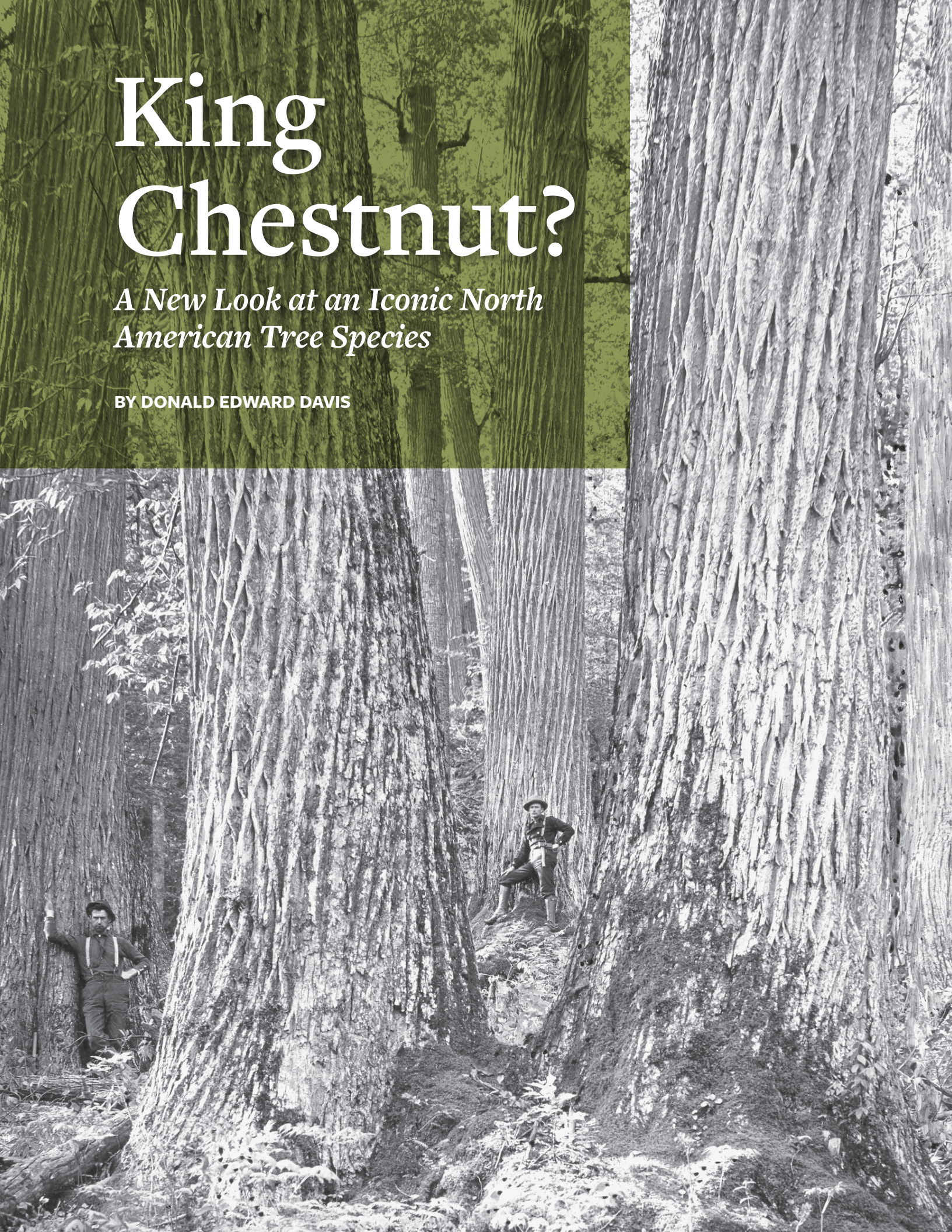
King Chestnut?

A New Look at an Iconic North American Tree Species

BY DONALD EDWARD DAVIS



The loss of the American chestnut was a national calamity, although not for the sentimental reasons often associated with the species.

If there is a single photograph that illustrates the prominence of the American chestnut in the southern Appalachians during the early twentieth century, it is the one taken by Sidney Vernon Streator in 1909. Appearing in the January 15, 1910, issue of the *American Lumberman*, the black-and-white image features several large chestnut trees in Poplar Cove, above Little Santeetlah Creek in Graham County, North Carolina. According to archivist Eben Lehman of the Forest History Society, of the more than 35,000 images in the Society's archives, the Streator image "is by far the one most requested for use. . . . People always seem to be impressed by the sheer size of the chestnut trees in the photograph, and how the men pictured are just dwarfed by these tree trunks."[1]

Streator captured the image in the summer months, when the leaves on the trees' cascading branches are completely unfurled. Standing among the chestnuts to offer perspective are timber agent D. W. Swan and timber warden E. B. King, individuals who were likely employed by the Whiting Manufacturing Company when the photograph was taken.[2]

The Whiting Manufacturing Company was owned by Frank and William Whiting of Philadelphia, who operated large lumber mills in Abingdon, Virginia, and Judson, North Carolina. Under the guise of an independent news story, the *American Lumberman* published the image of the chestnuts in order to advertise the Whitings' newly acquired timber holdings. The goal was to convince American and British investors to fund the construction of a railroad into the remote area, as the Whiting brothers did not have the required funds to do so. Although the position of Swan and King in the image distorts the size of the two trees in the foreground, both trees appear to be six feet or more in diameter. In the original publication, the written caption beneath the photograph—likely composed by Streator himself—describes the trees as "large, sound, and free from visible effects."[3]

Streator's image provides important documentation of one of the last remaining old-growth stands of American chestnut (*Castanea dentata*) in the eastern United States. Although they are exceptional trees, and do not represent the typical stand, they are visual reminders of what a mature grove might look like if afforded proper soil, nutrients, rainfall, and sunlight. They were also not the only chestnuts in the company's holdings, as the Whiting brothers possessed some 70,000 acres of timber across four watersheds.[4] When the parcel was surveyed by the Lemieux Brothers & Company—an independent cruising firm based in New Orleans—chestnut was the second most dominant species, accounting for 209,346,743 board feet of lumber.[5] For perspective, that volume is greater than the total amount of chestnut milled in the Mid-Atlantic states in 1909, the historic peak year of production.[6] In the so-called Belding Tract, which included Poplar Cove where the Streator photograph was taken, Lemieux Brothers estimated that the 10,000-acre parcel contained more than 40 million board feet of chestnut. In fact, the trees comprised thirty percent of all standing timber—only Eastern hemlock was more plentiful.[7]

Although western North Carolina timber had already acquired notoriety among timber barons in both England and Europe when the Streator photograph was taken, and was of exceptional quality, not all chestnuts in the southern mountains were sound or free from visible defects.[8] As a result of natural and human-set fires, which damaged the outer bark and made them prone to scarring and disease, the trees had a tendency to become hollow as they aged.[9] This made them beneficial to animals making dens inside the trees, especially bears, raccoons, opossums, and squirrels. However, lumbermen generally avoided such specimens, which allowed them to form, over time, even larger interior cavities. Consequently, humans found creative uses for the trees, including both temporary and permanent shelter.

One of the most innovative uses of such trees was documented by the *New York Times* in 1904.[10] According to the anonymously written report, a federal revenue agent named Thomas H. Vanderford was summoned to inspect a large chestnut tree in the Pisgah Mountains near Asheville. The tree was emitting smoke from its main trunk in the morning and evening, suggesting a smoldering fire at its base or interior. Smoke was also seen emerging from a small hole at the top of the tree, a specimen that was otherwise in perfect health. In fact, prior to Vanderford's arrival, several individuals dug around the base of the trunk and found it firmly rooted with "no hollow under it."[11][12]

Upon arrival, Vanderford made a careful examination of the tree, but found no acceptable cause for the smoke. The next day he brought an iron rod, which he thrust repeatedly in the ground in concentric circles around the tree. On a third day, after considerable searching, Vanderford detected something

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This photo of American chestnuts, located in Poplar Cove, Robbinsville, North Carolina, was taken in 1909, and appeared in *American Lumberman* (January 15, 1910).

unusual about 100 yards from the tree. Later that evening he left for nearby Hendersonville, returning the following day with six revenue officers. At daylight, all seven men observed smoke coming out of the tree "at full blast." Finding the spot from the day before, the men dug a hole with picks and shovels, which led them to an underground tunnel. Armed with carbine rifles, the men moved cautiously toward the interior of the tree, where they discovered "a blockade still running at full capacity." They also found Amos Owens inside the chestnut, who the *New York Times* called "the most incorrigible revenue violator in the State." Owens was apparently asleep when Vanderford found him, but awoke when he tapped him on the shoulder. "I suppose you would find me out after a while," Owens muttered. "I knew you were prospecting around here."[13]

In another instance, a hollowed-out chestnut tree provided temporary housing for an entire mountain family. In an interview conducted during the 1990s, Oleta Nelms recalled that her grandfather, John Denton, had once built a log cabin adjacent to a huge fallen chestnut tree. According to Nelms, the tree was actually near the location where the Sidney Streator photograph was taken in 1909.[14] Using an axe and other tools, she remembered, Denton expanded the structure "right into that chestnut log."[15] The hollowed-out portion of the tree was so large it allowed Denton to stand fully erect without bumping his head, even though he was six feet four inches tall. According to Nelms, the tree provided shelter for Denton and his family until a more permanent home could be built. Not surprisingly, the tree remained part of community folklore for decades and even caused a young Oleta to be teased at school. As Nelms explained it, her classmates thought it peculiar her "grandfather had lived in a log."[16]

An equally remarkable story was told by Charles Grossman, one of the first rangers of the Great Smoky Mountains National Park. On a mountainside above Cosby, Tennessee, Grossman documented a chestnut tree 9 feet 8 inches in diameter at a point 6 feet off the ground. "The hollow portion is so large that [an adult] could stand up in it," wrote Grossman after discovering the tree. "The hollow runs more than 50 feet up the trunk and at its narrowest point is not less than three feet," he recalled. "This must be the tree of which I heard. A man lost some stock during a snowstorm and later found them safe in a hollow chestnut tree."[17] Frank W. Woods, a University of Tennessee forestry professor, believed the chestnut was the same one another Cosby farmer had used "as a barn for a pig and a cow."[18]

The largest American chestnut tree on record, however, was located at Francis Cove, North Carolina, near the town of Waynesville. According to several published sources and one eyewitness, the enormous chestnut measured "seventeen feet in diameter."[19] In fact, the late Colby Rucker, of the Eastern Native Tree Society, believed the tree very likely possessed "the greatest known diameter of any eastern hardwood."[20] Gene Christopher, a native of Francis Cove, recalled seeing photographs of the tree and even played in the decaying stump as a young boy. According to Christopher there were other large chestnuts at the site, including one tree with such an enormous hollow trunk that, after falling on the ground, cattle could not only enter inside, but turn around and exit at will.[21]

Christopher believes the giant chestnut was felled for firewood in 1915, a full decade before the blight reached the Francis Cove community.[22] His use of the term firewood is somewhat misleading, however, as chestnut was unpopular for use in fireplaces due to its tendency to throw off sparks.[23] Chestnut kindling, on the other hand, was highly desirable for early-twentieth-century cookstoves, woodstoves, and locomotive fireboxes. In airtight structures, chestnut burned hot, evenly, and longer than pine or other woods. As a result, chestnut stovewood had become a common heating source for home parlors, community stores, and one-room schoolhouses.[24] Cured chestnut kindling also left fewer ashes and produced less smoke, making it a favorite among moonshiners needing to conceal their illegal distillery operations.[25]

Although the true dimension of the Francis Cove chestnut will perhaps never be known, the tree was undoubtedly a rare and exceptional anomaly. If removed for firewood, the measurement was likely taken at the very base of the stump, which may explain its exaggerated size. However, some researchers believe the seventeen-foot measurement refers to the circumference of the tree and not its true diameter.[26] If the Francis Cove tree was seventeen feet in circumference, it would only be five-and-a-half feet in diameter. This would hardly be a noteworthy specimen, as the historical record is replete with examples of trees seven, eight, and even nine feet across.

KING CHESTNUT?

Knowing the size and past distribution of the American chestnut is important, particularly as attempts to reintroduce the species intensify. Chestnut enthusiasts should be careful not to make false claims about the species, however, as they could hamper the restoration effort. By promoting unproven notions about their size and prevalence, restorationists raise false expectations about the tree's growth and performance. As I document in my book *The American Chestnut: An Environmental History*, the tree was not equally ubiquitous across its range

REPORT OF SECRETARY OF AGRICULTURE IN RELATION TO FORESTS, RIVERS, AND MOUNTAINS OF THE SOUTHERN APPALACHIAN REGION, 1902

This image of a large decaying chestnut tree, taken around 1902 in the Great Smoky Mountains, East Tennessee, gives scale to the size of some American chestnuts. It was included in a report on the Southern Appalachian Mountains prepared in support of creating national forests in the East.

and did not everywhere grow to great heights and dimensions.[27]

Nevertheless, there is evidence of an American chestnut that was fifteen feet in diameter. Once located on the estate of James Madison in Montpelier, Virginia, it stood near what Madison called "The Temple," a gazebo-like structure situated just north of his primary residence. In 1903, five years before it was inventoried by William duPont, the tree measured "forty-nine feet around its trunk."[28] Had the tree been cored by dendrologists to determine its exact age (it possessed a "double trunk"), it is possible it was already more than two centuries old when Madison inherited the estate from his father in 1801.

Evidence for the tree's advanced age is extrapolated from a dendrological study conducted by forester Thomas Dierauf, who cored numerous trees in the Landmark portion of the Montpelier estate.[29] Dierrauf discovered several trees at the location had been "released" in 1670, including a white oak and an unnamed hickory. The white oak, which measured only 35 inches in diameter, was calculated to be 336 years old in 2009, and possessed an average annual growth rate of ten rings per inch. The hickory was even smaller in diameter (30 inches), with an annual growth rate of eleven rings per inch. However, the largest tree, a red oak, measured 51 inches in diameter, but grew at a rate of four rings per inch, making its birth or release date 1776.[28] Madison's Temple chestnut—if one uses the estimate of four rings per inch of growth—was 360 years old in 1908 and its release or birth date 1548.[30]

Another large American chestnut worthy of mention was located at Porters Flat, in the Great Smoky Mountains National Park near Gatlinburg, Tennessee. When photographer Albert Roth captured the tree in 1933, it measured "twenty-eight and a half feet at four feet from the ground" (nine feet in diameter).[31] The tree was featured in the inaugural issue of *Castanea*, the official publication of the Southern Appalachian Botanical Society, in May 1937. The opening pages of the journal were penned by West Virginia forester Alonzo B. Brooks, who was, appropriately, asked to summarize the importance of the American chestnut to the southern Appalachians. In his appraisal of the Porters Flat tree, Brooks referred to it as a "magnificent

specimen," although he noted it had suffered severe blight damage in 1936.[32]

In 1942, the American Forestry Association brought additional attention to the Porters Flat tree, designating it their first National Champion in the native chestnut category. Stanley A. Cain, a University of Tennessee botanist, nominated the tree after discovering several large living specimens at the same location.[33] When the association introduced the champion tree in the November 1942 edition of *American Forests*, it was given the title "King Chestnut" and labeled "the largest American chestnut in the world."[34] Curiously, the association omitted the fact that its crown was dead or dying, perhaps anticipating criticism from readers had they done so.[35] Predictably, the tree did not survive beyond the end of the decade, as was the case with other large survivors attacked by blight. To see future national champions, one would have to travel to Wisconsin or Michigan or as far away as the state of Washington.

The Porters Flat tree had originally sprouted as a nut seedling, as evidenced by the slightly twisting furrows of its outer bark. Its trunk was also extremely flared, so if it had been measured at ground level, it possibly exceeded thirty-five feet in circumference or more than eleven feet in diameter. It also occupied a geographic location very similar to Poplar Cove, so, like the Streator chestnuts, it would have received significant amounts of rainfall but not continuous direct or full sunlight. Had the tree lived another century or so, the Porters Flat tree might have achieved a base diameter of thirteen feet, although older trees generally grew more slowly than younger ones. However, to reach a diameter of seventeen feet—the same as the Francis Cove specimen—the tree would have needed to live another two centuries or more, which seems unlikely—even if chestnut blight had never been introduced into the United States.

Not knowing the precise age of the Porters Flat tree in 1942, or its average annual growth rate, leaves much to speculation, or entirely excludes the possibility of a seventeen-feet-in-diameter American chestnut. Fortunately, the size and age of the Streator chestnuts are fairly well documented and serve as important arbiters in the size debate. We owe this fact to research done by forest ecologist Craig Lorimer, who studied the Poplar Cove watershed prior to receiving his doctoral degree at Duke University. In 1980, after completing his dissertation, Lorimer published a summary of his research in the journal *Ecology*, in an article entitled "Age Structure and Disturbance History of a Southern Appalachian Virgin Forest."[36]

As Lorimer discovered as early as 1973, the Streator photograph contains not two, but five large chestnut trees. This is corroborated in the printed caption of the *American Lumberman* photograph, which reads: "Characteristic Growth of Chestnut in Poplar Cove. The Big Trees in the Background in the Center of the Illustration are Poplar. The Five Large Ones in the Foreground are Chestnut. This Growth is Unusually Heavy."[37] In 1975, Lorimer was able to measure all five trees, but was unable to count, with precision, their annual growth rings. Moreover, none of the trees still possessed their outer or inner bark, as they had been dead for more than thirty-five years. The missing bark, as well as the additional shrinkage caused by the decaying process, decreased the diameter of the trees by as much as four inches. It was still possible to ascertain their growth rates, however, as several large trees that lay across a nearby trail were sawed in two, exposing their growth rings. One such chestnut, which measured 53 inches in diameter, was 210 years old when it succumbed to the blight and possessed an average annual growth rate of a quarter inch per year.[38]

With respect to the three smallest chestnuts in the Streator photograph, the tree on the right-hand side of the image—which is partially cropped and out of focus—measured 61 inches in diameter at breast height. The tree in the center of the photograph, just behind timber agent Swan, measured 63 inches in diameter. The tree in the far left of the image, beside warden King, measured 65 inches in diameter at breast height.[39] All three trees sprouted as seedlings and may be closer in age than the different dimensions suggest. Soil quality, moisture, and available sunlight are the best predictors of tree growth and those variables can vary greatly, even at the same site.

Although the two trees in the foreground appear much larger than the others, they actually are not. According to camera historian and Hollywood consultant Robert Niederman, Streator used a wide-angle lens when capturing the image. Such lenses, says Niederman, possess a greater depth of field, but make objects nearer the camera appear larger. Niederman believes Streator's camera also possessed a "rear tilt" feature; otherwise, the trees would have bent forward at the top of the image. Niederman is confident that Streator was standing on a small ladder when he took the photograph. By doing so, he was able to get all five trees, and both individuals, inside the single frame. In 2014, when I asked Niederman to offer his opinion about the diameter of the two trees (at the time, Niederman and I were unaware of Lorimer's published article), he responded by saying they were "just shy of six feet."[40]

The "Temple" American chestnut, at Montpelier Station, Virginia, c. 1898.

A. G. "DUTCH" AND MARGARET ANN ROTH PAPERS, BETSEY B. CREEKMORE SPECIAL COLLECTIONS AND UNIVERSITY ARCHIVES, UNIVERSITY OF TENNESSEE LIBRARIES, KNOXVILLE. REPRODUCED WITH PERMISSION FROM CHARLIE ROTH

University of Tennessee botanist Harry M. Jennison (left) and an unknown individual measuring the Porter's Flat Chestnut, November 19, 1933.

Niederman's estimate proved uncannily accurate, as Lorimer's measurements—which were taken at breast height and included no living bark—revealed the tree on the left was 68 inches in diameter, and the one on the right, 71 inches.[41] It is very possible that the largest tree was 276 years of age when it died of the blight and had a release date of 1659. Both trees were likely planted by squirrels or jays, the most common movers of chestnuts in the eastern deciduous forest. Although the three smaller trees in the background likely arrived at the location in the same manner, they may have also sprouted from nuts produced by the two largest trees, perhaps as early as 1670.

Despite their large size, the two Streator chestnuts would have needed to survive another four centuries in order to possess dimensions equal those of the Francis Cove giant. While it is unlikely the two trees would have lived that long, there are, in 2021, several tuliptrees in Poplar Cove that are 500 years of age, specimens possessing few signs of disease or decay.[42] Unfortunately, because the two Streator chestnuts were growing close together, they would have joined at the trunk after another century or two, as their bases were already touching in 1909. This would not only have slowed their annual growth, but would have eventually eliminated them for "champion" status, as neither tree could be considered a separate, individual specimen. This is obviously how Madison's Temple chestnut reached such a large girth, and may explain the enormous size of the Francis Cove tree.

In the case of the Temple chestnut, the merger of its two trunks occurred early on in its life, resulting in the appearance of a single individual tree. If the Francis Cove specimen shared this same characteristic, its stump, after being cut down, would have also appeared as a single trunk. Indeed, most eyewitnesses who claimed to have seen the giant chestnut did so long after it was harvested for firewood. Gene Christopher, as already noted, recalled playing in the stump as a young boy. By that time—thirty years after the tree had been fully removed—all that remained

were portions of the stump's outer shell. Evidence for this is the fact that cattle grazed inside it, suggesting considerable and advanced decay.

If the Francis Cove tree did possess a double trunk, it needed to be only four centuries old to reach a girth of seventeen feet (using the growth-rate of the Streator chestnuts as a metric). Obviously, as a single-trunk specimen, it would need to live much longer in order to reach such dimensions; so long, in fact, that after six centuries, the tree would still not be any larger than fifteen feet in diameter. However, if the Francis Cove tree was growing in the most optimal conditions, receiving maximum water and sunlight, it might have reached that size in as little as four hundred years.

Henry David Thoreau provides evidence for such accelerated growth rates among chestnuts, as he was an astute observer of the species and made considerable mention of the trees in his journals.[43] In fact, he was also the first to record the natural history of the species over its entire life cycle, describing the tree as both a tiny seedling and as a mature producer of nuts.[44] In 1852, near Concord, Massachusetts, Thoreau measured a chestnut stump "eight feet five inches" in diameter, a tree, he believed, had been cut "but a short time—a winter, perhaps two winters, before." When determining the tree's age, Thoreau counted "one hundred and two rings" and an additional "thirty-nine rings" at the very heart of the stump (the first forty rings were partially rotted). Taken together, he concluded, the number of rings "equals one hundred and forty-one."[45]

Thoreau noted the tree had "grown very fast till the last fifty years of its existence," but had since grown much slower. When measuring its growth from the center of the stump (not the actual diameter), he noted that the tree had grown nine inches in its last forty-nine years (1810–1850) or "one-seventh of an inch in a year." However, in the previous forty years (1770–1810), it had grown fifteen inches or "three-eighths of an inch a year." This means that for the first fifty-two years of the tree's life (1709–1770), its growth rings expanded, on average, more than a half-inch per year. Thoreau's explanation for the accelerated growth was the tree's solitary existence and lack of competition from other surrounding trees. "Having light and air and room," he pondered, "it grew larger than it would have done if its neighbors had not been cut."[46]

Although the growth rates documented by Thoreau do not confirm the precise dimension of the Francis Cove tree, they do make its reported size more probable. If trees could sustain such accelerated growth rates, they might, after a single century, reach diameters of six feet or more. However, very few chestnuts did so, making the Francis Cove tree, as already noted, a rare exception. In truth, very few American chestnut trees possessed diameters of ten feet or more, and those trees certainly did not represent the norm.

These facts do not make the American chestnut any less of a tree, but they do suggest that those who refer to the tree as "King of the Eastern Forest" or "Redwood of the East" are guilty of misrepresenting its true size. While chestnut trees grew to enormous dimensions in the southern Appalachians, so did other trees, including tuliptrees and several species of oaks. Both hemlock and white pine grew, on average, much taller than the American chestnut. Outside the Appalachians, it is even harder to make the claim that chestnut was the largest species, as trees with greater average girths included white oak, tuliptree, and the American elm, among others.[47]

A BANQUET TABLE FOR WILDLIFE

While size and ubiquity are important criteria for measuring the impact of the American chestnut on forest ecosystems, those things alone did not determine their full value. The tree was also responsible for maintaining moisture levels in the soil, as well as promoting the recycling of essential nutrients, including carbon and nitrogen. In 2007, the U.S. Forest Service biochemist Charles C. Rhoades discovered that chestnut leaves possessed higher amounts of nitrogen, phosphorous, potassium, and magnesium, and that beneath the leaf litter, the underlying soils retained more carbon and nitrogen.[48] Researchers in Connecticut also found higher amounts of nitrogen in chestnut leaves and discovered they decayed more quickly than those of other deciduous trees, including American beech and northern red oak. The authors of the study concluded the faster decomposition meant more available energy for other plants and microbes, which improved overall nutrient recycling.[49] These findings suggest that chestnut leaf-litter promoted a greater abundance of nitrogen-loving organisms in the soil—including beneficial bacterium, fungi, and nematodes—as well as healthier ecosystems.

Chestnut leaves were also beneficial to numerous aquatic insects, including caddisflies, stoneflies, and craneflies. In 1988, two Virginia Commonwealth University biologists discovered that when stonefly larvae were fed decaying chestnut leaves, they had "significantly faster specific growth rates and [larger] adult body mass than individuals reared on oak."[50] They also found adult female stoneflies reared more offspring after eating chestnut leaves.[51] Freshwater fish species benefit from chestnut leaf-litter, as caddisflies and stoneflies are among their most preferred foods.

The American chestnut improved stream quality in yet another way. When large limbs or logs of the tree became submerged in water, they

decayed very slowly—perhaps more so than all other tree species. As a result, more organic matter was captured in the stream, which, overtime, created higher concentrations of nutrients beneficial to both macroinvertebrates and vertebrates.[52] The deeper pools and eddies caused by the woody debris also reduced soil erosion, minimized flooding, and lowered water temperatures, benefitting cold-water fish species like native trout.[53] Remarkably, a study conducted in the southern Appalachians during the mid-1990s, found that woody chestnut debris was still having a measurable positive impact on riparian ecosystems.[54] In another study, also conducted in the Appalachians, researchers found that 24 percent of the woody debris in a single mountain stream was comprised of chestnut—more than sixty years after blight struck the area.[55]

Perhaps the most significant impact of the blight on the wooded landscape was the elimination of chestnut mast (nuts) from the forest floor. Although oak trees eventually lessened some of that shortfall, in areas where the American chestnut represented nearly half of all nut-producing species, overall mast production declined by as much as 34 percent.[56] However, a more recent study found the American chestnut produced higher amounts of mast than even northern red oaks—"the next highest nut-producing trees"—and may have accounted for as much "80% of the hard mast in any given year."[57] Computer simulation models projected a precipitant loss in mammal populations as a result of chestnut blight, with white-tailed deer, gray squirrel, eastern chipmunk, and the white-footed mouse all declining measurably in numbers.[58] There is also considerable evidence the now endangered Allegheny woodrat was heavily dependent on chestnuts, as the mammal cached literally hundreds in their winter larders.[59]

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Such findings are corroborated by oral histories, further evidence the trees played an extremely important role in forest health. In Appalachia, the relationship between wildlife and chestnut mast was so well known that it often became the subject of community folklore. Walter Cole, who grew up in the Sugarlands community of Tennessee's Great Smoky Mountains, recalled in the 1960s, "the worst thing that ever happened in this country [was] when the chestnut trees died. Turkeys disappeared and the squirrels were not one-tenth as many as they was before . . . bears got fat on chestnuts, coons got fat on chestnuts . . . most all game ate chestnut."[60] Will Effler, a neighbor of Cole's, remembered shooting a wild turkey near their homes that contained "ninety-two chestnuts, still in the hulls and undigested" in its swollen craw.[61] Earl R. Cady, a forester trained at the University of Michigan, and one of the first naturalists at the Great Smoky Mountains National Park, referred to the annual chestnut crop as "a banquet table for wildlife." Cady believed the annual bounty was so significant it allowed mammals to store "layers of fat in their bodies," as well as "nourish larger and healthier litters of young."[62] Former Cades Cove resident Maynard Ledbetter echoed similar sentiments when he jocularly exclaimed, "Back when they was chestnuts, bear got so fat they couldn't run fast, now the poor bear run like a fox."[63]

Predator species also suffered because of chestnut blight, as they frequently consumed birds and mammals that were dependent on chestnut mast. In 1992, James M. Hill, a former Randolph-Macon College biologist, ascribed the decline of goshawk, Coopers hawk, eastern cougar, and bobcat populations to the loss of the American chestnut.[64] Although Hill's evidence was mostly anecdotal, wildlife managers witnessed a direct relationship between mammal and bird populations and the availability of chestnuts. A report published by the North Carolina Wildlife Resources Commission in 1957, for example, stated "the fruit was a staple in the diets of squirrels, turkeys, bear, and deer. The loss of the chestnut as a wildlife food is immeasurable."[65]

Nongame animals were also dependent on the tree, including several moth species that ate chestnut leaves as their primary food source. In 1978, Paul A. Opler of the U.S. Fish and Wildlife Service estimated seven species of moths became extinct as a result of chestnut blight, including the American chestnut moth, the chestnut ermine moth, the phleophagan chestnut moth, the chestnut clearwing, the chestnut casebearer, the chestnut yponomeutid moth, and the confederate microbagworm.[66] Although two species have since been identified in the wild (chestnut clearwing and confederate microbagworm), the others represent a significant portion of all known invertebrate extinctions since the last Ice Age. According to University of Connecticut etymologist David L. Wagner, chestnut blight "correlates to the greatest invertebrate extinctions on earth . . . there are only sixty-one invertebrate extinctions in the modern era . . . forty-one in North America, and

CRAIG LORIMER

These fallen American chestnuts are the same trees photographed by Sidney Streator in 1909. Taken in Poplar Cove in Joyce Kilmer Memorial Forest in 1975.

of those, five are directly related to loss of chestnut."[67] The functional extinction of the trees affected other insect populations, including native bees and butterflies.[68] Douglas W. Tallamy, an entomologist specializing in the propagation of native plants and wildflowers, estimates the leaves of the American chestnut provided larval food for no less than 125 different *Lepidoptera* species.[69]

Thus, in hindsight, the loss of the American chestnut was a national calamity, although not for the sentimental reasons often associated with the species. Yes, the tree provided holiday treats to millions, and gave the young and old alike an enjoyable autumn pastime. It inspired seasonal desserts, music, and poetry, and directly influenced the development of American material culture. It helped build the country's nineteenth-century transportation and communication networks and was the economic engine that provided employment for tens of thousands of individuals. Yet, at the same time, wildlife also greatly benefitted from the tree; so much so, that numerous animal species suffered because of its disappearance. The trees also provided numerous ecosystem services, including the retention of moisture in forest soils and essential habitat for fungi, birds, and insects. For those reasons and more, the functional extinction of the American chestnut was not only a human loss, but an ecological one as well.

THE ABIDING CHESTNUTS

Regarding the fate of the Streator chestnuts, their death was spared until at least the mid-1930s.[70] Although portions of Poplar Cove were impacted with the blight as early as the late 1920s, the trees did not die all at once, as the watershed contained 6 million board feet of chestnut—"with tight bark and some green leaves"—as late as 1935.[71] In fact, the entire watershed was designated a "virgin forest" in 1936 and consequently offered up for sale.[72] After it was purchased by the U.S. Forest Service, the area was set aside as the Joyce Kilmer Memorial Forest, to honor the author of the well-loved poem "Trees" (*I think I shall never see / A poem as lovely as a tree*), who was killed in action during World War I.[73] The government preserve was created not only to pay homage to Kilmer, but to showcase one of Appalachia's last remaining old-growth forests. Ironically, the trees that once comprised thirty percent of the standing timber in the cove were, by the early 1940s, no longer an integral part of the landscape.[74] At the end of that decade, the only remaining evidence of the American chestnut's former dominance in the watershed were the hundreds of decaying snags and logs that lay scattered across the forest floor.

However, in 2015—more than seventy-five years after they had succumbed to the blight—the Streator

The Streator chestnut in 2015.

chestnuts were still an integral part of the Poplar Cove environs. I found the trees that year after Craig Lorimer directed me to the site using his hand-written field notes.[75] The largest tree in the Streator photograph had fallen to the southwest, but was still relatively intact, as its trunk stretched 110 feet across the forest floor. The smallest end of the decaying log was 11 inches in diameter, which means the crown of the tree extended at least 130 feet into the canopy. Because the base of the trunk had partially collapsed, it was impossible to get an accurate girth measurement, although the log was certainly more than four feet in diameter at breast height. At 56 feet from its base, the intact trunk was exactly 3 feet 2 inches in diameter. The second tree, which had fallen to the northeast, had decayed considerably, especially where it touched the forest floor, although several of its exposed roots were still intact. Both logs were home to mosses, numerous fungi, a variety of herbaceous plants, and dozens of tree seedlings.

The Streator chestnuts continued to have an ecological impact on the surrounding forest long after being killed by the blight, as did others before them regardless of their cause of death. This is an important fact, particularly as we begin evaluating the various restoration efforts that seek to return the species to the eastern deciduous forest. The American chestnut was a tree of considerable utility, but it also was a vital and enduring component of the forest ecosystem. Some trees interacted with their environments for as long as five centuries.

Will the advanced chestnut hybrids, as well as the newly developed genetically modified American chestnuts—which reportedly possess blight resistance—share these same qualities? If they do not, some have argued that the ecological footprint of the American chestnut will, in the coming decades, completely disappear. However, as I argue in *The American Chestnut*, the story of the species is far from over. As long as the trees are "smoldering at the roots and sending up new shoots," as Robert Frost once put it, there is still some hope for the species.[76] In fact, the elevated number of living survivors suggests the term "functionally extinct" may no longer even apply to the tree, since millions continue to blossom and, in rare instances, produce fertile, viable nuts.[77]

Whatever the ultimate outcome of the various breeding programs, it is possible that the most well-intentioned humans will be unable to restore the American chestnut to its former place in the woodland

ecosystem. When and if American (or American-like) chestnut trees are established in the eastern deciduous forest, they will still need to contend with old adversaries like *Phytophthora* (root rot), periodical cicadas, and chestnut timber worms, as well as newer diseases and pests, including the Asian chestnut gall wasp and the Asian ambrosia beetle.[78] A changing climate and suburban sprawl will also take its toll on the species. All of these obstacles will obviously reduce the number of healthy living trees, making the successful reintroduction of the tree less likely.

Attempts to restore the American chestnut will also need to illuminate the tree's evolutionary history. Evolutionary history is not evolutionary biology, but a subfield of environmental history that sees nature-human relationships as ongoing, reciprocal processes. Proponents of evolutionary history, such as Edmund Russell of Carnegie Mellon University, argue that when plants and animals evolve with humans, they are altered by that relationship, including their genomic structure. According to Russell, evolutionary history allows one to marry biology to history in unique and important ways, offering a perspective not found in either discipline alone. A good example of the phenomenon would be any domesticated plant, such as New World cotton, which possesses longer fibers as the result of long-term human selection and breeding.[79]

Although the American chestnut evolved for millions of years without the presence of humans, the trees have, over the last several millennia, been directly influenced by anthropogenic forces. Twenty-first century breeding efforts have also altered the DNA structure of the American chestnut, although the jury is still out regarding what this ultimately means for the future of the species. Obviously, the best option moving forward would be to have an unadulterated *Castanea dentata* thriving again in the eastern deciduous forest, as it was that tree, and not others, that shaped the natural and human communities of North America.

Donald Edward Davis is an independent scholar and the author of The American Chestnut: An Environmental History (*University of Georgia Press, 2021*). *He has authored or edited seven books, including the award-winning* Where There Are Mountains: An Environmental History of the Southern Appalachians. *Davis was the founding member of the Georgia Chapter of the American Chestnut Foundation and currently works for the Harvard Forest as a part-time research scholar.*

ENDNOTES

1. Personal email communication, July 14, 2021.
2. [Wesley T. Christine], "Whiting and Timber Mill Interests," *American Lumberman* 1808 (January 15, 1910): 74. Information regarding the identity of Swan and King is from a caption attached to the image in the Forest History Society archives (USFS negative number 320000). In referencing the Streator photographs in the article, the editor of the *American Lumberman* claimed they "were the most remarkable series of timber pictures ever taken" (32).
3. "Whiting and Timber Mill Interests," 74.
4. Owen L. McConnell, *Unicoi Unity: A Natural History of the Unicoi and Snowbird Mountains and their Plants, Fungi, and Animals* (Bloomington, IN: AuthorHouse, 2014), 92.
5. Christine, "Whiting and Timber Mill Interests," 98.
6. Henry B. Steer, *Lumber Production in the United States: 1799-1946*, USDA Miscellaneous Publication no. 699 (Washington, DC: GPO, 1948), 137-138, table 57.
7. Christine, "Whiting and Timber Mill Interests," 68. In 1910, Graham County possessed the largest concentration of mature chestnut trees in the United States: twenty-five thousand board feet of timber per acre. Horace B. Ayers and William W. Ashe, "Land Classification Map of Part of the Southern Appalachian Region, 1904," map insert in Horace B. Ayers and William W. Ashe, *The Southern Appalachian Forests*, U.S. Geological Survey Professional Paper No. 37 (Washington, DC: GPO, 1905), n.p.
8. Christine, "Whiting and Timber Mill Interests," 66.
9. William W. Ashe, *Chestnut in Tennessee*, State of Tennessee–State Geological Survey, Tennessee Geological Survey Series 10-B (Nashville, TN: Baird-Ward, 1912), 16. Ashe wrote that "chestnut suffers severely from fire because of its thin bark . . . the sprout stands are left after lumbering, they [are] frequently burned, and the trees are either hollow or defective at the base,"
10. "Twas All Moonshiner; Smoking Tree Mystery in North Carolina a Case for Revenue Only," *New York Times*, July 22, 1894, 8.
11. "Twas All Moonshiner." In an account printed in the *Clinch Valley News*, the distillery was not inside the chestnut but in a "tunnel-like cavern" thirty feet from the tree. In that version, a tunnel had been dug into "the eight feet in diameter" chestnut, which allowed the "smoke to enter the hollow beneath the ground," *Clinch Valley News* (Tazewell, VA), April 6, 1894, 1.
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15. Nelms is quoted in Tim Homan, *Hiking Trails of the Joyce Kilmer-Slickrock and Citico Creek Wildernesses* (Atlanta, GA: Peachtree, 2008), 118.
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40. Robert Niederman, personal communication, November 5, 2014.
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