FALL 2023 ~ ISSUE 3 VOL. 37

Chestnut

THE JOURNAL OF THE AMERICAN CHESTNUT FOUNDATION

THE AMERICAN CHESTNUT FOUNDATION 40th ANNIVERSARY 1983 – 2023

A BENEFIT TO MEMBERS
THE AMERICAN CHESTNUT FOUNDATION

Historical Timeline ~ Van Bossuyt Orchard Dedication ~ The Great Chestnut Lodge ~ CRISPR Technology

FALL 2023 ~ ISSUE 3 VOL. 37

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Lisa Thomson
Former President & CEO

Doug presents Lisa with baton at the NC Arboretum before the first showing of *Clear Day Thunder: Rescuing the American Chestnut.*

Will Pitt
President & CEO

DEAR CHESTNUT ENTHUSIASTS,

By the time you receive this issue of *Chestnut*, I will have completed my tenure as your President & CEO. Please know what a great honor it has been to serve you and our mission for more than eight years. I am excited to pass the baton to Will Pitt, whom I met this summer at Meadowview Research Farms. We enjoyed getting to know each other, shared hopes and dreams together, and toured our flagship research facility to see the results of the last 35 years of tree breeding. We have had frequent Zoom meetings since his appointment was announced and have pledged to work closely on the transition so it is a smooth one. He will have begun his career with us on July 31 here in Asheville and I hope all of you will have a chance to meet Will in his early travels to our chapters and remote offices.

As Will recently shared with me, "I am very excited to be joining an organization that is making a real difference in restoration on such a broad scale. TACF has made great strides over the last 40 years because of the dedication of staff, volunteers and supporters. I am looking forward to getting to know each of you as soon as possible."

As far as passing the baton, believe it or not, it is a reality! I was talking to one of our long-time volunteer leaders Doug Gillis, and jokingly mused, "Wouldn't it be fun to have a chestnut baton as a tradition for CEOs to pass on to their successor?" Lo and behold Doug, a talented woodworker, designed and crafted an actual baton, with chestnut wood and nuts embedded in its core. This type of caring and creativity is an example of how deep the love and commitment is from members of TACF's community. Another illustration of this ethos was an event held for Director Emeritus Rufin Van Bossuyt by the MA/RI Chapter in June. Enjoy the article on page 15 which describes that celebratory day when Rufin was honored with a named orchard and for all his amazing contributions to our cause since the early 1990s.

On page 10, I outline some staffing transitions within TACF. We have hired some wonderful new talent, promoted high performers, and celebrated our 5+ year employees. There is nothing as constant as change, especially in this challenging post-pandemic workplace.

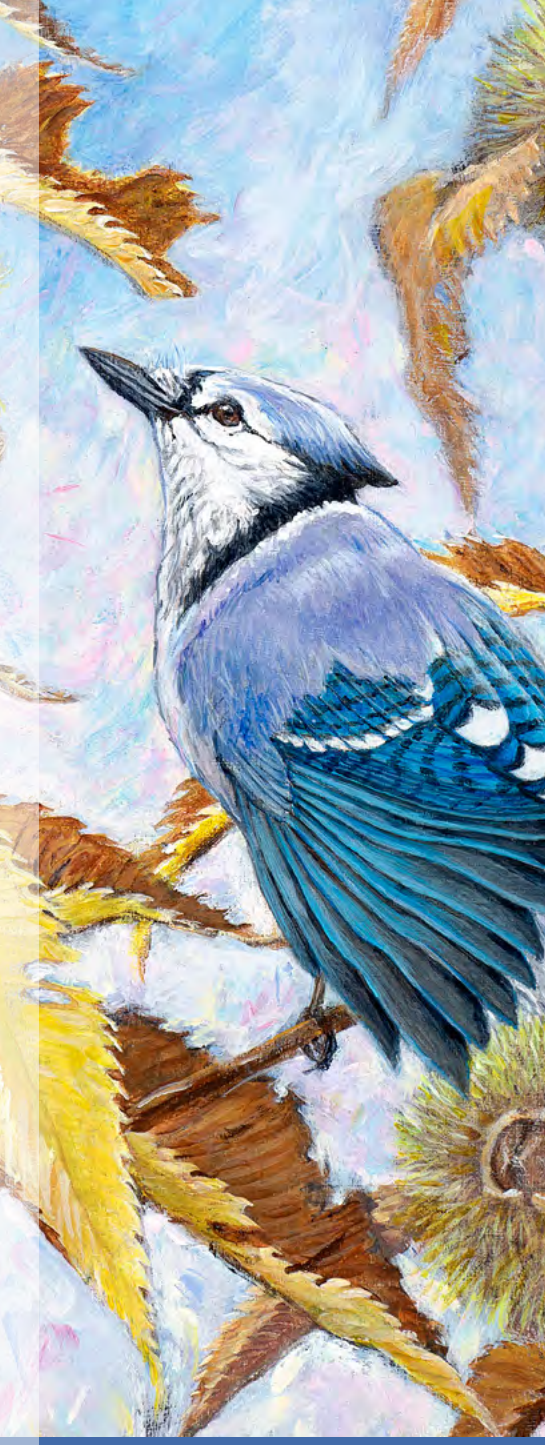
And now, at the sunset of my tenure, I remain extremely grateful to all of you for your guidance, wisdom, and kindness as I navigated TACF's complexities. I am thrilled that I leave a financially sound, reputationally solid, science-based organization with one of the most ambitious and impactful missions in conservation today. Our continued progress is all because of you: staff, board of directors, chapter leaders and volunteers, and loyal partners. The American chestnut has a true voice in you, its devoted advocates, because of this, the species has a real chance at a true ecological comeback.

I treasure the many friendships we forged together. I promise not to be a stranger and please know I'll be cheering on the team from whatever adventure is next in store for me and my family.

With affection,

Lisa Thomson

Lisa Thomson, Former President & CEO
The American Chestnut Foundation



Race to the Finish

This lovely and intricate work of art was painted by ME Chapter President Mark McCollough. Blue jays help grow and spread chestnut trees by dispersing their seed. Read the article about it on page 12 and learn how you can purchase the print!

THE AMERICAN CHESTNUT FOUNDATION™

WHAT WE DO

The mission of The American Chestnut Foundation is to return the iconic American chestnut to its native range.

CONTACT US: chestnuts@tacf.org • tacf.org
facebook.com/americanchestnut • twitter.com/chestnut1904 • instagram/tacf1983

TACF National Office
50 N. Merrimon Avenue
Suite 115
Asheville, NC 28804
(828) 281-0047

Meadowview Research Farms
29010 Hawthorne Drive
Meadowview, VA 24361
(276) 696-9142

Mid-Atlantic Regional Office
Virginia Department of Forestry Central Office
900 Natural Resources Drive
Charlottesville, VA 22903

New England Regional Office
UVM Aiken Forestry Service Labs / USFS NRS
705 Spear Street
South Burlington, VT 05403
(802) 999-8706

North Central Regional Office
Pennsylvania State University
108 Business Services
206 Forest Resources Lab
University Park, PA 16802
(814) 863-7192

Southern Regional Office
50 N. Merrimon Avenue
Suite 115
Asheville, NC 28804
(828) 281-0047

THE AMERICAN CHESTNUT FOUNDATION 40th ANNIVERSARY 1983 – 2023

40-YEAR HISTORICAL TIMELINE

While The American Chestnut Foundation has been in existence for 40 years, the quest to save the American chestnut has spanned many more decades. Since the discovery of the blight in 1904, the efforts of countless conservationists, researchers, and citizen scientists have been devoted to its recovery and reintroduction. We are proud to share some milestones of this storied history.

1904

Chestnut blight first noticed in Bronx Zoological Park in New York City

1905

The blight fungus identified by Dr. William Murrill at the New York Botanical Garden in New York City

1911

Pennsylvania Chestnut Tree Blight Commission undertakes efforts to control spread of the blight (efforts discontinued in 1913)

1913

Plant explorer Frank N. Meyer[1] identifies chestnut blight growing on chestnut native to China

1922

USDA breeding program, begun by Dr. Walter van Fleet[2] in 1911, reactivated under G. Fillipo Gravat (program abandoned in 1960)

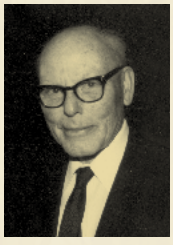
1930

Dr. Arthur Graves undertakes a chestnut breeding project under the auspices of the Brooklyn Botanical Gardens[3]

1947

Graves transfers the chestnut breeding project to the Connecticut Agricultural Experiment Station[3]

1980



Dr. Charles R. Burnham becomes interested in breeding a blight-resistant American chestnut

[1]Photo courtesy of Special Collections, USDA National Agricultural Library
[2]Walter van Fleet, Public domain, via Wikimedia Commons
[3]Photos courtesy of Connecticut Agricultural Experiment Station

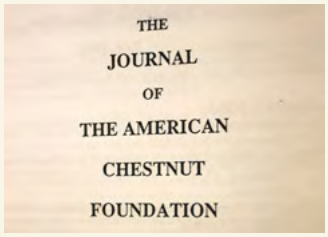
1983

Articles of incorporation for TACF were signed on June 22, 1983

1983

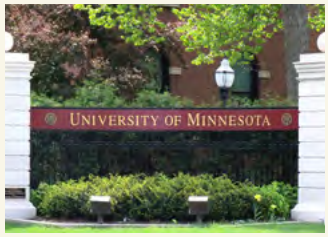
Philip Rutter is appointed first President & CEO

1985



The Journal of The American Chestnut Foundation was first published in July 1985

1985



TACF's first annual meeting was held on September 21, 1985 at the University of Minnesota

Photo by Alexius Horatius, Wikimedia Commons Public Domain

1990

TACF's first chapter established in New York

1991

Researchers begin a biological control study with hypoviruses at the American chestnut stand in West Salem, WI

1991

Connecticut Chapter established

1994

Pennsylvania Chapter established

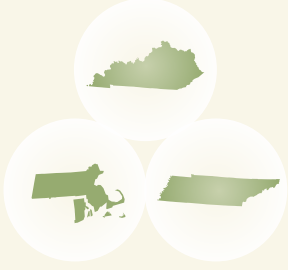
1999

Maine Chapter established

2000

Carolinas Chapter Established

2001



Kentucky, Massachusetts/Rhode Island, and Tennessee chapters established

2002

First regional office is established in Asheville, NC (Southern Regional Office)

BOARD CHAIRS: 1983 PHILIP RUTTER **1993 DR. PAUL READ**

1989

TACF establishes the Wagner Research Farm, a breeding station in Meadowview, VA, and hires Dr. Fred Hebard to manage the breeding program

1990

TACF headquarters established in Bennington, VT

Photo by Hunter Kahn, Wikimedia Commons Public Domain

1990

John Herrington hired as President & CEO

1990

ESF

SUNY's College of Environmental Science and Forestry begins transgenic research

1995

TACF's Pennsylvania Chapter initiates the first successful chapter breeding program

1996

Indiana Chapter established

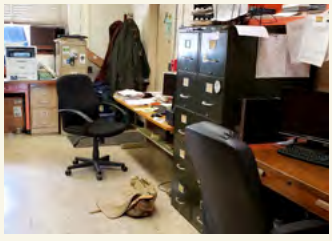
1997

Marshal Case hired as President & CEO

1998

Dedication of the 93-acre Glenn C. Price Research Farm in Meadowview, VA

2003



North Central Regional Office instituted at Penn State University

2003

Maryland Chapter established

2004

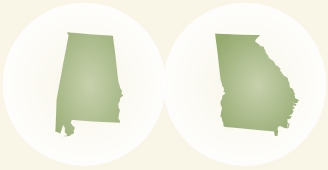
New breeding efforts launched in Seneca, SC, to combat Phytophthora root rot

2005

First potentially blight-resistant chestnuts harvested from Glenn C. Price Research Farm

1995 L.L. COULTER | **1999 DR. JAMES ULRING** | **2002 HERB DARLING**

2005

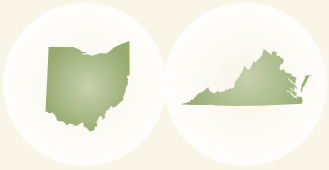


Alabama and Georgia chapters established 1983

2006

First transgenic American chestnut tree planted in the field

2006



Ohio and Virginia chapters established

2007

New England Regional Office instituted at Yale University

2009

U.S. Forest Service (USFS) Southern Research Station and University of Tennessee participate in first forest planting of TACF hybrids

2010

Mid-Atlantic Regional Office instituted in Charlottesville, VA

2010

The Journal of The American Chestnut Foundation redesigned to a full-color magazine

2010

Dedication of the Glenn C. Price Laboratory at Meadowview Research Farms

2014

National headquarters moves offices in Asheville from USFS building to Reynolds Village

2014

Dr. Jared Westbrook hired as Director of Science

2015

Lisa Thomson hired as President & CEO

2015

TACF's magazine *The Journal* is renamed *Chestnut* and won its first Best of Category PICA award

BOARD CHAIRS: 2007 RICHARD S. WILL **2010 GLEN REA**

2007

Vermont/New Hampshire Chapter established

2008

New England Regional Office moves to Burlington, VT

2009

Bryan Burhans hired as President & CEO

2009

TACF headquarters moves from Bennington, VT to the USFS Service Office in Asheville, NC

2010

West Virginia Chapter established

2011

SUNY's College of Environmental Science and Forestry plants transgenic, potentially blight-tolerant American chestnuts at the New York Botanical Garden

2012

TACF's 16 chapters plant more than 450 breeding and test orchards in 20 states, including the first seed orchards in five states

2013

TACF celebrates 30 years toward its goal of restoring the American chestnut

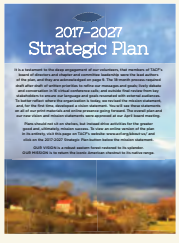
2016

3BUR Proposal for Integrated Research approved by TACF Science and Oversight Committee

2016

Meadowview Research Farms Operations Building established

2017



2017 – 2027 10-year Strategic Plan adopted by Board of Directors

2018

TACF Breeding Plan revised and implemented

2013 DR. KIM STEINER

2016 MICHAEL DOOCHIN

2018

Meadowview Research Farms greenhouse and shade houses established and dedicated to Board Emeritus Richard S. Will 1983

2018

Transgenic chestnut tree developed by SUNY's College of Environmental Science and Forestry is submitted for review to regulatory agencies

2018

Third External Science Review evaluates breeding program changes, which helps TACF further its mission toward American chestnut restoration

2018

TACF celebrates 35 years toward its goal of restoring the American chestnut

2021

Jay Cude replaces Dr. Brian McCarthy as board chair

2021

High-level staff positions created: Chief Conservation Officer and Director of Research at Meadowview Research Farms

2021

New high-light growth building constructed at Meadowview Research Farms

2022

USDA APHIS public comment period opens on draft PPRA and EIS for deregulation of Darling 58

2023

TACF produces its first documentary film, *CLEAR DAY THUNDER: Rescuing the American Chestnut*

2023

Dr. William Pitt hired as President & CEO

2023

TACF celebrates 40 years toward its goal of restoring the American chestnut and looks forward to future successes through unprecedented momentum.

BOARD CHAIRS: 2018 DR. BRIAN McCARTHY 2021 JAY CUDE

2019

TACF Chapter-Wide Science Meeting in Abingdon, VA

2020

Due to the COVID shutdown TACF develops new virtual resource, Chestnut Chat, to continue engaging with its supporters

2020

USDA APHIS first public comment period toward deregulation of transgenic American chestnut

Logos from Wikimedia Commons Public Domain

2020

First Darling 58 crosses take place at Meadowview Research Farms

2022

Backcross phenotyping in the field completed toward developing best x best program

2022

High-light growth pollen production begins at Penn State Partnership Office

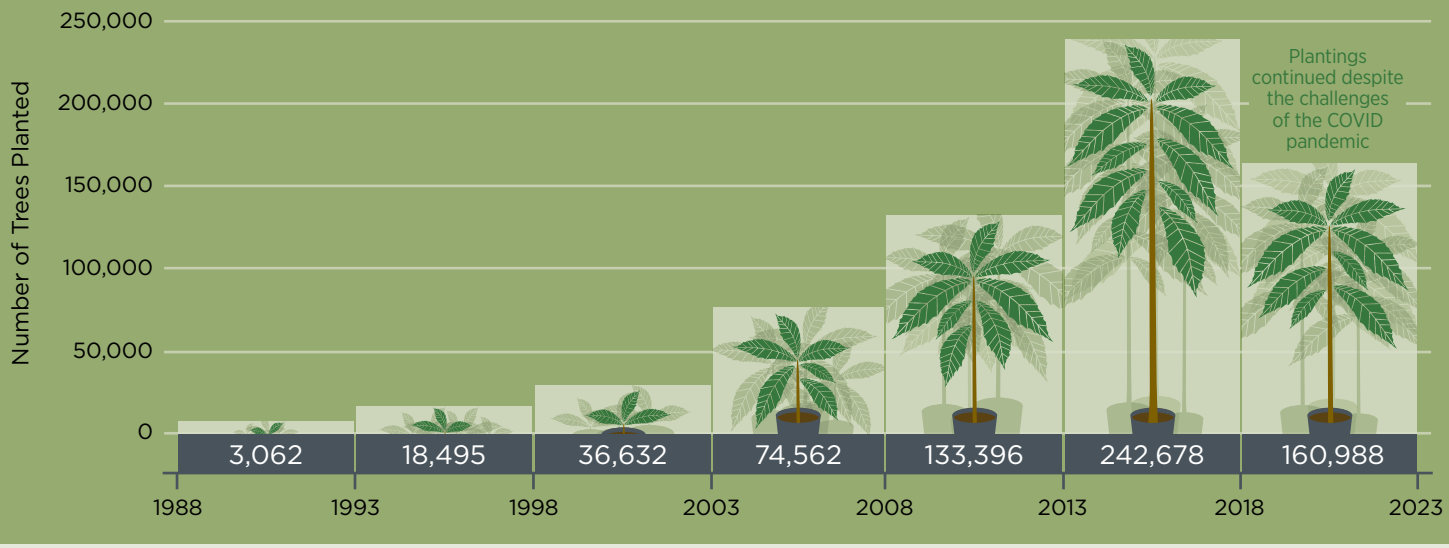
2023

TACF launches new website

2023

Additional staff positions created: Regional Outreach Coordinators (2) and Website Administrator

CHESTNUT TREE PLANTINGS



Meet TACF's New Staff Members

The American Chestnut Foundation is growing! As we all know, talented individuals are what make an organization soar. TACF runs on people, both volunteers and staff, and we could not do what we do without them. We have recently hired some wonderful new talent and promoted high performers, and would like to introduce them to you now.

Hal Brindley

Lesley Heiser

Lauren Kerwien

Hannah Leeper

Hal Brindley, Web Administrator
As our need for increased online presence grew, both nationally and at the chapter level, we determined a full-time web administrator to be essential. Hal comes to us after 25 years working as an independent web contractor and has already begun the enormous task of ensuring TACF's website is accurate, functional, and compliant. He has skills in writing, illustration, and video editing, and is also an award-winning nature photographer.

Lesley Heiser, Grants Manager
Lesley has a strong and versatile background in grants and charitable gifts. She began her career writing grants at Johns Hopkins University, served as library development officer in New Mexico State University's comprehensive campaign, and led communications and fundraising for Maine nonprofits where she most recently worked for the food-based nonprofit, Cultivating Community. She has studied permaculture and loves to garden.

Lauren Kerwien, Laboratory Manager, Meadowview Research Farms
Lauren's position entails conducting laboratory-, nursery-, and field-based experiments, producing and distributing inoculum and pollen, and keeping our lab equipment and systems in strong working order. Lauren recently graduated with an MS from Virginia Tech following employment as a laboratory manager at the University of Pittsburgh and the University of Vermont. Her primary background is in molecular genetics, microbiology, and plant biology.

Hannah Leeper, Southern Regional Outreach Coordinator
Hannah joins us after 10 years working in outdoor education, event production, and operations. She moved to Western NC at the beginning of the pandemic and stayed for the unparalleled natural beauty and biodiversity.

Shaomin Li, Controller
Shaomin manages all of TACF's financial systems, including accounts payable and payroll, along with HR on- and offboarding responsibilities. Shaomin, a CPA, comes to TACF with a strong nonprofit background, most recently with Asheville's Housing Authority.

Catherine Martini, Northern Regional Outreach Coordinator
Catherine, based out of Albany, NY, has more than 10 years of experience in horticulture, outreach, and education, ranging from cooperative extension work to public gardens. Her main passion in each of these positions has been growing and restoring native areas.

Shaomin Li

Catherine Martini

Jen Picicci

Jen Picicci, Communications Coordinator

Jen will support the communications department in areas of branding, messaging, social and print media, and assist in editing TACF's award-winning *Chestnut* magazine along with editor Jules Smith. Jen is a writer, content creator, and marketer with a BA in studio art/graphic design from Eastern Connecticut State University and a master's degree in health sciences from Western Carolina University.

CONGRATULATIONS TO PROMOTED STAFF

Kendra Collins has been promoted to **Director of Regional Programs** while retaining her duties as New England Regional Science Coordinator, managing VT/NH, MA/RI, ME, and CT chapters. Kendra supervises four regional staff and handles a number of programmatic functions within TACF's science, outreach, and chapter functions. She will continue to be based in the USFS/University of Vermont regional office in Burlington, VT.

Stephen Hoy has been promoted to **North Central Regional Science Coordinator**. He has been with Penn State as the orchard manager for the PA/NJ Chapter research orchards since 2014 and will now oversee aspects of regional science programs in the NJ/PA, NY, OH, and IN chapters. Hoy holds a degree in forestry technology from Penn State Mont Alto. He enjoys all aspects of fieldwork and strives to create standardized processes to improve efficiency.

Cassie Stark was recently promoted to **Mid-Atlantic Regional Science Coordinator** after nearly a year at Meadowview Research Farms as Lab Manager. She is based in Charlottesville's VA Department of Forestry office and will cover scientific and volunteer activities in the MD, VA, WV, and KY chapters. Cassie has an undergraduate degree from James Madison University and a master's in forest resources from Penn State University.

Congrats to our seasoned employees who have had more than five years of service at TACF:

Sara Fitzsimmons
North Central Regional Science Coordinator and Chief Conservation Officer
20 years

Kendra Collins
Director of Regional Programs and New England Regional Science Coordinator
15 years

Dan Mckinnon
Director of Land Management
9 years

Eric Jenkins
Tree Breeding Coordinator
9 years

Jared Westbrook
Director of Science
8 years

Jules Smith
Director of Communications
7 years

Jim Tolton
Facilities and Grounds Technician
6 years

Blue Jays and Red Squirrels

SPREAD AMERICAN CHESTNUTS

By Bernd Heinrich, Professor Emeritus of Biology at University of Vermont

Establishing an American chestnut population in my forest in western Maine was inadvertent, though quite welcome. In my youth I never would have believed I would live to see chestnut trees growing throughout our woodlot. This is the story of a modern-day Noah, and how the diligence of blue jays and red squirrels helped four American chestnut trees grow into more than a thousand.

Jason Mazurowski, Bernd Heinrich, and Carolyn Loeb count seedlings on Bernd Heinrich's land. Photo by Rob Rives.

Inset Photo: Watercolor painting by Bernd Heinrich. This piece has been donated to a collection owned by the Maine Historical Society in Portland.

Their start came from an accidental whim. I had just finished building a log cabin in 1982 and cleared brush around it to perhaps plant a fruit tree or two. As I browsed a gardening catalog my eye caught an advertisement for wild-type American chestnut seedlings that were reputed to have some immunity from chestnut blight. They were stock from the Wexford Soil Conservation District in northern Michigan that had evaded the infamous blight by either isolation or immunity. I ordered 15 seedlings and planted them at the edge of my cabin clearing, then forgot about them for a few years. My fruit trees succumbed to one calamity or another, but the chestnuts shot up and, to my great surprise one summer, burst into beautiful catkin blooms. Ultimately, four trees matured, though two were removed in 2014 due to extensive damage caused by porcupines. The two remaining show no signs of blight after 40 years. They have a circumference of up to 66″ and have large crowns of near 65′ in height. They survived an attack by honey fungus (*Armillaria* spp.) in 2018, but continue to produce copious crops of chestnuts annually (**Figure 1**).

Shortly after the trees began producing nuts in 2001, I realized that blue jays and red squirrels were harvesting the bounty before I could. Since then, I have been observing their seed harvesting and hoarding strategies. The chestnuts, hidden within a bur, open synchronously over about four days. Once open, the jays systematically harvest them. A jay can carry up to four or five chestnuts at a time, several in its throat pouch and one in its beak, before they hide them in caches in the nearby forest to consume later.

Red squirrels are on to the tactics of the blue jays but have a different strategy. Before the burs open, they climb to the treetops and start snipping off one bur after another, not stopping to open them and eat the nuts. They come down after they've dropped a dozen or two burs, hauling them off one at a time to a nearby underground cache. My observations over the years show that red squirrels make nut caches, and they may relocate these caches as well as add nuts to them. Their use of the same site for multiple caching trips contrasts with the scatter-hoarding behavior of the blue jays.

Red squirrel in process of snipping off burs that they let fall to the ground before gathering and caching them.

In 2013, blue jays and squirrels did not visit my chestnut trees because of a large crop of beech nuts and red oak acorns. So, instead of conducting formal observations at the chestnut trees, I searched systematically for chestnut seedlings in the woods. I was amazed to find 200 of them!

In 2019 and 2020, Jason Mazurowski and other colleagues at the University of Vermont, including my daughter Lena, completed a more formal survey for offspring of our chestnut trees. We searched for seedlings in late October, a time when American chestnuts still have green foliage, which is a stark contrast to the surrounding woods. Working in a group of five, we surveyed the property, moving outward from the clearing. We continued our search in all directions until we had reached a saturation point and could no longer find any new trees. In total, we searched nearly 123 acres of forest.

Figure 1. Two surviving American chestnut trees in Weld, Maine.

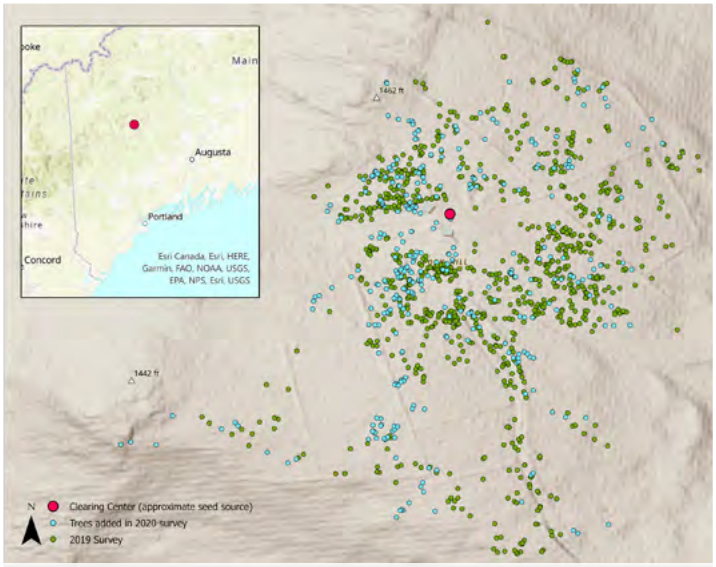


Figure 2. A map showing 1,016 wild American chestnut offspring located in the 2019 survey in green and 332 trees added to the survey in 2020 in blue. The red dot represents the center of the clearing where the four original parent trees were planted in 1982.

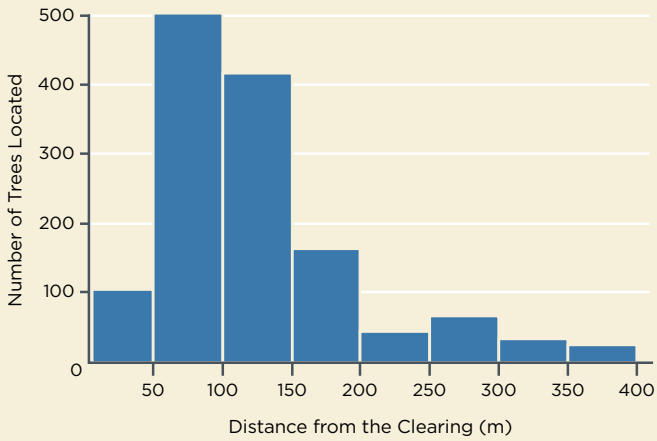


Figure 2. Number of American chestnut offspring observed relative to the dispersal distance in meters. Most offspring were dispersed between 50 and 150 m from the clearing center with an average dispersal distance of 123.6 ± 2.0 m.

We found an astounding 1,348 offspring, varying in size from one-year-old seedlings to nearly mature trees. As of October 2020, the natural spread of this population had expanded to at least 370 m from the parent trees, with an average dispersal distance of 124 m. Several of our neighbors reported chestnut seedlings growing beyond our survey area, up to 800 m from the parent trees. Since these were incidental sightings reported after our survey had been completed, we did not include them in our results. Few seedlings were found in the clearing where the parent trees were planted. Most were located in the forest 50–150 m beyond the edge of the clearing and were suspected to have been cached by red squirrels, as rodents have rarely been observed transporting seeds more than 100 m (**Figure 2**).

We believe our small study in western Maine has big implications for The American Chestnut Foundation's restoration efforts. We documented that four healthy seed-bearing chestnut trees can initiate a reproductive population of more than 1,000 individuals within a span of only 30–40 years. The scatter-hoarding behavior of blue jays and red (and possibly gray) squirrels will be instrumental in dispersing the seeds of blight-resistant chestnuts. Jays and squirrels are abundant throughout eastern North America.

As of July 2021, the first known offspring reached reproductive maturity, and a third generation of seedlings may soon be established on my woodlot. Continued study of this population in subsequent decades will provide further insight into establishing resilient wild populations and may offer a better understanding of the rate at which American chestnut may disperse northward with climate change. Given the absence of other reproductive populations of American chestnut in the immediate vicinity of our cabin, our data provide rare insights into natural seed dispersal from a known point of origin and document that a functionally extinct species can be reintroduced into a northern hardwood forest ecosystem.

A TRIBUTE TO

A Quiet Chestnut Hero

RUFIN VAN BOSSUYT

By Lisa Thomson, Former President & CEO

On an unusually warm New England summer day, about 55 friends and family gathered to recognize the immense contributions volunteer Rufin Van Bossuyt has made to the MA/RI Chapter. Thanks to our long-time partnership with colleagues at the Massachusetts Division of Fisheries and Wildlife (MassWildlife), the MA/RI Chapter dedicated the two-acre chestnut orchard, located at their headquarters in Westborough, in honor of Rufin. After all, it was Rufin who was frequently there, tending to the 4,500 trees, organizing the tool shed, and making sure the fence was maintained. But his dedication to TACF has not been limited to this one orchard. Rufin joined TACF in 1992, is a founding member of the MA/RI Chapter, has served on both the Chapter and National Boards, and was instrumental in forming the partnership with MassWildlife. He has generously sponsored multiple internships over the past three years. Two student interns, Eric Harris and Nate Lord, are now active members of the Chapter's Board.

Rufin and Lisa after the official sign unveiling.

It was a special day for me as well, as it was Vice President of Orchard Development Brian Clark who first introduced me to the Chapter's orchards way back in the summer of 2015, my first year. I was able to tour the MassWildlife orchard with Brian and observed young saplings just making a go of it. Returning eight years later, I was amazed at the number of healthy, 20-foot trees!

The day began at the edge of the orchard, with event organizers, MA/RI Board Member Bill Davis and President Kathy Desjardin, making heartfelt remarks, with Rufin and his wife Rena Richard as guests of honor. They recounted Rufin's seemingly endless history and accomplishments with the Chapter and the tremendous impact he made over time. I shared a fond memory of their generous hosting of me at their home on Cape Cod, and how much fun we had sharing tale after tale at their kitchen table, with an occasional kitty of theirs joining in the action. We then unveiled the "Rufin Van Bossuyt American Chestnut Orchard" sign that TACF donated in his honor.

After the orchard dedication, everyone gathered for a festive luncheon with delicious side dishes of Kathy's homemade salads. Speaker after speaker told stories of Rufin's quiet yet effective leadership, frequent generosity, and overall kindness. Rufin's family and friends joined in the celebration, some from as far away as Hawaii. More than a few brief tears were shed at the mention of these stories; Bill Davis attributed this to the "strong onions" in the sandwiches! One of the more rousing stories was from Ann Bobigian who said Rufin once talked her into climbing a remote wild American chestnut tree to gather pollen. She said she had no problem scaling the tree but wondered how she was going to get down, and if she fell, who would find her? Well, she managed to jump a short distance to safety after her collection was complete, only to land in a yellow jacket nest!

Rufin also received a certificate of merit from the MA State House of Representatives and was congratulated for his work with osprey and eagle restoration projects he championed. He also received tributes from MassWildlife Assistant Director Todd Richards, Massachusetts Electric colleague Tom Sullivan (where Rufin spent his career as the utility's system arborist), and his younger brother David Van Bossuyt.

Rena concluded the speaker remarks with her own warm appreciation of the day and said she was amazed to learn how widespread his network was and how much respect so many have for Rufin. As one former utility official said to her "I can't imagine Rufin ever tooting his own horn." Rufin himself took in all the accolades with his usual gentle grace. We then offered a screening of *Clear Day Thunder,* TACF's documentary film. It was a lovely gathering to pay tribute to an incomparable volunteer leader who has made a huge difference in the restoration of the American chestnut.

Rufin and Rena await the orchard dedication.

MA/RI Chapter leader and long time friend of Rufin, Bill Davis, facilitated the dedication.

MA/RI Chapter volunteers came out in force to celebrate Rufin.

Jeremy Hodge prepares to drop the last and largest of the Berlin chestnuts: 34″ DBH, 35′ to the first limbs.

VERMONT/NEW HAMPSHIRE CHAPTER REMINDED OF

Chestnut's Magnificence at the Berlin Site

By Evan Fox, VT/NH Chapter President

In 2006, then-Vermont County Forester Russ Barrett took Kendra Collins, The American Chestnut Foundation's (TACF) director of regional programs and New England regional science coordinator, to the site of mature, living, reproducing American chestnut trees in Berlin, VT. These amazing trees, which became the subject of Kendra's master's thesis at the University of Vermont, were later pollinated for TACF's breeding program. They have also been studied by researchers from Pennsylvania State University, Purdue, and William and Mary for their propensity to attempt regeneration. The site has been mapped, the trees genotyped, and ancestry analysis completed on the few founder trees. Sadly, the trees died several years ago.

Young Earl, years ago among the majestic Berlin trees.

Harvesting the Chestnut trees: A VT/NH Chapter member Jeremy Hodge, excavation contractor Tim Hart, and Chapter President Evan Fox after felling the big Berlin tree. B The butt log is chained for removal. C Butt log being hoisted to the mill. D "Cookies" being sawn on the mill. E 34" DBH "cookie;" no pith or sapwood decay. F Boards being sawn on the mill. G Boards cut, 4/4 up to 17" width.

Luckily, in February 2023, landowners Dwight Hobart and Carol Carbo gave TACF permission to scientifically study and harvest the trees. VT/NH Chapter members Jeremy Hodge and Dan Jones, together with Chapter President Evan Fox and Chapter Vice President Gary Hawley, along with support from Vince Conti, town administrator, harvested the last three trees. One was the Vermont state champion (the largest of its species) until its death. These trees lived roughly a human generation – between 75 and 80 years – reminding us of the American chestnut's magnificence and how previous generations would have experienced their growth.

Today it is rare that American chestnut can be harvested for lumber, but these three trees alone produced roughly 18 saw logs and 2,000 board feet, proceeds from which will help fund VT/NH Chapter operations. The lumber is pristine, solid, and some wide widths are available. Cabinetmakers interested in purchasing lumber are encouraged to contact Jeremy Hodge, who, with assistance from excavation contractor Tim Hart, transported the logs to Jeremy's portable sawmill site in North Haverhill, NH. Jeremy sawed them between April and June and the lumber is being dried.

Carol received firewood from the limb wood, and Dwight will receive lumber to his specifications, which will be made into two George Nakashima-designed trestle-style tables for his business, the Liberty Bar, in beautiful San Antonio, Texas. Both Carol and Dwight will receive tax-deductible contribution confirmations for the estimated salvage value of the stumpage from the VT/NH Chapter.

Interestingly, Vermont's nearby state capitol Montpelier has a Tree Board, and Chair John Snell is also a Chapter member. Earlier this year, he read an article published in the Chapter's newsletter about the harvest, and was then able to provide a picture (previous page) taken many years ago from the Berlin site of a young friend, Earl, on Carol Carbo's property. Even then, the trees were stunning, and they have inspired others to become members of TACF and support American chestnut restoration.

Berlin, Vermont, which is not within the well-known map of the tree's native range, sits relatively high on a piedmont between the Connecticut River Valley and the Lake Champlain Valley. These warmer valleys were thought to be the northernmost reaches of the range, and the Green Mountains, too cold to grow American chestnut. However, the Berlin trees inspire Chapter members to believe that with climate change, specifically warming, Vermont and New Hampshire are squarely in the target restoration zone. The VT/NH Chapter fully intends to make that happen.

Flower on a hybrid chestnut tree that will eventually develop into a bur.

Chestnuts AND ME

By Lyle Estill, Carolinas Chapter

I planted my first chestnut trees in 1990. At twenty-seven years old, I had a patch of dirt in Chatham County, North Carolina, and I was a homesteader wannabe.

Somehow, I knew that chestnuts were once an important source of nutrition in the landscape, and I was interested in harvesting calories from the land.

I planted plums, apples, pluots, and lots of trees that would one day allegedly bear fruit. Once, when I referred to my endeavor as an "orchard," my daughter snorted soda through her nose with laughter. She was not wrong. I lost trees to deer browsing and deer rutting. I lost trees to drought and bushhogs. Moles, voles, disease, and caterpillars also took their share.

Chestnut at The Plant with muhly grass in the background.

For the last thirty-two years, I have planted trees in the fall. If I lost a chestnut tree I would plant a couple more. Sometimes I would forget I was down to just one and would plant persimmons instead.

My primitive understanding of fruit trees suggested that there was a root stock (that which goes into the ground), and a fruit stock (that which looks skyward). It appeared the "volunteer" trees that came from root stock produced inferior, worthless fruit. Most of the fruit stock of my chestnut trees died, and multi-trunked root stock chestnut "bushes" emerged. I used to mow them, as I assumed they would not produce fruit. That is when I gave up growing chestnuts.

My neglectful nature as an orchardist, however, allowed two pairs of chestnut trees to grow large and prosper. The year I found my first nut, I figured it would be tasteless. A friend came by, absent-mindedly took away my lone chestnut in his pocket, and eventually threw it away.

The next year there were multiple nuts. I gathered a handful, then scored and roasted them. To my astonishment, they were a high-shouldered yellow fruit that was delicious. I was stunned: I had accidentally grown chestnuts!

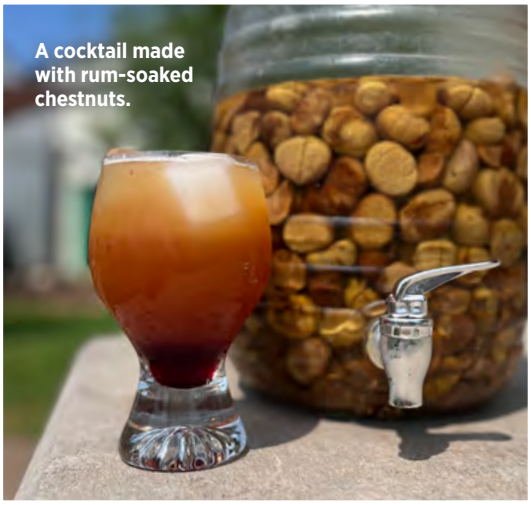
One year when I was at a local nursery buying my usual allotment of fruit trees for my failed orchard, they had a dozen hybrid chestnut trees that had lost their provenance. In the nursery business that makes them worthless, so I bought a truckload and delivered chestnut trees to my friends.

I once attended a genetics workshop at Jordan Lake State Park in Apex, NC. It was very complex, and I left understanding little of what I had heard. I was not interested in American chestnut genes or ancestry. I only wanted fruit. I turned my back on the "chestnut establishment," but that is because I misunderstood the mission.

My career has closely paralleled my orchard management over the past thirty-two years. I was in tech. I was in art. I made biofuels. Then, somehow, I accidentally landed in food and beverage.

I am now the CEO of the Fair Game Beverage Company in Pittsboro, North Carolina. We are a small distillery with a mating pair of chestnut trees ten yards from our front door at The Plant in Pittsboro.

A few years ago, we introduced a "chestnut cordial" to our tasting room. We soak roasted chestnuts in rum for weeks, then use them as a platform for chestnut cocktail creations. Chestnut drinks shoot through the till and the customers love them.


A cocktail made with rum-soaked chestnuts.

Restaurants at The Plant followed suit and ordered nuts. Customers collect nuts in the yard. Everyone has heard the Nat King Cole song, but few have sunk their teeth into a freshly roasted chestnut. This year they will have a chance to because we will be selling roasted chestnuts along with shelled and unshelled chestnuts.

We are also having a mini chestnut festival this year, and will be screening *CLEAR DAY THUNDER: Rescuing the American Chestnut* on Sunday, October 15 at The Plant, a 17-acre eco-industrial park that houses like-minded small businesses. Of those, Rachel's Native Plants will be selling trees, restaurants will include chestnut in some of their dishes, and Fair Game will offer chestnut cocktails.

In the Piedmont of North Carolina, chestnuts drop in mid-October. For maximum sweetness they need to cure in the shell for a few weeks. Once cured, they are roasted and shelled before they begin to shrivel and harden. Roasting and shelling by hand is arduous and makes chestnuts very expensive, but this fall we will be ready. I brought in a pair of shelling machines from Korea, where apparently eating chestnuts is commonplace.

Here is hoping the business can bring some real poundage to market this year, and offer even more delicious chestnut items on the menu.

COMING SOON: WIDE VIRTUAL SCREENING OF

New American Chestnut Documentary

SAVE THE DATE! NOVEMBER 4 & 5, 2023

To become a subscriber, scroll to the footer on our website, enter your email, and click "SUBSCRIBE."

In celebration of its 40th anniversary, The American Chestnut Foundation is hosting a wide screening for members and email subscribers November 4 & 5, 2023 to view the recently completed documentary, *CLEAR DAY THUNDER: Rescuing the American Chestnut*. Currently, the film is only available for viewing at public and private screenings, some of which TACF chapters are hosting. It will be released for streaming in 2024. In the meantime, gather your friends, get out the popcorn, and enjoy watching the story about this magnificent tree of which we are all determined to rescue!

Visit rescuingtheamericanchestnut.com to view the trailer, screening schedules, and updates.

Kathy Patrick

USING "SOLUTION SALES" TO DRIVE RESILIENCE

By Scott Carlberg, Contributing Author

Being called a "real peach" is high praise in the state of Georgia, and we think Kathy Patrick, TACF's Georgia Chapter Volunteer of the Year, is a real peach of a volunteer.

"I do a little in a lot of places," she says. That adds up to results, not just for TACF, local theater, school kids, and Cancer Navigators in Rome, Georgia, but for Kathy as well.

From the Ground Up

At TACF, we know the value of strong roots. We are a small organization, and every single contribution from people like you develops into big growth. We gratefully invite you to be part of advancing the vitality of this historic mission.

Founded 40 years ago by prominent plant scientists and committed chestnut enthusiasts, TACF has come this far due to your commitment and support. Because of you, we have been able to plant more than 400,000 new trees, harvest nearly 2 million chestnuts, and distribute 185,000 seedlings, and we are not slowing down!

Your gift to TACF's 2023 End of Year Appeal will help us continue our endeavor to inform, educate, and inspire younger generations, and bring us closer to achieving our collective goal: the return of the American chestnut to its native range. Thank you for being part of our grassroots effort from the ground up.

"I try to focus on what matters; something outside of my immediate sphere," Kathy says. Her chestnut work, though, is close to home. Kathy volunteers alongside her husband, Marty Cipollini, who was the featured volunteer in the 2021 spring issue of *Chestnut* magazine.

She was the president of the GA Chapter for four years and is now in her second year as vice president. Overall, she has clocked more than a dozen years of chestnut volunteerism.

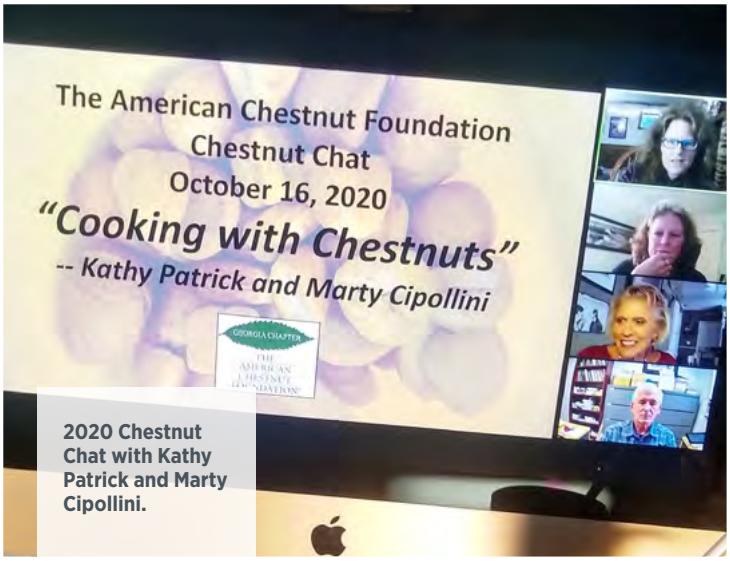
She also works in the local theater – in the box office and as stage crew – and with theater school show groups. Her work with Cancer Navigators as a chef for weekend retreats is rewarding and insightful as she helps cancer patients explore pescatarian and gluten-free dietary options.

Cooking became a second career. After years of corporate sales, Kathy started "Meals on Heels," the personal and entertainment chef business she ran from 2009 to 2020. She enjoyed helping people entertain in their homes and expand their meal options.

Even in cooking she has a chestnut angle – check out her recipe for Chestnut Pasta with Butter and Sage Sauce on page 42. It was one of the recipes Kathy and her husband, Marty, demonstrated in their 2020 "Cooking with Chestnuts" Chestnut Chat.

At heart Kathy is an outdoors person. Born in Detroit, her family had a place at Lake Huron. Time was filled with water skiing, sailing, camping, hiking, canoe trips, and biking. She was destined to become an environmental volunteer in the future!

Kathy places a tree tube over a seedling at a GA Chapter planting.



2020 Chestnut Chat with Kathy Patrick and Marty Cipollini.

Following her Michigan State University diplomas in marketing and telecommunications, she moved to Atlanta and landed at BellSouth Corporation. In sales, no less. Then, a move from that 77,000-person company to a software start-up where Kathy was employee #45.

That builds character and perspective!

"'Solution sales' is what I learned. What is the need and what is good for the customer? How does my product integrate with and improve what the customer has today? How do we mentor the client's resources and staff for success?"

In the end, "solution sales" is what TACF is all about. It is a perfect fit.

"Our chestnut efforts have challenges, as with most organizations. Science, people, money, time, resilience." Especially resilience, in all definitions of the word. "A big ah-ha for me as Chapter president was maintaining the need for steadfastness – the need to stick to it – because chestnut restoration is a long-term effort and successes can be offset by setbacks."

The Chapter covers a substantial territory. "Georgia has a pretty big footprint so we need people working with us across the

In spring 2023, Kathy is awarded GA Chapter Volunteer of the Year, presented by current Chapter president Jack Rogers.

state," says Kathy. "Having 'feet on the ground' in the mountain and piedmont areas beyond Atlanta helps with orchard stewardship, tree mapping and identification, as well as local outreach. In addition to covering the geography, we'd like to be a draw for students, teachers, hikers, paddlers, birders, and folks of other interests who would enjoy the opportunities our Chapter offers."

Maintaining the volunteer base is an art. "People sign up to help with really good intentions but then that enthusiasm fizzles," reports Kathy, echoing a national trend. Volunteerism in America has been declining for decades and took a whopping seven percent hit during the pandemic. "Providing clear messaging about our organization's needs along with communicating specific tasks and work essentials are ways to help volunteers stay engaged. But all that is easier said than done!"

Like making sales, working for the revival of the American chestnut requires drive and optimism.

From Farm to Field

A LETTER FROM CASSIE STARK, NEW MID-ATLANTIC REGIONAL SCIENCE COORDINATOR

Dear TACF Community,

My journey with The American Chestnut Foundation (TACF) started in 2022, when I became a full-time staff member at Meadowview Research Farms (MRF) in southwestern Virginia (VA) (**Figure 1**). However, this is not where my story with American chestnuts (*Castanea dentata*) began. I started studying American chestnut reintroduction and forest management strategies as an undergraduate at James Madison University in Harrisonburg, VA. Participating in this research as an undergraduate sparked my curiosity of forest ecology and botany. Little did I know that this was just the beginning of my career with the American chestnut.

I became laboratory manager at TACF's MRF in July 2022. During my time at Meadowview, I learned more about chestnuts and their story as I began to have a hands-on active role working with both the trees and the fungus that nearly wiped them out (*Cryphonectria parasitica*). As lab manager, I was now responsible for culturing chestnut blight inoculum to test for resistance in hybrid trees, caring for transgenic trees to accelerate pollen production, and testing seeds for inheritance of the oxalate oxidase gene. At the farm, staff members pitch in during seasonal activities when "all hands on deck" are required. These activities often include: inoculation, seasonal greenhouse work, planting trees, and harvesting and processing chestnut seeds (AKA shucking the burs). Last year, myself and several gracious volunteers processed more than 70,000 seeds at MRF! While I enjoyed all aspects of this job, my favorite task was designing and performing experiments to better understand chestnut species. There are still a lot of unknowns surrounding chestnut blight resistance, thus

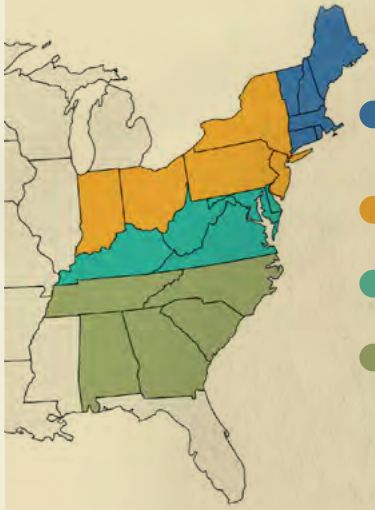
FIGURE 1. Sunrise over Price orchard at Meadowview Research Farms.

Photo by Freepik.com

there are an endless number of experiments to be performed.

My lab management experience has helped to prepare me for my new position as Mid-Atlantic regional science coordinator (MARSC). As of May 2023 I became the MARSC and have since relocated to Charlottesville, VA. TACF has four regional science coordinators located throughout the native range of American chestnut (**Figure 2**). The role of regional science coordinators is to advise and support their state chapter members in all science-related activities. These activities range from identifying the chestnut in your backyard, to guiding controlled pollinations in your breeding orchard, and everything in between.

FIGURE 2. TACF'S REGIONAL SCIENCE COORDINATORS



- **Kendra Collins: New England** Connecticut, Maine, Massachusetts, Rhode Island, Vermont, New Hampshire
- **Stephen Hoy: North-Central** Indiana, New York, Ohio, Pennsylvania, New Jersey
- **Cassie Stark: Mid-Atlantic** Virginia, West Virginia, Kentucky, Maryland
- **Jamie Van Clief: Southern** Alabama, North and South Carolina (Carolinas), Tennessee, Georgia

As MARSC, I recently participated in my first pollination season (**Figure 3**). While I have had plenty of experience at MRF in chestnut-related field work, I did not have the opportunity to participate in a pollination season. Though controlled pollinations are tedious, they are rewarding; not just in the result of a seed, but in the relationships it fosters. I was privileged to work alongside many helpful volunteers who are passionate about American chestnut restoration.

FIGURE 3. Cassie performing controlled pollinations at Lesesne State Forest in VA.

In a lot of ways, the field aspect of this position reminds me of my master's work. I studied ramp/wild leek habitat and utilized citizen scientists to connect with land owners to inquire if ramps were growing on their property. This gave me the opportunity to meet and chat with folks about a resource we were both invested in and cared about. Chestnuts and ramps are a part of Appalachian culture, and researching both has allowed me to make connections with people I may never have met otherwise.

The transition from lab manager to regional science coordinator feels as if I was working on a broader, national level and am now zooming into the work each chapter in my region does to make TACF the organization that it is. I am enjoying my new position, and looking forward to working with and meeting new members!

Sincerely,

Cassie Stark

Figure 1. The authors, Mark Double and Lewis Cook stand on the porch of the Great Chestnut Lodge. Photo by Mark Double.

The Great Chestnut Lodge

AT CAMP WASHINGTON-CARVER

By Mark Double, WV Chapter President and Lewis Cook, WV Chapter

On July 26, 1942, a 4-H camp was opened in the remote town of Clifftop, West Virginia (WV) in Fayette County. It was not unusual that a new 4-H camp would open, as 44 of West Virginia's 55 counties had 4-H camps. However, those camps were for White children only. What made the Clifftop camp different was that it was the first 4-H camp in the U.S. for Black children.[1,2] Initially called the West Virginia Negro 4-H camp, the name was soon changed to Camp Washington-Carver in honor of two prominent Black Americans: Booker T. Washington and George Washington Carver.[2]

In 1935, John Davis, President of West Virginia State College (a public, historically Black, land-grant college), secured a federal grant of $114,000 for the construction of a 4-H camp for Black youth.[3] Fleming Adolphus Jones, an attorney and Black member of the WV House of Delegates presented to the legislature the importance of a camp, "for the purpose of teaching Negro boys and girls the 4-H standard of living, and to inspire them to lift themselves toward these standards, and to discover and train Negro boys and girls for leadership, and for the purpose of teaching standards of excellence in agriculture, soil conservation, vocational agriculture, and home economics."[1] On March 9, 1937, the WV Legislature passed Jones' bill, the first of its kind in the nation.[1] In 1938, 583 acres of land near Clifftop, WV were leased for $5.00 from Charles and Kathryn Middleburg.[4]

In 1935, President Franklin Roosevelt introduced the Works Progress Administration (WPA) that employed millions of unemployed citizens across the U.S. to carry out public works projects. One of the most ambitious WPA projects in WV was the construction of Camp Washington-Carver.[2] In autumn of 1939, 41-65 people were employed in the clearing and production activities. Of special significance was the availability of

Figure 3. Side view of the Great Chestnut Lodge with 60′ timbers and local stone. Photo by Mark Double.

large quantities of native chestnut timber recently killed by the blight that ravaged stands of chestnut throughout WV. Men cut and sawed 220,000 feet of rough lumber, and 1,550 logs were salvaged from a clearing operation that consisted of mainly American chestnut.[2] The timber was harvested over the entire property. The Great Chestnut Lodge and a two-room guest cottage were constructed entirely of American chestnut. The lodge (55′ x 111′) was the largest log structure in WV built entirely of American chestnut, and one of the largest in the nation.[5]

The dining hall (**Figure 1**) contains 534 logs (112,000 board feet), "slabbed off" (sawn) on two sides down to an 8″ thickness and "V"-notched at the ends. The logs were then hacked with a broad ax or adz to give them a hand-hewed effect and to approximate "typical early log construction in WV."[2] The 4-inch joints were chinked and daubed with wooden wedges and a mortar of lime and cement (**Figure 2**). All

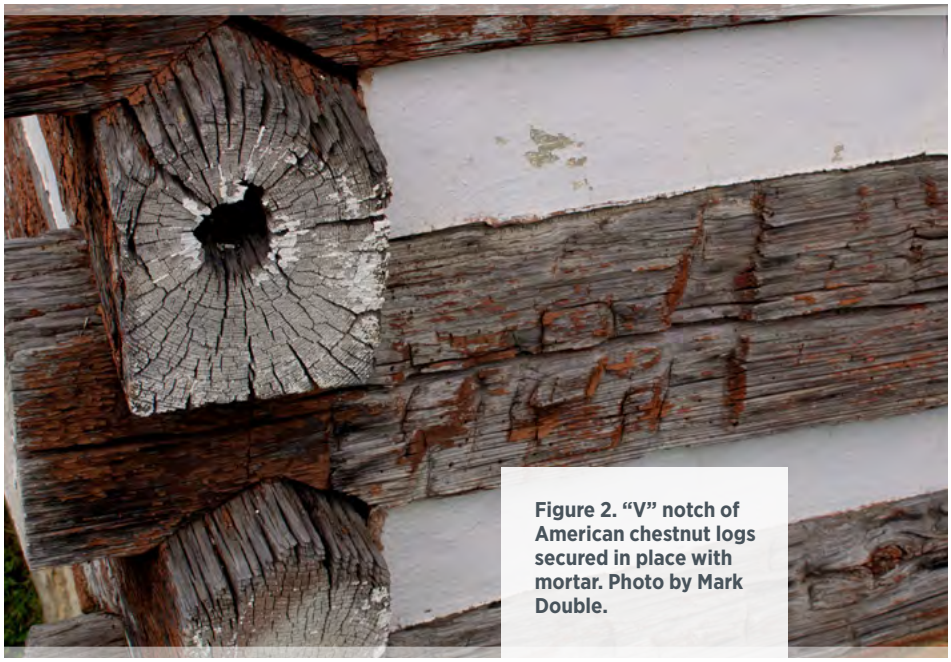


Figure 2. "V" notch of American chestnut logs secured in place with mortar. Photo by Mark Double.

partition walls, windows, doors, and other trim were fashioned of chestnut. The chestnut logs of the gable ends of the lodge measure 60′ in length (**Figure 3**).

All of the material used in the construction of the buildings was taken from the site, including the locally quarried stone.[2] The lodge alone required the skilled labor

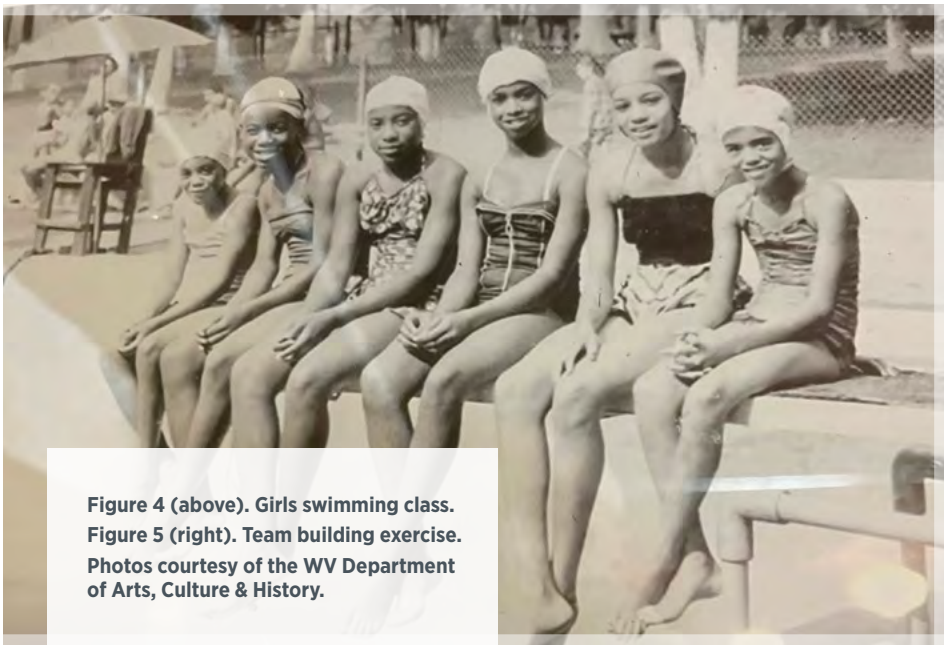


Figure 4 (above). Girls swimming class.
Figure 5 (right). Team building exercise.
Photos courtesy of the WV Department of Arts, Culture & History.

of three stone masons and seven carpenters for its construction. Some 27 prisoners from the WV State Penitentiary at Moundsville also assisted in interior finishing of windows and doors.[4] The lodge took a year to construct, starting in the spring of 1941 and concluding in early 1942.[3] A swimming pool and bathhouse also opened in 1942.[1] Additional buildings were constructed at the same time from other wood, and they have been lost to decay (personal communication, J.D. Hess, Superintendent, Camp Washington-Carver).

Use of the camp began immediately, even before construction was fully completed. The peak years of use occurred during the 1950s when the camp accommodated about 1,600 campers annually. A camper's day included nature study, music, drama, crafts, swimming, play time, and evening vespers[1] (**Figures 4, 5**). During the 1950-1960s, the camp was used not only for 4-H camps, but also by other groups and organizations such as Scouts, church groups, and homemakers.[4]

In 1954, the U.S. Supreme Court's decision, Brown v. Board of Education, ended segregation and by 1960, Camp Washington-Carver was integrated.[3] In 1979, the WV Legislature transferred the camp's administration to the WV Department of Culture and History.[2] On June 20, 1980, Camp Washington-Carver was placed on the National Register of Historic Places.[2] On that same day, then-West Virginia Governor Jay Rockefeller rededicated the camp as a mountain cultural and arts center.[4] The camp is now home to the popular Appalachian String Band Music Festival, held every August.

This five-day mountaintop gathering of string band musicians and friends from all over the world features concerts, dancing, and workshops.[6]

A trip to Clifftop, WV is worthwhile to witness the size of the Great Chestnut Lodge built entirely of American chestnut logs, and a friendly staff is there to greet you.

LITERATURE CITED:

[1] https://www.nps.gov/places/camp-washington-carver.htm
[2] United States Department of the Interior Heritage Conservation and Recreation Service, National Register of Historic Places Inventory, WV 4-H Camp for Negros: Camp Washington-Carver.
[3] Camp Washington-Carver 1928-1980, A Brief Chronology of Five Decades.
[4] https://wvnewdealtrail.com/camp-washington-carver
[5] Camp Washington-Carver, "Construction Details," WV Department of Arts, Culture & History.
[6] The West Virginia Division of Culture and History, Office of the Secretary, Education and the Arts.

ACKNOWLEDGEMENTS:

Special thanks to the West Virginia State University Library for their extraordinary effort to provide archival material for our research, and to the staff at Camp Washington-Carver.

A View

FROM MEADOWVIEW

At TACF's Meadowview Research Farms, staff are testing emerging technologies to improve efficiency and precision of a variety of workflows. Unmanned aerial systems (UAS) or drone technology has many applications in American chestnut restoration. Drones provide unprecedented access to tree canopies through their ability to approach from any angle and provide a higher resolution image from a wide range of distances.

TELLTALE FLOWERS

Aerial imagery used at scale can help reveal new locations of flowering wild-type American chestnuts on difficult-to-access sites to maximize collection of native range genetic diversity. This photo shows an approximately 30′ tall, re-sprouted American chestnut tree. With a potential abundance of re-sprouts, it was of interest to determine the extent of the remnant stand as well as its ability to flower and reproduce in situ. This particular tree shows many flowering branches with highly visible white catkins along with considerable canopy die-off. A future interest of TACF is training image recognition models to scan high-resolution, satellite-based imagery.

TREE BREEDING

Meadowview's Tree Breeding Coordinator Eric Jenkins is trialing a consumer video drone's ability to improve the accuracy and actionability of scouting female chestnut flower development at the start of the breeding season. With a DJI Air 2S drone – funded by a visionary gift from PA/NJ Chapter member Assunta Gaglione – Eric approaches the uppermost reaches of a backcross tree's canopy to zoom in on its flowers to an extent not possible with standard binoculars. The drone allows him to peer through the complex foliage structure and more accurately assess flower development. This, in turn, informs efficacy and timeliness of breeding decisions.

Using CRISPR

IN THE FIGHT AGAINST CHESTNUT BLIGHT

By Bruce Levine, MD Chapter and TACF Board Member

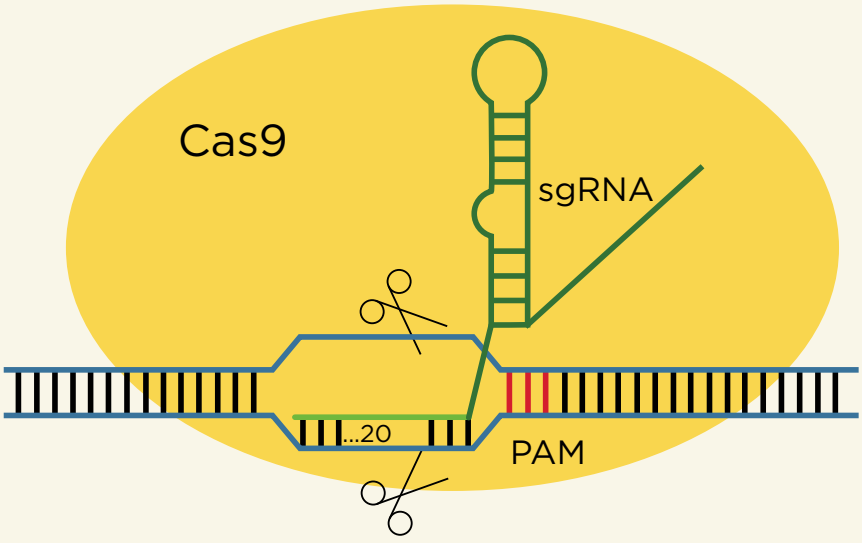
CRISPR is a new gene editing technology that has gotten a lot of publicity. TACF members often ask whether it can be applied to the fight against chestnut blight. The short answer is yes, and you can read how below. But first, what is it?

CRISPR stands for "Clustered Regularly Interspaced Short Palindromic Repeats." Don't worry if that means nothing to you. What you should know, though, is that CRISPR is a molecular system from bacteria which we have learned to use for making precise edits in the genetic sequences of all types of organisms.

Modifying the genes of organisms is how we uncover what those genes do. For example, we still do not know precisely which chestnut genes are responsible for blight resistance, nor do we know much about the genetic basis for why the chestnut blight fungus, *Cryphonectria parasitica* (Cp), is so uniquely pathogenic against American chestnut. CRISPR is a vastly better tool than what we had before to start answering those questions.

Making genetically modified organisms (in our case, trees or fungus) is essential to discover the roles of different genes involved in pathogenicity and resistance. While there are already several well-established ways to modify genomes, CRISPR offers important advantages. Previous genetic modification methods add new genetic material at random locations in the genome of the organism of interest. One then has to screen for individuals where the introduced DNA sequences are adequately expressed. It is generally much more difficult to delete, replace, or modify existing genetic sequences because this requires the

Figure 1



The yellow oval in this image represents the Cas9 protein. A scissor icon marks the part of the protein that cuts DNA. The DNA molecule to be cut is represented in blue. The green sgRNA molecule is the guide RNA that has a looped part which inserts into the Cas9 protein. A site-specific portion that protrudes from Cas9 anchors the whole complex to the DNA molecule where the DNA sequence is complementary to the guide RNA.
Source: Nødvig et al 2015[1]

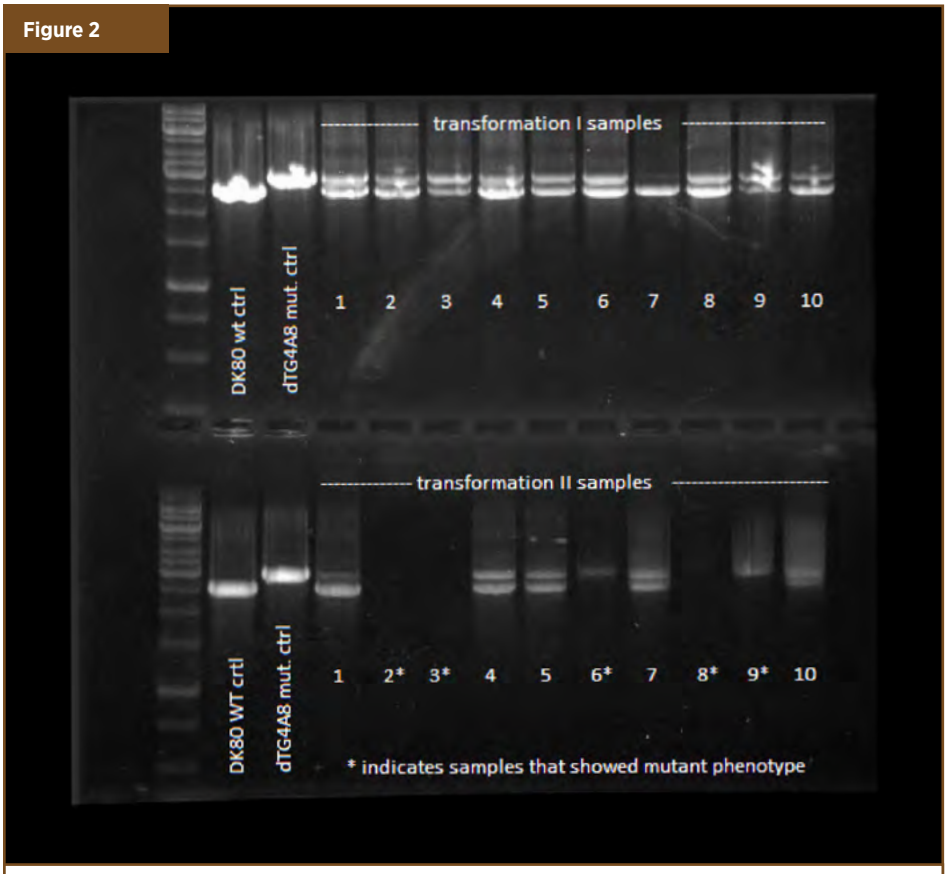
ability to target specific sites in the genome. Pre-CRISPR technologies for doing so were generally difficult to use, if available at all.

With CRISPR, one introduces two types of molecules into the nuclei of target cells: an enzyme such as "Cas9," which can cut through DNA, and short segments of "guide RNA," designed by the researcher to guide the enzyme to a specific cutting site (**Figure 1**, previous page). When the target cells repair their cut DNA, they will often make errors, causing mutations. Used by itself, CRISPR/Cas9 can thus cause targeted mutations in genes of interest, enabling researchers to observe changes in the organism when the gene's function is lost. If one also adds strands of "donor DNA," the cell may use these as templates to repair the CRISPR-induced cut, copying the donor sequence into the repaired DNA strand as it does so. This is editing, and it allows researchers to replace "wild-type" genetic sequences with novel sequences of their choosing. Researchers can use this approach to make small or large edits to the sequences of existing genes or even to add whole new genes at targeted locations in the genome. CRISPR also offers the possibility of making multiple edits to a genome at once, something which could not be done by other methods.

We have various ways of making educated guesses about which chestnut or Cp genes are of importance, and CRISPR gives us a much more efficient way to remove or edit such candidate genes to test our hypotheses. Thus, CRISPR can help us both discover the function of important chestnut or Cp genes, and potentially let us create gene-edited chestnut trees that are less susceptible to the disease, based on those discoveries.

Suppose we learned that the Chinese version of a particular chestnut gene confers better blight resistance than the American version. We could then use CRISPR to edit the gene in American chestnut cells to resemble that of Chinese chestnut, without bringing along additional Chinese DNA that one would get through traditional

Figure 2

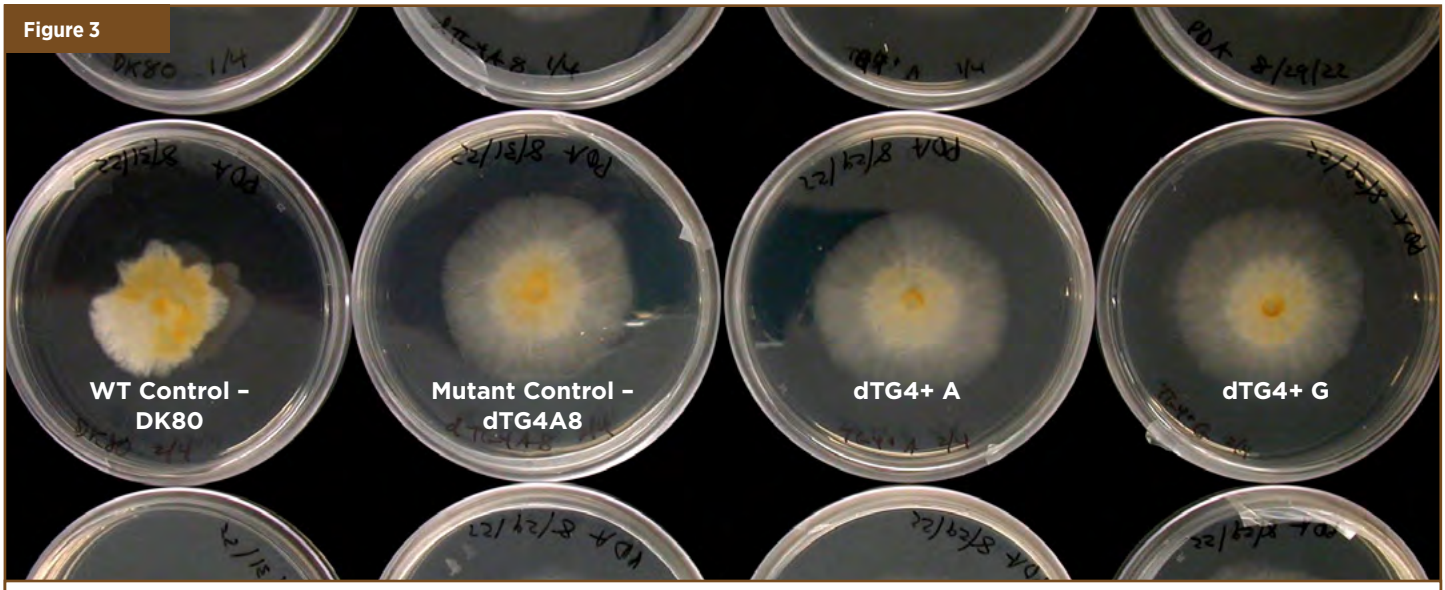


These images show fluorescent DNA fragments traveling through a gel. The shorter the fragment, the further down in the gel it moves. Both rows contain wild-type controls (with the natural gene) and mutant controls (where the gene has been replaced), and the difference in size is evident - the mutant sequence is somewhat longer than the wild-type sequence and appears higher in the gel. The upper row includes samples taken from a transformation using HGR alone and we can see that all of the samples contain both wild-type and the mutant gene. The lower row includes samples transformed with the CRISPR-aided approach, and here we can see two samples (6 and 9) where only the mutant gene is present. (Subsequent testing showed that samples 2, 3, and 8 were also pure mutant colonies.)

breeding. These cells could be grown into trees which we can then test and use for breeding. CRISPR could also be used to introduce defense-related genes from other plant species that would still function in chestnut, but not be affected by the mechanisms that Cp has developed to shut down chestnut's specific defenses.

Many CRISPR tool kits have been developed for editing animal and plant genomes. Currently, CRISPR methods for producing modified chestnut trees have been reported only for European chestnut (Pavese et al. 2021[2]), and this system has not yet been used for American chestnut. Even with the improvements CRISPR brings, it will still be time consuming and difficult to make genetically-modified chestnut trees. On the pathogen side the work is easier, but there are fewer CRISPR systems available for fungi, and, until now, none optimized for Cp. Under a TACF grant awarded in 2019, I developed a way to use CRISPR to increase the efficiency of genetic modification in Cp. There is already a well-established method, known as homologous gene replacement (HGR), to delete or replace genes in Cp, but it can be time-consuming, inefficient, and often fails. Even when HGR works,

Figure 3



These Petri dishes show the difference in appearance between the wild-type Cp strain, DK80, and mutants derived from DK80 where the *CpSec66* gene was deleted. The mutant dTG4A8 was made using HGR alone, while dTG4+A and dTG4+G were made using the CRISPR-aided approach. All of the mutants show the identical fast-growing, sparse, lightly pigmented appearance typical of the *CpSec66* knockout.

it cannot be used to replace more than one gene at a time, and deleting or replacing multiple genes in succession can be very complex. Through my work under TACF's grant, I showed that the CRISPR/Cas9 system works in Cp, and does result in higher gene editing efficiency than HGR alone.

I began by using HGR to insert a version of the Cas9 gene directly into the Cp genome. This created a new strain of the fungus I named "DC9" which behaves normally in every way except that it also expresses the Cas9 enzyme. I used DC9 cells to attempt two separate gene replacements using both the old HGR method, which involves introducing donor DNA, and a CRISPR-enhanced approach using both donor DNA and guide RNA designed to direct Cas9's cutting power to the target genes. In both cases, I saw notably increased efficiency. For the first gene, *CpSec66*, I produced more genetically transformed colonies using the CRISPR-enhanced approach than with HGR alone. More significantly, some of the transformed colonies generated with CRISPR did not have to be subcultured to separate the transformed from wild-type nuclei, a tedious step that is almost always required when using HGR alone (**Figure 2**, previous page). The CRISPR-enhanced *CpSec66* knockout strains showed the same abnormal phenotype and reduced virulence seen in the *CpSec66* knockout generated with HGR alone (**Figure 3**). Success was even more notable for the second gene I targeted, *TG6* – I had failed in five previous attempts to knock *TG6* out using HGR alone, but with the CRISPR-enhanced method, I immediately obtained a single *TG6*-knockout colony in which the wild-type gene was completely abolished. (The effect of the *TG6* gene on fungal virulence is currently being tested in chestnut seedlings.)

DC9 shows that the CRISPR/Cas9 system does work efficiently in the chestnut blight fungus, and additional refinements to the method may boost efficiency further, enabling us to increase the number and pace of gene knockout studies in the fungus. All of this will help accelerate our exploration of the Cp genome, which in turn will help us discover the genetic basis for naturally-occurring forms of blight resistance, or to create new forms of resistance targeting the pathogen in novel ways.

CRISPR is not magic, and will not solve anything on its own, but it is a very useful new addition to our research tool kit. We will certainly hear more about it as TACF's research and restoration efforts continue.

LITERATURE CITED:

[1] Open Access: Nødvig CS, Nielsen JB, Kogle ME, Mortensen UH (2015) A CRISPR-Cas9 System for Genetic Engineering of Filamentous Fungi. PLoS ONE 10(7): e0133085. doi:10.1371/journal.pone.0133085

[2] Pavese V, Moglia A, Corredoira E, Martínez MT, Torello MD, Botta R (2021) First Report of CRISPR/Cas9 Gene Editing in *Castanea sativa* Mill. *Frontiers in Plant Science* 12. doi:10.3389/fpls.2021.728516

Restoring American Chestnut:

HOW ASSISTED MIGRATION IS BEING USED TO [RE]INTRODUCE A KEYSTONE SPECIES UNDER CLIMATE CHANGE

By Pete Clark[1], Tony D'Amato[1], Paul Schaberg[2]

Climate change is expected to alter many aspects of forest ecosystems. Among these changes, tree species ranges are projected to shift northward and upslope in response to warming temperatures and altered precipitation patterns. Unfortunately, natural seed dispersal and plant migration rates dramatically lag behind the pace of climate change.

Figure 1 Example of seedlings established in a one-acre harvest gap in a northern hardwood forest after being planted five years prior. Nine species were planted to test different forms of assisted migration, including assisted population enrichment (PE) and assisted range expansion (RE). Photo by Tony D'Amato.

[1]Rubenstein School of Environment and Natural Resources, University of Vermont, Burlington, VT
[2]US Department of Agriculture, Forest Service, Northern Research Station, Burlington, VT

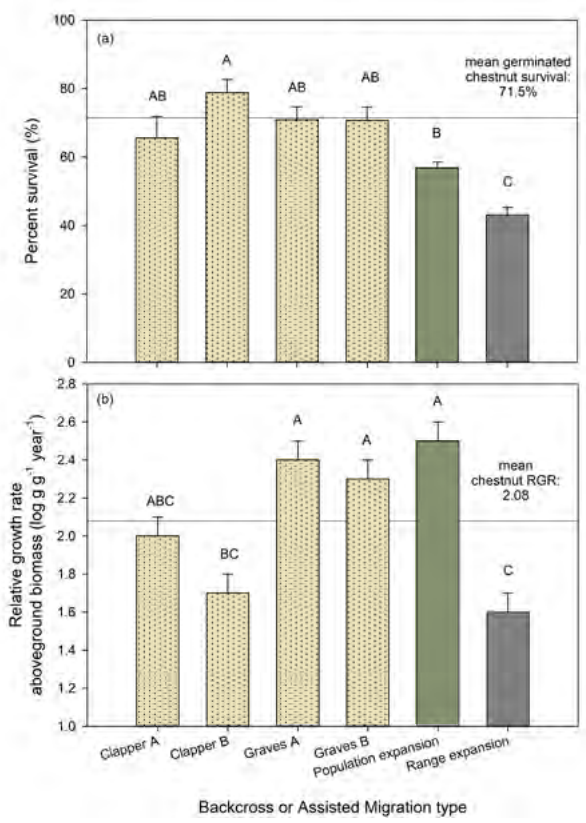
For instance, tree migration rates in the eastern U.S. after the last glaciation were approximately 300-1500 feet per year (100-500 meters). Compared to the rate of climate change, approximately 3-6 miles per year (5-10 kilometers), trees are greatly outpaced in this race. An outcome of losing this race is that by the end of the century, climate may shift so far outside the historic range that forested communities could ultimately become maladapted to new and novel conditions. This is problematic because it will lead to issues with forest health, greater ecological vulnerability, and potentially high levels of mortality with fewer offspring to replace overstory trees in decline.

In anticipation of these changes, various forest adaptation strategies have been proposed, including intentionally modifying species composition via "assisted migration" to incorporate tree species and genotypes expected to be better adapted to future climate regimes. With respect to assisted migration, the devil is in the details. For instance, *assisted population expansion* refers to the movement of species or genotypes over relatively short distances, such that movements occur within a species' historic range and often aim to augment already existing populations at northern latitudes with seed sources from southern seed zones. Pushing the envelope, *assisted range expansion* refers to "modest" movement of species to environments outside of historic ranges, but to areas forecasted to be better suited to track the pace of climate change. This movement is intended to move species to places they would reach if they could only migrate as fast as the climate is changing.

Foresters have a rich legacy of using tree planting to achieve various outcomes, namely for timber production. Historically, the long-term conservation paradigm has been to prioritize locally adapted species and genotypes with only modest movements away from parent seed sources. Considering dramatic changes to many forested landscapes that we have already observed (extreme forest fires, repeated "one-in-a-century" droughts, more invasive pests and pathogens) coupled with the forecasted increases in these events, there is a pressing need to assess how forest adaptation measures that include assisted migration may be used to support forest conservation strategies aimed at meeting diverse cultural and ecological objectives. Among these objectives is to examine how assisted migration may be incorporated into restoration efforts of degraded foundation species, like the American chestnut.

In 2017, a partnership formed between the University of Vermont, Dartmouth College, the U.S. Forest Service Northern Research Station, the Northern Institute of Applied Climate Science, and The American Chestnut Foundation to assess forest adaptation strategies in the northeastern United States. This work was part of an international effort, *Adaptive Silviculture for Climate Change*, and the project by this team involved a 400-acre (161 hectare) "operational scale" experiment in a northern hardwood forest in northern New Hampshire to test various forest management strategies that confer ecological adaptation, termed resistance, resilience, or transition (learn more at adaptivesilviculture.org). This experiment is the largest of its kind in the region, and

Figure 2



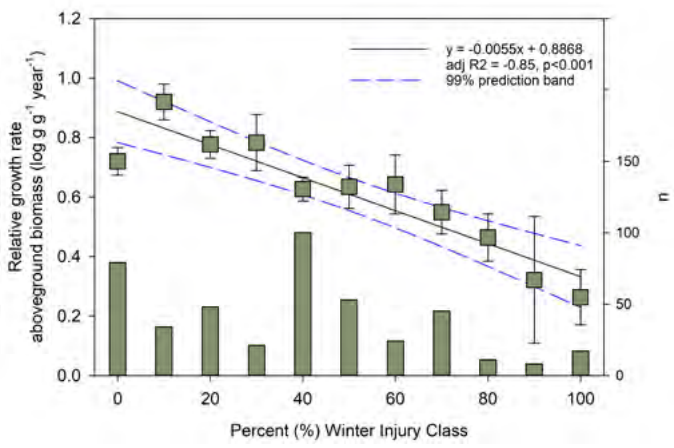
Five-year survival (top) and relative growth rate (bottom) in terms of aboveground biomass of American chestnut seedling backcrosses (Clapper and Graves) relative to other species tested, grouped by assisted migration type (assisted population expansion, assisted range expansion). Species classified as assisted population expansion are northern red oak, red spruce, eastern hemlock, bigtooth aspen, white pine, and black cherry. Those classified as assisted range expansion are bitternut hickory, black birch, and American chestnut (the latter presented separately in the figure). Letters denote groups that are significantly different ($p<0.05$).

the second of now twelve replicate installations in North America that apply a common climate-smart forest management framework across various ecosystems.

To test the efficacy of assisted migration as a tool to adapt and diversify forest species composition, in 2018 our team planted nearly 5,000 seedlings from nine species expected to fare better under a changing climate (**Figure 1**). In addition to selecting species forecasted to increase in abundance under a warming climate, emphasis was placed on planting diverse species that may confer important ecological traits and cultural values for a future forest, not just for future timber value. For example, conifers like red spruce and eastern hemlock were included to help provide a more mesic, deep shade environment; species with nutrient rich seeds such as red oak and bitternut hickory were incorporated to provide future seed sources for wildlife

and traditional uses. Other species included black cherry, bigtooth aspen, white pine, black birch, and of course, American chestnut (four families of Clapper and Graves B_3F_3 hybrid backcrosses). Some of these species are locally present on the site but only comprise a small part of the forest. In the assisted migration nomenclature, these species would be examples of assisted population enrichment. Other species, like chestnut, have never been part of these ecosystems but can be found growing within 100 miles (160 kilometers) to the south and are expected to have favorable species habitat in the future. These are considered assisted range expansion plantings.

Figure 3



The effect of percent shoot winter injury (three-year mean) on American chestnut seedlings in terms of relative growth rate in aboveground biomass (boxplots and linear regression) and the number of individuals affected (n; bars). RIGHT: Picture depicting winter shoot injury and associated dieback on an American chestnut seedling. Figure reference: Clark et al. 2022

Being a seedling is no easy task and establishing roots outside of your element can be even harder. Pressures on seedlings from nursery transplant shock, moose browse, competition from other vegetation, or the increasing occurrence of extreme weather events (drought, spring frost) are just a few examples that make the seedling stage a bottleneck for survival. To track performance over a five-year period, our planted seedlings were monitored twice annually to assess various measures of growth, survival, and capacity to grow at or beyond their range limits. Among the many exciting findings from our study was the ability for American chestnut to not only persist but maintain high levels of growth and survival during this critical life stage (**Figure 2**). This is impressive given the parent seed source for chestnuts was nowhere close to being local (more on this below). Remarkably, American chestnut outperformed all other assisted range expansion plantings that we tested and has performed as well as the more locally adapted assisted population enrichment plantings.

Nevertheless, the American chestnut seedlings in our experiment have faced many challenges growing far north of the species' historic range. One of the biggest limitations has been extreme low temperatures which led to frost damage to sensitive shoots (**Figure 3**). This produced considerable die-back on seedlings resulting in more bush-like growth forms and challenging its ability to maintain sustained growth. Still, our results indicate that the species has a strong capacity to tolerate shade from competition and maintain high growth rates, which should give these seedlings an advantage to help shape future forest demography.

There is a growing interest in using tree planting to achieve various benefits for climate change, such as restoration of degraded species and ecosystems, reforesting understocked forests or afforesting non-forest areas to elevate the greenhouse gas and carbon mitigation potential, or adaptively responding to climate change via assisted migration. Despite this interest, the capacity of forest nurseries to supply sufficiently diverse species and seed from climate-adapted seed zones falls seriously short of the need. Nowhere is this problem more apparent than with the American chestnut. While many factors contribute to the lack of seed of availability, there are simply few reproductively viable seed sources left to be relied upon for broadscale chestnut restoration. One of the outcomes of our work was a demonstration that American chestnut has the capacity to be incorporated into northern forests settings, far from the parent seed source. This finding has important implications for species restoration given that these sites may ultimately become more favorable for this species as climate continues to change. Provided they can hang on, these chestnut plantings may become a valuable seed source to help restore this species into the future.

Read the full story and learn more about this research at doi.org/10.1016/j.foreco.2022.120505.

Clark, P. W., A. Freeman, A. D'Amato, P. Schaberg, G. Hawley, K. Evans, C. Woodall. 2022. Restoring a keystone tree species for the future: American chestnut assisted migration plantings in an adaptive silviculture experiment. *Forest Ecology and Management*. 523. doi.org/10.1016/j.foreco.2022.120505

Reflecting on a Summer Among the Chestnuts

By Mira Polishook, Duke Stanback Fellowship Summer Intern

Last December, I listened to a podcast about the history of the American chestnut and recent efforts to revive its place in our forests and culture. I had previously learned about chestnut blight as a case study on fungal pathogens in a mycology class. I remember thinking about how fascinatingly scary it was that such a fungus could wipe out a tree so integral to the eastern U.S. forests. It felt like a perfect coincidence that less than a month later, I saw a listing for a Southern Restoration Intern at The American Chestnut Foundation (TACF) through the Duke Stanback Fellowship Program. Six months later I was in Asheville for my dream summer job, combining my interest in plant-fungal interactions with my passion for environmental conservation.

Now, 10 weeks into my internship, I am amazed at how much I have learned and done – it has been a whirlwind in the best possible way.

I began the summer with many questions! Between long car rides and hours of fieldwork, Jamie Van Clief, TACF's southern regional science coordinator, taught me the ins and outs of chestnut trees and conservation strategies. I have been so inspired by what I have learned that I find myself going down multiple internet rabbit holes, spending hours and hours reading scientific papers: What fungi associate with chestnut tree roots in the soil? What is the lifecycle of *Cryphonectria parasitica*? What are the challenges of grafting? I even felt inspired to ask ChatGPT how we can save the American chestnut, curious to see if it produced any novel conservation ideas. It did not, although it did offer information about TACF's restoration mission.

Besides filling my mind with chestnut knowledge, the most incredible part of this job has been the fieldwork. Spending hours in chestnut orchards in the hot southern sun, surrounded by these majestic trees, with the awareness of passion and care that has gone

Mira standing in front of highly rated trees at the Redstone Arsenal Orchard in Huntsville, AL after a day of data collection.

Mira poses with students and professor from Maryville College who performed orchard cleanup at the nearby Mountain Homes Orchard in TN.

Preparing seedlings for a small stem assay to screen trees for blight resistance at the University of Tennessee at Chattanooga.

Bagging trees for pollination with Joe James at Chestnut Return Farm in Seneca, SC.

into breeding and growing them, is the hands-on summer experience I was looking for. (During the school year I spend so much time in libraries, labs, and lecture halls, it was a welcome change!) Though exhausted and covered in dirt and bug bites, nothing is more gratifying than finishing up a day among the chestnut trees.

Beyond all the significant knowledge I have gained, it is also the people who have made this summer so memorable. I have genuinely enjoyed meeting folks from all over the South who share a mutual love of American chestnut. I appreciate the stories of how they became involved in the tree's restoration. The passion among this community is infectious.

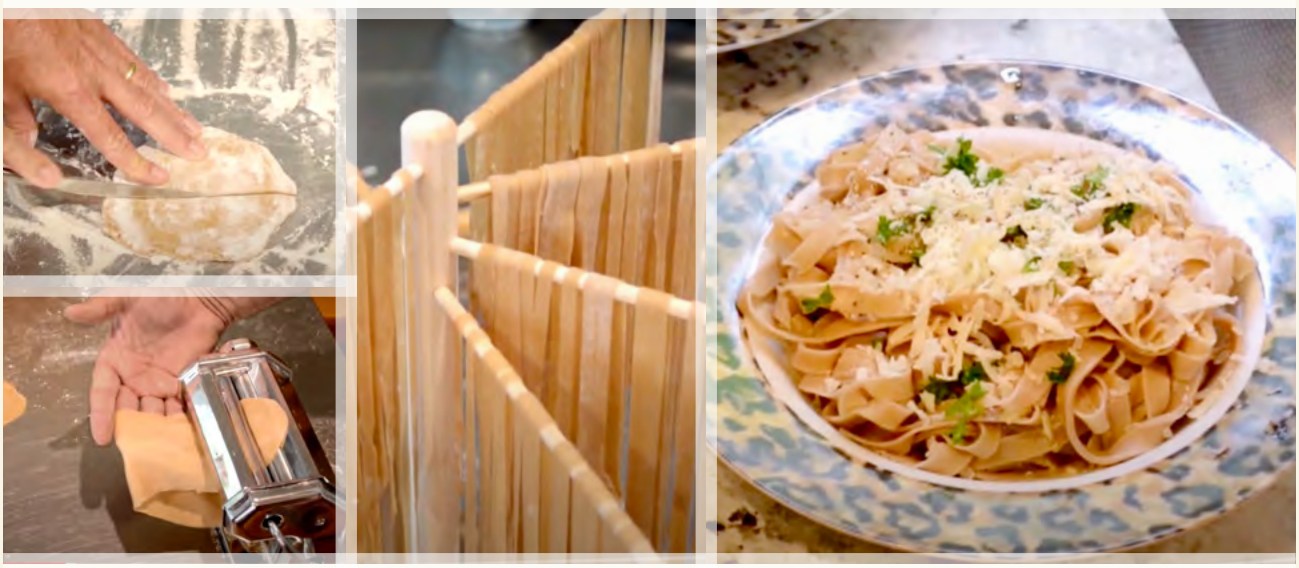
By the time this magazine is published my summer internship will have ended. I am grateful to Jamie and everyone at TACF for this invaluable experience. I am officially hooked on chestnut and excited about being part of this enthusiastic community dedicated to bringing it back.

Chestnut Pasta with Butter and Sage Sauce

Recipe by Kathy Patrick, GA Chapter Vice-President

In this recipe, chestnut flour is mixed with wheat flour to create fresh pasta served in a sauce of melted butter, flavored with fresh sage, allowing the nutty, earthy chestnut flavor to shine through.

Serves 4



Ingredients

2 ½ cups all-purpose flour
⅘ cup/100 grams chestnut flour
4 eggs
2 tablespoons olive oil
½ cup unsalted butter
1 sage leaf
Salt, to taste
Black pepper, to taste
Freshly grated Parmigiano-Reggiano cheese, to taste

Method

Gather the ingredients. Sift the flours together, then form into a mound on a wooden surface.

Scoop a well in the mound to form a volcano-like shape and crack the eggs into the crater, together with the olive oil and a pinch of salt. Knead the dough for 10 to 15 minutes or until it is firm and elastic.

Roll the dough out to about the thickness of a dime, then cut the sheet into irregular pieces using a knife or serrated pastry wheel, or run through a pastry machine to cut into long, thin tagliatelle.

Set a large pot of water to boil over high heat for the pasta. Meanwhile, melt the butter in a small pot over low heat with the sage leaf to flavor the butter. Let the sage leaf infuse into the butter for one to two minutes, then remove the leaf and discard it. Season the melted butter to taste with salt and pepper.

When the pasta water reaches a rolling boil, add one to two tablespoons of coarse sea salt to the water. Return to a rolling boil, add the pasta and cook for one to two minutes. (Since the pasta is fresh, it will cook very quickly.)

Drain the pasta, return it to the pot, and toss gently with the sage-infused butter.

Serve with the grated Parmigiano on the side.

A Tribute to Bob Summersgill

Bob Summersgill may have been American chestnut's biggest fan. He worked diligently to form a New Jersey Chapter of TACF, and when it was clear that would not come to fruition, he collaborated with his state Chapter, Pennsylvania, to form the PA/NJ Chapter we know today. He also worked with chestnut enthusiasts to create the Maryland Chapter, and instilled interest about chestnut restoration wherever he went. He was such an admirer he even named his beloved dog Chestnut. Bob will be greatly missed, and his contributions will not be forgotten.

I knew there used to be chestnut trees in NJ, that something wiped them out, and that there was an organization working to bring them back. In my search to learn more, I was told, "You have to talk to Bob Summersgill." Sure enough, I tracked Bob down and he brought me up to speed. The first round of plantings at the Schooley's Mt. Orchard had already begun and he enlisted my help with maintenance and harvesting nuts. Through that work I spent many interesting and informative hours with Bob and his faithful friend, Chestnut.

Mervyn Haines, Schooley's Mountain, NJ

Bob was my first contact with the PA Chapter of TACF. He invited all NJ TACF members to a presentation on growing chestnuts in Morristown, NJ. He tried for years to start a NJ Chapter with no success. He was always eager to give a talk, exhibit our display, or help with plantings and orchard maintenance. His drive and enthusiasm will be missed.

Les Nichols, Phillipsburg, NJ

I remember having lunch one day between planting sessions and Bob sketched the backcross breeding scheme on a napkin so I could understand it better. It did not matter to Bob what needed to be done, he would just do it! Whether that was cold calling people for support, membership, or money, or doing field work of any sort, he was front and center leading by example! RIP my friend.

Clark Beebe, Longmont, CO

In 2004 I reported an American chestnut tree in Monmouth County, NJ. Bob came down to see it and recruited me to join TACF. He was totally committed and knew how to motivate others. I have fond memories of staying at his farmhouse and up in a bucket with Bob pollinating surviving Americans.

Tony Rosati, Middletown, NJ

(l-r) John Kressbach, Bob Summersgill, Mervyn Haines, and Chestnut the dog at Schooley's Mountain in 2009.

I am so saddened to hear that Bob passed. I had not spoken to him in some years, but I will always remember him fondly since he was one of the first (if not the first) people I had discussed the American chestnut with. There was definitely always something special about Bob – a quiet kindness that shone through when you spoke with him. He will surely be missed.

Ted J. Del Guercio, III, Old Orchard Beach, ME

Bob was my mentor, and he inspired me to help spread the word about the need to save the chestnut tree. We attended meetings all over NJ and PA to inform people of the plight and importance of the American chestnut, often with his puppy, Chestnut. He will be missed.

Tom Paris, Kendall Park, NJ

I first met Bob in 2004 at a PA/NJ Chapter meeting. He was president at the time and in his welcome message he explained that he had become president because he missed a meeting. In his absence, his fellow members had nominated and elected him to office. He found out after the fact, and though he enjoyed the work and traveling, it was a lesson to not skip another meeting!

Timothy P. Van Vliet, Branchburg, NJ

Bob was a dedicated volunteer with the PA/NJ Chapter and we I spent many days walking the woods of northern NJ finding flowering American chestnut trees (along with his dog named Chestnut), and then many days in a bucket truck collecting pollen and cross-pollinating trees for the breeding program.

Ron Farr, New Foundland, NJ

Bob Summersgill and Ann Leffel pollinate at Brogue Orchard in PA.

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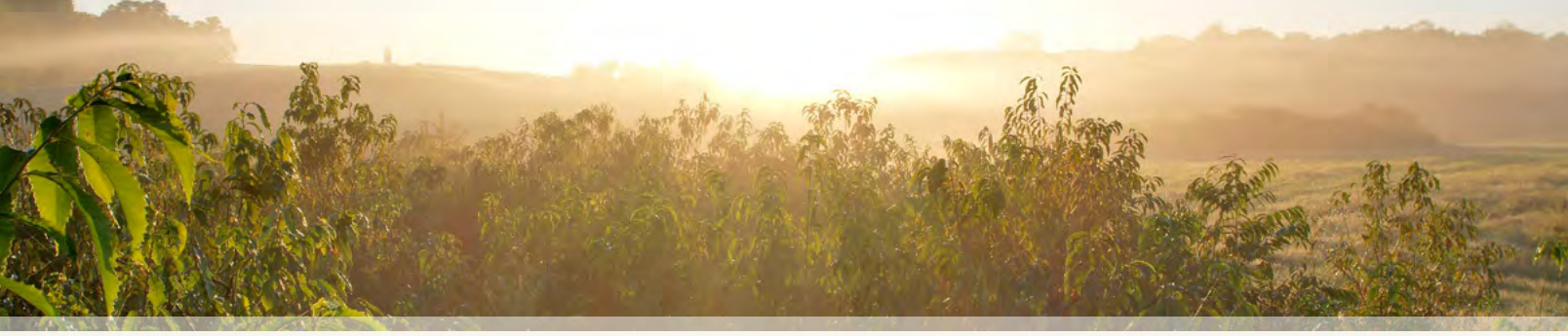

Founded 40 years ago by prominent plant scientists and committed chestnut enthusiasts, TACF has come this far due to your commitment and support. And we are not slowing down!

Help us continue our endeavor to inform, educate, and inspire younger generations, and bring us closer to achieving our collective goal: the return of the American chestnut to its native range. We gratefully invite you to be part of advancing the vitality of this historic mission by making an end of year gift.

Thank you for being part of our grassroots effort from the ground up.