CONTENTS

NOTES

MEMORIES

SCIENCE AND NATURAL HISTORY

CASTANEA GUIDE


notes

FROM THE EDITOR

Bears lumber, crocus' bloom, birds circle above, hope and renewal abound – at last, spring is here! While flowers and animals keep busy, stalks from last year's harvest begin to nourish the soil, ensuring the fall harvest. Right now, Fred, George, and Danny are preparing the soil at Meadowview, working hard to ensure the next step in our breeding of blight-resistant chestnuts. All along the East, member volunteers are also beginning to till the soil at regional breeding centers.

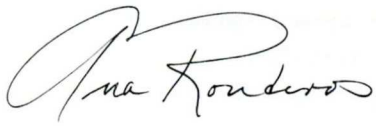
While you turn the pages of this issue of *The Journal*, you will enjoy a celebration of the past, including cherished chestnut harvests in the old sheep pasture, important chestnut sales at grandfather's corner store, and knee-high chestnut mast. From the Scotch-Irish desire to head for the mountains toward chestnut bounty, to the stone mason's half-full cement sack for his family, the American chestnut was an important part of our economy, culture and survival. It was hope and security throughout the East.

As we look at our past, we begin to experience how life was in the two articles by David Cameron, one about the folklorist Charlotte Ross, and the other about the famous stock drives of Appalachia. Yet only those who lived among the great chestnuts, such as Donald McCall and Georgia Miller who tell their own stories here, actually know how it was. For many, our curiosity about the spectacular past of the American chestnut feeds our interest in the tree's future.

Informed by his long-term view as a geophysicist, Dr. Paillet presents his own perspective of American chestnut past, present and future in a tour of chestnut ecology. Then, he leads us through the reconstruction of the history of a small present-day grove of chestnut, a comparison of American chestnut and its only American cousin, the chinquapin, and finally to the discovery of true chestnut grandeur in the Caucasus Mountains of Russia. It is a perspective I am sure you will welcome.

Based on many year's of hands-on research, Chandis Klinger presents a pragmatic discussion of methods to start chestnut in the woods. In his quest to discover an effective and inexpensive means to protect chestnuts from a wide number of potential threats, Mr. Klinger explains the pro's and con's of tubes, cans, wood slabs, and more to protect the seedlings. It is essential reading for any chestnut grower.

We must remember our past so that the past can continue to feed the future of the American chestnut. Since spring is only one part of a larger cycle, like our own efforts, this issue concludes with simple illustrations of the growth stages of the American chestnut from sprout to mature tree, by Bruce Lyndon Cunningham, artist and forester. Enjoy!



Help us preserve chestnut memories for the future! Contact Gerrie Rousseau, membership director, at chestnut@acf.org or 802-447-0110 if you or someone you know has memories of chestnut or remembers a relative's chestnut stories.

CHARLOTTE ROSS AND THE CHESTNUT CONNECTION

by David D. Cameron

Why did all those Scots-Irish immigrants head for Appalachia? How did they build and feed those large herds of livestock? How could a man with a few acres of mountain land support thousands of hogs? Charlotte Ross believes she has found the answer. A folklorist by training and temperament, Ross grew up in the North Georgia Mountains listening to stories handed down through the generations. And she asked questions. "This was long before I knew you could get a graduate degree in Folklore!" Steeped in mountain tradition and with a love for Appalachia and its people, Ross was the ideal person to develop the Appalachian Regional Collection at Appalachian State University, Boone, NC.

"Asheville circa 1851."

A college professor, she also became active in the North Carolina Humanities Council. It was in this capacity that she attended a lecture in Virginia that gave her a new mission. A noted authority on the Colonial period was talking about the settlement and culture of the English colonies. Then he made the statement, "Nobody knows why the *stupid* Scots-Irish headed for the mountains." This got Ross's attention. But when it was repeated, it got her Scots-Irish dander up! "He ought not have said that!" Knowing that these people were not fools, she set about to find out, "Just why *did* they head for these mountains!"

Enlisting the help of her history professor husband, Ross turned their considerable resources to bear on the problem. Some things were easier

to understand. The English settlers of the Atlantic Coast were largely focused on their homeland. They looked to England for wives and goods and often sought to return when their fortune advanced. But always their thoughts were toward England. They rarely settled more than a few miles from a river and its connection to the coast and thereby to "home."

The political and economic realities of Northern Ireland gave the Scots-Irish little to leave and much to regret. They were eager to get away from their English overlords. Selling themselves as indentured servants many made their way to America. When their servitude was over, they were not looking back to England. They turned their faces west. But how were they to live?

Taking her research to archives in Ulster, Charlotte Ross came upon mountains of letters written to relatives and friends back home by American Scots-Irish immigrants. "The chestnut mast is knee deep." "A man fell waist deep in the mast and had to be pulled out!" The letters told how an entire home could be built from one tree. Game fattened on the chestnut mast was plentiful. Rabbits were so fat and lazy a child could fetch one in with "a chucking stone." "A poor man can live like a king." Chestnut meal provided breads and puddings. You could turn livestock loose on the mountainside. It would take years for the free-range herds to eat through the fodder provided by acres and acres of chestnut groves.

So they came. Looking for a life that was not dependent on their former English overlords, they turned their faces toward the mountains—for freedom and the bounty of the American chestnut.

THE LEGEND LADY

Charlotte Ross's education began on her grandfather's front porch and has taken her across the world. Along the way she has collected over 3500 stories not to mention a Ph. D. in folklore from the University of Pennsylvania. Ross is a master storyteller, presenting programs, workshops and college courses on Appalachian culture, folklore, history, literature and dialect. She has performed from the Smithsonian to Harvard and from Opreyland to Ireland. PBS has aired broadcasts of a play she wrote titled "From My Grandmother's Grandmother unto Me," based on her family's five generations of stories

For information or to book programs by Charlotte Ross including folklore, storytelling, children's programs and educational workshops for teachers contact her at **rossct@appstate.edu**, 593 Pinnacle Drive, Boone, NC 28607 or call 704-264-8989. An audio recording featuring Charlotte Ross and five Appalachian stories including "Clara's Ring" and the classic "Long Dog" is available for $10.00.


memories

THE DROVERS OF APPALACHIA

by David D. Cameron

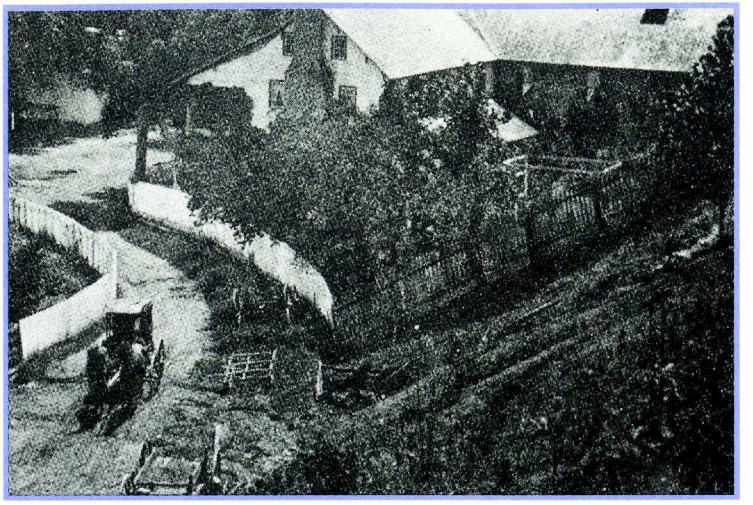
The unmistakable cry of a herdsman echoes across a Tennessee valley. In a little schoolhouse, Edmund Cody Burnett glances across the room toward his friend. Their eyes meet. He has heard it too! There it is again! Now the whole class is alert as the teacher tries in vain to hold their attention. The fall drives are on!

"Drover's" from Harper's, October 1857.

After the War of Independence, in the time of Daniel Boone and Davy Crockett, new treaties with the Cherokee opened North Carolina land west of the Blue Ridge. As this area developed, farmers began to use the old Indian trading trails to move cattle, hogs, turkeys and other livestock from western North Carolina and eastern Kentucky and Tennessee to lucrative markets in South Carolina and Georgia. The cost of shipping corn and other farm products such distances was prohibitive. However, converting corn to fat on the hoof provided a profit-making commodity that could provide its own transportation. Soon huge herds of cattle, hogs and turkeys, made their way from the slopes of the southern mountains to feed laborers on the great plantations of the Southeast.

For the children in the school at what is now called "Del Rio," the excitement and romance of the drives were almost unbearable. There in the unshuttered schoolhouse young Burnett and his friends had a front-row seat. The ferry crossing was well in view out the open door. Animals waited their turn in pens across the street. Occasionally a great commotion arose as one of the hogs would break away from the ferry. The rescue of a valuable animal would be gripping if not comic!

While the children were captivated by the spectacle, their parents found the drives to be a principal source of revenue. The main trail ran from Greeneville, Tennessee to Greenville, South Carolina, via the French Broad River. "Stands" started to appear every 3-8 miles, providing lodging for the men, pens for their herds and food for both. According to one eyewitness, "These 'stand' proprietors were usually also merchants. They sold goods to the farmers to be paid for in corn when gathered in the fall." They would send out word to their debtors that on a day named they would receive corn in payment of all debts. "On that day the farmers would come with the wagon loads of corn, sometimes a string of such wagons extending for a mile in length, and, commencing at daylight and continuing until midnight, paying their debts at fifty cents a bushel with the corn stored into the merchant's large cribs."[1]



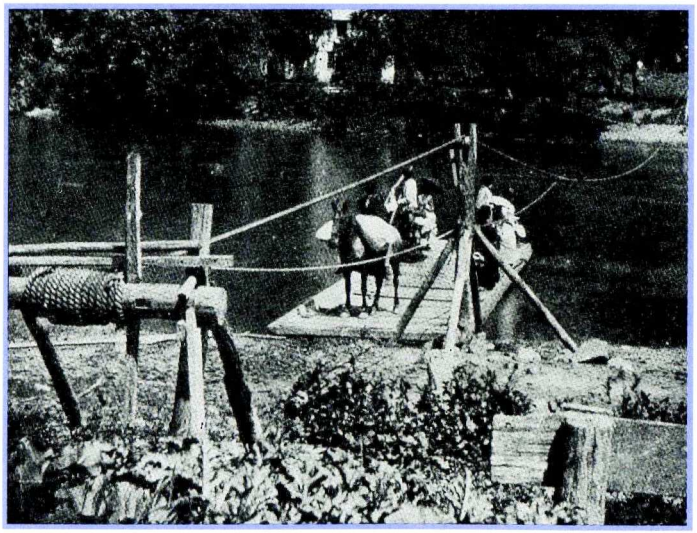
"Alexander's along the Drover's road."
Original in the collection of Pack Memorial Library.

The prosperity came at a cost. Life along the drover road could be wretched. Folklorist Charlotte Ross of Appalachian State University recalls hearing about it from neighbors as a little girl. Her voice slips easily into the dialect of the time. "This family had its roots near the drover trail at Parrottsville, Tennessee, and they would often retell the stories that were handed down from the drover era. There were cattle of course and there were even more hogs, and that was noisy and Lord knows that was smelly...But when people just wanted to leave, close up their houses and go visit somebody further up the mountain was at the turkey time of the year. There were hundreds of thousands of turkeys that came through some of those stands...When it gets dark, what are those turkeys going to do? Those turkeys are by God going to roost. It doesn't matter if it's the white picket fence you just painted. They are going to roost on your Chinaberry tree. They're going to roost on the porch of your house, on your outbuildings, your barns, your sheds, the spring house...Some of it

is going to cave in from the weight...it was just a mess and the noise and they just hated those turkeys...They just *hated* those turkeys!"[2]

The drovers tended to be owners of the larger farms. Well respected, they would often buy livestock from others to round out their herd. Although one drover talked of moving a herd of over 2500 hogs, the average was about 500 head with the normal range being from 300 to 1000 animals.[3] The animals were from free-range herds. Corn for fattening was grown in the bottomlands while the animals would roam on the mountain slopes. There they would graze on the chestnut mast and other vegetation. As fall approached they would be rounded up and put in pens, where a corn diet would add weight for market. Then toward the end of October the drives would begin.

Animals coming from a free-range lifestyle did not take immediately to being driven. A former slave, Uncle Walsh, living in Cocke County, Tennessee, told Wilma Dykeman, "I growed up working on the farm. One thing I could always do better than anyone else on the whole place, and that was break a drove of hogs to the road whenever they set out for South Caroliny or Georgia. They're mean to drive, but that was my job. I'd start out with about thirty and take them as far as Warm Springs—it's Hot Springs since then, ain't it—and then whenever they were going good on the road I'd let the regular drivers take over and I'd start back to break another batch. I never did get all the way to South Caroliny myself, just the beginning of the way. After you once get hogs broke to the road, you can't get them off, no matter how contrary they were at the start."[4]



"Ferry at Alexander's."
Original in the collection of Pack Memorial Library.

At major intersections and river crossings small communities and larger towns grew up around the drover trade. Asheville, North Carolina became important because of a river crossing and the first major branch on the distribution side of the trail. Herds were driven right through town.

The area now known as Pritchard Park contained the "stand" owned by James Smith, who also controlled the nearby river crossing and its tolls. Lexington Avenue also served the drovers with pens, food and lodging.

The drover trails continued for several years after the War Between the States. Then a combination of post war politics and new economic realities saw the once well maintained and thriving trail reduced to a poorly maintained relic. At the time Burnett and his classmates were thrilling to the rescue of hogs from the river, the trail was already past its prime. Though he longed to join one of the big drives, it never worked out. He went on to college and a career far removed from the romance of the trail.

Eventually the cries of the drivers grew silent in the valleys. Already many of the Appalachian settlers were moving out west...building a new economy and forming the basis for the great cattle drives of a new frontier. Still, for sheer numbers, many say the trails of the West never equaled the masses of livestock that passed by that little schoolhouse and along the drover trails of the Southern Appalachians.

Also see page 23, "Sherrill's Inn: One of the last remaining 'stands' of the great Appalachian livestock drives."

[1] Wilma Dykeman, THE FRENCH BROAD, University of Tennessee Press, 1955

[2] Charlotte Ross, Folklorist, Appalachian State University, interview, February 7, 2001

[3] Edmund Cody Burnett, Agricultural History, Volume 20, April 1946, p 86

[4] Wilma Dykeman, THE FRENCH BROAD, University of Tennessee Press, 1955, p 340-1

SWEET CHESTNUTS

By Donald McCall

Mr. McCall lives in the village of Vittoria in Norfolk County, Ontario, a few miles inland from the north shore of Lake Erie, directly across from Erie, Pennsylvania.

Norfolk County's well-drained sandy soils support flue cured tobacco and fruit orchards. As part of the Carolinian Zone, which stretches across southern Ontario and as far south as the Carolinas, the county shares many tree species with the eastern United States.

Mr. McCall is a descendant of Empire Loyalists who came to Ontario from New Jersey in 1796 and settled in what was known as the Long Point settlement — one of the first settlements in that part of Ontario. He is 92 years old and enjoys recounting the many events that took place in the area.

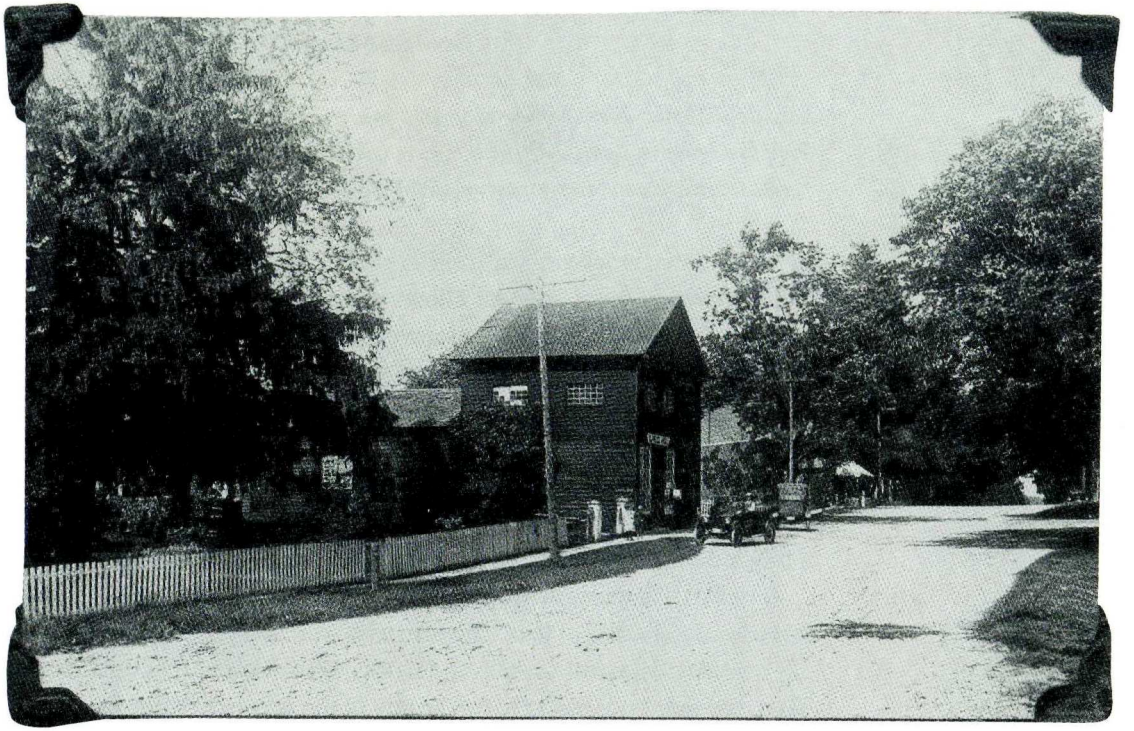
My father, R.C. McCall, had a store for many years before 1922 where the Vittoria Post Office is located. One of the items we sold there was sweet chestnut. During the time Dad had the store the sweet chestnut was a big crop around this area. Most farms had trees. They were located along the roads, in the middle of the fields, in their woodlots, etc.

Donald McCall

A lot of the farmers counted on the money from their chestnuts to pay the taxes on the farm. Dad bought the chestnuts from the farmers by the quart or by the pound. The chestnuts were harvested in the fall at about frost time. The frost opened the burs so you cold pick them up from the ground. If the wind didn't knock the nuts to the ground, they could be knocked out of the burs with a big stick.

At our store we dried the nuts after we bought them so that they wouldn't mould. In order to dry them we spread them out on the counter when the store was closed or on the weekend. When the store was open, they were spread out wherever we could find room. When the chestnuts were dry we sold them in the store but also shipped them to Alberta, Saskatchewan, and Montreal.

As boys we would go to a tree on the side of the road to get some nuts. Some boys would climb the fences and go into the farmers' yard. The farmers would chase the boys out. The chestnuts were good to eat raw, but better boiled or roasted like peanuts.



Sweet chestnuts were regularly bartered and sold in the store owned by Donald McCall's grandfather and later by his father.

Most of the chestnut trees around Vittoria had died out due to a blight by the late 1940's. There are a few chestnut trees around still. Russell Stone has two, Ernie Ratz has one, Ken Smith has one down by the Mill Pond and the Gates at Walsh have a few. I planted two trees in the spring of 2001. Two are needed in order to pollinate. Bruce Graham, the Superintendent of the Burford Tree Nursery (519-449-2265), sells small trees for those who wish to reintroduce the sweet chestnut in Canada (known as American chestnut in the U.S.).

CHESTNUTS BEFORE THE BLIGHT

By Georgia Miller

Editor's Note: *Mrs. Miller was 101 years old when she wrote this piece. Her birthday is April 27, 1900. She is still living by herself with some outside assistance and is a member of the Pennsylvania chapter.*

Grab a sugar sack and we're off to get chestnuts. In that precious time between school and our chores was prime time to head out for a sheep pasture or a chestnut grove, whichever name suits your desire.

Unless you recognized the squat shape of the chestnut tree, you could pass them by unnoticed that were inside the fence rail. They were our treasure.

The weather had a lot to do with chestnut gathering. Wind would shake the fat glistening nuts from the burs. Rain would turn the fallen nuts to a much darker brown. That was a sign of ripe nuts.

Shades of brown were well recognized in the color scale. Chestnut brown was a beautiful shade of hair. The man who wore a chestnut beard was usually considered handsome. Silks and satins were available in chestnut brown. That may help you grasp the real beauty of the native chestnut.

The nuts came in a bur; one side flat as it shared the velvety lined bur with another. Sometimes there were three; the middle one had two flat sides as they fitted together.

It takes a bit of imagination to compare the taste of those rich nuts with those available today. The nuts I gathered in 1914-1917 were delicious raw. We'd lay some on the coal stove oven to roast but try that today without first cutting the husk and you likely will find a few bits of debris and almost no nuts–especially with an electric or gas oven.

If you recall seeing an old rail fence that has become part of the rural landscape, chances are, it is made of chestnut rails. They split true and lasted longer than any other available wood.

There was a chestnut rail fence around the pastures that we climbed easily. Even before the sheep were moved closer to shelter near the farm, they gave no trouble to me as I gathered nuts. They did not seem to eat any. When the 5-pound sugar sack was full, the miles to home did not seem long, and tomorrow or the next day we would repeat the trip.

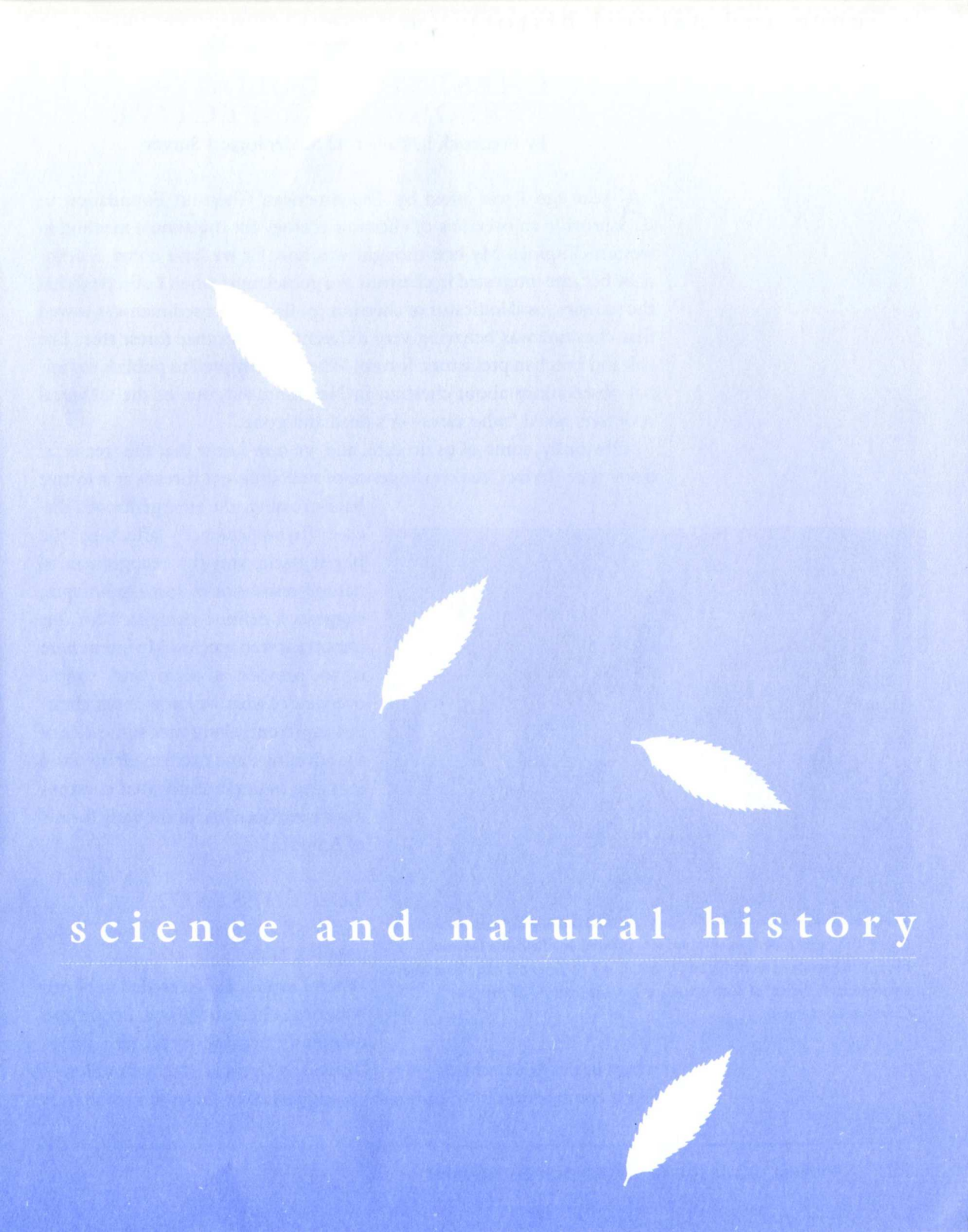
My father was a stone mason and walked to his jobs that required stay-

ing several days. One such job was in Gatesburg. I have not much notion how far that was from Port Matilda (where we lived) because he knew all the short cuts. One such trip took him through the chestnut grove. While he was there he gathered nuts to half-fill a 98-lb. cement sack (turned inside out of course).

That was around 1911. We ate nuts all winter and in the summer we boiled them for they had dried.

About five years ago a chain store offered native chestnut. They were not the good old true chestnuts and had about as much flavor in the raw as a piece of cardboard and were not much better when cooked. When the bushel basket that contained them was down to about 4 inches, there were about as many worms as nuts.

I am anxiously waiting to get a taste of the true chestnut that is being developed by the faithful workers of TACF.


science and natural history

CHESTNUT ECOLOGY— A PERSONAL PERSPECTIVE

By Frederick L. Paillet, U.S. Geological Survey

A year ago I was asked by The American Chestnut Foundation to provide an overview of chestnut ecology for the annual meeting in western Virginia. My first thought was how far we have come. I originally became interested in chestnut as a geoscientist when I observed that the primary fossil indicator of chestnut (pollen in lake sediments) showed that chestnut was behaving very differently from other forest trees like oak and beech in prehistoric forests. When I attempted to publish my initial observations about chestnut in New England, one of the technical reviewers asked "who cares—it's dead and gone."

Obviously, some of us do care, and we now know that the tree is far from gone. In fact, the convergence of such different threads as selective back-crossing, the emergence of a disease (hypovirulence) affecting the blight itself, and the recognition of natural resistance in some genotypes, suggests a definite comeback for this important tree species. My intent here is to provide a plain and simple overview of what we know about chestnut at present, along with some idea of the adventure and excitement involved in trying to understand what chestnut must have been like in the early forests of America.

COURTESY F. PAILLET

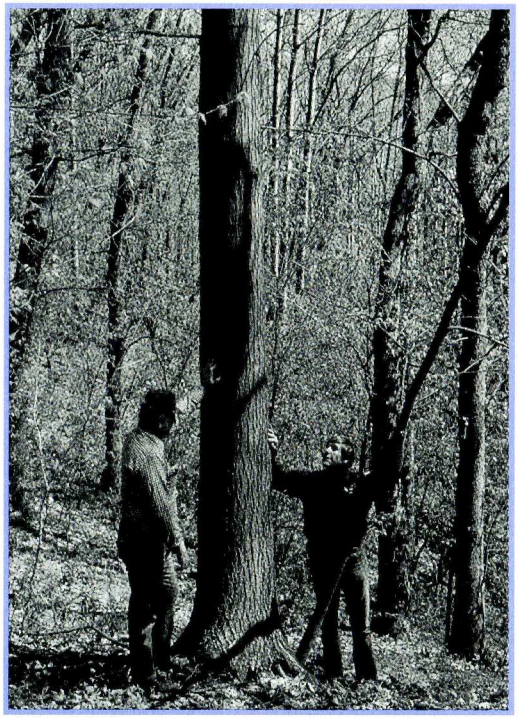
Figure 1: A large American chestnut tree planted in a field at a location beyond the range of chestnut and blight. It is 110 years old and shows the enlarged base typical of such open-grown trees (with TACF member Cameron Gunderson).

THE CHESTNUT FORESTS OF NORTH AMERICA

When Europeans first settled in North America, chestnut was a major and eminently notable forest tree everywhere in the Appalachians—from Ontario to Georgia. Reconstruction of forest composition from early surveys suggests that chestnut was often as

much as 70% of wood volume on some slope forests, and a frequent minor associate in various mixed forests. Foresters defined a major forest association of the Appalachian region as the Oak-Chestnut Forest. Chestnut had an affinity for slopes.

When forestry began to emerge as a science in the early part of the twentieth century, the consensus seemed to be that chestnut was a forest tree roughly equivalent to the major oak species such as northern red and white oak. An introduced disease effectively removed this valuable but otherwise oak-like tree from our forests. Certainly a real tragedy, but foresters felt that there were numerous other ecologically equivalent oak species to fill in the gaps in the forest. In modern technology terms, chestnut slipped below the radar screen.



COURTESY F. PAILLET

Figure 2: Tall and straight chestnut naturalized in oak-chestnut forest adjacent to a chestnut plantation in Wisconsin.

THE TREE

A good place to start appreciating *Castanea dentata* as a special and unique member of the ecosystem is to consider the tree itself. Unfortunately, our impressions of chestnut are badly skewed by the images in our literature. We routinely see chestnut in two rather stereotyped forms: 1) swarms of young coppice sprouts in woodlots during the early years of photography in New England; and 2) massive, open grown trees growing in back yards and along median dividers in regions far beyond the former range of chestnut (such as in figure 1).

So exactly what was chestnut like in the wild? The best answer we have comes from one of a few unique woodlots where chestnut is "escaping" from plantations and has begun to invade oak and hickory forests that have a definite resemblance to Appalachian slope forests (figure 2). These wild trees are straight and tall. In fact, if you look at the old reports on the fledgling National Forest system produced under the auspices of President Theodore Roosevelt, you can find a statement to the effect that chestnut is the one eastern forest tree that approaches the dimensions of the gigantic Pacific Coast rain forest conifers.

Just as interesting as the erect stature of trees such as those in figures 2 and 3 is the record of growth in their stumps when they are cut.

Chestnut trees a good two feet in diameter are typically only 60 years old at the West Salem, Wisconsin location. Compare that to centuries for similar-sized oaks on the same site. The one similarity with the open-grown trees is that these straight and tall chestnut trees grown in the closed forest also have the small sprouts arrayed around the periphery of the trunk (page 26, bottom). This is something unique and distinct for chestnut.

COURTESY F. PAILLET

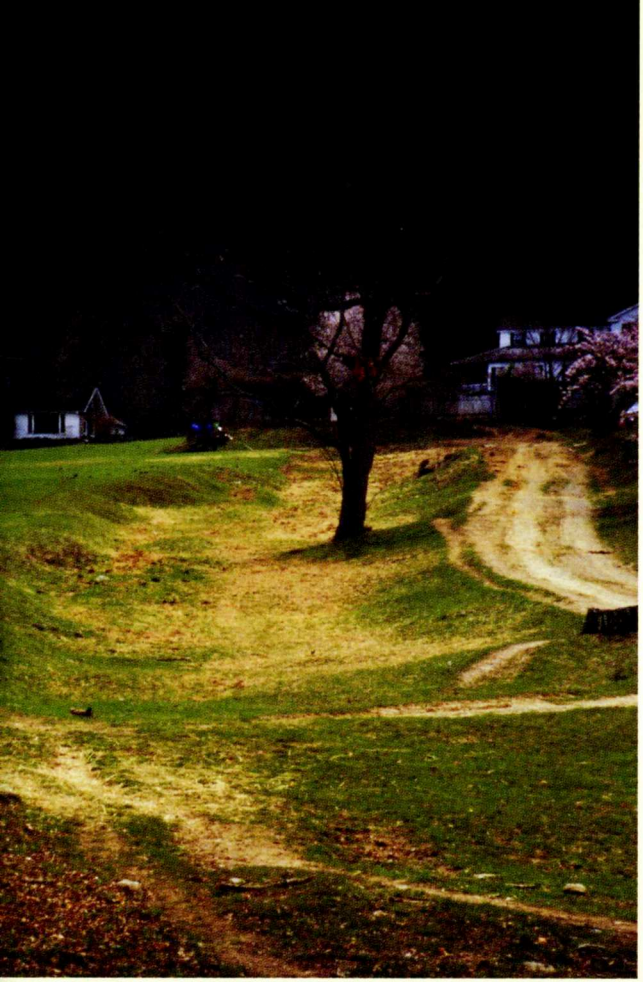
Figure 3: The mature bark pattern of a naturalized chestnut tree at the same Wisconsin location.

CHESTNUT IN OUR WOODS TODAY

Anyone who has walked in eastern woods knows that chestnut is a part of today's forest. The chestnut trees that are most often noted appear in the form of symmetrical and evenly branched young trees that appear to be derived from recently established seedlings (figure 4). Such trees attract attention because they often show up at roadsides where brush clearing makes way for them. They often have burs in their tops. These are usually infertile, and may be especially conspicuous when they remain in the crown of the tree all winter. Unfortunately, these over-wintering burs are the last gasp of a tree attempting to reproduce while in the stranglehold of blight.

One of my first lines of investigation was to determine where such chestnut trees come from. This can be done in a number of ways. One is to examine the shape of such "super saplings," and another is to measure the rate of diameter growth recorded in the rings of stems that have been killed. I regularly found that the trees had grown at an impressive rate, sometimes approaching an inch a year. But in the center of the stem was often a cylinder of closely spaced rings. Such data indicated these super saplings had originated as nearly stagnant little trees trapped in the dark understory of the forest. Land clearance or the removal of surrounding trees served to allow a sudden spurt of new growth. This was also evident from the trunks that regularly showed twists and turns, indicative of a stem that was once crooked.

Forestry Professor David Smith of Yale University has pointed out modern foresters have begun to look on chestnut as a nuisance! Wood cut-



SHERRILL'S INN

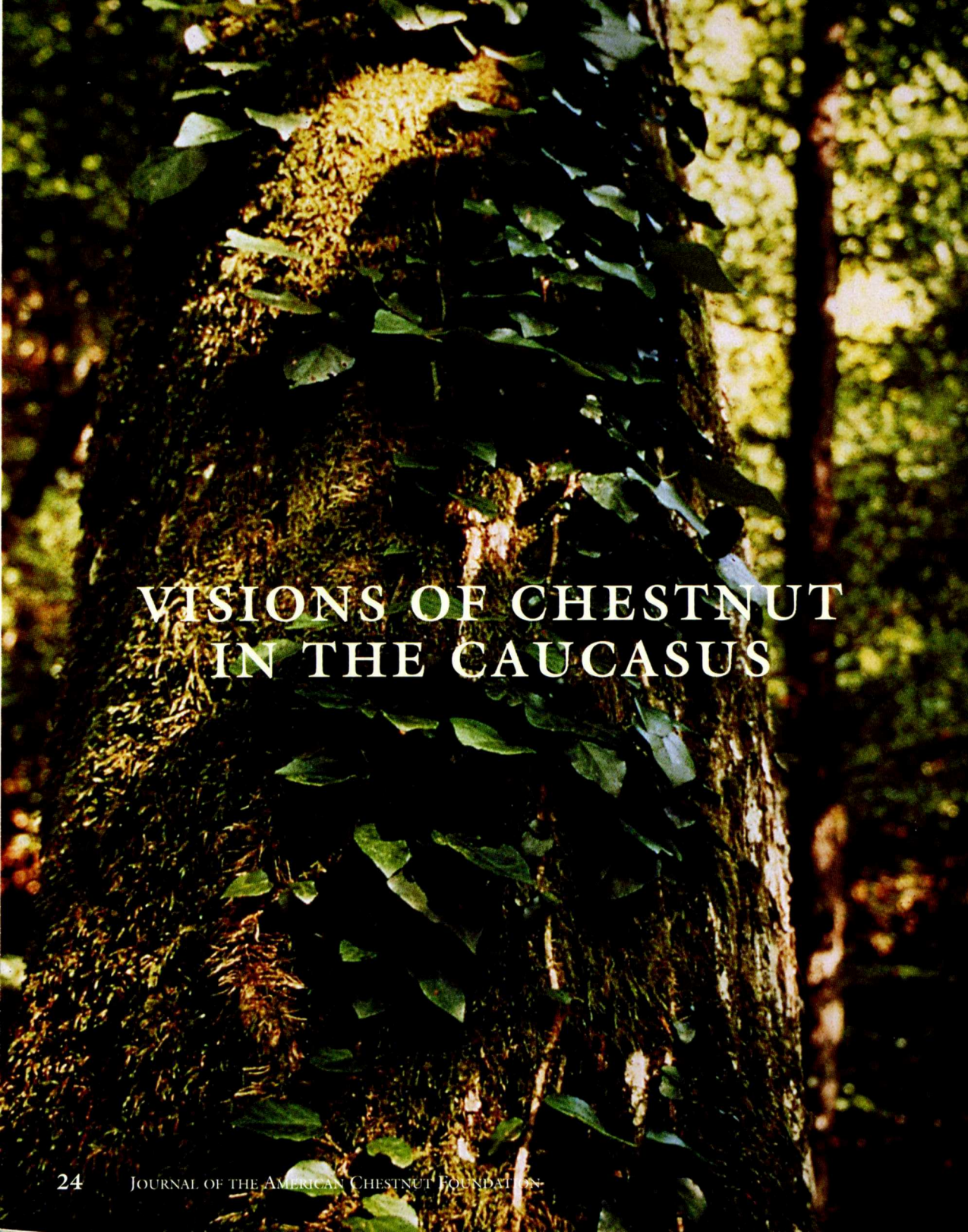
One of the last remaining "stands" of the great Appalachian livestock drives.

Photos © Elizabeth Cameron

Now a private residence, Sherrill's Inn in Fairview, NC, is one of the few remaining "stands" of the great livestock drives that fueled the southern Appalachian economy in the 1800s. In those times, the structure would not have been painted. From the porch, drovers would have seen forests made up of approximately 40% American chestnut trees.

Records show that the drovers had a choice of chestnuts or corn to provision their livestock for the next stage of the journey. The old drover road, a long depression in the landscape, still leads up the hill towards the inn. A modern road next to the trail now replaces it.

See "The Drovers of Appalachia" on page 10.



VISIONS OF CHESTNUT IN THE CAUCASUS

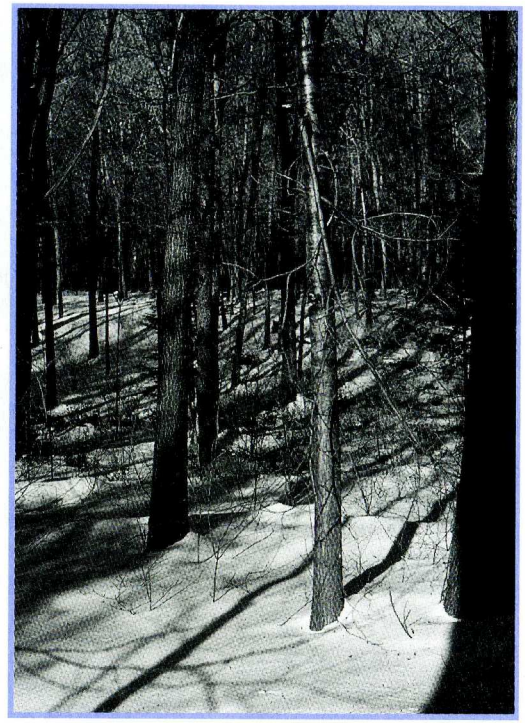
Oriental beech and European chestnut dominate the western Caucasus Mountains, with European hornbeam forming the sub-canopy (top). The upper alpine slopes are defined by the convergence of landslides rather than a typical tree line (bottom). Unknown to many, the moist Caucasian forest is a luxurious riot of moss and ivy. Here, a large chestnut tree is hidden beneath the growth (left). *Photos courtesy of Frederick L. Paillet.* *See page 36 for article.*

CHESTNUT ECOLOGY

Today, most American chestnut sprouts survive for long periods as small, heavily suppressed stems no more than a few feet tall (top left). When sprouts remain small for several decades, they develop the rough bark of a mature tree even though they may be only an inch in diameter (top right). Basal sprouts persist even when the "parent" tree is healthy (bottom). *Photos courtesy of Frederick L. Paillet.* *See page 32 for article.*

ting in Appalachia commonly results in a dense crop of chestnut sprouts appearing out of virtually nowhere. But these sprouts have no future in the face of blight. (See "What About the Other American Chestnut?" for a similar trait in Chinquapins.)

Another line of investigation was to try to capture these little super chestnut trees in the very act of making their appearance. This wasn't hard to do. In fact, they usually go from suppressed little trees, to impressive saplings, to dead, blight-killed snags in about five years. I could also show that the dramatic appearance of these trees is an artifact of their life style. In small clear-cuts these trees often dominate the appearance of the regenerating forest where there had hardly been chestnut before. I was able to go into adjacent woodlots and show the exact same density of chestnut trees, most of which were so small and insignificant as to escape notice (page 26, top left). One routinely finds heavily suppressed chestnut trees no more than a foot tall, covered with perhaps a dozen small leaves, and showing less than one inch of shoot extension per year (page 26, top right).



COURTESY F. PAILLET

Figure 4: Rapidly growing chestnut sapling that suddenly appeared when oak forest was opened for a gas pipeline in Connecticut.

The next step was to see how the many chestnut sprouts fit into the forest. I did this the old fashioned way—with lots of work and attention to detail. This meant mapping the locations of sprouts and their relationship to terrain features and to the locations of big trees killed by blight as much as 70 years ago. It was surprisingly easy to find the remains of chestnut trees because the wood is so rot resistant (figures 5 and 6). One site in northeastern Massachusetts contained 226 different chestnut sprouts in a one-hectare area of oak dominated woods (one hectare is equal to about 2.5 acres). This particular location had oak trees more than a hundred years old, and was clearly a young coppice sprout forest at the time chestnut blight appeared there in 1922.

How do I know it was exactly 1922? All you have to do is take a core from an oak next to an old chestnut stump. All such oaks showed an impressive and very sudden spurt of growth in exactly 1922 when they benefited from the demise of their neighbor.

Only 12 of the sprouts showed that they were growing from the stumps of former trees. I deduced from the pattern of sprouting on the Massachusetts study site that chestnut only sprouts from the pre-formed buds on the burls that circle the base of the tree. This conclusion is also firmly stated in the old chestnut literature. Since so many sprouts were located away from the remains of former trees, almost all of the sprouts on my study site must have always been nothing more than little seedling sprouts. They have undergone a continuous cycle of growth and resprouting over the more than 70 years since the source of seed was cut off. Even more surprising to me was the fact that blight had such little impact on these "old seedlings." Chestnut stems in our forests have been escaping blight by simply being too small to attract attention from either foresters or fungus.

COURTESY F. PAILLET

Figure 5: Log from chestnut tree killed by blight about 1920 and photographed in 1983; when these trees topple over they uproot any living sprouts still attached to their root collar.

Do these observations mean anything? I think they reveal a carefully crafted strategy. The combination of amazing feats of "old seeding" survival and astounding rates of release when a place in the sun becomes available suggest that chestnut is programmed to work this way. The evidence largely speaks for itself. Tiny chestnut trees—old seedlings—that originated from seed and probably never became more than one inch or so in diameter have been surviving in large numbers in the forest. The chestnut strategy is one of simply lying low. The trees avoid competition altogether until conditions give them a chance.

The key to chestnut sprouting is a story in its own right. Studies of chestnut seed growth show that new bud tissue forms as soon as the first shoot emerges from the nut. Little buds of tissue are formed at the point where the stem joins the root—the root collar. They grow a small amount every year, just as the rest of the plant goes through its life cycle. Chestnut wood that was not salvaged by cutting was left to topple over, which pulls

the entire root collar out of the ground, uprooting any sprouts that may have survived.

CHESTNUT IN THE FUTURE

Geoscientists traditionally take the long view. As far as I can see, chestnut is still an integral part of American forests, and the prognosis of a "cure" for chestnut blight is on its way. Considering it is a successful forest tree that has been around for many millions of years, *Castanea* can probably take care of itself. As long as there are relatively wild woodlands in our National Forests and Parks, and as long as there are rodents and jays foraging in those forests, chestnut will likely manage. I like to think of what the pollen profiles from North American lakes will look like in a few millennia. About 5000 years ago, some kind of disease nearly removed hemlock from eastern forests. We can only guess at what that disease was. But we see hemlock pollen disappearing everywhere at about that time. The pollen data show that hemlock returned to its role in the forest within a few centuries, except for a few areas around the edge of its range. Those were probably places where the climate had changed so that hemlock was holding on by sheer ecological inertia, and was unable to retain its former position. Let us hope that chestnut pollen shows a similar signature—permanent disappearance for a few areas, and resurgence to its former dominance almost everywhere else, and perhaps even in a few new locations. In fact, studies in places like Wisconsin show that chestnut can be downright invasive. Perhaps future foresters will face a chestnut eradication problem from locations where that tree is an alien "weed." I, for one, would gladly live with that problem.

COURTESY F. PAILLET

Figure 6: Flat-topped stump of chestnut killed about 1922 and salvaged for timber or firewood; living sprouts (in front of clipboard) are still growing where litter has collected on top of the old root collar.

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Some good sources on the old forestry and ecology literature related to chestnut can be found in:

E. Lucy Braun, *Deciduous Forests of Eastern North America*, 1950 edition, Hafner Publishing Company.

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E. H. Frothingham, 1912, Second growth hardwoods in Connecticut, U. S. Dept. of Agriculture, Bureau of Forestry, Bulletin No. 95.

Emily W. B. Russell, 1987, Pre-blight distribution of Castanea dentata, Bulletin of the Torrey Botanical Club, volume 114, p. 183-190.

Interesting reconstructions of deciduous forests in the northeast are given in the two books by Harvard Forest authors; both are well worth reading by anyone with an interest in chestnut and forestry in general.

Charles W. Foster, 1998, *Stepping Back to Look Forward: a History of Massachusetts Forests*, published by Harvard Forest and available though Harvard University Press.

David R. Foster, 1999, *Thoreau's Country*, Harvard University Press.

Some other interesting perspectives on changes in land use and forest cover are given by:

William Cronon, 1983, *Changes in the Land*, Hill and Wang.

Gordon Whitney and W.C. Davis, 1986, Thoreau and the forest history of Concord, Massachusetts, Journal of Forest History, v. 30, p. 70-81.

For those with the interest, my personal investigations in chestnut ecology can be found in the flowing publications.

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Paillet, F.L., 1988, Character and distribution of American chestnut sprouts in southern New England woodlands: Bulletin of Torrey Botanical Club, v. 115, p. 32-44.

Paillet, F.L., and Rutter, P.A., 1989, Replacement of native oak hickory tree species by the introduced American Chestnut in southwestern Wisconsin: Canadian Journal of Botany, v. 67, p. 3457-3469.

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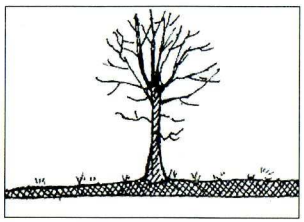
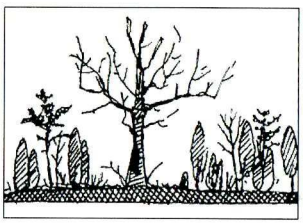
CHESTNUT ECOLOGY: A SIMPLE EXAMPLE OF CHESTNUT ARCHAEOLOGY

By Frederick L. Paillet, U.S. Geological Survey



Virginia Chestnut Site 1870

Open growth tree—Young but very large (40-50 years?).

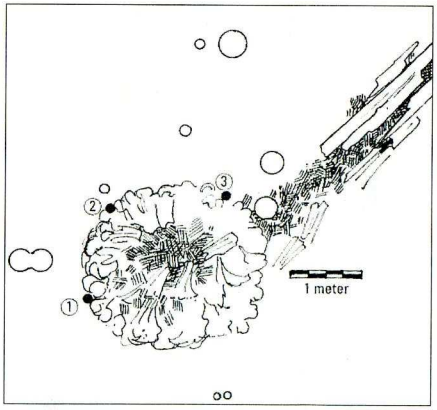


Virginia Chestnut Site 1920

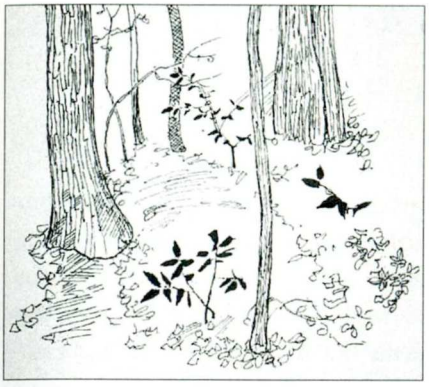
First signs of maturity—similar to trees at original plantation in West Salem—lightning injury? A few chestnut saplings in juniper woods.

Once one has learned to read the clues in the forest, it is possible to reconstruct the history of chestnut at a particular location. A very typical example is a small island of woodland embedded in a new suburban golf course across the street from the Sheraton Hotel in Reston, Virginia. This tiny woodland was once part of a vast regenerating forest created when the tobacco economy collapsed in this part of the state sometime in the late nineteenth century. Today, this woodlot is a deciduous forest dominated by oak and tulip poplar. Nearly twenty years ago I found the poorly preserved stump of a great chestnut tree, with the broken trunk of that tree lying off to the side. Three small sprouts still grew from the root collar. Last year I saw the same three sprouts growing in the same place. Actually, these were clearly different sprouts which must have originated as shoots from similar-looking sprouts that were here back in 1984. But one would have to look closely to tell the difference. The remains of the original stump are now virtually undetectable. From this meager evidence, a story unfolds.

A decade or two after the Civil War this site was a pasture with a single spreading chestnut tree. The tree was maybe fifty years old back then and had the usually flaring trunk and spreading crown of an open-grown chestnut tree . How do I know this? I measured the diameter of the base of the stump back in 1984, and found it was not quite ten feet. The woods today contain the remains of pines and cedars typical of the evergreen forest that becomes established on abandoned field. So it is easy to infer that the big chestnut tree had grown in the open, and that



Map of chestnut sprouts in a Virginia woodlot in 1984 where the sprouts are clearly arising from the remains of a large chestnut stump.



Ring of chestnut sprouts in the Virginia woodlot of figure 12 as sketched in June 2000.

the typical old-field succession had commenced sometimes after 1870. In the mind's eye one can see a few contented Holstein milk cows lounging in the shade of a pasture chestnut tree on a hot Virginia afternoon.

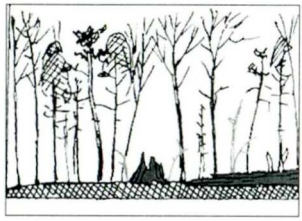
In the years before the blight arrived (about 1920) the old chestnut tree grew older and gained some real character, even as it became embedded in a dense stand of pines and cedars. We can surmise the old tree had character because the trunk failed to pull the root collar out of the ground when it fell. Instead, the trunk broke off as it fell, suggesting a point of weakness. Being the tallest tree in an open pasture, lightning damage would have been the likely cause for this injury. But the injury was just the thing to allow the sprouts growing from the base of the tree to remain rooted in the soil.

When I saw this site in 1984, the last of the cedars and old field pines were fading away. Numerous pine logs and snags were around, but the punky wood of these pines deteriorates pretty fast. It was possible to see the three sprouts growing right out of the dead wood of the old root collar. I was appreciative of the fact that the golf course developers allowed my chestnut site to remain intact. Today, you would hardly suspect that the little triangle of three chestnut sprouts is the remains of a former giant chestnut tree. These sprouts are in no way different from the several true old seedlings in the area.

Forest archaeology is not a new subject. A number of ecologists have been able to reconstruct woodlot history by projecting sites backward in time using the growth rings of growing trees, and material from long-dead trees and stumps in the area. A great example is:

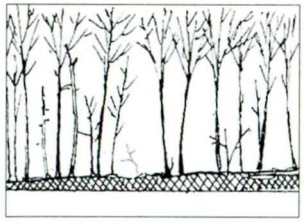
J.D. Henry and J.M.A. Swan, 1974, Reconstructing forest history from live and dead plant material - an approach to the study of forest succession in southeast New Hampshire, Ecology, v. 55, p. 772-783.

Also see references on pages 30 and 31.



Virginia Chestnut Site 1950

20 years after blight. Sprouts from stump and old seedlings. Pines and junipers on their way out.



Virginia Chestnut Site 1984

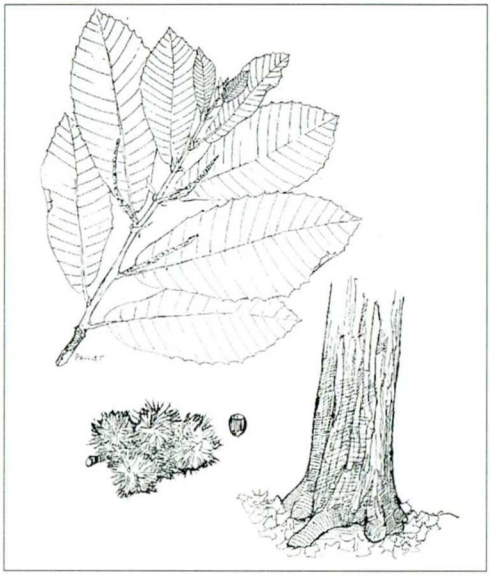
As seen on my first visit. Slabs of log and much of old root collar still can be identified.

ILLUSTRATIONS BY FREDERICK L. PAILLET

CHESTNUT ECOLOGY: WHAT ABOUT THE OTHER AMERICAN CHESTNUT?

By Frederick L. Paillet, U.S. Geological Survey

Many of us American chestnutters forget that there is another American chestnut tree, the chinquapin *(Castanea pumila)*. The Allegheny chinquapin is a shrub or small tree, usually with several stems like the shadbush. It's range overlaps with chestnut in the south, and extends all the way to central Florida and eastern Texas. Chinquapin leaves look similar to those of American chestnut, except they are somewhat broader and have somewhat shallower teeth. The burs are smaller and contain a single acorn-like nut.



The other American chestnut.
C. pumila

Allegheny chinquapin is apparently forced to grow as a very low, almost creeping shrub in pinelands subject to frequent light burning, but the same species grows as a small tree in deciduous woods. I have compared chinquapin and chestnut where the two species grow in the same Virginia woodlots. They are distributed in about the same way, but chinquapin stems are consistently smaller and have consistently more stems per plant. Chinquapin growing underneath dense forest does not seem to ever bear nuts. But I did see chinquapin stems big and hearty enough to bear little fertile nuts where brush clearing had released them along utility rights of way and roadsides. Just like chestnut, chinquapin stems are killed by blight, but the actual incidence of blight in Virginia was low. Again, this is attributed to the relatively small size of either in terms of targets for blight infection and the general low level of blight activity in the surrounding landscape.

Then there were stories about Ozark chinquapin. When I contacted a local US Forest Service ecologist to arrange a visit, he was glad that I called. It appears they had a chinquapin problem on their hands. The little nut is involved in Ozark folklore, but was now considered rare and possibly endangered. Thus, Ozark chinquapin was placed on the "list" and possible damage to chinquapin had to be addressed whenever it appeared. In spite of its rarity, chinquapin was getting in the way all the time. The

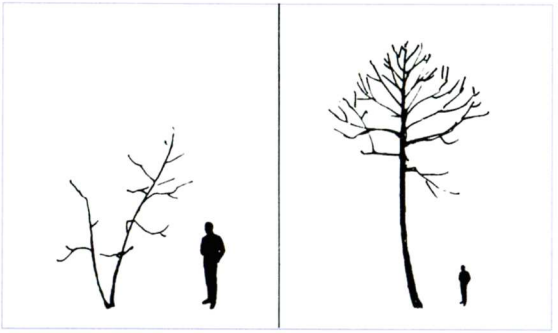
foresters complained that every time they opened up the woods in wildlife clearing, chinquapin appeared in great abundance. Here was my chance. I quickly pointed out the problem. Chinquapin was simply lying low in the forest, only to virtually colonize new clearings. In fact, it was hardly rare in its natural environment at all.

Seeing Ozark chinquapin in action was interesting in its own right. Here were trees looking and acting just like chestnut. I soon recognized that each of these *Castanea* species was playing a similar game. Both get established and survive as long-lived seedlings. Each waits for the chance to be released. I conclude that chinquapin is a shrub that occasionally escapes to produce seed, whereas chestnut remains dormant as a shrub-like plant until it can escape to become a long-lived forest giant.

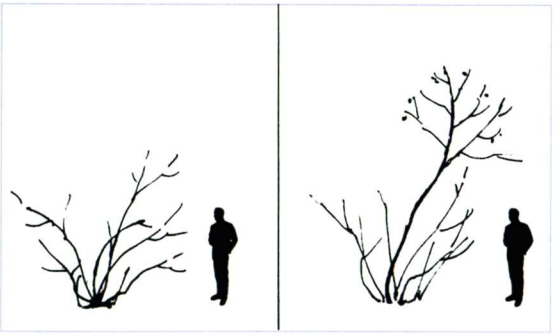
One other issue was of interest to me while poking around the Arkansas woods: where were the pre-bight chinquapin remains? They were relatively easy to find but quite a surprise. I soon found their fallen trunks with diameters frequently more than two feet. These trees were big, but had a peculiar form with great downsweeping branches forking from the trunk at relatively low positions. So the chinquapin was more of a giant bush than a real tree in pre-blight times. Living in an Appalachian-like environment and not having chestnut as a competitor, Ozark chinquapin may be evolving to fill both niches at the same time.

For references see "Chestnut Ecology—A Personal Perspective," pages 30 and 31.

CHESTNUT



CHINQUAPIN



Size comparison of seedlings and mature specimens.

ILLUSTRATIONS BY FREDERICK L. PAILLET

CHESTNUT ECOLOGY: VISIONS OF WILD CHESTNUT IN THE CAUCASUS

By Frederick L. Paillet, U.S. Geological Survey

No matter how much time one can spend trying to reconstruct what American chestnut was like in truly wild Appalachian forests, there is no substitute for seeing the real thing. I had thought blight precluded that ever happening in my lifetime. Thus, my interest was captured when I met Russian Foresters visiting the USFS in New Hampshire. These guys came from the western Caucasus region. Now I was aware that chestnut was an integral part of the forest in their research area. There was a small language problem, but it doesn't take long for people who genuinely like trees to recognize a kindred soul. I was soon helping to show the visitors around our forests. In return, I had an invitation to visit them in their research area.

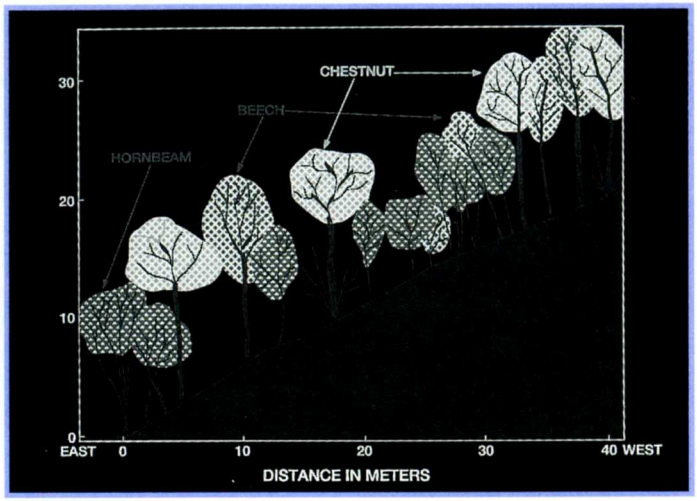
COURTESY F. PAILLET

Figure 1: In the deciduous forest on a Caucasian ridge, light reflects off the shiny "pins" of maturing chestnut burs.

The Russian resort city, Sochi, is known as the Russian Riviera, but behind my shorefront hotel loomed range after range of hills covered with dense deciduous forest. In a construction area where workers had opened up the forest to relocate the road I found the object of my quest. Here were straight and unbelievably tall forests trees – beech, oak, and chestnut (page 25, top). Here was forest with the undeniable stamp of virgin hardwood. The forest did not look much different from other woods, except all of the trees were so straight and so big. In fact, the trees didn't feel big – I felt small. And, here chestnut was an integral part of the woods. They had a hard time getting me back into the jeep!

After calming down, there was time to assess the region around the research station. I was deposited at an outpost in a tight mountain valley surrounded by deciduous forest in all directions. The distant moun-

tains climbed up to snowfields with no distinct tree line. Instead, the slopes became so steep that avalanche chutes simply merged into continuous meadow (page 25, bottom). The forest was a mixture of oriental beech and European chestnut, with a lot of poorly formed hornbeam underneath, and with an occasional durmast oak, Caucasian linden, or sycamore maple mixed in. I soon learned that you could see chestnut crowns on the surrounding hillsides by identifying a silvery sheen from the expanding burs (figure 1).



COURTESY F. PAILLET

Figure 2: Diagram showing the size and spacing of typical chestnut, beech, and hornbeam trees in the Caucasus.

After sampling the composition of typical slope forest at several locations, I selected a very typical transect to illustrate the size and spacing of the trees (figure 2). In the vicinity of this profile I could find only a few examples of typical "old seedlings" which might serve as "advanced reproduction" for the future forest (figure 3). In contrast, I found new chestnut seedlings everywhere (figure 4). In the areas I searched, there were on average only two or three "old seedlings" but from 1000 to 1500 new seedlings per acre. The new crop of seedlings in the Caucasus may simply represent a case where economics and land use conditions have conspired to temporarily reduce livestock and wild pig predation on chestnuts. I have strongly urged my Russian colleagues to trace how many of these new seedlings can entrench themselves for the long haul.

COURTESY F. PAILLET

Figure 3: One of the relatively rare examples of "old seedlings" found in Caucasian forests. These are the kind of heavily suppressed little trees we see being released in American forests.

COURTESY F. PAILLET

Figure 4: One of thousands of chestnut seedlings counted in Caucasian sampling plots.

COURTESY F. PAILLET

Figure 5: Clip-board used to illustrate the size of typical mature chestnut tree in the Caucasian forest. Note the presence of suppressed root collar spouts growing from the uninjured base of this mature tree.

One interesting observation from the Caucasus is that European chestnut in these wild forests shows the same abundance of basal sprouting from the root collar of mature, canopy-dominant trees (figure 5). These trunks show absolutely no sign of injury, and there is no local canopy opening that might have stimulated the sprouting. When I put the question to Peter Del Tredici, Arnold Arboretum Botanist and generally acknowledged guru of sprouting in woody vegetation, his best guess is that this is an adaptation for young trees that just manages to hang on into old age. Perhaps that is all there is to it. But one observation in Russia makes me think there may be more to the story. There was no question that landslides were the dominant cause of forest turn-over in these woods. I tried to survey the succession in recent landslides by walking into the jungle of overturned root masses and broken trunks. In every case, the new clearing was being colonized by young chestnut trees originating from root collar sprouts on the big trees (figure 6). So maybe the root collar sprouts on mature trees serve as advanced reproduction for openings produced by landslides.

One other aspect of the Caucasian forests needs to be commented on. Much of the forest looks like the Appalachian forests of the Great Smoky Mountains National Park: sturdy deciduous trees with an understory of such familiar shrubs as rhododendron, azalea, and blueberry. But I was unprepared for the veritable riot of vegetation in some of the tighter mountain coves. Chestnut and beech trunks were enveloped in ferns, ivy, and moss so that you could hardly tell one from the other (page 24). This just might be the final

end condition of chestnut forests left undisturbed for generations. If so, I am especially pleased to have visited one of the few places on earth where such sights are still to be seen.

REFERENCES:

Pridnya, M.V., V.V. Cherpakov, and F.L. Paillet, 1996, Ecology and pathology of European chestnut *(Castanea sativa)* in the deciduous forests of the Caucasus Mountains in southern Russia: Bulletin of the Torrey Botanical Club, v. 123, no. 3, p. 213-222.

Also see references on pages 30 and 31.

Figure 6: Vigorous root collar sprouts from a chestnut stump overturned in a pile of landslide debris; the retention of sprouting by mature trees may be an adaptation to mountainous climates where landslides are more common than forest fire or disease in the disturbance regime.

STARTING CHESTNUTS IN THE FOREST

By Chandis Klinger

Introduction & Background

In 1983, the founders of The American Chestnut Foundation thought it would take 50 to 60 years to breed a blight resistant American chestnut tree. Now we know that it will take only half as long, and the first highly blight resistant nuts are expected to be produced in 2006.* The breeding of the nut was done in an orchard type environment. When we start planting nuts in the forest, the question arises: "How do we plant nuts in the forest and successfully grow them into forest trees?"

The equipment used to till the orchard fields will not work in the rocky and root filled forest soil. There must be a way to plant nuts (or seedlings) in the forest soil that is effective and inexpensive. This discussion is on my experience toward this endeavor.

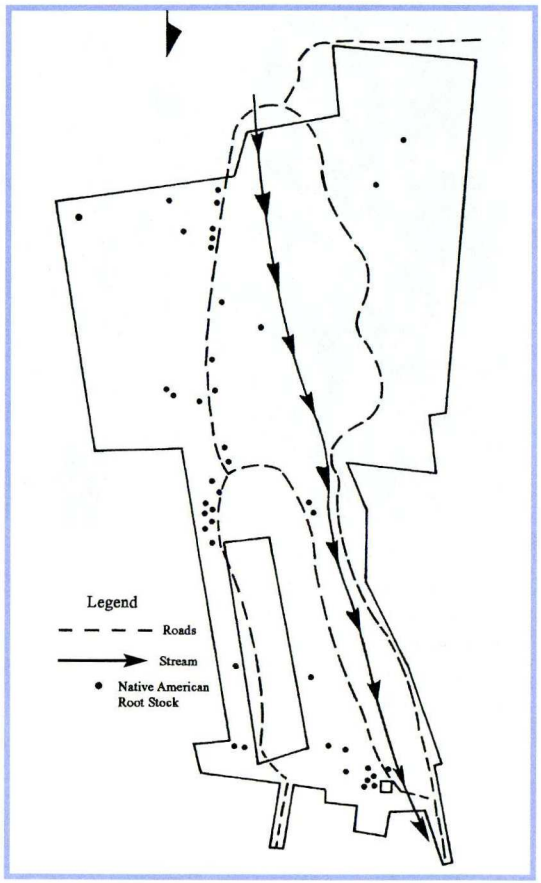


Figure 1: Native American chestnuts on author's property.

Where Do Chestnuts Grow?

Simply placing a nut in the soil may not produce a fully-grown tree. I have been thinning my woods over the last 15 years and have noticed that the 40 naturally growing stump sprouts (heights of 6" to 34') on our property are not uniformly spread over the entire 118 acres (figure 1). They are generally concentrated in a narrow row in the middle of the property and spread out on the higher elevations on a ridge. Chestnuts are not observed in the neighbors heavy timber cuts. This is an indication that the American chestnut may not grow in all soil.

There is a strong correlation between chestnut oak and American chestnut. Timber was harvested at

*Editor's Note: While the first small numberof blight-resistant nuts will be produced in 2006, initial nut production will be dedicated to further research. Blight resistant nuts will be distributed to members and the public at the earliest possible time, estimated to be 2010 or 2011.

the base of the mountain behind us and a portion of the area has American stump sprouts growing, but not in other areas. Where the chestnuts do grow, there are chestnut oaks growing nearby. For the 40 American chestnut stump sprouts growing naturally on our property, the distance to the first chestnut oak is as follows:

Chestnut Sprouts	Distance to First Chestnut Oak
37	1′ to 56′
1	60′
1	80′
1	165′

Unfortunately there are hybrid chestnut orchard plantings that are not doing well, also indicating that American chestnuts will not grow in all soils. If we are to succeed, we must plant chestnuts where they will grow well.

Starting Methods

Tubes — Many growers use tubes to start their nuts. This method will get the seedlings off to a rapid start and some seedlings will grow 5-6 feet of height the first year. Once the plant gets out of the tube, it seems to grow slower while developing trunk size and a good root system. Leaving the tube around the tree for about five years may enable the tree to stand on its own. However, if hurricane winds come, the tube will blow over—even when securely staked. Beside the expense, I'm a naturalist and like the seedling to develop naturally with the wind. Every time the wind blows the standing seedling, the seedling grows stronger.

Ashes — Years ago a state forester and I noticed the only place where acorns grew is where they were covered with coal ashes. Throughout the rest of the forest floor, there were no seedlings growing.

Initially, planting chestnuts under coal ashes seemed to work, but the third year of coal ashes, a rodent found 88 of 90 nuts and ate them. The rodent was so well trained to look for nuts under ashes, it dug up a seedling planted the previous year under ashes looking for the nut. I replanted the seedling and it is still surviving.

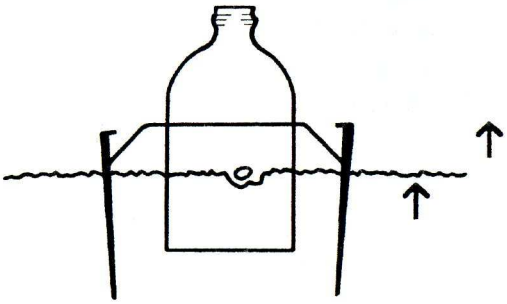


Figure 2: Plastic container in soil.

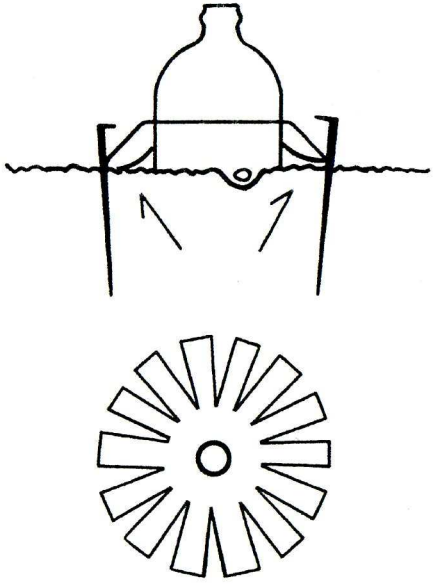


Figure 3: Flared plastic container.

The nuts that sprouted and survived seemed to struggle for several years. They did not grow as well as expected. It seemed as though the roots had to get away from the influence of the coal ashes before they started to grow well.

Plastic Bottles* — Using 2-liter plastic juice bottles with the bottoms cut out works well (Figure 2). One advantage of the buried plastic bottle is it contains water very well, especially important when watering during the dry summer. The water is poured into the bottle and the water stays near the roots rather than running away from the plant. However, if the bottle is removed from the seedling too soon, the roots can easily be disturbed and the seedling will die. Digging has been observed around the outside of the plastic bottles, but there has been no sign of tunnels being dug to the bottle's inside.

An alternative to this straight bottle is to flare the bottom of the bottle (Figure 3). The bottom is sliced into thin strips that are bent outward. The purpose of the flare is to prevent rodents from digging under the bottle to get the nut. In their attempt to dig, they scratch on the flare and give up in desperation. To date, tunneling under the flares has not been observed. However, this alternative does have a down side. When the seedling is watered, the water spreads underneath the flares and beyond the seedling's root system.

Slab Wood — Another technique is to use two pieces of sliced slab wood (Figure 4). Holes are drilled into each half for stakes that will anchor the slabs to the ground. Also a notch is cut into the center of each half so that when the two pieces are put together, they form a

*I do not like to use one-gallon plastic milk jugs. In my tests, these jugs are not very rigid when their bottoms are cut out and will bend very easily when anchored to the ground. Also, they are of a different type of plastic that soon gets brittle and shatters very easily. It is time consuming to pick up the pieces.

hole. Debris on the ground is scraped away and the thumb can be used to make a depression in the forest soil to place the nut. The notched hole in the slabs is placed directly over the point of the nut. The nut sprouts and the seedling grows up through the hole.

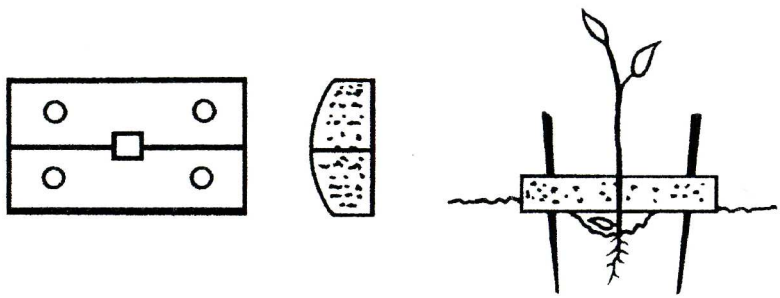


Figure 4: Slab wood.

The purpose of this technique is to provide protection to the nut and plant until it gains some height. It is important to use stakes that will decay fast, so that the growing seedling can push the slabs away. It is believed that this method may prevent mice from girdling below ground level. An advantage of this technique is that the location can easily be hidden to make it very difficult to find — even if you know the location. The down side is: it is time consuming; you need a source of slabs; and it is difficult to water the seedling. The water runs on top of the ground away from the seedling.

Milk Cartons — In subsequent years, I placed very moist garden soil in cardboard milk cartons with a partial X cut into the bottom to allow drainage (figure 5). I covered the nuts with soil and the nuts rotted within two weeks. When I simply pushed the nut into the soil (with about the same soil moisture content), leaving about half the nut exposed, the nut sprouted. This method allows one to watch the nut sprout and develop into a seedling. After sprouting, the nut will probably rest on top of the ground. I have transplanted these seedlings in June and July. When transplanting the nut, use a pair of dykes or pruning shears to cut off the nut to prevent a rodent from disturbing the plant to get at the nut.

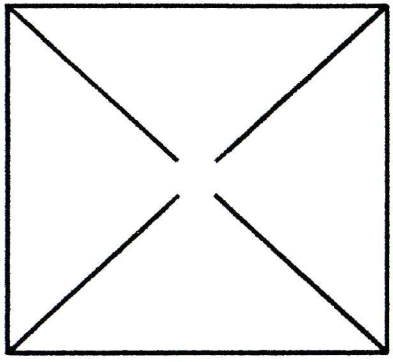


Figure 5: Milk carton bottom with partial "X" cut for drainage.

Cans — Number 10 coffee cans with a hole punched in the bottom were turned upside down and buried with about 2 inches of the bottom show-

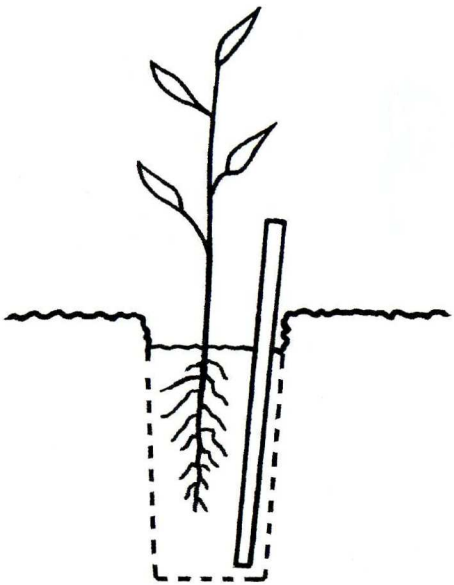


Figure 6: Seeding transplant from milk carton.

ing above the ground. The nuts germinated and started to grow through the hole. There was evidence of rodents digging down along the can's side, but they stopped after digging a few inches. The following year more nuts were planted the same way. A week later every single can was torn out of the ground and all chestnuts were gone. There is good reason to believe a bear tore out the cans.

Wire Screen — I also tested wire mesh screen with ½ inch holes. The bottom of the screen was buried into the ground while the top of the screen was pinched together and closed tightly. The nut germinated and the seedling grew right through the mesh. The screen had to be removed to prevent the screen from being embedded into the seedling.

Pests

Rodents — Initially I thought only about small rodents like mice, chipmunks, and squirrels. My experience is that protecting nuts from these rodents is easy compared to other pearls one faces to get nuts germinating and growing. It does not take much to keep them away from the nuts. However, one must keep the young seedling protected from being girdled. I went 6 years before I had a problem of rodents eating the stem off below ground level. Now I'll be placing a split can around the seedling.

Deer — Another problem is deer browsing on the young seedlings. Mixing eggs with water and spraying the mixture onto the seedlings will keep the deer away. I blend 4 eggs in the blender for 2 minutes and add 1 gallon of water. Begin spraying the buds in early spring just as the buds begin to swell and spray every week until some foliage is present. As the summer progresses, stretch the spray interval to once every 3 or 4 weeks. It is beneficial to spray the buds during the winter to prevent winter browsing. For a large number of trees, this is labor intensive, but it has successfully worked for me for seven years.

Bear — Getting the nuts to germinate is a small part of getting the seedlings to grow to a height where nothing will destroy them. If a bear learns there are chestnuts inside tubes, the bear will easily identify were all the nuts are located, rip out the tubes, and eat the nuts. Bears cannot resist the tubes. They will bend the tubes in half, chew them and knock them down allowing the deer to browse on the seedlings. I also learned that someone planted chestnuts in a clear cut and when the trees were of bearing age, the bears climbed the trees and broke the limbs down to get the nuts.

SUMMARY

Several planting methods have been presented to start chestnut nuts in the forest. An **effective** and **inexpensive** method I have found so far is to plant the nuts in cardboard milk cartons and transplant the seedlings with the roots and soil intact. Another favorite method is the plastic container buried in the ground.

What method you use to plant is irrelevant, being successful is what counts. Good Luck.

From an article of the same title printed in the Northern Nut Grower's Association 91st Annual Report – *2000, pp. 9-17.*
Illustrations courtesy of the Northern Nut Grower's Association.

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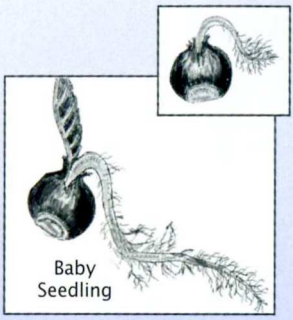

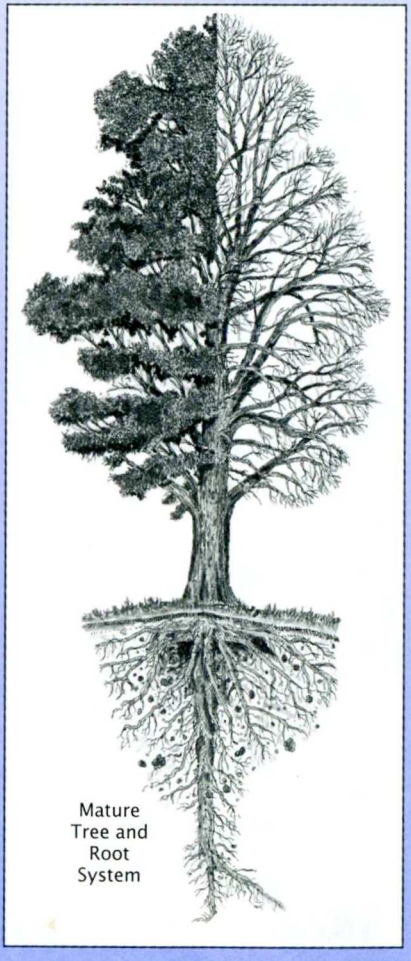

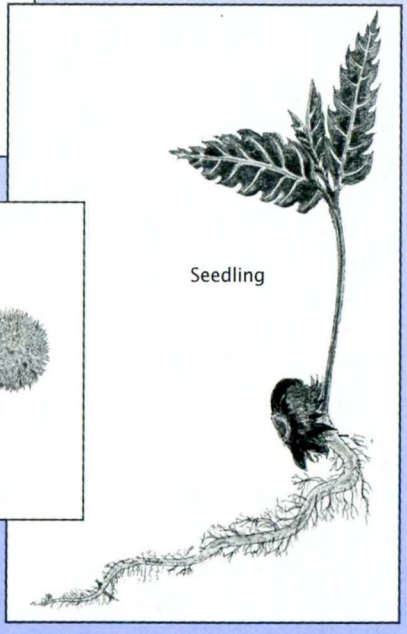

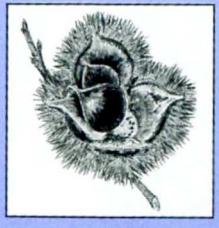

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