnuts in our eastern forests over the next seven years.

Stop for just a moment and imagine children you know today being able to walk among wilderness stands of mature chestnuts in their lifetime.

Your Generous Contribution Can Make This Possible.

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160 Zillicoa Road, Asheville NC 28801

THE AMERICAN CHESTNUT FOUNDATION®

The Mission of The American Chestnut Foundation

Restore the American chestnut tree to our eastern woodlands to benefit our environment, our wildlife, and our society.

We harvested our first potentially blight-resistant nuts in 2005, and the Foundation is beginning reforestation trials with potentially blight-resistant American-type trees. The return of the American chestnut to its former range in the Appalachian hardwood forest ecosystem is a major restoration project that requires a multi-faceted effort involving 6,000 members and volunteers, research, sustained funding, and most important, a sense of the past and a hope for the future.

About Our Cover Photo

TACF recently put out a call for winter pictures of chestnuts. One of the many responses was this simple but beautiful shot of snow-dusted leaves including an American chestnut leaf on the forest floor at Brasstown Bald Mountain in Georgia. (Yes, it snows sometimes in Georgia). The image was taken by Georgia Chapter President, Joe Nicholson.

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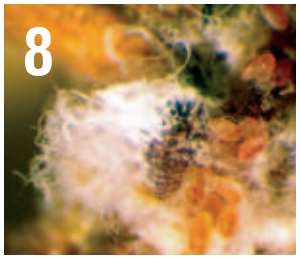


Changing the Way We Look at Things

Glen Rea, TACF chairman of the board

TACF Chairman Glen Rea

Motivational speaker and author Wayne Dyer said it best: "When you change the way you look at things, the things you look at change." The presentations at our 28th Annual Fall Meeting in Java Center, New York, definitely changed the way we look at TACF.

The term "restoration" is both in our mission statement and, not surprisingly, defines what we do. However, the actual interpretation of what restoration means to TACF varies. Dr. Brian McCarthy's presentation defined TACF's restoration activities as comprised of three practices: (1) breeding chestnut trees for disease resistance, (2) testing our chestnut trees in the field, and (3) reintroducing the chestnut to our forests. And further, these practices must occur at the same time.

Paramount to this restoration process, as Dr. McCarthy pointed out, is the understanding that TACF must use adaptive management to "embrace risk and the unknown and proceed by successive refinement." Our science is riddled with unanswered questions, but we must embrace risk and adapt using the best available information. To wait until we have all the answers before moving forward is truly an exercise in futility.

The concept of adaptive management was further defined with respect to our breeding program by Dr. Kim Steiner. When TACF started our back-cross breeding program we followed, and continue to follow, a plan developed by Dr. Charles Burnham in the early 1980s. Today, TACF looks at the resultant Restoration Chestnut (v1.0) as a first step in a long process of further breeding, testing, and reintroduction.

"Our science is riddled with unanswered questions, but we must embrace risk and adapt using the best available information. To wait until we have all the answers before moving forward is truly an exercise in futility."

TACF is not producing a "crop plant," like an apple tree or a variety of soybean. Instead, TACF's goal is to reintroduce a genetically diverse "wild" chestnut with the appropriate mix of genes for blight resistance and American chestnut growth characteristics to allow the species once again to proceed with evolution through natural selection. Unlike a typical crop plant, our chestnut trees must have the built-in genetic diversity to allow the *population* to adapt over time. Only this can ensure long-term success even if the population falls a little short in the near term.

Dr. Steiner also noted that the future of TACF's breeding program necessitates that the organization look at and evaluate all tools at our disposal. The back-cross breeding program will always represent the backbone of our efforts. For example, if the attempts to produce a disease-resistant tree through transgenic methods are successful, the back-cross breeding program is needed to bring in the necessary genetic diversity to result in a population of chestnuts that can adapt over time. But it is critical that TACF have in our toolbox other biotechnology techniques, such as marker-assisted selection, cloning, and transgenic technology.

The survival of the chestnut as a species is dependent on the success of the population, not an individual "final" tree to plant in the forest. Instead of looking at the chestnut from the perspective of an individual disease-resistant tree, we must shift our focus to the chestnuts that will have the ability to adapt over time thanks to TACF's efforts.

News From TACF

NEW FACES AT TACF

Jeffrey Donahue is New Director of Operations at Meadowview

TACF welcomes Jeffrey Donahue as the new Director of Operations at the Meadowview Research Farms in Meadowview, Virginia. Working closely with TACF's Chief Scientist Dr. Fred Hebard, Donahue will oversee operations at the foundation's research farms in southwestern Virginia.

"We are very pleased to have someone with Jeff's outstanding qualifications," says TACF President and CEO Bryan Burhans. "He brings a wealth of practical and technical expertise to our Meadowview operations."

That expertise includes extensive experience in tree breeding, progeny testing, seedling production, and operational management with forest industry leaders such as ArborGen, International Paper, and Boise Cascade. He also served as Associate Director, Central America and Mexico Coniferous Resources Cooperative (CAMCORE) at North Carolina State University. Donahue received his BS in Forest Management from Purdue University and an MS in Forestry with a minor in Genetics from North Carolina State University.

Dr. Laura Georgi Joins Meadowview Staff as Research Scientist

TACF is also delighted to announce that Dr. Laura Georgi has joined the staff at Meadowview as a Research Scientist. She will be working in the new lab there to investigate the genetics of chestnut and the blight fungus and to further our understanding of the disease process.

Bryan Burhans, TACF President and CEO, says: "TACF is fortunate to acquire a scientist with Dr. Georgi's experience. Her background in genome research with trees, including the American chestnut, will prove invaluable at Meadowview."

Dr. Georgi received a BA in Classics from Cornell University and was elected to membership in Phi Beta Kappa. She received an MS from Purdue University and a PhD from Cornell in Plant Pathology. She was a research scientist at Clemson University for many years and participated in the genetic and physical mapping and genomic sequencing of peach. She also started the physical mapping of chestnut that helped lead to the current multimillion-dollar genomic research funded under the Forest Health Initiative. Most recently at Rutgers University, she engaged in genetic mapping of disease resistance in cranberry.

TACF Welcomes Michael French as New Forester/ Restoration Scientist

TACF is pleased to announce the hiring of their first Forester/Restoration Scientist, Michael French of Bloomington, Indiana. The 3-year position is supported by a Conservation Innovation Grant (CIG) awarded to TACF this past summer from the USDA Natural Resources Conservation Service. French will oversee an aggressive 5-state, 12-site reclaimed surface mine planting initiative that is the core of the CIG project.

French has a strong background in the implementation of planting projects on reclaimed mine sites. He has served as the Vice President of the Kentucky Chapter of TACF and as an intern for TACF. He will work closely with the Appalachian Regional Reforestation Initiative (ARRI) and many other private and public partners to implement 30-acre reforestation plantings on privately owned reclaimed surface mines.

TACF's Science Cabinet Awards an Additional $29,700 in Research Grants

The Science Cabinet approved funding for three additional External Research Grants at TACF's 28th Annual Meeting in Java Center, NY, October 21-23:

$8,850 to the Center for Urban Restoration Ecology at Rutgers University for "Chestnut Restoration in Northeastern Forest Gaps: Experimental Plantings to Advance Forest Structure and Restoration Ecology Practice." This project will monitor the relative performance of genotypes in forest gaps created by invasive species removal and the potential to use chestnuts as part of regional forest restoration efforts.

$4,850 to the Virginia Chapter of TACF, Bull Run Mountains Conservancy, and Smithsonian Conservation Biology Institute for the "Bull Run Mountains Chestnut Survival Study." This project will quantify the germination and short-term survival rate of 1,000 chestnuts planted in varied forest settings on Bull Run Mountains, where American chestnuts once thrived.

$16,000 to the Department of Horticulture at Auburn University in Alabama for "Development of *Castanea pumila* Specific Single Nucleotide Polymorphisms to Detect the Occurrence of Hybridization Between American *Castanea* Species." This study will analyze single nucleotide polymorphisms for species-specificity across different Allegheny and Ozark chinkapin populations. This will allow the detection of hybridization between *Castanea dentata* and *C. pumila* especially in populations with intermediate morphological characteristics.

In Memory of and In Honor of our TACF Members

In Memory of

Dick Stohler
Brenda Hunter

Lt. Commander John Woodriff
Elaine Woodriff

In Honor of

Sandy Greene
Ralph and Christina Bolgiano

Janelle Reardon
Fairview Park Garden Club, Ohio

Joseph P. Reardon
Westlake Garden Club, Ohio

TACF President and CEO Bryan Burhans

Individual Creativity – TACF's Largest Asset

by Bryan Burhans, CEO

Earlier this fall I was driving through central Pennsylvania's pastoral countryside looking for the location of the Raystown Lake's Restoration Branch event being held at the C. Barton McCann School of Art in Petersburg, PA. For once, my trustworthy GPS did not have the location in its database. I was in trouble.

I had to resort to extreme measures. Yes, I had to stop and ask for directions. Problem was, this was Pennsylvania farm country; I couldn't even find a gas station. Finally I saw two bow hunters parked along the road discussing their upcoming foray. Thanks to them, I made it to the event, but 20 minutes late.

Our Restoration Branch program has really picked up momentum over the last year, thanks to the energy and passion of our TACF volunteers. Restoration Branch events are designed to bring our chestnut restoration story to the local community level and build grassroots support. Typically, the events include a dinner followed by presentations and updates on TACF's activities, and often a live or silent auction. This model has worked very effectively for our chapters.

Hosts Jeff and Lori Krause provided an innovative and creative approach to the Raystown Branch event this year. Instead of a dinner, they started the event midday on a Sunday and provided heavy hors d'oeuvres. This was followed by three workshops—wine tasting, cooking with chestnuts, and an update on our TACF programs—and ended with an auction. What a great way to spend a beautiful Sunday afternoon.

Offering "classes" was a new idea for Branch events and very successful. All the attendees participated in all three classes. I started off with the chestnut cooking class offered by professional chef Mike Benjamin (www.benjaminscatering.com). He went from start to finish demonstrating one of his favorite dishes, chestnut stuffed pork loin. Mike had prepared several loins prior to the event for everyone to taste. Wow!

"Our Restoration Branch program has really picked up momentum over the last year thanks to the energy and passion of our TACF volunteers."

Next stop for me was wine tasting, an activity in which I try to stay current. But instead of my usual $7 bottle of merlot, Seven Mountains Wine Cellars (www.sevenmountainswinecellars.com) owner Scott Bubb brought his own locally made wines to share with the group. Scott's knowledge and passion for wine were very apparent.

Finally, I attended the last class by TACF Regional Science Coordinator Sara Fitzsimmons and Director of Development Mark Banker. Sara and Mark covered the history of the American chestnut and updated the group on TACF's current restoration activities. As I was leaving the class, a woman approached me and said: "I had no idea your organization even existed. This is the most exciting project I have ever seen."

The event closed with a live and a silent auction. The bidding was heated and the Branch generated $23,000 to support the local orchard and state chapter activities. And they brought many new people onto the TACF team – 100 new TACF regular members and 40 Annual Sponsors.

The restoration of the American chestnut is an activity that will ultimately depend on local, grassroots support. Our TACF Restoration Branches provide a special opportunity to share our great conservation story, bring new volunteers into the fold, and most of all, provide a fun time sharing the wonderful story of the American chestnut. The creativity of our TACF volunteers across the country in adapting the Branch event model to their local communities is inspiring.

Curt Laffin supervises a group of Girl Scouts planting Restoration Chestnuts (v1.0)
Photo by Emily Provencher

TACF Honors Its Volunteers

Curt Laffin: Tireless Advocate for the American Chestnut

by Dan Hale

Curt Laffin's fascination with the American chestnut began at age five, when his father took him to see the last living mature chestnut tree he knew of. In his education and career in wildlife science, Curt came across numerous references to the importance of chestnuts, especially as a wildlife resource. He was delighted to learn about TACF and became a member in 2003. Curt was concerned that his home state of New Hampshire was poorly represented in TACF, so he applied his outreach experience toward getting more residents involved. He developed his own chestnut restoration presentation, which he has given to groups throughout the region. Curt also finds time to seek out and document wild chestnut trees, pollinate mother trees, harvest and plant nuts, and care for chestnut orchards. In 2011, Curt organized a planting of eight Restoration Chestnuts (v1.0) at Benson Park in his hometown of Hudson, NH. More than 60 Boy and Girl Scouts, leaders, students, teachers, parents, and interested folks gathered for the event.

"Curt Laffin is one of the Vermont/New Hampshire Chapter's most dependable volunteers," says Kendra Gurney, TACF New England Regional Science Coordinator. "His inspiring and educational presentations on the American chestnut have really helped to spread the word and recruit new members."

James Curtis: Environmental Volunteer and Renaissance Man

by Paul Franklin

James Curtis learned about the plight of the American chestnut as a Boy Scout, but it wasn't until four years ago, when he found a large surviving tree that was bearing nuts, that he became seriously interested in joining TACF.

Today, James puts in many hours at the State Highway Administration orchard in Hampstead, MD, planting and fence building, as well as monitoring and providing advice for the Carroll County school system's chestnut orchards.

James is active with the Maryland Master Naturalist Program: "One of my projects with the naturalists has been to locate wild chestnuts in Oregon Ridge Park, ten miles north of Baltimore. I have found several nut-bearing, wild American chestnuts and have collected a few nuts for planting next spring." James located a large surviving American chestnut, which was later named the Curtis Mother Tree. For the past two years, James has worked with the tree, pollinating and harvesting the nuts.

A passionate environmentalist, James Curtis weaves the theme of restoring the American chestnut into his many volunteer activities
Photo by James Curtis

TACF Mid-Atlantic Science Coordinator Katy McCune says: "Jim is a tireless volunteer. He really is a jack–of–all–trades, tending orchards, and even maintaining the Maryland TACF website."

Tracking the Spread of the Hemlock Woolly Adelgid

by Anna Huckabee Smith

Hemlock woolly adelgid infestation
Photo Courtesy of Connecticut Agricultural Experiment Station

There is something eerily familiar moving through America's eastern forests. Yet another invasive species accidentally introduced from East Asia in 1924 is wreaking havoc on one of our iconic tree species. Similar in scale to the blight that wiped out the American chestnut in the 1930s, this time the victims are the eastern hemlock (*Tsuga canadensis*) and related Carolina hemlock (*T. caroliniana*). The hemlock woolly adelgid (*Adelges tsugae*), an aphid-like insect that is only about the size of the period at the end of this sentence, has literally sucked the life out of 41 percent of the total hemlock basal area across 45 percent of the known range of the tree species. In some areas of the Shenandoah National Park, for example, most if not all of the old-growth hemlocks have been wiped out.

The vast majority of eastern hemlocks are located in the cove forests of New England and the Appalachian Mountains, while Carolina hemlocks are confined to more rocky terrain in the southern Appalachians. The rate of infestation has been estimated at 10 to 15 miles per year, with faster spreads occurring in the southern regions. This is possibly due to cold temperature constraints slowing northern advancement of the insect.

Hemlock trees are long-lived giants of ravines; cool, moist valleys; and rock outcrops. They are often found in pure stands where their shade can block as much as 98 percent of the sunlight from reaching the forest floor. They are valued for their lumber by the timber industry and for their aesthetic appeal by landscapers. Hemlocks are considered keystone species because their presence is critical to the proper functioning of the ecosystems in which they are found. Besides filtering water runoff into streams and controlling erosion, hemlocks shade streams, regulating water temperatures. These cool waters are essential to brook trout and other aquatic species. Researchers have also found that approximately 1,000 species of insects and spiders, 90 species of birds, and a variety of mammals rely on hemlocks for shelter and food. Several neotropical migratory birds, such as the veery (*Catharus fuscescens*) and black-throated blue warbler (*Setophaga caerulescens*) rely on evergreens like the hemlock for early nesting. Without them, these bird species would decline. In addition, hemlocks keep the soil moist, highly organic, and acidic—all of which are very specific requirements for certain arthropods.

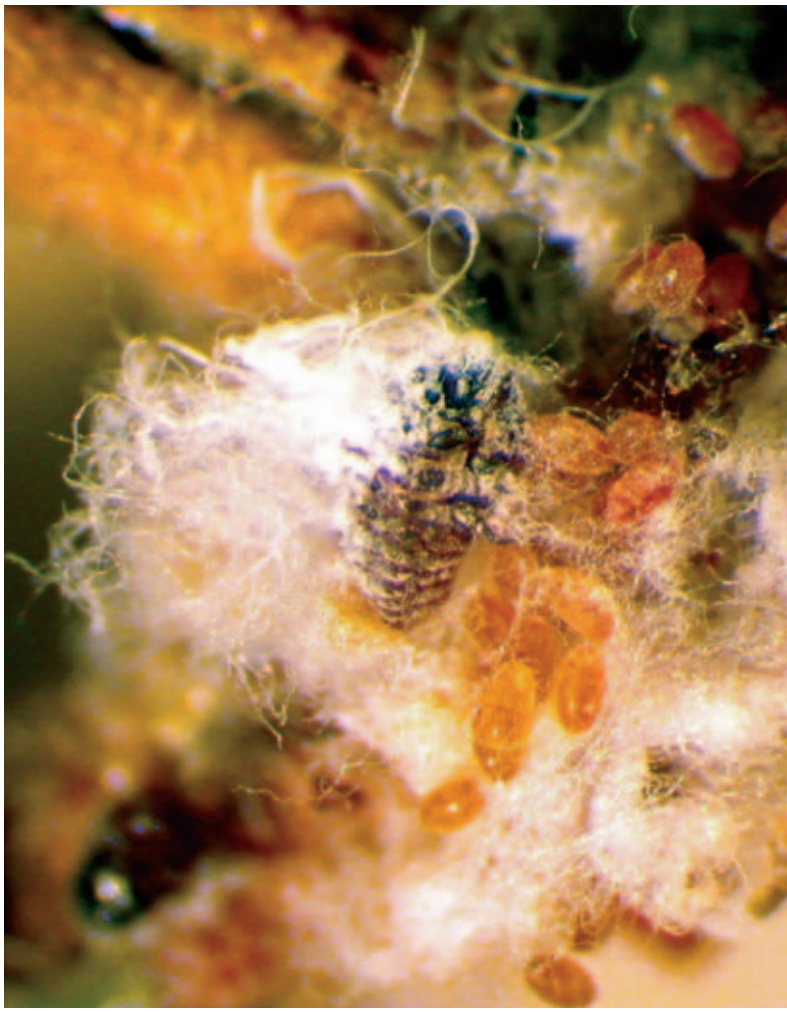
Rusty Rhea, an entomologist with the USDA Forest Service, Forest Health Protection Program in Asheville, NC, explains: "If you remove hemlocks from an ecosystem, there are no other species of tree able to fill the niche left behind. Ecologically, the loss of hemlocks could be more significant than the loss of American chestnuts in some places." Rhea explains that when the American chestnut was removed from the landscape, a variety of mast-producing oaks filled the gap, still providing food and shelter for wildlife. Hemlocks, however, have no substitute and there is instead a turnover in forest type when they are eliminated.

The hemlock woolly adelgid (*Adelges tsugae*), an aphid-like insect about the size of the period at the end of this sentence, has literally sucked the life out of 41 percent of the total hemlock basal area across 45 percent of the known range of the tree species.

HWA Lifecycle

Hemlock woolly adelgids (HWA) in North America are all females that reproduce asexually, basically making them all clones. Adults secrete a woolly, waxy covering for protection from predators and desiccation; they then lay their eggs within this mass. Two generations per year are produced. One group hatches in early spring and has both wingless and winged individuals. The second group hatches in late spring and is entirely wingless. Those with wings would normally fly off to reproduce sexually and lay eggs on a single species of spruce (*Picea*). However, this particular spruce species doesn't occur in North America, so the winged HWA population eventually dies. After hatching, the wingless nymphs crawl to new growth and attach themselves to the base of the hemlock needles. These nymphs lose their legs and become immobile, maturing while feeding on the phloem sap. This act robs the tree of starch stored in its cells, quickly drying up the needle and killing the needle buds, making regrowth impossible.

A heavily infested tree appears grayish-green in color and sparse at the crown and at the branch tips, and large limbs may begin to fall off. The time from infestation to symptom onset may be only a few months, and death often occurs within four years. Even before the tree succumbs to the HWA, stress from the attack may leave it vulnerable to other insects and diseases, as well as windthrow and drought, any of which may hasten its demise. Well-meaning homeowners who have hemlocks as landscape trees sometimes mistakenly fertilize their trees in an attempt to help them recover. Although watering is beneficial to the tree, fertilizer only increases the nutrients available to the adelgids.



Hemlock woolly adelgid adult and eggs inside an ovisac
Photo Courtesy of Michael Montgomery, USDA Forest Service

Although the HWA spends most of its life protected inside its cottony encasement, the actively crawling nymphs can spread to new trees/areas by hitching a ride on birds, deer, squirrels, humans, logging equipment, firewood, bark chips, and even the wind. Although active nymphs are more likely to be taken by predators, there are only a few native insects (such as lacewings and some beetles) that feed on HWA eggs and nymphs, and none has significantly impacted adelgid populations.

Treating and Controlling HWA

To control outbreaks, foresters and land managers have had to rely on insecticides, hybridization techniques, biological control agents, and quarantines of nursery stock.

Chemical solutions may involve foliar sprays or systemic treatments. While the nymphs of both generations are mobile and therefore unprotected (March-April and again in September-October), sprays such as horticultural oils and insecticidal soaps can be used to kill them.

Systemic treatments are those that involve getting the chemical into the tree's vascular system (i.e., the sap), to be subsequently ingested by the adelgids. Various methods are used to deliver systemic treatments such as soil drenching, soil injection with a hand-held Kioritz® injector, and trunk injection. All are expensive and each has its own pros and cons. The soil injector reduces the risk of chemical runoff into nearby aquatic environments and the protection window is about 3 to 4 years. Recent trials have met with much success, as

many trees have had dramatic recoveries. Although not as effective as soil injection, tree injection may be a better option for trees on rocky outcrops where chemical runoff is expected. However, direct injection is more stressful to the tree because the chemical has to be inserted into holes drilled in the tree, and the duration of protection is less than with other methods. As with most chemical applications, future reapplications will be necessary. This can be expensive and not practical over large areas. Another ecological downside of chemical applications is their effects on non-target insect species.

Genetics and Biological Controls Show Promise

Researchers are attempting to utilize resistance genes as an alternative way to combat the HWA. Although the two eastern species of hemlocks do not show resistance to HWA, western hemlocks (*T. heterophylla*) do. In the western United States, HWA and hemlocks have coexisted much longer, which may explain the higher degree of resistance there. Another possible explanation is that the eastern strain of HWA is from Japan and the western strain is from China. Some scientists argue that this difference may be important.

Hemlock woolly adelgid will probably never be completely eradicated, but it may be controlled enough to salvage some part of the hemlock's range. In the meantime, seeds from across the species' range are being banked just in case.

In addition to the resistant western hemlocks, hemlocks native to Asia (*T. chinensis* in particular), are the Old World hosts of HWA. As such, they too display resistance to the damaging effects of the insects. Scientists hope to use these resistance genes to create hybrid hemlocks that still retain native characteristics, but have better survival rates than pure strains.

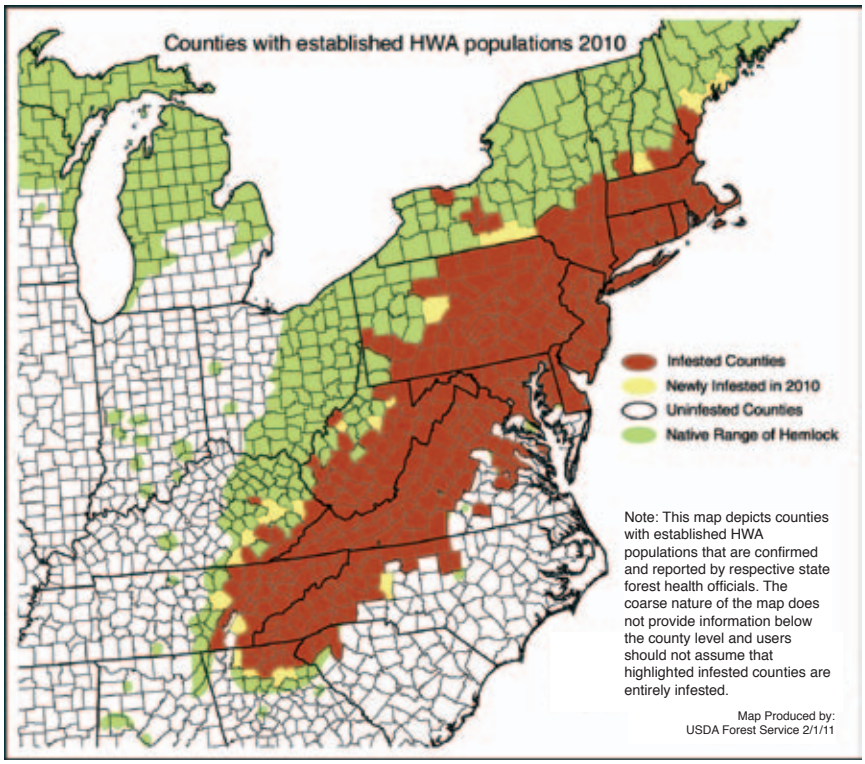
Biological control agents are also being utilized to augment the effects of native predators of HWA in North America. In their native Japan and China, HWA are preyed upon by several species of lady beetles. Likewise, the western hemlocks of the Pacific Northwest have their own predatory beetle, *Laricobius nigrinus*. Scientists have been releasing both *L. nigrinus* and the

Spraying hemlocks with insecticidal soap is one way of controlling woolly adelgid

Photo Great Smoky Mountains National Park Resource Management Archive

Asian *Sasajiscymnus tsugae* (formerly named *Pseudoscymnus tsugae*) into infested hemlock stands across the range to combat the adelgids. Fungal pathogens are also being studied for the same purpose.

Of course, there is some concern about the use of genetically altered trees and the release of non-native insect predators into the environment. However, many botanists feel that the minuscule DNA change required to impart resistance does not alter the ecosystem functions of hemlocks (wildlife food, shelter, etc.). Besides, there is little genetic diversity among eastern species of hemlocks (unlike oaks), so finding a stand of naturally resistant trees is highly unlikely at present. Non-native beetles used as biocontrols have been scrutinized to make sure they will not prey upon alternate food sources if their HWA prey runs out. Dr. Joseph Culin, an entomologist from Clemson University who studies the HWA, explains: "The data indicate that these two species, if starved, will consume other adelgid species (none of which are considered beneficial insects), but the predators do not reproduce much or at all if they are not feeding on hemlock woolly adelgids." In further support of the case for biocontrols, Rusty Rhea points out that eastern hemlocks are growing in the urban areas of Seattle, WA. Although a strain of HWA is present there, so are the predatory *L. nigrinus* beetles. Instead of the eastern hemlocks succumbing



to the HWA, they thrive. Dr. Scott Salom, Professor of Entomology at Virginia Polytechnic Institute and State University, is optimistic about the combined use of both chemicals and biocontrols for a kind of one-two punch on the adelgids. "Using both at the same time, especially chemicals on some of the dominant trees in a stand and releasing beetles in the understory may help the stand survive an outbreak better than using one treatment alone. This concept is currently being tested."

The picture gets somewhat more encouraging when we examine some of the differences between HWA and American chestnut blight. Whereas chestnut blight is caused by a fungus whose spores are easily carried on the wind, HWA are much less mobile, so outbreaks are not as widespread as blight. "Also," says Salom, "we have more tools at our disposal this time around in the fight against this invasive species. The American chestnuts were gone before the science had time to catch up to the disease."

The hemlock woolly adelgid will probably never be completely eradicated, but it may be controlled enough to salvage some part of the hemlock's range. In the meantime, seeds from across the species' range are being banked just in case. "The jury is still out on whether the hemlock woolly adelgid will be as widespread a killer as blight was for the American chestnut," says Johnny Townsend, botanist with the Virginia Natural Heritage Program. "There is a slight possibility that eastern hemlocks will develop some resistance to the adelgid in future generations, and the amount of effort being put into biocontrols is certainly heartening."

One factor biologists are watching closely is climate change. Although HWA population expansion may currently be suppressed to the north by low winter temperatures, global warming may help HWA expand northward. Already in the southern Appalachians, extended periods of low temperatures during the winters are becoming more infrequent. Climate change associated with warming trends may also increase periods of drought that will further stress hemlocks, which makes the trees even more susceptible to HWA.

Anna Huckabee Smith is a TWS Certified Wildlife Biologist® with Innovative Wildlife Management Services, LLC, of Mt. Pleasant, SC (IWMS_Smith@comcast.net). She has worked as the SC Department of Natural Resources Forest Stewardship Biologist and later served as the NC Wildlife Resources Commission's first Urban Wildlife Biologist. Smith has a BS degree in biological sciences and an MS in zoology (2001) from Clemson University.

2011 Annual Meeting

Photos by Paul Franklin

Held at the beautiful Beaver Hollow Resort and Conference Center in Java Center, NY, the TACF Annual Meeting drew about 160 members and partners who enjoyed three days of learning and sharing chestnut knowledge.

A wealth of well-attended programs covered a range of subjects from the successes of State University of New York College of Environmental Science and Forestry's (SUNY-ESF) transgenic chestnut research, to an update on the advances of TACF's breeding program, a fascinating look at developing chestnuts as an industry, and much, much more!

Outstanding in Their Field

Dr. William Powell, Dr. Charles Maynard, the SUNY Science Team, and members of TACF, NY, pose by a transgenic, potentially blight-resistant American chestnut at the William White Orchard in upstate New York. From left to right, Amelia Zhang, Andy Newhouse, Brian Burhans, Bethany Ruane White, Dr. Bill Powell, Linda McGuigan, Dr. Chuck Maynard, Katy Damico, Dick Radel, Kathleen Baier, Jim Donowick, Kristen Russell, Herb Darling, and John Gordon

There Were Fascinating Presentations . . .

Dr. Dennis Fulbright gave an entertaining and informative talk to a capacity crowd on the work he has done helping to develop a commercial chestnut industry in Michigan

There Was Time for Honoring Our Volunteers

Kathy Marmet presents a Memory Book to Essie Burnworth in thanks for her years of dedicated service to TACF. Essie served as TACF Board Secretary for the past six years

Time to Meet New People and Share Ideas

Carolyn and Jim Hill enjoy a fireside chat with TACF Director of Development Mark Banker

Saturday Night Was an Award-Winning Evening

Dr. Paul Sisco presents Volunteer Service Awards to Pennsylvania Chapter members Alvin Jackson, George Perry and Tim Eck. The awards were accepted by Pennsylvania Chapter Vice President Donald McCann

Dr. Bill Powell and Dr. Chuck Maynard present a plaque from SUNY-ESF to Dale Travis and Sigrid Freundorfer (not present), commemorating the naming of a transgenic variety of American chestnut "Travis" in honor of "their leadership and unwavering dedication to the effort to restore the American Chestnut."

Dale also received a President's Award from NY Chapter President Herb Darling for his exceptional work as a volunteer in support of the New York Chapter

TACF Board Member Brian McCarthy received a Volunteer Service Award

TACF Science Cabinet Vice Chair Kim Steiner was honored with an award in recognition of his dedication to TACF New York Chapter

Dr. Maynard also presented a plaque to Richard Radel, honoring the naming of a new variety of American chestnut "Radel," in honor of Richard and Judy Radel's dedication and hard work to restore the American chestnut

Join us in Beautiful Asheville, NC, October 19-21 For The 2012 Chestnut Summit

Harvesting Rainwater for Chestnut Orchards

by Dr. Gregory Weaver

A heavy rain tops off a rack of 150-gallon tanks nestled under the eaves. This shed roof deflects over 13,000 gallons of rainwater in an average year. Screens help keep large debris out of the tanks which are supported by heavy timbers.

As all chestnut growers know, there are many challenges to keeping chestnut trees healthy in our orchards. At the beginning of any given growing season, it is impossible to predict whether drought will be a factor that year; but drought is likely to be an issue at some point in many orchard plantings, especially in the South. Although mature chestnuts are relatively drought resistant, a recently planted orchard is vulnerable and some method of watering the young trees may be necessary to improve their chances of survival.

Growers fortunate enough to have access to municipal water supplies can tap into them, assuming a willingness to pay the water bill, no local watering restrictions, and a method to distribute water to the individual trees. Ponds and streams are options if pumps and pipes are available to move the water. However, in many cases, the best places to grow chestnut trees are on remote hilltops, far from water lines, electricity, or surface water; this requires an alternate approach.

"After years of hauling water tanks up a steep four-wheel-drive tractor road to my hilltop orchard on Tennessee's West Highland Rim, I have embraced an alternate solution that provides more water with less work."

Rainwater harvesting is becoming more popular around the world as a method of augmenting water supplies. The simplest rainwater capture method is an empty bucket placed in the field. Set out a 5-gallon bucket in March and within a few weeks, you will have captured and stored 5 gallons of water (and probably more than a few mosquito larvae too). Barrels designed to be placed under gutter downspouts are widely available at hardware stores and may hold up to 55 gallons. More elaborate systems, sometimes including solar pumps, are used in arid climates or in regions of the world that have uneven distribution of rain throughout the year. Tucson, Arizona; New Delhi, India; and the Australian states of New South Wales and Victoria are among the municipalities and states that require the installation of a rainwater-harvest system on new construction.

After years of hauling water tanks up a steep four-wheel-drive tractor road to my hilltop orchard on Tennessee's West Highland Rim, I have embraced an alternate solution that provides more water with less work and without the myriad adventures that accompanied the drive up the hill. My system consists of a storage building with a 16-by-24-foot shed roof; a rack of 150-gallon livestock watering tanks (available at the co-op) positioned beneath the lower edge of the roof, 7 feet above the ground on heavy timbers; and PVC pipes leading from each tank to a common outlet hydrant, to which is attached a watering hose. The rain hits the roof and flows downslope into the

Rainfall: Fewer "Normal" Years:

The southern end of the native American chestnut range experienced exceptional drought during the summers of 2007 and 2008. Moderate drought also occurred in parts of the southern range in 2011. During the past five years, "normal" levels of summer rainfall, as defined by the National Drought Mitigation Center, occurred at my Middle Tennessee orchard only once, in 2009. - *GW*

The water tanks are joined via PVC pipe into a common outflow pipe, which can be accessed by a standard garden hose hydrant or via a 1 1/4-inch PVC pipe connection. On the right side of the building, I have begun adding a second tier of tanks to store the overflow when the first tier is full.

waiting tanks, where it is stored until I open the valves to let it flow to the hydrant and then into the hose or watering buckets.

I use livestock watering tanks both to capture the water off the roof and to store it. Water is heavy. Each gallon weighs 8.3 pounds, and a full 150-gallon tank weighs a little over 1,200 pounds. My 1,000-gallon system weighs over 4 tons when the tanks are full. A gravity-flow system requires elevation of the tanks above the highest point of the orchard. This necessitates the use of heavy timbers and bracing for the racks supporting the tanks. I can increase the capture volume by adding more 150-gallon tanks, until my storage equals the amount of water I can reasonably expect to harvest and need to store, minus my average usage within a given timeframe.

One thousand gallons is not an overly abundant supply, but it enables me to nurse my trees through the driest part of the summer. Given my relatively modest water supply, I have not run irrigation pipes throughout the orchard. Instead, I distribute the water via a combination of hand-carried 5-gallon buckets and 150 feet of garden hose. Water pressure in this system is low, with slow flow, but it is very effective in providing water when and where I need it.

I built screen covers for each tank, but these were insufficient to keep out the mosquitoes. I add mosquito "donuts," readily available from hardware stores, which contain a natural larvicide and provide effective control.

The volume of water potentially available can be surprising. The average annual precipitation at my farm in Middle Tennessee is 55 inches. This means that over 13,000 gallons of water hit the roof of my storage building in an average year. During 2007, the driest year in Tennessee in over 100 years, the 31 inches

The average annual precipitation at my farm in Middle Tennessee is 55 inches. This means that over 13,000 gallons of water hit the roof of my storage building in an average year.

With only 6 feet of head, water pressure in the system is low, but it still suffices to provide water to this Ozark chinquapin 100 feet from the hydrant.

of precipitation that fell would have supplied over 7,400 gallons (see sidebar for sample calculation).

Future enhancements to my system may include a larger common water tank mounted on top of tall poles, high above ground level to gain more water pressure, with water pumped from the existing storage tanks to the higher tank using a solar pump. It would be fairly simple to bury PVC water lines at selected points in the orchard, connected to the main water supply and equipped with hydrants, to provide closer access for water around the orchard. Another option is to mount on my tractor a PTO-driven, 3-point-hitch-mounted pump with a pistol-grip hand sprayer, available from tractor supply stores. This method can be used to distribute water to the trees by filling the tractor-mounted tank from my existing water storage tanks and driving down the orchard rows, spraying each tree in turn.

So how much rain will come from your roof?

Here's how to estimate your annual potential rainwater harvest:

Start by determining the total collection area of your roof in square feet, which is the width times the run (length of the roof measured horizontal to the ground). Look online to find the annual rainfall for your region, measured in inches per year. Divide this number by twelve to get the rainfall in feet per year. Multiply the feet of rainfall per year by the collection area of your roof, which will give you the total cubic feet of water you can expect to collect in an average year. Multiply this number by 7.43 to get the total gallons of water you can collect from your roof in an average year.

As an example: a 400-square-foot roof that receives 48 inches of rainfall in a year will capture 1,600 cubic feet or 11,888 gallons of water per year.

The native range of the American chestnut is in general a good place to grow trees and other crops. A water system like the one described here can help the chestnut grower tending a remote orchard to keep the trees alive during dry times.

Dr. Gregory Weaver is a radiologist who lives in Tennessee and involves his family in caring for their extensive chestnut orchard. Dr. Weaver is also an author and has contributed previously to *The Journal* and to *Mighty Giants: An American Chestnut Anthology*.

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Death by Chestnutting and Grave Torpedoes

A STRANGE BUT TRUE TALE FROM 1894

by S. Zimmerman

With special thanks to Vicki Slater and the Wayne County Ohio Historical Society

In October of 1894, Wayne County Ohio farmer, Samuel Lautenschlager, was laid to rest amid the pastoral beauty of Apple Creek Cemetery. His life, as far as is known, was quite normal, but in death he distinguished himself from his peers. His gravesite holds not one, but two fascinating stories. First is his unique gravestone—an oddly shaped marker that looks like a dead and rotting weather-bleached tree trunk. To understand why Lautenschlager's family might have chosen this tree-shaped gravestone, we must first understand how he died.

Samuel's son-in-law, Cyrus Frank, owned a thriving farm four miles southeast of Wooster. The farm was home to a healthy stand of American chestnut trees. Lautenschlager and Frank had made a sharecropping deal that year on all the chestnuts they could gather from the trees located on the property.

> Samuel Lautenschlager's gravestone commemorates not only the way he died—but also, ironically, the death of the American chestnut itself.

In the late 1800s, chestnut trees were abundant and produced a prolific and valuable crop of small, exceedingly sweet nuts that could be eaten raw, roasted, dried and ground into flour, or used as a cheap animal feed. Many rural people also earned extra money by harvesting chestnuts by the bushel and taking them to market.

On the morning of October 11, 1894, Samuel and his 20-year-old daughter, Laura, had planned to spend the day on the farm harvesting chestnuts with Cyrus. The

Samuel Lautenschlager's tombstone in the Apple Creek Cemetery is made to look like the chestnut tree that he fell from in 1894
Photo by Joe Slater

Lautenschlagers got to the trees first and Samuel nimbly climbed the oldest and tallest tree to shake chestnuts from the branches while his daughter stayed on the ground to gather the nuts that fell. Cyrus had just made it to the edge of the field, when he noticed Lautenschlager standing on a high tree limb, violently lashing at the branches around him in an attempt to get them to release their bounty of nuts. Moments later Cyrus watched in horror as Samuel lost his footing and fell 30 feet through the tree's branches and landed on the ground. Cyrus and Laura rushed over, but there was nothing they could do. Death had been instant and gruesome. Samuel's left arm was broken at the wrist, his head and face were smashed in, and his neck had snapped.

But the monument above Samuel Lautenschlager's grave is not the only unusual thing about his gravesite. What is buried below would literally blow your socks off: high explosives. At the time of Samuel's death, the Lautenschlager family apparently feared that bodysnatching ghouls would find the relatively new Apple Creek Cemetery an enticing place to loot. So they had Wooster undertaker, David Y. Landis, install an "immense grave torpedo" in the plot. Today, the word torpedo brings to mind an underwater weapon launched from a submarine, but before WWI, a torpedo

Apple Creek Cemetery was relatively new in 1894 and a tempting site for grave robbers
Photo by Joe Slater

referred to any hidden explosive device or land mine. Grave Torpedoes were used to deter thieves from stealing bodies, not valuables, and were basically spring-activated bombs buried with the coffin. If robbers tried to dig up the coffin, the shell would explode, injuring or killing them..

In the late 1870s, public outrage over body-snatching reached a fever pitch in Ohio because of a notorious incident involving the body of a former prominent U.S. House Representative, John Scott Harrison, son of President William Henry Harrison, and father of future U.S. President Benjamin Harrison. After he died, his family went to great measures to secure his body in a gravesite heavily constructed of cement and guarded by a night watchman. Soon after the funeral, they noticed that the grave of a young boy next to Harrison's had been disturbed. Outraged that robbers would steal the body of a child they went to a Cincinnati medical school to search for it. Discovering a trap door in the floor of the medical school they opened it and found a rope descending into the darkness. When they pulled up the rope they found dangling from the end, not the body of a boy, but the body of John Scott Harrison! After this incident many people in Ohio felt that if the body of somebody like Harrison could be stolen it could happen to anybody.

The public outcry motivated an underemployed Circleville, Ohio, watchmaker, Thomas Howell, to invent and patent the grave torpedo to solve the problem. Did the device really work? Yes, according to an article published in the *Richwood Gazette* newspaper in 1881: it was reported that a grave robber was killed when "three men who attempted to rob a grave near Gann in Knox County, Ohio, met with a horrible obstacle; when nearing the coffin, they struck a torpedo."

By the turn of the century grave robbing had significantly declined. Cadaver storage and preservation had improved and legal avenues for obtaining bodies for dissection were more readily available. Furthermore, many cemeteries had outlawed the use of grave torpedoes during the 1890s because it was too much of an occupational hazard for anyone working in the cemetery. So as the need for stealing fresh human corpses declined, body snatching and grave torpedoes soon became a thing of the past.

Ironically, Samuel Lautenschlager's death by falling from a chestnut tree foreshadowed the death of the American chestnut itself. Starting just ten years after his death, the spread of the fungus that caused chestnut blight would mark the beginning of the end of nearly four billion chestnut trees.

Sleep well sweet angel,
Let no fears of ghouls disturb thy rest
For above thy shrouded form lies a torpedo
Ready to make mincemeat of anyone
Who attempts to convey you to the pickling vat.

Newspaper advertisement for Thomas Howell's Grave Torpedo, July, 1879

John Scott Harrison (October 4, 1804 – May 25, 1878) is the only man to be both the son and the father of a U.S. president. Shortly after his death, his body was stolen by grave robbers, setting off a public furor and leading to the invention of the "grave torpedo"

PBS's *History Detective* recently aired a piece on grave torpedoes. You can view the video at: http://www.pbs.org/opb/historydetectives/investigation/cemetery-alarm/

RECIPES

Brussels Sprouts with Chestnuts

Recipe and photo courtesy of HomeCookingAdventure.com

Brussels sprouts with chestnuts are a wonderful holiday side dish. This recipe originated from France and brings a special flavor to your holiday meal.

Makes about 4 servings

- 1 pound Brussels sprouts
- 1/2 pound chestnuts
- 2 tbsp. butter
- 1/2 cup milk
- 1 onion, finely chopped
- 2 garlic cloves, finely chopped
- 3-4 tbsp. water
- Salt and freshly ground pepper

Cut an X on the flat side of the chestnuts. Bring a pan of water to the boil over medium-high heat. Drop in the chestnuts and boil for about 6-8 minutes. Remove pan from heat. Remove a few chestnuts at a time from the pan leaving the others in the water until ready to peel. Using a knife, remove the shell and skin while chestnuts are still hot.

Put the peeled chestnuts in a pan with the milk and water to cover and simmer over medium heat for about 10-12 minutes until tender. Drain.

Cut an X on the underside of the Brussels sprouts so they cook evenly. Melt the butter in a frying pan. Add the onion and garlic and cook until softened. Add the Brussels sprouts and water and cook covered over medium heat for about 8-10 minutes, stirring occasionally. Add more water if necessary.

Add the chestnuts, toss, and cook for a few minutes until the sprouts and chestnuts are heated through. Season with salt and pepper and serve hot.

This buttery, garlicky chestnut dish is great seasonal comfort food

These light-as-a-feather treats are just the thing to bring holiday cheer to your next gathering

Roasted Chestnut Cookies

Recipe and photo courtesy of Deb Perelman with Smittenkitchen.com

Makes about 4 dozen 1-inch cookies

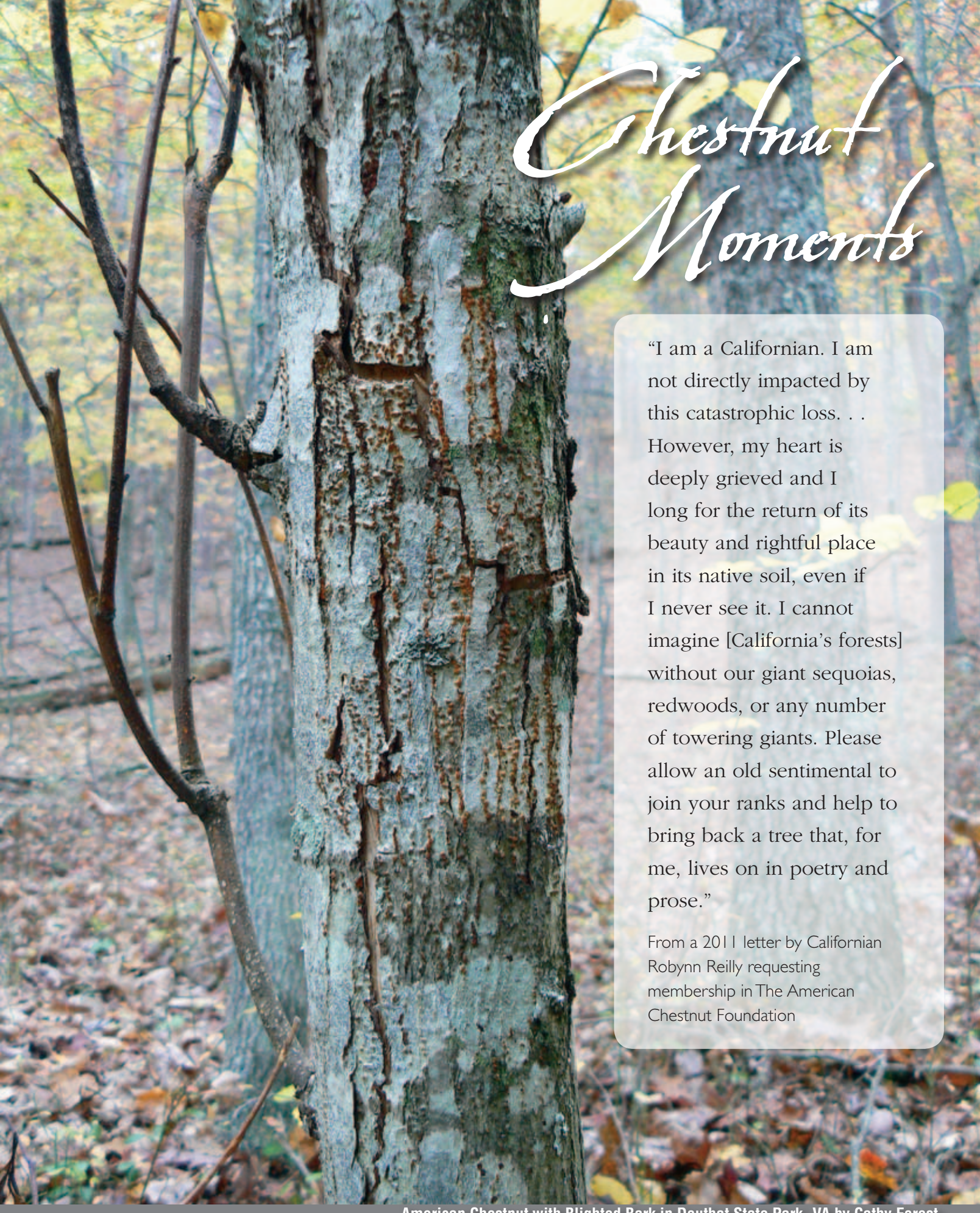
- 1 pound chestnuts
- 1 cup (2 sticks or 8 ounces) butter, room temperature
- 2 cups powdered sugar
- 2 teaspoons vanilla extract
- 1/4 teaspoon ground cinnamon + additional for coating
- A few gratings of fresh nutmeg
- 1/8 teaspoon salt
- 2 cups all-purpose flour

Preheat oven to 450°F. Cut a small X on each chestnut. Roast on a baking sheet for about 20 to 30 minutes, until the X peels back to reveal the inner nut. Cool on tray and peel.

Chop chestnuts coarsely. Measure out 1 cup and grind them in a food processer until they are finely chopped. Add softened butter and pulse until combined. Add 1/2 cup of powdered sugar, vanilla extract, 1/4 teaspoon cinnamon, nutmeg, salt, and flour and pulse until an even dough is formed.

Divide dough in half and wrap each half in plastic, chilling for one hour or until firm. Preheat oven to 350°F. Whisk remaining 1 1/2 cups powdered sugar and a few pinches of cinnamon in a small bowl and set aside. Working with one half of the chilled dough at a time, roll dough into 2-teaspoon-sized balls in the palm of your hand. Arrange on parchment-lined baking sheet leaving 1/2 inch between the cookies.

Bake until golden brown on bottom and pale golden on top, about 14 to 17 minutes. Cool cookies 5 minutes on baking sheet. Gently roll cookies in cinnamon-sugar mix to coat and place on rack to finish cooling.



Chestnut Moments

"I am a Californian. I am not directly impacted by this catastrophic loss. . . However, my heart is deeply grieved and I long for the return of its beauty and rightful place in its native soil, even if I never see it. I cannot imagine [California's forests] without our giant sequoias, redwoods, or any number of towering giants. Please allow an old sentimental to join your ranks and help to bring back a tree that, for me, lives on in poetry and prose."

From a 2011 letter by Californian Robynn Reilly requesting membership in The American Chestnut Foundation

American Chestnut with Blighted Bark in Douthat State Park, VA by Cathy Forest

http://www.fs.fed.us/r8/chestnut/