

# Pursuing an Am

*Restoring the American chestnut to our forests — and our wildlife.*

by Virginia Shepherd

**I**n the mountains of Nelson County, Dr. Gary Griffin jumps out of his white Chevy van and whistles for his dog. “Let’s go, Timber.” A 14-year-old English setter, Timber is the second-best grouse dog Griffin has ever owned. “He still has at least one season left in him, I think,” grins the optimistic Griffin, a lean and athletic figure in his late 60s. A member of The Loyal Order of Dedicated Grouse Hunters, Griffin sets a goal of spending 120 hours hunting grouse every year. That translates into a lot of forest he and Timber have covered together in Virginia and West Virginia. But when Griffin is in the woods, he’s not only grouse hunting. He’s hunting chestnuts. For more than 40 years, Griffin, a plant pathologist and professor emeritus at Virginia Tech, and wife Lucille have joined a handful of researchers on a quest to restore our blighted past and bring the American chestnut back to Virginia forests.

One hundred years ago, the American chestnut, *Castanea dentata*, made up nearly one-quarter of the tree species in our woods, forming the very foundation of the southern Appalachians’ forests. Reaching heights of more than 65 feet and 4–5 feet in diameter, the hardy and aggressive American chestnut was the undisputed monarch of the forest. A tree of true abundance, it was a preferred food of wild turkey, deer, bear, grouse, and squirrels, and one of the most important sources of income for mountain farmers who fattened their hogs on chestnuts and earned cash

Philadelphia’s Fairmount Park was the scene for *Gathering Chestnuts*, by J.W. Lauderbach. This engraving appeared in the *Art Journal* of 1878.

# American Dream

Courtesy of Brenda Morgan and George Richardson



Dr. Gary Griffin with his English setter, Timber.

Photo courtesy of the Great Smoky Mountains National Park Library



The family of James and Caroline Shelton pose by a large, dead chestnut tree in Tremont Falls, Tenn., circa 1920. The tree was found to be hollow.

Photo courtesy of Shenandoah National Park Archives



A lone chestnut snag stands in Big Meadows in Shenandoah National Park, Virginia. **Right:** Illustration by Susan Bull Riley. (Courtesy of The American Chestnut Foundation.)

by supplying the nut trade. Virginia was the very center of its kingdom, with chestnut forests spreading north and south through the Appalachians from New Hampshire to Georgia.

Yet a microscopic fungus invisible to the naked eye brought this giant of the forest to its knees. In 1904, *Cryphonectria parasitica*, the Asian fungus responsible for the chestnut blight, was first identified in New York in a stand of dying American chestnut trees. By 1914, the blight had reached Northern Virginia. By 1925, it was blazing through the Blue Ridge into North Carolina, killing virtually every overstory chestnut tree in its wake and spreading south and west at a rate of 24 miles per year. In a short 40 years, the tiny fungus killed between three and four billion trees and completely dismantled the forest landscape in more than 33 million acres of the southern Appalachians.

The devastation was nothing less than catastrophic, and frightening to those who realized there was nothing they could do to stop it. Susan Freinkel, in her must-read book, *The American Chestnut: The Life, Death, and Rebirth of a Perfect Tree*, interviewed Joe Tribble, an eastern Kentucky native who remembers the death of the chestnut forests, "Man, I had the awfullest feeling about that as a child, to look back yonder and see those trees dying. I thought the whole world was going to die." (p. 84)

Fortunately it didn't. The healthy oak-hickory-maple complex of the hardwood forests we know today gradually replaced the great chestnut forests in Virginia. Abundance returned, and deer, turkey, bear, and squirrel flourish again in our forests. Nevertheless, with the loss of the mighty chestnut, we lost nearly a third of our forests' produc-



tivity, translating into vital winter food for wildlife. The cyclical acorn failures we experience today signal starvation years for wildlife which were unknown in chestnut forests. Because the chestnut flowers in June, no late frost ever spoiled its reliable and abundant harvest of carbohydrate-rich nuts which could support high populations of wildlife through the harshest of winters.

These facts have not been lost on those who value wildlife. The National Wild Turkey Federation (NWTf) is supporting the efforts of those dedicated to restoring the American chestnut to our landscape. "We want to be part of the restoration plans," said Robert Abernathy, Director of Agency Programs for the NWTf. Backing restoration efforts with money and cooperative agreements, NWTf hopes to involve its members in on-the-ground chestnut forest restoration work in the future. "It's a segment of our natural history that's been missing for a long time," said Abernathy, "and all wildlife will benefit from its return."

Nevertheless, restoring the kingpin of our forests has proved a hard nut to crack. The microscopic fungus blown on a breeze has proved a worthy opponent to the toughest and greatest of our trees and the best and brightest of its supporters for nearly a century. Today, the blight is firmly established in the southern Appalachians, and any American chestnut sprout opportunistically pushing its stem through the soil in the spring is guaranteed to fall victim to it within 10 years or less. Fortunately, howev-



**Above:** The anatomy of an American chestnut tree. Illustration by Bruce Lyndon Cunningham, 2001. (Courtesy of The American Chestnut Foundation.)

**Left:** American chestnut bur in winter, photo by Kathy Marmet.



er, the fungus does not kill by attacking a tree's root system. Instead, it attacks the bark, killing all living tissue above the infection. As a result, though felled by the blight or nipped off by a passing deer, chestnut seedlings continue to exist in our forests, persistently sprouting again and again for many years.

Unlike the Chinese chestnut,

*Castanea mollissima*, which has co-existed with the blight for thousands of years, the American chestnut has not yet developed effective blight resistance. Some large surviving American chestnut trees do, however, possess a heightened degree of resistance. But the toll it takes to battle the blight makes them more susceptible to drought, deer damage, or a host of



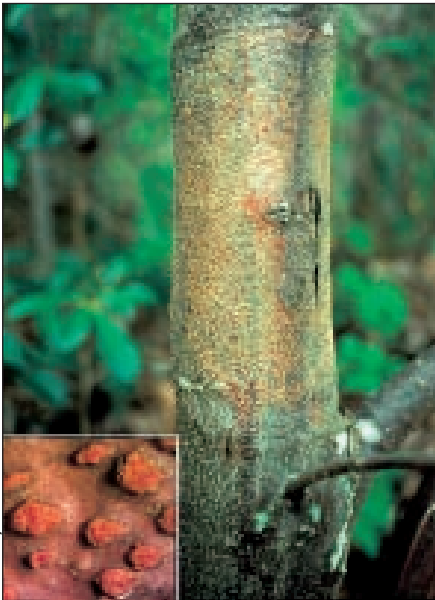
Dr. Griffin with wife Lucille, who directs the American Chestnut Cooperators' Foundation.

other difficulties naturally present in the forest environment.

Thus, some researchers have devoted their efforts to enlisting the Chinese chestnut to help the American chestnut shore up its defenses. Their idea is to perfect an American-Chinese chestnut cross through a sophisticated backcross breeding program, which will preserve most of the prized characteristics of the pure American chestnut while adding the essential strong blight resistance trait of a Chinese tree. Backcross programs of this sort have been perfected with agricultural crops such as corn. But any type of tree breeding program is slow going and slow growing. Each successive generation of chestnut crosses must be raised to maturity (some 5-6 years under the best of conditions), tested for blight-resistance, and then paired again to produce nuts to begin another 5 to 6-year cycle.

The American Chestnut Foundation (TACF) was formed one-quarter of a century ago by a determined group of scientists and chestnut lovers dedicated to pursuing this slow but effective hybridization program at their research sites in southwest Virginia. Today, they are growing over 34,000 trees of a blight-resistant variety which is but 1/16th Chinese chestnut and 15/16ths American chestnut.

But even though a blight-resistant chestnut seedling is planted in the woods, it does not mean that it will grow. The forest is full of its own complexities, something Gary Griffin knows well from his thousands of logged hours grouse hunting, cou-



**Middle left:** Virulent canker on young American chestnut tree. Inset: close-up of orange pimple-like structures which are the stromata of *Cryphonectria parasitica*. (Courtesy of The American Chestnut Foundation.)

**Middle right:** Blight damage is evident, but because the fungus does not attack a tree's root system, this chestnut will continue to survive, sprouting again and again for many years.

**Left:** Griffin and his colleagues have discovered that a two-time inoculation of young trees with a naturally occurring, but weakened "hypovirulent" strain of the blight fungus fortifies the tree's resistance.

pled with his 40 years of research with purebred American chestnuts in their natural forest environment. Every week, Dr. Griffin and his wife, Lucille, and Timber make the three-hour drive from their home in Blacksburg to a three-acre clearcut site in the middle of the 422-acre Lesesne State Forest in Nelson County, land donated to the state more than 40 years ago specifically for chestnut research. In the '80s, the Griffins and a small group of like-minded researchers formed the American Chestnut Co-operators' Foundation (ACCF), dedicated to the restoration of what Lucille calls the "All-American chestnut."

ACCF's mission is to build up

location of large surviving chestnuts in the forest to strengthen the program's blight-resistant genetic pool, and the identification of forest habitat well-suited to chestnut growth. Griffin has found that grouse hunting helps fulfill that mission. "Sooner or later hunters who spend a lot of time in the woods will come across a large chestnut survivor. One of the best trees in our breeding program I found while grouse hunting in Floyd County," he says. Griffin carries a compass in his pocket—not to find his way home, but to add to the critical data he gathers when he locates a primo chestnut site.

"Basically, when I'm grouse hunting, I'm doing a forest transect as

ant chestnut seedlings. Griffin explains that "blight resistance" is a relative term. Chestnuts do not conquer the blight; instead, they must be tough enough to live with it. Through his research, Griffin has identified what promising seedlings need to carry on the fight and survive into mature, reproducing trees in a forest environment, including adequate protection from deer, bear, and vole damage in their early years. Griffin and his colleagues have also discovered that fortifying blight resistance in pure American chestnuts means enlisting the presence of a weakened "hypovirulent" strain of the blight fungus, which they have found existing naturally in mature



Sally Mills

Researchers with the National Wild Turkey Federation and The American Chestnut Foundation (with president of Va. Chapter, George Thompson, right) cooperate in many areas of study.



Photo by Joe Schibig. Courtesy of The American Chestnut Foundation.

A healthy American chestnut tree in Tennessee. Pollen from this tree has been used in The American Chestnut Foundation's breeding program.

the naturally low blight resistance in pure American chestnuts through its cross-breeding program with large surviving trees, while simultaneously funding research to better understand the dynamics between the American chestnut, the blight, and the forest ecology in which they both exist. "It is an integrated management approach," explains Griffin, whose research philosophy was influenced by his work as an undergraduate in wildlife management at the University of Alaska. "The wildlife management connection is important to me."

Key to the ACCF's strategy is the

well," he said. "I spend 90% of the time grouse hunting and 10% looking for chestnuts." Griffin once found a premier restoration site as well while hunting—a clearcut with old chestnut stumps of a diameter and in a density that wowed even this veteran chestnut researcher. He returned to the site, gained permission to establish seedlings there, and now says, "They're growing like gangbusters. It's a terrific site."

Griffin has found that aspect, slope, direction, and the quality and composition of the forest habitat are key elements to ensuring the survival of even the strongest of blight-resist-

survivors. Their studies reveal that a two-time inoculation of young trees with this weakened strain improves their survival dramatically.

As executive director of ACCF, Lucille oversees their breeding program, including horticulture and grafting procedures perfected by J.R. Elkins in cooperation with now-retired VDOF research forester Tom Dierauf. Lucille sends out blight-resistant nuts to 850 cooperating landowners to plant each fall, and compiles follow-up reports on seedling survival. "What we have is a huge outdoor laboratory where we're learning as we go how to raise

chestnuts in the wild environment," says Lucille. "Basically what I've learned so far from doing this is that it's a very difficult job."

Half a mile down the road from the Griffins' ACCF research site, Virginia state foresters Wayne Bowman, John Scrivani, and Jerre Creighton are 30 feet high in the lift of a Department of Forestry "bucket truck," swaying in the treetops of Lesesne's 40-year-old hybrid American chestnut plantation. Reaching into a tree's canopy for a single dark green, glossy-leaved limb, Bowman locates the tiny green nub resembling a Thumbelina-sized artichoke at the base of each leaf. Because chestnut trees are not self-pollinating as a rule,



American chestnut in full blossom. (Courtesy of The American Chestnut Foundation.)

it is possible to control breeding crosses through hand pollination. Bowman gently waves a 3-inch stem of fluffy pollen over each flower before slipping a small white paper bag over the blossom cluster and wrapping it tight. Two months from now, the bags will come off and the prickly burrs protecting the cluster pop open to reveal three nuts inside. Carefully packed in peat moss and refrigerated over the winter, each nut that VDOF plants in the spring represents a small, shiny, tough little bundle of hope.

There is no doubt that those who have refused to allow the loss of the

mighty American chestnut to remain one of the great ecological tragedies of our time are a tenacious lot. Like the chestnut seedlings persistently sprouting each spring against all odds, they have refused to give up the fight. Now, finally, a harvest of sorts may be near.

Over the past 20 years, ACCF has sent out 140,000 open-pollinated seedlings and nuts to their cooperators. VDOF has planted 600 hybrid chestnut seedlings in forests throughout the state; their nurseries hold 8,000 seedlings, and thousands of nuts have been planted in their nurseries since the 1960s. In 2008, the 6,000-member strong TACF announced the monumental achievement of their hybrid backcross breeding goals. They will soon begin reforestation trials on national forest sites with blight-resistant, 94% pure American chestnut seedlings. George Thompson, president of the Virginia Chapter of TACF, whose late father was a DGIF board member for whom the G. Richard Thompson WMA in Fauquier County is named, is justly optimistic. "In 25 years, TACF has shown that the American chestnut can be saved, and within the next 25 years Virginia will see the reintroduction of this wonderful tree into our forests."

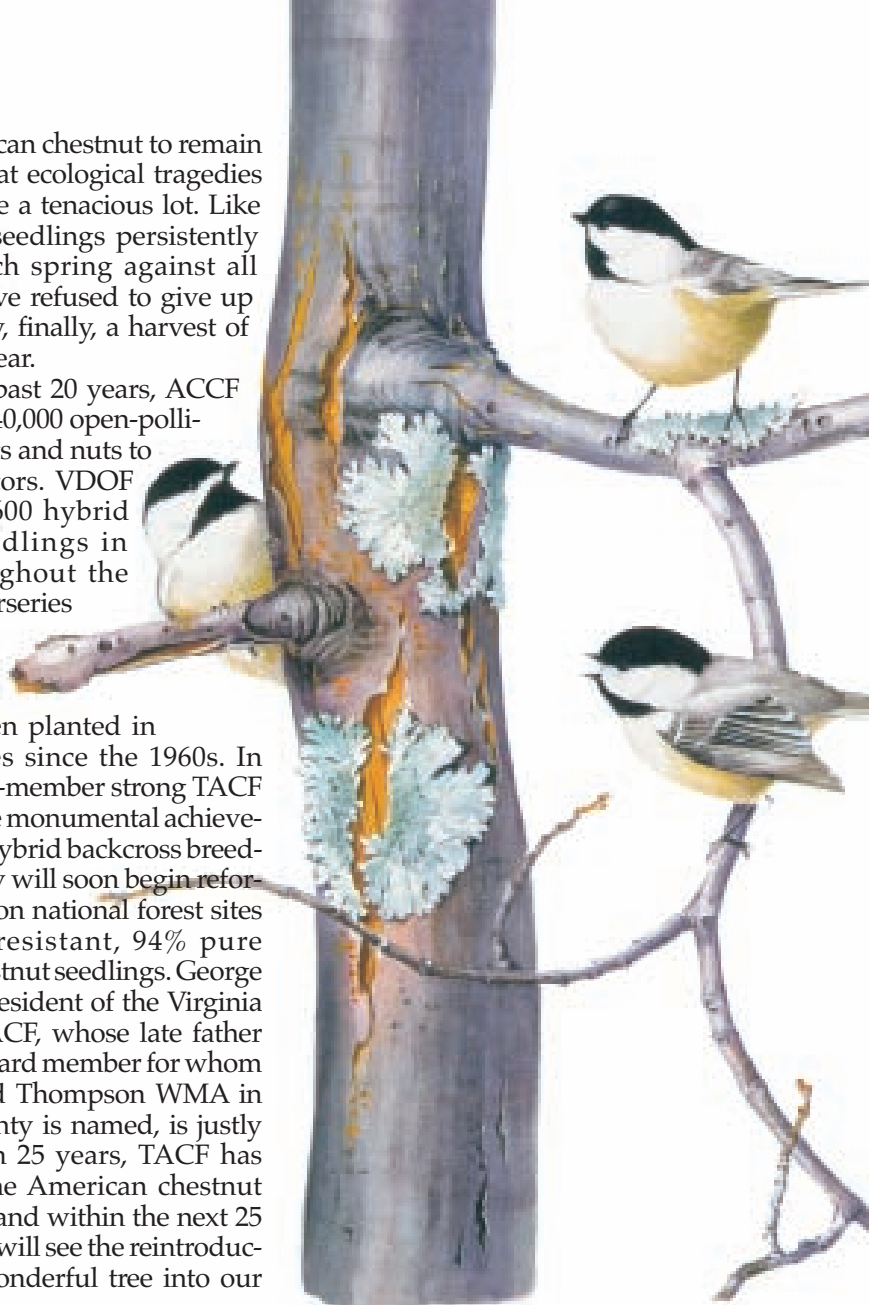
Still, whether or not we will ever be able to walk again through a chestnut forest in the Appalachians remains a vision of epic proportion. It continues to beckon the best and the brightest and the most tenacious lovers of wildlife and one mighty tree. ■

*Virginia Shepherd is a former editor of Virginia Wildlife magazine. She has been a freelance writer for the past 12 years.*

### Books:

*American Chestnut: The Life, Death, and Rebirth of a Perfect Tree*, by Susan Freinkel Published by the University of California Press, 2007.

*Mighty Giants, An American Chestnut Anthology*, edited by Chris Bolgiano and Glenn Novak. Published by The American Chestnut Foundation, 2007. (available from [www.vatacf.org](http://www.vatacf.org))



Blighted American chestnut with chickadees and lichen. Illustration by Susan Bull Riley. (Courtesy of The American Chestnut Foundation.)

### Resources:

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