# CONTENTS

## Notes



## Memories



## Science and Natural History



## From Then to Now

notes

## FROM THE PRESIDENT
## 25th Anniversary Year 2008

"Tree of Hope" is the best description I have heard of American chestnut as we celebrate our 25th anniversary year and focus on securing the science as we look forward to a major reforestation initiative.

Secretary of Interior, Dirk Kempthorne, made the "tree of hope" statement when we planted several of our backcross trees at the Department of Interior building in Washington, D.C.-July of 2007. He was so energized by our program that it has led to additional opportunities including a new program-"Operation Springboard". This is a cooperative program, under Appalachian Regional Reforestation Initiative (ARRI), a component of the Office of Surface Mining. It opens up a major opportunity to assist in restoration through reforestation of coal surface mined lands-of which there are more than 300,000 acres to be considered for this program. This will lead to multiple benefits including providing major mast crops for wildlife, carbon sequestration, healing the land, and putting American chestnut back on its historic range.

Our fifteen state chapter network is in place (two more state chapters are underway) with a significant number of trained volunteers who continue to help with pollination, harvest, and developing seed orchards to help ramp up production of our best science material for reforestation. In just ten years, we have gone from four to fifteen state chapters and the historic chestnut range is now well covered thanks to the hard work of volunteers-guided by TACF's regional staff and a network of partners including many colleges and universities. All of this guided by a volunteer board of directors and two cabinets.

USDA Forest Service, under the guidance of Chief Dale Bosworth in 2004, signed a long term agreement with TACF to help broaden our network and science expertise while providing much needed funds to assist with farm and field operations.

Penn State University (PSU) signed a long term agreement with TACF in 1999 and that was the beginning of major recognition of our science program. PSU dedicated ten acres of its Arboretum land to American chestnut science and committed to office space as we opened a northern Appalachian regional presence with full time staff-in collaboration with our Pennsylvania state chapter.

There are many other partnerships and opportunities that have developed in recent years. Among them are a major multi-partner project funded by the National Science Foundation; signed agreement with National Wild Turkey Federation; plantings at the White House, Mount Vernon, Monticello, Smithsonian, and Abraham Lincoln Birth Site National Park.

As we look to the future, there needs to be a balance of strong leading-edge science, continued administrative responsibility that has led to the highest possible national ratings for TACF's efficient operations, and ability to both recognize and create opportunities that will lead to a long term successful reforestation of American chestnut to Eastern forests, including restoration of coal surface mined lands in its historic range.

Marshal T. Case

## FROM THE EDITOR

*"I like to see a man proud of the place in which he lives.*
*I like to see a man live so that his place will be proud of him."*
—Abraham Lincoln, 1858

On February 12, 2008, America celebrated the 200th Birthday of President Abraham Lincoln at his birthplace in Hodgenville, KY. In conjunction with the bicentennial event, TACF kicked off its 25th Anniversary by unveiling a placard describing the importance of the American chestnut to Abraham Lincoln's family. Born in a log cabin and called from the humblest rank in life to preside over our nation during the most momentous period of its history, it has been stated that no single individual has ever shaped our nation or our world as did President Lincoln. On National Arbor Day, April 25th, 2008, TACF planted another chestnut tree at another Lincoln property, Hildene, the Lincoln Family summer home, located in Manchester, VT, a mere 20 miles from this office.

It is funny to think real American history lies but a short distance from my front door. I find it truly amazing to look back at the antiquity of yesteryear and try to place myself in that time period. Unlike the Lincoln Family, it will not take me a day and a half to travel the winding roads from Bennington to the famed Hildene. I do not have to endure the breaking of wagon wheels or the jarring bounce of the horses gallop. I do not have to worry about my food stores going bad or the onset of influenza through rough terrain.

In those days, people dealt with all those things and more. I have only to deal with the other insane motorists, gas prices, potholes, and whether or not the horses under my vehicle's hood want to get out of the stable!

Perhaps that's why I believe people of yesteryear were cut from a stronger, tougher cloth than people of today. Please bear in mind I am no Historian, but it seems to me, "Honest Abe" was a rail-splitting chestnut man who overcame his own adversity to become the landmark figure we read about. Today, people have gas-driven logging machines, acceptance issues, and parental angst!

But I have hope.

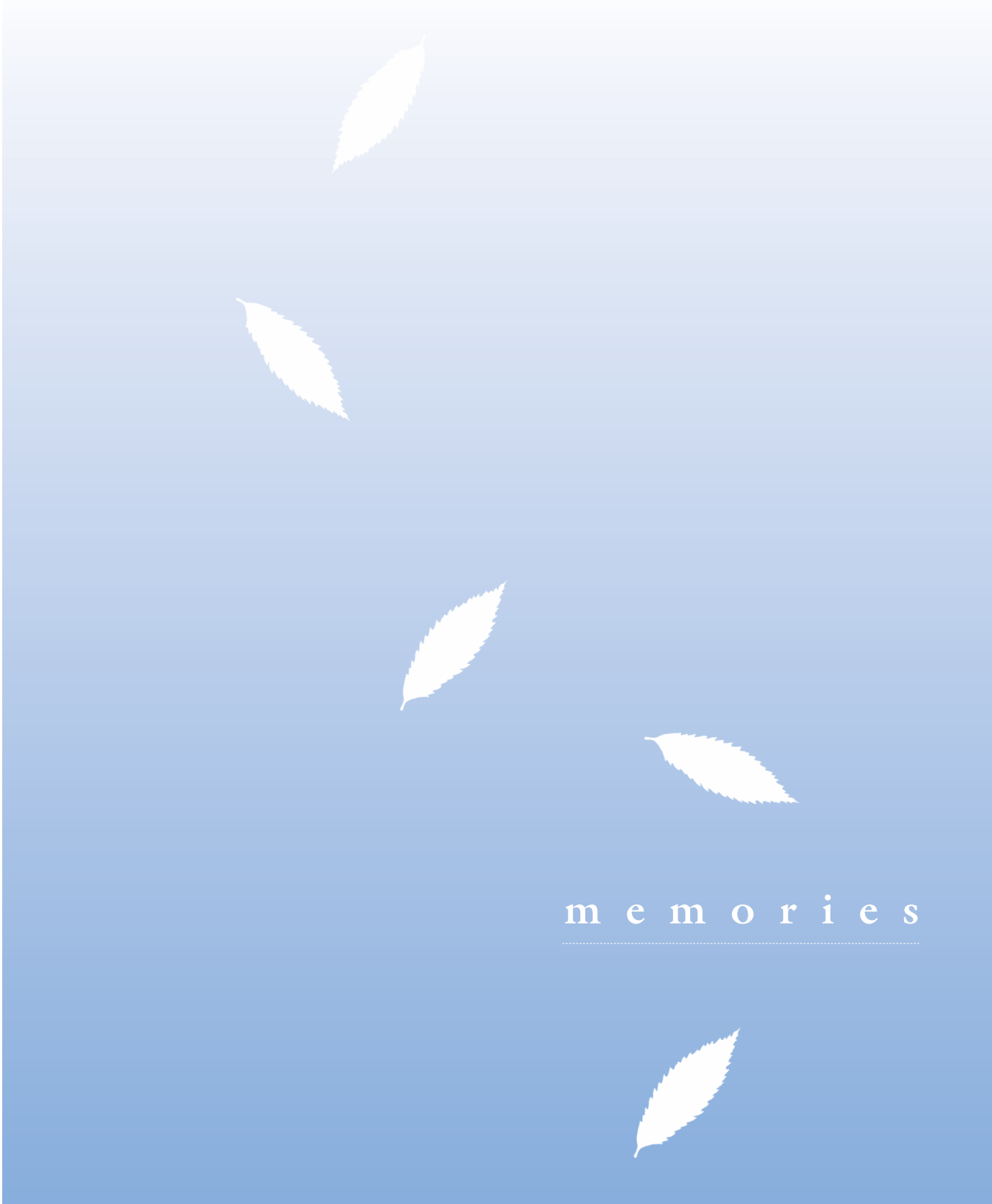
Hope for the people of today and the children of tomorrow. I have hope because, everyday, I read and/or listen to heroic tales of volunteers, working together to overcome forest adversity. I have hope because, like President Lincoln and others of great historical significance, the people involved with TACF care what happens and belong to this organization by choice, not by force. I have hope because I am part of an organization trying to save the planet and make it better for all of its inhabitants. I have hope because of a tree.

Like the quote atop this article, every volunteer and member of TACF is proud of where we live. And, most importantly, we all strive to make the place we live in proud of us!

To that end, this issue of *The Journal of The American Chestnut Foundation* has something for everyone. Discover the origins of *Castanea dentata* within Bill Lord's extremely well-researched piece, "What's in a Name?" Take a lesson from "Honest Abe" and learn "How to Fell a Tree and Create Split-Rail Fences for Beginners" by Don Barger and Bill Lord. Take "A Walk through Brasher Woods: A Tale of Two Families" and allow the memories to fill your heart. Find out what is happening in Maine and the discovery of the largest stand of mature American chestnut trees within the natural range of the species. Uncover the mysteries of Dr. Fred Paillet's humor and the secrets of the planets crust in "Unearthing a Pair of Chestnut Time Capsules". Finally, read what the ever-busy TACF Science Coordinators have been doing all year in the "2007 Regional Update".

Enjoy!

Louis Bedor III
Publications Director for TACF


memories

# A WALK THROUGH BRASHER WOODS AND A TALE OF TWO FAMILIES

Excerpted and Assembled by
Louis Bedor III, TACF Publications Director

The following story has been transposed from two audio recording interviews and contains excerpted material from the document: "Summary of Visit to Brasher Woods, August 10, 2000" and the article, "Restoring the American Chestnut Tree to Alabama" printed in the Spring '06 issue of *Alabama's TREASURED Forests.*

Lois and Julius Brasher standing at the "Tabernacle" and off to the right is a chestnut post used as one of the foundations.

*On August 10, 2000, Alfred Shotz-on behalf of the Alabama Chapter of the Nature Conservancy-surveyed Brasher Woods to assess and classify natural vegetation types. A series of randomly placed sampling plots were used to acquire the baseline data. Once classified, these communities were recorded and entered in the Biological Conservation Database at the Alabama Natural Heritage Program.*

Brasher Woods is situated in a relatively undeveloped region of northern Alabama of what is commonly referred to as the Southern Ridge and Valley. A vast majority of the tract occupies a moderately steep, north-facing slope that overlooks the bottomlands of Clear Creek. The parcel has achieved statewide recognition for its exceptional floral diversity and old growth timber. In fact, approximately 60 acres have never been logged with the exception of selective removal of some yellow poplar from the lower slopes nearly 100 years ago and removal of dead chestnuts in 1940. With the virtual absence of human-derived disturbance, a remarkable diversity of plant life has been able to grow and flourish. The lowermost slopes are characterized by a prominence of hardwoods, of which the following appear to be the most representative: white oak (*Quercus alba*), northern red oak (*Quercus rubra*), shagbark hickory (*Carya ovata*), pignut hickory (*Carya glabra*), yellow poplar (*Liriodendron tulipifera*),

basswood (*Tilia americana*), beech (*Fagus grandifolia*), and white ash (*Fraxinus americana*). Southern sugar maple (*Acer barbatum*) and black walnut (*Juglans nigra*) also occupy the canopy but are generally widely distributed. The sub-canopy and shrub layers are equally as diverse containing, in addition to saplings of the foregoing canopy species, a suite of species commonly encountered throughout the region. Typical under-story [sic] species include bottlebrush buckeye (*Aesculus parviflora*), southern sugar maple (*Acer barbatum*), redbud (*Cercis canadensis*), flowering dogwood (*Cornus florida*), pawpaw (*Asimina triloba*), and oakleaf hydrangea (*Hydrangea quercifolia*). As one ascends upslope, a gradual transition from the mesophytic hardwood forest of lower elevations into a dry upland oak-hickory association becomes readily apparent. This flora can be attributed to edaphic conditions influenced by shallower, better drained soils and a greater mineral deficiency affected by the slower weathering of the underlying sandstone bedrock. Here, chestnut oak (*Quercus prinus*) is dominant in the canopy. Of secondary importance, but equally as characteristic, are northern red oak (*Ouercus rubra*), post oak (*Quercus stellata*), pignut hickory (*Carya glabra*), and yellow poplar (*Liriodendron tulipifera*), the last-named being equally at home along the lower slopes. Shortleaf pine (*Pinus echinata*), while not common, is rarely absent from the canopy.

Julius Brasher and the last chestnut snag. Summer 1970.

Julius Brasher (age 93) and his neighbor James Euliss Walker (age 84) both grew up at Brasher Springs near Gadsden, Alabama. Their stories complement each other and offer a real-life account of the Great Depression and a community of people working together to survive.

### Mr. Julius Brasher:

"I wasn't actually here when the chestnuts died. I was away at college. I grew up across the creek at the foot of the huge mountain. I remember that mountain used to have so many chestnut trees. Everywhere you looked, big chestnut and hickory trees stood tall over the forest floor. Also, there were stumps up there from some tulip poplars—trees that a Chattanooga-based furniture company had cut about 1905.

The area I lived in was depressed economically and, during my younger years, I went to a little country school named Clear Creek. Clear Creek was comprised of two groups of students: first, second, and third graders in one section, and fourth, fifth, and sixth graders in the other section.

I remember, we had a teacher who would take the elder students up the mountain across from the school to gather chestnuts. All of the students would have bags, and as we walked the mountainside, we would pick up fallen chestnuts lying on the ground. Some of the bags the kids carried were made from leftover feed sacks, others from what was around and useful. Some children were so poor they came to school barefoot, and they had to be careful not to step on the sharp burs lying on the forest floor.

The burs were about the size of a tennis ball and fell from such heights they broke open. The ground would often be completely covered with both nuts and broken burrs. Each student walked away with a sizable amount of chestnuts in their bags. We never had to compete against each other for the chestnuts because there were so many. We were just kids out having fun. By the end of the trip, our bags would bulge full of chestnuts and hickory nuts to deliver home.

On those nights, I would come home to our big house where two families lived together. The kids would empty their bags out on the hearth in front of a roaring fireplace. We let them sit there and cook for a while and then ate them.

I have known Mr. Euliss Walker most of my life. Euliss' father, Jim, sharecropped our farm for several years and he used to raise cantaloupe-delicious cantaloupe-and take them into town to sell. Along with being a marvelous farmer, Mr. Walker was also an expert squirrel hunter. He would come over on the mountain at dawn and wait as the squirrels began their day. Sometimes, he would bag up to 6-8 squirrels without even moving. His wife, Stella, once made my family possum and sweet potatoes-that was the only time I have ever eaten possum, and it was delicious!

Occasionally, I squirrel-hunted up there with Jim. I remember there were times when I would set my 12-gauge shotgun down atop the leftover stumps of tulip trees and the weapon would not cover their diameter. Sometimes, there was still over a foot of uncovered trunk at the top and bottom of the shotgun. I used to wonder how the furniture company could have gotten the logs out of that forest because of how big they were.

Once the chestnuts died, the leftover dead trunks stayed in the forest. They did not rot away or become unusable. At that time, people used anything and everything they could without wasting the resources. The useable chestnut wood was cut into long rails, and my father was one of the best ax wielders I have ever seen. Some people swing an ax and remove a chip. My father could swing an ax and remove a section. His arms drew back and he would swing the ax into the same spot over and over, until, finally, pieces of wood the size of footballs flew out from the log leaving a section ready for long wooden rails. I remember my father saying how he could split two hundred rails a day because chestnut wood was so easy to use.

I wasn't too aware of the blight when it first happened since I was away at college. While we were aware the trees were dying, we didn't realize the importance of the blight at the time. I hope the American Chestnut Foundation (TACF) can bring the tree back."

*Julius Brasher, age 93, Brasher Springs, Etowah County*

Euliss Walker holding a catfish

### Mr. Euliss Walker

At the end of 1932, Julius Brasher left the family place to head off to college. By this time, Mr. Euliss Walker and his family were sharecropping the Brasher farm and Euliss tells about the blight hitting Brasher Woods.

"Mr. Julius Brasher lives a quarter mile from my house. The Brasher place had two houses: one that the Brasher family lived in most of the time, but they were on the road a lot of time 'cause their daddy was a preacher, and one house that we lived in. We farmed his land while the Brasher family was gone. The Brasher's took 1/3 of our profit and our family took the rest. We lived on their property for 11 years, from the time I was six month old, from January 1924 - 1935. In 1935, my father bought this house and I have been here ever since. We have been friends and a neighbor of the Brasher's all of our lives.

I told my two sons the story about the chestnut trees and what life was like during the Depression. They don't believe a lot that was going on then. We had to farm for a living and during that time; it was rough for a farmer. On Sunday afternoons after lunch, my family and I would

head up to the mountains and scavenge hickory nuts, black walnuts, and chestnuts and bring them back to the house. We would walk the quarter of a mile three or four times, making trips back and forth, and sometimes we could gather as many as a bushel. Once home, we would bring all the nuts into the kitchen and store them, or roast them, or boil them, or even eat them raw-kinda like people do now with peanuts. We raised most of what we ate. We bought sugar and coffee and flour, but we raised our own corn and had it turned into meal. In those days, the miller would turn 56 lbs. of corn into meal and he would take a gallon worth for his cost. Once ground, the miller would help strap the remaining meal on us kids and we would make the hike back to the house.

During that time, the trees were a part of our livelihood. We'd eat the chestnuts in the wintertime and, when the blight hit, it was like watching our crops die. I remember conversations between my parents discussing the chestnut trees and why they were dying. Everyone was talking about it. No one knew why. At the time, I was only seven or eight years old; chestnut trees didn't mean a lot to me. No one suspected the trees were infected with a fungus that would wipe out over 4 billion trees in the eastern part of the United States. In about two years, all the chestnut trees on the mountain were dead. Two years.

In 1940-41, several years after the blight hit, my dad and I ventured over the mountain and cut some of those dead trees down and would make fence posts out of them. Some of the trees we cut down were over 4 feet in diameter and over 60-70 feet tall. We cut those trees up into rails and brought some to Dr. Brasher and his family, and we would keep some of them for our farm. We shared everything in those days.

We cut those rails with a 6 ft long cross-cut saw-no chainsaws like people today use-a man on each end pushing and pulling and working together to accomplish the goal. It took about 30-40 minutes per tree-the saw did not afford us much room for play on either end. Those saws had a lot of teeth and drags; the teeth to cut and the drags to clear. We would saw and saw until the tree came down. From there, we would spread the logs out and get to splitting them into posts. They did split real well! Come to think of it, I still have one post from back in those days. It's not a pretty specimen, but it's a leftover from a time long, long gone.

I always thought the trees would come back-but they haven't. As a young man I did not notice the chestnuts. I was a kid and did not pay

attention to what was going on. As I grew into an adult, the chestnuts lost importance. Now that I am in my 80s, I miss the trees and wish they were still around-kinda funny, isn't it?"

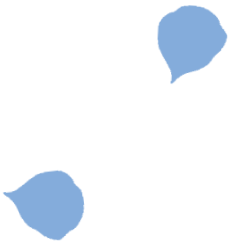
*Mr. Euliss Walker, age 84, Brasher Springs, Etowah County*

Every part of the chestnut trees that Euliss and his father cut was used. The same year they were cut, Julius Brasher's father, The Rev. Dr. John Lakin Brasher, had local builders construct a large open-air "tabernacle" on the farm for the worship services of Brasher Springs Camp Meeting. The structure, which seats 400 people and is still used by worshippers every July, is supported by two dozen massive chestnut posts, the tops of the trees that had been split for rails.

Alfred Schotz, botanist for the Alabama Natural Heritage Program, states that Brasher Woods is "the finest old-growth hardwood forest remaining in the State of Alabama" and contains "an exceptional diversity of flora that is virtually unparalleled in similar hardwood associations elsewhere in Alabama." Chris Oberholster, Director of the Alabama Chapter of The Nature Conservancy, cites Brasher Woods as "the only known virgin mixed hardwood forest in the Ridge and Valley province of Alabama, a unique and important remnant of Alabama's natural heritage."

Members of the Alabama and Tennessee chapters of TACF are documenting remaining chestnut sprouts in these woods and collecting graft wood. Studies there are underway of the natural hybridization between chestnuts and chinquapins.

Currently, the Brasher family, in conjunction with The Nature Conservancy and The Conservation Fund, is creating a 320 acre preserve to protect this pristine piece of wilderness.




science and natural history

## WHAT'S IN A NAME?

By Bill Lord

When you read about the chestnut tree and see it identified as *Castanea dentata* does it confuse you? The chestnut is a lovely tree, rich in folk lore and nostalgia. We want to bring it back to our Appalachian forests but the science stuff is a turn-off. Well, what do you think when you see *Castanea dentata (marsh) Borkh*? A double turnoff? Think again, there is more human endeavor and drama represented than you could ever dream of. The people evolving the "dry" science of Taxonomy; the orderly classification of plants and animals lived during the age of discovery from the 16th into the 20th centuries. They were the scholarly part of exploration, seeking knowledge and order rather than gold.

Carolus Linnaeus, 1707-1778, of Sweden, "...was the first to frame principles for defining genera and species of organisms and create a uniform system for naming them." [Ency. Brit, 15th ed., vol. 7, p379] Essentially, he defined the binomial scientific name, one for each species and written in Latin. Plants closely related and resembling each other are grouped in a genus; for chestnut, *Castanea*. A plant that is descriptively unique within a genus is a species; for the American chestnut, *dentata*.

Throughout the centuries of exploration something akin to a fever motivated the wide ranging botanist, facing down danger and exhaustion to find and name new species. Some of the more sedentary eagerly received and classified them. It was an honor more precious than gold to make a first discovery. To identify a species or have a plant named for you achieved the ultimate acclaim.

To whom are we indebted for the genus name, *Castanea*? This would be Philip Miller, 1691-1771, a Scotsman and chief gardener of the Chelsea Physic [Apothecary] Garden in London. He established an interchange and obtained plants world wide. He was a gardener's gardener and published an ongoing commentary, *The Gardener's Dictionary containing the Methods of Cultivating and Improving the Kitchen Fruit and Flower Garden*. The genus *Castanea* is first mentioned in the 4th edition in 1754 and the genus and three species are described in 1768 in the 8th edition. *Castanea* "...takes its name from Castana, a city of Thessaly [Greece] , where this tree anciently grew in great plenty."

Miller conformed to the Linnaeus format with reservations, as befit-

ted his status as Britain's foremost botanist. He defined *castanea* as a separate genus and he prevailed. In the words of the master, "This genus of plants is ranged in the eighth section of Linnaeus's twenty-first class, entitled *Monoecia Polyandria*, the plants of this section have male and female flowers, and the male flowers have many stamina, but he has joined this genus to the Fagus, making these of one genus, so that he has entirely abolished the title. However, as the male flowers of the Chesnut [sic: intentionally so written] are formed into long katkins, and those of the Beech are globular, they may with propriety be kept separate; and this I choose to do, that it may be more intelligible to common readers." [*The Gardner's Dictionary*....8th edition]

The American chestnut is not one of the three species described by Miller so let's fast forward to the America of Humphrey Marshall, 1722-1801, and the heady years emerging from Colonialism into independence. Humphrey, like his older cousin, John Bartram, 1699-1771, was one of, "the remarkable circle of Quaker botanists from Chester County, Pa., who helped shape American botanical practice during the 18th and early 19th centuries." [www.amphilsoc.org/library/exhibits/nature/marshall.htm]

Humphrey was a successful entrepreneur raising and exporting plants of interest to world wide parks and gardens. He compiled a description of native trees and shrubs in his *Arbustrum Americanum*, 1785, full of "useful knowledge" and dedicated to his friend, Benjamin Franklin. It contains the first published description of the American chestnut. He classified it as "FAGUS-*CASTANEA dentata*", using terminology from Linnaeus. This scientific name is a botanical synonym, a term applied to all scientific names for a species other than the one officially approved. The American chestnut, in common with most plants, has a number of synonyms.

Quoting Marshall's *Arbustrum Americanum*, "The CHESNUT TREE [sic:] The Characters are nearly the same [as] of the Beech, except the Male flowers being disposed in cylindrical katkins. The Styles more in number and bristly. The Capsules much larger, round, and set very thick with long prickly Spines; containing from one to four or five, but generally two or three nuts, filled with sweet kernel."

*"The Species of Chesnut, [sic] with us are,*

"1. FAGUS-*CASTANEA dentata*, *American Chesnut [sic] Tree*. This

often becomes a large tree, growing to the height of sixty or eighty feet, and to four or five feet in diameter, sending out but few branches, garnished with long spear-shaped leaves, toothed or notched on their edges. The timber is used much for rails, splitting free and out-lasting most of our Oaks. The kernel of the nuts are dried and used by some as a substitute for Coffee. The wood is also burnt into coals [charcoal] for the use of blacksmiths, &c. but not much esteemed for common fuel."

Marshall also includes a brief description of the chinquapin as FAGUS-*CASTANEA* pumila.

The identity of the first person to publish a description of the American chestnut as *C. dentata* surprised me. This is Mortiz Balthazsar Borkhausen, 1760-1808, a German forester, botanist and entomologist. He was a prolific writer and in 1800 published a book on forestry, "*Handbuch der Forstbotanik und Forsttechnologie*," including the first reference of the American chestnut as *Castanea dentata*. Marshall's Fagus-*Castanea dentata* is given as the sole synonym.

Who would expect the author of our tree's scientific name to be from central Europe? The American chestnut is not mentioned by Miller [in 1751 or 1768]. Nonetheless, the American chestnut was well established in Germany by 1800 and Borkhausen considered it more suited to the northern German climate than the European chestnut.

As interpreted from the German, "This tree which reaches a height of 50-60 feet and an average thickness (circumference) from three to four feet, appears to differ little in its structure from the European chestnut tree; it is, however, healthy due to its tougher nature; for it grows in North America according to Warter, everywhere on the wooded hills and foothills of the Appalachian Mountains across the entire land. It is found upwards until the colder regions lying below the 41st degree latitude north, whose climate is equal to the climate of European lands lying below the 61st degree latitude, and also has a far tougher nature as our common chestnut tree, which come from warmer land and requires a protected and warm location. The bark of the trunk is ash colored and somewhat raised. The leaves are broad, lanceolate in form, pointed, sharply dentate, smooth and bright green. The blossoms and fruit are similar to the European variety. The latter have a pleasant, sweet taste.

"For the northern regions of Germany, this tree is very much recommended and deserves preference over the preceding variety because it [is]

uncommonly durable in the harshest situations. The fruits, which it yearly yields in large quantities, are somewhat smaller as the ones of the European variety; they are, however, more pleasantly sweet and will probably be enlarged and improved by cultivation. In America they are mostly eaten raw and in the wilderness, when ripe, provide an excellent food source for various animals and especially for American bears, which at this time are extraordinarily fat and delicious.

"The wood is similar to our chestnut, easy to split, very durable and is equally useful for all occasions [for carpentry and construction], firewood and wood for embers [Kohlholz=charcoal]
All these advantages....together with its rapid growth and the little attention it demands....recommend the tree most emphatically not only to the German forester but also to the farmer. Its reproduction in large quantities can only be achieved with seeds..."

"The fruits are prepared in the kitchen in various ways. Sometimes they are boiled and served with broths, ragouts and cabbage; other times they are used for stuffing in geese and ducks; other times they are roasted and enjoyed with or without lemon juice and sugar; one can also prepare a kind of chocolate, coffee, and also starch from them. Yearly in Italy, some of them are dried in the oven in order to be stored for the winter. They also can be used as a superb mast for pigs and other cattle. They are very dear to the deer.

"In autumn the seed of the chestnut is treated in the same way as the beech. With several varieties of differing quality having been cultivated, the best are propagated by grafting and budding....the growing bud onto the trunk of the chestnut tree, grown from seed."

"The rapid growth of this valuable tree, its good wood, its usable fruit, and the little attention that it require recommend its frequent cultivation."

It required a fever of a sort to keep me exploring via libraries and the internet to learn the identities of Miller, Marshall and Borkhausen. My course was much less hazardous than that of the botanists of old, but I shared a kindred joy beholding the ancient documents and their treasured words.

Appreciation is extended to Charlotte A. Tancin Librarian and Senior Research Scholar of the Carnegie Mellon University Hunt Institute for Botanical Documentation and to Bonny Isaacs, Collection Manager, Section of Botany, Carnegie Museum of Natural History. They and their archives are keepers of the faith.

Translation of Borkhausen by Kevin Bilicke, Kebst28@Pitt.edu

The basic reference source for Miller, Marshall and Borkhausen is from R. Govaerts, & G. D. Frodin, World checklist and bibliography of Fagales, pp 113-119, 1998.

## FIFTEEN ACRES IN MAINE

It was late September in 1993 when Sam Andrews, a logging contractor from Atkinson, Maine, first saw a large American chestnut tree that was producing chestnuts. The land was owned by Prentiss & Carlisle (P & C), a premier land management company located in Bangor, and they had contracted with Sam to harvest trees on this land which was located just a few miles from Sam's house. It was late in the day and Sam had established his tote roads and skidder trails, but there was this large (20 inch +) tree that was in the way of his skidders. At first glance he thought it was a Balm-of-Gilead tree (*Populus gileadensis* - Rouleau). He drove his skidder to the tree, got his chain saw out and actually had the chain saw running when he saw the burs on the ground. He thought to himself, "This just doesn't look right." The leaf was too narrow and the fresh burs on the ground caused him to contact the P & C forester, Tom Nelson, who happened to be on the site. When Tom saw the tree, he studied it carefully as he had been taught at the University of Maine School of Forestry, and came to the conclusion that it was probably an American chestnut tree. They spared the tree that day and Tom went home to study the matter further that evening. The next day he called Sam and told him, "Don't cut that tree down or any others that look like it. It is an American chestnut tree even though it is well north of the "natural range" as indicated in most books." Atkinson is forty miles north of Bangor and the northern limit of the "natural range" was indicated to be about 20 miles south of Bangor. So this tree was a full degree of latitude north of what had been published by most writers. Also the winter temperatures in this area reach -20 to -30 degrees F (plant hardiness zone of 3) while Bangor is in zone 4b (-10 to -15 degrees F). As one enters the grove it is possible on a clear day to see Mount Katahdin (the northern terminus of the Appalachian Trail) in the distance. Large numbers of big oaks were harvested and Sam counted three chestnut trees that were producing viable nuts. This past summer an intensive survey was conducted on the 10+ acres that contain the bulk of the chestnut trees and that large tree that Sam first saw is now 34 inches in diameter and is about 80 feet tall. Two more chestnut trees, located about 50 feet from this mother tree, are now producing viable nuts so this brings to eight the number of nut producing trees. The survey also showed over 250 chestnut trees in these 10 acres

with many of them being less than 2 feet tall, but many have grown to a height of 20 - 30 feet and are outgrowing the competition and should start producing nuts in the near future. The newer trees are most plentiful where the skidder trails were located.

One of the trees producing nuts has suffered from the blight and wind damage, and will be harvested in 2008 and the land owners have agreed to donate the lumber from this 27 in. (dbh) tree to the Maine chapter and will do the harvesting for us. At almost 15 acres in size, the Atkinson grove is one of, if not the largest natural areas comprised of American chestnut trees derived from natural seeding, and is located in a wooded area of about 1200 acres which is now on the market to be sold. The Maine chapter will be working with Prentiss & Carlisle to try to purchase the 10 to 15 acres that contain the bulk of the native American trees.

The Maine chapter has incorporated one of these trees into its breeding program and plans to return this year (2008) and add another one from this lot. This spring the Maine chapter, at the request of the Arnold Arboretum (Harvard University) will donate about 12 seeds from this grove to be planted in their forest in Boston. We wish to thank Sam Andrews for his professionalism and also Prentiss & Carlisle for their assistance and contributions to the mission of restoring the American chestnut to the forests of Maine.

Glen *Rea*
*President, ME-TACF*

# THE AMERICAN CHESTNUT AND THE ZIG-ZAG SPLIT RAIL FENCE

By Don Barger and William Lord. Illustrations by Don Barger.

As spoken in a saying of long ago, "Where there be mountains there be chestnut." The same held true in historic time for the chestnut and the split rail fence with its zig-zag pattern bounding hill and vale. In adapting to a new world, our forefathers learned the rot resistance and relative ease with which the chestnut split, the wood, long and true, made it the perfect choice for fencing.

The fences that evolved became an American innovation. A rail fence, presumably of the zig zag pattern, was in use on Long Island, NY, by 1652. However, throughout much of Colonial America it was known as the Virginia split-rail, indicating an early and prominent use. It required more timber than the upright post and rail fence, but timber was then an unlimited resource at the time. The split-rail required less labor, no digging, no nails and was much easier to assemble, repair or relocate. (1)

Splitting rails was a common chore on every farm using basic tools brought from Europe, the ax, the saw, a sledge or maul, and wooden wedges. Logs were cut into 10 to 12 foot lengths from trees straight of trunk and spare of limb. A wedge was centered vertically into the butt end of a log and struck with a maul to start a length long split. A second wedge was placed in the front of the crack and again whacked with a maul to advance the crack. Usually this was sufficient to split the log in half. Some skilled rail splitters could boast of splitting a log with one mighty whack. The same technique was applied to quarter the log. In this manner, an 8 inch diameter log would provide 4 rails. A tree of larger diameter, say 24 inches , could provide 12 rails per log, and involved the knowledgeable use of the wedge, as illustrated in the drawings by Don Barger.

Early on our forefathers learned that growing chestnut from stump sprouts, or "coppicing" provided the most rapid growing and straightest source of rails. Coppice was a practice of ancient vintage in Europe, growing sprouts of varying size for a wide range of uses. In America the chestnut became the primary coppice tree and a source for poles, ties, posts and rails. The practice flourished but the name faded from common use. In 1912 Dr. H. P. Baker, a forester at Penn State College commented, "the cutting of the forest and its reproduction from stumps...has been

practiced by our wood owners for many years. They have not called it coppice, but it has been that just the same." (2)

It is interesting to note, Raphael Zon, one of our first professional foresters, recommended the longest growing period, 43 years, for sprouts to be use for rails.

| | Age |
|---|---|
| Post | 14 years |
| Tie | 29 |
| Pole | 38 |
| Rails | 43 (3) |

This indicates the sprouts would have attained a considerable tree height and diameter and each would provide many rails.

Fence building commenced with setting the first course of rails in zig-zag fashion, called "laying the worm." If deemed necessary, the crossed ends were placed on a flat rock for stability. Rails were added to a height of three or four feet, and then topped at each intersection by a pair of cross rails forming an "X". A heavy "rider" rail was laid atop each pair of "X's," acting as a lock to withstand the violence of weather and the push of livestock.

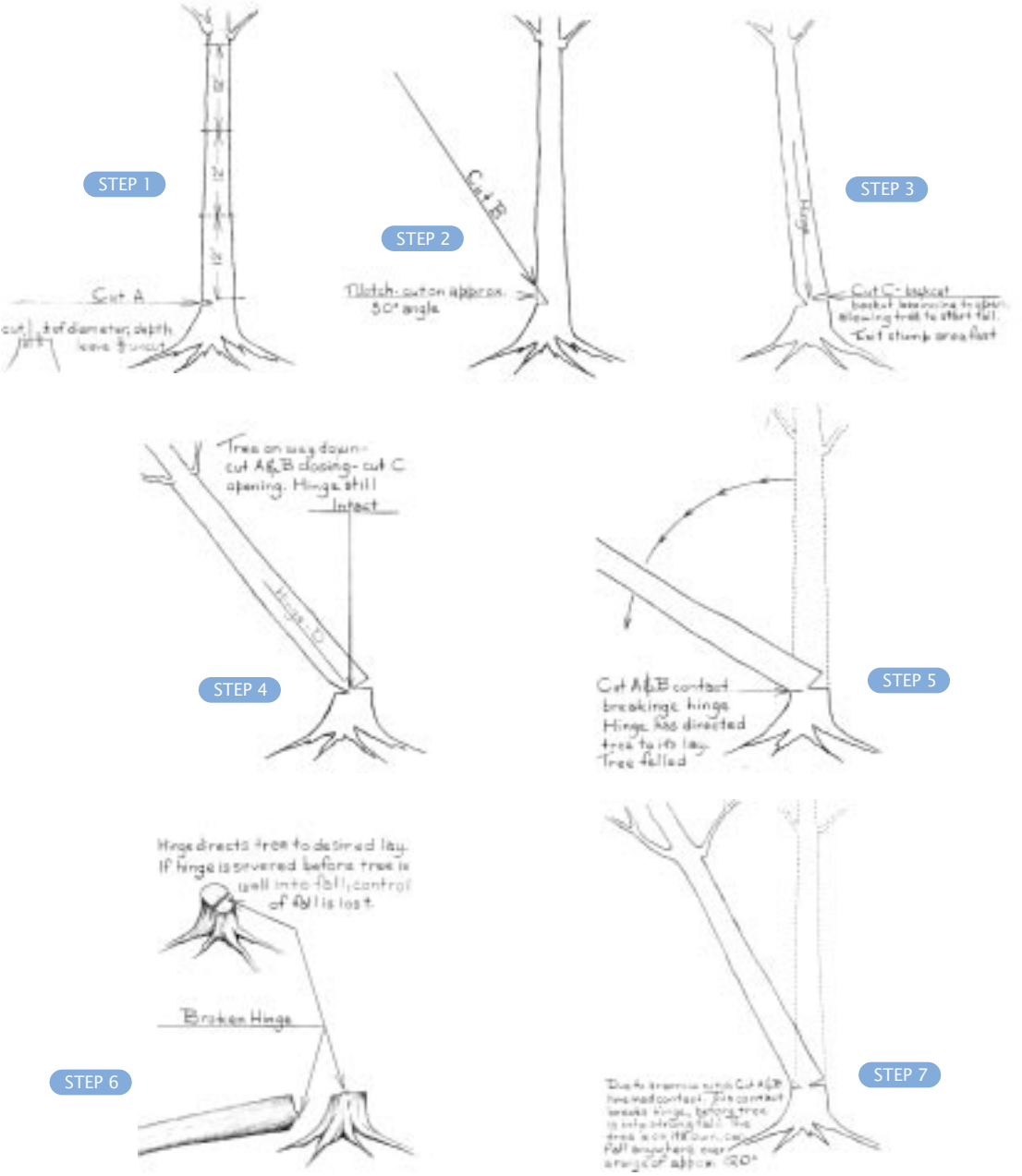
Many fences were laid down with a distance of one rod or 16 1/2 feet between intersections, enabling the owner to compute the acreage of a rectangular field at 16 square rods per acre. (4)

A chestnut rail fence lasted a life time, but more and more life times are coming to an end. Still, mile upon mile of chestnut rail fence are still seen along the 469 miles of the Blue Ridge Parkway extending over the Southern Appalachians in Virginia and North Carolina. This is the legacy of Bill Hooper, the Blue Ridge Parkway agronomist. During the last years before he retired in 1974 he "scrounged high and low," accumulating a reserve supply of chestnut rails. By now they have all been called to duty and new replacements are obtained from yellow poplar.

The Parkway maintains an exhibit of native rail fences at Groundhog Mountain parking overlook, milepost 188.8 in Carroll County, southwest Virginia.

*Don Barger*

# HOW TO FELL A TREE



Excluding his three years in the U.S. Navy, Don and his wife, Marie, have lived their entire lives on Chestnut Ridge in southwestern Pennsylvania. They derive from ancestors who came and settled the land in Colonial times. Don has a heritage of woodsman's skills. When he was born in 1928, the chestnut was fast disappearing due to the blight and the zig-zag split-rail fence was a memory, having been replaced by the stake and rail and the wire fence. He has felled many trees but, until now, has never split rails. But he has the knowledge to do it and his drawings illustrate the method he plans to demonstrate in a documentary film. His drawing shows a tall straight tree with a 24" dbh [diameter at breast height]. He and a partner begin by making a horizontal cut with a cross cut saw on the side he wants the tree to fall. With an ax he hews out a notch and then, using the cross cut saw, they start a cut on the opposite side of the tree. As the cut penetrates past half way they are alert for any "cracking" sound indicating that the tree is starting to bend the thin strip of wood or "hinge" remaining between the two sawn cuts. This is the time to retreat to predetermined spot of safety and watch as the tree snaps the hinge and arcs its powerful sweep to the ground. Don cautions that cutting down a tree is not for the unwary and is best done with a partner.

After the brush and limbs have been removed they cut an eleven foot log and lift one end and place it securely, "T" fashion, in the notch of a log placed beneath. A vertical cut is sawn into the butt end into which Don places a wooden wedge he has made from dogwood. He then begins to split the log in half by hitting the wedge with a sledge or maul. The crack will extend part way down the log. Don places a wedge at the front end of the crack and extends it by striking the wedge. If necessary, this last step is repeated.

When the log is halved, the process is repeated to quarter it and each quarter is split into three rails, using the wedge as shown in Don's illustration.

(1) Appalachia Fence Company, Internet
(2) Proceedings of the Pennsylvania Blight Commission, 1911-1913, Mann Library, Cornell U., 1993
(3) Chestnut in Southern Maryland, Raphael Zon, U.S. Dept of Agri., bltn 53, 1904
(4) Split Rail Fence, Wikapedia Free Encyclopedia, Internet


from then to now

# UNEARTHING A PAIR OF CHESTNUT TIME CAPSULES

By Dr. Fred Paillet

One of the joys of being a geologist is to comprehend the immense span of earth history, and yet recognize a single fossil leaf as having fallen in a mud deposit just as similar leaves fall today. What a wonderful experience to peer so deeply into time. Our ability to do this has been aided by a marvelous accident that occurred billions of years ago. That's when one or more large objects literally whacked the earth. The initial circular orbits and the perfectly vertical spin axes of the planets where knocked about and left to resonate at regular periods that continue through time. The miracle is that these harmonic vibrations are regular enough that we see distinct periods of oscillation reflected in climate, and yet there are enough different oscillations that they make a unique pattern through time when superimposed on each other. If the oscillations were too regular, we could place a time at the top or bottom of a climate cycle, but would never know which one we were dealing with. Instead, the cycles add up to form fingerprints we can recognize. A typical example (Figure 1, page 34) shows the recognizable signature produced when ocean sediment data are calibrated on a scale of global ice volume. The exact same data set can also be represented as global sea level, since the water in the ice is removed from the oceans (Figure 2, page 34). In order to comprehend how effectively these kinds of diagrams help the geologist peer into the past, let's look at a couple of examples from the recent literature that just incidentally tell interesting stories about my other most favorite subject - chestnut.

Our first stop takes us to the coast of Spain. But don't worry about bringing your tanning lotion as this is not the sunny Mediterranean coast. We are going to the rugged northwestern tip of the Iberian Peninsula where powerful waves driven by the prevailing westerly winds crash into rocky cliffs. It is easy to see how such cliffs are generated by waves pounding sediments at the waterline. This erosion undercuts everything above, which tumbles into the water and gets washed away. If that were the only story, there would be nothing to tell us about the deep past. But sea level has not remained constant (Figure 2). For much of time the waves have not reached up this far, and the cliffs were stranded far inland. The rigors of climate will quickly attack such freestanding rock walls. The

top crumbles as a wedge of sediment builds up at the base of the cliff. This is an episodic process so that every now and then a little basin develops on the accumulating slope. These basins can trap plant materials to create a tiny time capsule recording a single moment in local history. That's where the chestnut story comes in.

One such Spanish cliff has three little pockets of organic material exposed in the cliff face. Looking at Figure 2 we have a pretty good idea that the cliff itself represents a cross-section of everything that tumbled over the edge since the last time sea level was at this height. Materials at the very bottom must have tumbled down just after sea level dropped 120,000 years ago. Material further up collected in episodes from then until 10,000 years ago. Each of the three little layers must date to some time between those two limits. Sure enough, the highest is about half way up, and has enough radiocarbon to show a date of about 45,000 years ago. All radioactive carbon in the other two has decayed beyond detection, so those beds must be more than 50,000 years old. The plant materials in the upper two layers show a shrubby sagebrush environment indicative of cold and windy times. We would expect that from the colder climate indicated by the high ice volumes in Figure 1. But the lowermost deposit is of real interest because it contains the remains of a lush deciduous forest that includes chestnut. This lower bed lies right at the top of fossilized beach sand that must represent the last high water condition 120,000 years ago. It lies at the base of the cliff and has been buried by deposits tumbling off the top since then. So we are looking at the forest that grew here about 120,000 years ago just as sea level began to fall, and just as ice was starting to build up again at high latitudes.

What sort of forest does this sediment layer indicate and how does it compare to today's Spanish forest? The local forest today is really more of a scrub. Lots of broom (a thorny thicket forming shrub), heather, and blackberry with a few isolated pockets of trees. The bottom bed indicates a closed forest dominated by birch, but with significant amounts of all of the trees (maple, linden, ash, elm, hornbeam, beech, oak and even chestnut) of the most diverse European forests living today. This probably means that the exposed shoreline was subject to frequent storm damage such that the most common tree was birch, a tree with ecological tolerances similar to our eastern white birch. But wherever there was shelter from these winds there were substantial pockets of a much more

diverse forest. Chestnut was apparently a minor component in these islands of forest diversity. It is quite likely that this rich forest was much more widespread further inland away from the rigors of coastal environment. All studies suggest that the climate 120,000 years ago was actually quite similar to that of today, except perhaps a bit warmer and wetter. That small difference might explain why there is no rich forest today. The many millennia of goats and sheep grazing here may have something to do with the difference, too.

This image of a diverse European forest with chestnut in Spain has important implications because there are questions about whether chestnut was native to Europe at all. Early historic humans may have brought chestnut culture with them. Long periods of frigid climate during times of high ice volume all but wiped out trees from everywhere north of the Alps. Only a few pockets of the hardiest conifers and perhaps birch might have survived in France and Hungary. Chestnut must have been extirpated from these northern lands. But it appears that chestnut was able to survive from the days before these glaciers in the Iberian Peninsula south of the easternmost extension of the Alps (the Pyrenees). Chestnut was probably wiped out in France along with hickory, sweetgum, bald cypress, and hemlock more than a million years ago. One also wonders if there were people around to appreciate the benefits of these ancient Spanish nuts. The answer is yes, but they were speaking a very primitive form of Neanderthal if they spoke at all. This was a time when truly modern humans had just made their appearance in southwest Africa, and were millennia away from making their entry into Eurasia. But it is easy to envision the hardy Neanderthals snacking on roasted chestnuts between wrestling bouts with mammoths and cave bears.

Our second time travel is to the high peaks of the Adirondacks. North America is fortunate to have a history such that the eastern half has been geologically inactive for a long time. A well-worn band of mountains runs north-south and there have been no major volcanic eruptions or uplifts to interfere with the migration of trees back and forth under the influence of changing climate. But the down side of this history is that there are very few deep records of the environment such as in the volcanic craters of France and Italy. The withdrawal of the last ice sheet a mere 15,000 years ago left abundant evidence of the changing forest since then, but swept away or buried most of everything that went before. Much longer

records of the American deciduous forest are rare, and the best ones come from places like central Illinois where chestnut was not likely to have been present. The sediment layer in the Adirondacks is a real exception. Excavation for a mine discovered a bed of sediments beneath the till laid down by the most recent glaciers. The layer was found to be beyond radiocarbon dating, so it is obviously very old. What does this particular time capsule tell us about chestnut and what time period does it represent?

The simplest geologic argument is that the old Adirondack deposit corresponds to a relatively warm interval and before the latest glacial advance. This again leads us to the period 120-130,000 years ago. Having unique records of changes in climate over time such as explained in Figure 1 are just irreplaceable when it comes to figuring out the past. The amazing thing about this particular deposit is that it contains the remains of a real chestnut forest. In these sediments, chestnut pollen becomes abundant as spruce disappears and oak pollen increases sharply during a climatic warming. The proportion of chestnut pollen to oak remains less than 30%, but is typical of pre-blight forests in southern New England where chestnut was historically a leading dominant even if under-represented in pollen profiles from the Holocene. My previous work has shown that much of this under-representation is credited to the effects of a fully leaved canopy on the dispersion of pollen from chestnut catkins. Even more surprising, this location is beyond the historic range of chestnut. The location today lies within the realm of the northern hardwoods. Forests at these elevations (about 2000 feet) in the Adirondacks are a mixture of maple, beech, yellow birch, white pine, spruce, and hemlock. This kind of ecosystem is often labeled the "asbestos forest" because it grows in a climate too cool and moist to support fire. In contrast, the oak and chestnut association is considered dependent on fire disturbance. The dryness of the fossil site is further indicated by the abundance of basswood (known to prefer dry soils) and the very limited presence of hemlock. The latter extends far to the south of the northern hardwood realm where it inhabits the moister sites. This fossil forest must have been within the range of hemlock, and yet not suitably moist for that species to proliferate.

Geologists generally believe that the period after the second-to-last great glacial melt-off was rather similar to the most recent deglaciation (the Holocene). Our modern climate was just a bit wetter and cooler after the mid-Holocene "thermal maximum" ranging from 4000 to 9000

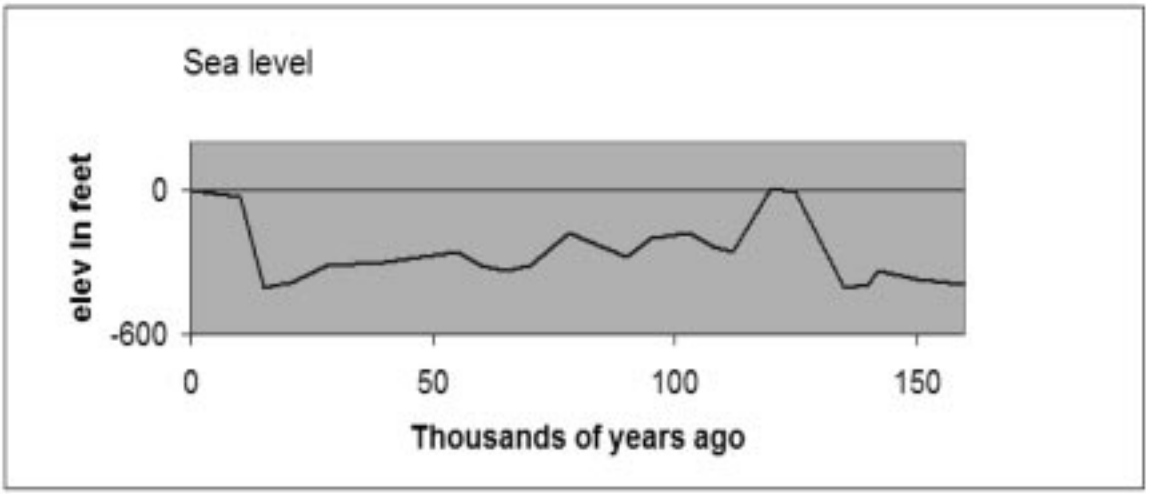



FIGURE 1

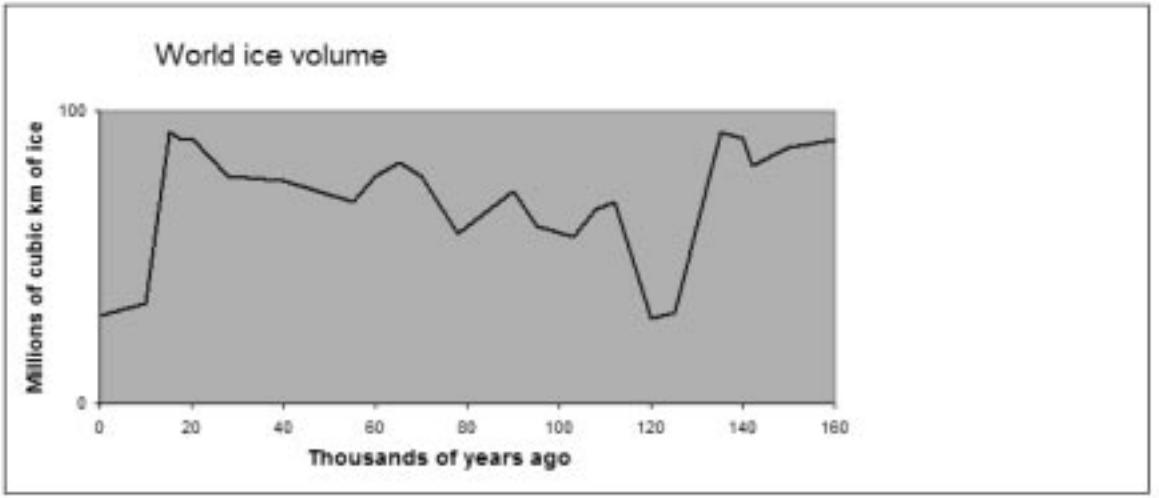



FIGURE 2

years ago. So maybe the last interglacial also had a thermal maximum that allowed chestnut to grow in the Adirondacks. The profile of pollen in the fossil bed does show a steady increase in beech, which prefers cool and moist conditions towards the top where the profile was truncated by an advancing glacier. But that poses another problem. We see that in more recent times chestnut failed to advance northward to take advantage of the warmest climate at high latitudes. Yet it somehow seems to have done so in the previous inter-glacial. Could the nuts have had human help? Not likely since there could have been no humans at all present then. Peking Man never made it out of China. On the other hand, the first human arrival in America was soon followed by a great wave of extinction. Perhaps there was some mammal alive 120,000 years ago that was capable of transporting chestnuts more effectively than our living fauna. If there were once giant prehistoric beavers, how about a giant Pleistocene ground squirrel?

# NEW ENGLAND REGIONAL SCIENCE REPORT

Leila Pinchot, Regional Science Coordinator, Yale University

2007 was another successful year for the New England chapters, marked by the region's first inoculations in Maine and Massachusetts, the formation of the joint Vermont/New Hampshire chapter, and an abundance of media coverage. Regional activity generated over 14 newspaper articles and television interviews. An article published by the Fosters Daily Democratic, based in Dover, New Hampshire, was picked up by the Associated Press and has prompted a short National Geographic article on TACF efforts, published in March.

The year ahead will require the same determination and dedication by TACF members that has made the region's current progress possible. Maine and Massachusetts look forward to more inoculations and to preparing for $BC_3$-$F_2$ seed orchards, while Vermont and New Hampshire will work to develop their new chapter. Connecticut will work to locate additional American trees, which has been difficult as a result of the abundance of Chinese and Japanese chestnuts growing throughout the state.

Atkinson, Maine American chestnut, 34 inches dbh.

## MAINE

The Maine chapter made its first inoculations this past summer at the Merryspring and Groce orchards. Initial selections were made in October, under Dr. Hebard's guidance. The chapter will make final selections at these two orchards and will evaluate Deer Hill orchard for possible inoculation next summer.

The chapter has made 24 Clapper and 19 Graves lines and thereby has essentially completed their 4th generation crosses, but may make a few more in order to replenish lines that suffered high mortality. The chapter's trees are planted in 11 orchards, most of which are located in the southeast section of the state.

### Studies of Native Stands

Maine has two known large, natural chestnut groves; one located in Embden and the other, the largest stand of mature chestnut trees with-

in its natural range, in Atkinson. This past summer ME-TACF President Glen Rea, with the assistance of his wife Ann and board member Jamie Weaver, initiated an inventory of the Atkinson grove. The grove was discovered in 1993 by logger Sam Andrews, who was just about to cut into a large tree when he noticed burs on the ground. The TACF survey of the 10+ acre site, owned by land Management Company Prentiss and Carlisle, turned up eight mature reproducing trees, the largest of which is 34 inches diameter at breast height and about 80 feet tall. Over 200 chestnuts, from seedlings to mature trees, are growing at the site; many appear to have established through seeding as opposed to sprouting. The chapter plans to create a management plan, under the guidance of University of Maine Forestry professors, to encourage chestnut growth and reproduction. Unfortunately, at least one tree in the stand is known to be infected with the blight.

## VERMONT/NEW HAMPSHIRE

Thanks to the hard work of local members and volunteers, the Vermont/New Hampshire Chapter gained official chapter status at the TACF Annual Meeting in October.

Prior to gaining this status, the group held four meetings in VT; in Marlboro, Rutland, Norwich, and Burlington, and one meeting in Hilsborough, NH, to discuss TACF's program and chapter activities with local members and interested citizens. Chapter members participated in other activities throughout the state, such as the Vermont Farm Show in Barre, to increase local interest in chestnut restoration. Through these activities the provisional chapter surpassed its goal of gaining 80 new members, thereby becoming eligible for official chapter status.

(VT/NH): Terry Gulick and Jack Weinzierl, VT/NH members pollinating the Thetford, VT tree. (I'm waiting to hear back from Terry on what Jack's last name is).

The chapter has one orchard located at Shelburne Farms in Shelburne, VT in which 4 Graves lines are growing. A test orchard was established on the property of Dr. Randy and Grace Knight in Perkinsville, VT. A full-fledged orchard will be established at the site next spring.

With much help from Kendra Gurney, Masters candidate at the University of Vermont, the chapter pollinated 4 new trees this year, which, when added to the 4 previously created lines, total 8 lines, and

that all before gaining official chapter status! Particularly exciting was the discovery of the "Thetford" tree — an American chestnut tree 31.6 inches diameter at breast height! — with branches low enough to pollinate from the ground. Also exciting was the chapter's first New Hampshire pollination, of a tree owned by Mr. and Mrs. Yates in Farmington.

### Adaptability studies

Dr. Paul Schaberg of the University of Vermont, and his students Ben James and Kendra Gurney have established two separate studies to test the cold tolerance of the backcross chestnut in order to determine their adaptability to Vermont winters. The first study, completed by Ben last year, assessed the cold tolerance of American and backcross chestnut and oak seed. Ben found no significant difference between the various seed, which indicates that the hybrid chestnuts should survive winters as well as native American chestnuts. The second study, lead by Kendra, examined the cold tolerance of Vermont American and backcross chestnut and red oak and red maple shoots. Kendra found that both types of chestnut were significantly less cold tolerant than the oak and maple, suggesting that the cold temperatures of chestnut's northern range may present a challenge to reintroduction.

## MASSACHUSETTS

### First Inoculations!

The Massachusetts chapter made its first inoculations this past summer at the Tower Hill Orchard in Boylston. Members inoculated 29 trees, many of which were already badly infected from natural blight. In October Dr. Hebard guided the initial selections of the inoculated trees. Though there are too few trees to make any generalizations about the selected lines, a few of the trees show promise. The chapter will make the final selection of the Tower Hill orchard and expects to inoculate another orchard next June.

The chapter has just about completed the 4th generation pollinations required by the regional adaptability program, but may make a few more pollinations in the western part of the state. MA-TACF's 24 Clapper and 19 Graves lines are planted in 28 orchards; 26 of which are located in Massachusetts and two in Rhode Island. The chapter's large and very dedicated board of directors has enabled the group to establish and maintain

this large number of orchards.

### Reforestation Studies

The MA-TACF chapter has taken particular interest in examining methods for successful reintroduction of chestnut into the forest. Two experiments were established this past year to test forest planting methods. One study examined direct seeding into recently harvested upland sites in the Quabbin watershed. Fifty nuts were shallowly planted using an acorn planting tube in each of three similar sites. Only residual brush protected the nuts from predation. At the end of the season, 18 of the 150 nuts had survived to grow into seedlings. Though this may seem a failure, a 12% survival rate is not unimpressive, considering how few chestnuts in the wild once survived to grow into seedlings and how little labor was expended planting the seed. The chapter will continue to monitor survival and growth of the seedlings.

The second reforestation study examines the success of planting large seedlings into the forest. Forty seedlings, 5-6 feet in height, were planted on two sites, one in the Quabbin watershed, and one at the Moore State Park in Paxton. The seedlings, which originated from Kentucky and were grown at the Georgia State Nursery, had extensive root systems and required considerable labor to plant. At the end of the growing season only about 5 of the seedlings had died. Though small, these two studies offer an interesting and useful comparison of planting techniques. While direct seeding is much cheaper and easier than planting seedlings, the first method yielded much lower survival rates. Planting seedlings, however, requires the initial labor of growing the seedlings in a nursery and the labor of lifting and replanting the seedlings into the forest.

Charlotte Zampini, MA-TACF Breeding Coordinator, inoculating a tree at the Tower Hill orchard.

## CONNECTICUT

The Connecticut chapter enjoyed a successful pollination season in 2007, yielding over 1200 nuts between 4 new lines. Two orchards were established this year; one in Ellington in collaboration with the Northern Connecticut Land Trust, and the second in Falls Village in collaboration with Great Mountain Forest, Inc. Five new lines were planted into these and the two existing orchards, which when combined with the two previously planted lines, create total 7 Clapper lines in the state. The chapter plant-

Gayle Kida, CT-TACF Breeding Coordinator planting at the Salem orchard.

ed two test orchards this year in collaboration with local conservation organizations, which will hopefully result in the establishment of new breeding orchards this spring. One of the Connecticut chapter's greatest strengths is its policy of establishing breeding orchards in collaboration with local conservation organizations, such as land trusts. This ensures not only that the orchards will be properly maintained, but that community members outside of TACF become interested and involved in chestnut restoration throughout the state.

Northeast Utilities, headquartered in CT, raised approximately $9000 for TACF, two-thirds of which was designated to the CT chapter, through a program in which the company raised $5 for every shareholder who registered to receive electronic, rather than paper, copies of the annual report. This program, which is part of a greater Northeast Utilities program to address environmental concerns, has helped the Connecticut chapter finance orchard equipment and supplies, and publications.

## NORTHERN APPALACHIAN REGIONAL SCIENCE REPORT

Sara Fitzsimmons, Regional Science Coordinator,
Penn State University

### NEW JERSEY

Though still not officially a chapter, breeding activities continue in New Jersey and more orchards are added each year. In 2007, $F_1$ seed from state trees were successfully created and over 200 open-pollinated seed from native trees were collected. New orchards are slated for Burlington and Monmouth Counties.

### NEW YORK

As most of you know, New York is focusing its program on creating blight-resistant American chestnuts through the use of advanced genetic transformation techniques. In association with SUNY-ESF (State University

of New York's College of Environmental Science and Forestry) researchers Dr. William Powell and Dr. Charles Maynard, the chapter works to assure availability of native New York germplasm in the form of trees in orchards (grafted and planted), embryos and pollen for transformation work, and seed for various other experiments.

In 2006, the chapter had a breakthrough when the first transgenic trees were planted in the field. Since then, the researchers have been making headway in increasing the amount of outplanted stock in their research orchards around Syracuse. The NY Chapter raised enough money to help researchers receive a new humidity/growth chamber that will help acclimate transformed plantlets going from the lab and into the field.

In the last issue of this Journal, Dr. Powell published an article on small-stem assays, a technique with may help decrease the amount of time required to determine the inherent resistance of transformed (and maybe even backcrossed!) trees. The groups also published on new methods for transformation (1) and the effect of transformed tissues (2) on the chemical they are supposed to neutralize. It is that second article, described in the next section, that might be of most interest for our readers.

### Bioengineered Resistance

The blight fungus produces oxalic acid, which seems to break down the cell walls of American chestnuts. Basically, the SUNY-ESF program is working to put a gene that will produce oxalate oxidase (OxO) into an American chestnut. Oxalate oxidase neutralizes oxalic acid, turning it into hydrogen peroxide and carbon dioxide. So, if American chestnuts have this capacity, they may be able to prevent the blight fungus from attacking and killing them.

Taking the above one step further, oxalic acid seems to have a major effect on lignin, a major component of cell walls. The SUNY-ESF crew took tissue from transformed American chestnuts (the tissue had the OxO gene put in) and non-transformed American chestnuts (no OxO gene put in). When they applied oxalic acid to the tissue, they found that the non-transformed tissue lost lignin, i.e. the oxalic acid probably ate away at it. The transformed tissue, however, did not exhibit a loss in lignin, presumably because the inserted gene was turned on, produced oxalic oxidase, and neutralized the offending chemical.

This research is one step closer to showing the feasibility of using the OxO gene for conferring resistance in American chestnuts. The field test will help confirm that.

(Top) Gary Miscky and Luke Stallsmith prepare to pollinate some chestnut trees. (Bottom) Paul Lupo measures American chestnut in non-herbicided plot. (Inset) Chestnut seedlings in herbicded plot.

## PENNSYLVANIA

Breeding work continues full force in the PA Chapter and we have inoculated the first PA-derived $BC_3F_2$ population in 2007. More information will be available on those results in the next edition of this report. In addition to normal activities, several other studies are underway in the chapter including experiments by Board member Jim Walizer into the use of chestnut as a species for woody biomass. Our contingency in Mercer County (northwestern PA) has also found a new way to pollinate using a shotgun, fishing pole, balloons, and whole lot of pollen (Figure 1. For details, please see PA-TACF's newsletter volume 12 issue 2).

### Silviculture studies

Under the guidance of Dr. Kim Steiner and several associated students and research technologists, Penn State University has been leading research in American chestnut restoration experiements. Since 1997, several techniques of chestnut restoration have been explored.

Before his departure in 2006, Tim Phelps - now of the Tennesseee Chapter, helped establish several sites looking at different methods of treatment at the time of establishment including using herbicide vs. not using herbicide, using various types of seed/tree shelters, and planting seed vs. planting seedlings. Though 2007 really only marks the first year of close study, some interesting observations were met, including that the herbicide mix chosen for this experiment was a bit too rough on the newly planted trees (Figure 2B). There may be better mixes

out there, but gauging by the growth experienced in non-herbicided sites (Figure 2A), it may not be necessary. As these trees grow and more data are gathered, the results will be reported here.

### The Haun Orchard

In the early 1980s, a resident of Sandy Lake in Mercer County Pennsylvania, Mr. Charles Haun, planted about 500 pure American chestnut trees on his property. Mr. Haun died shortly thereafter, but his son, Fred, still lives on that farm. Today, with little care given to each individual tree and several species of competing vegetation now growing on the site, over 250 trees still persist. All but one of the original stems are now dead, but those sprout clumps produce 1000s of chestnuts every year attracting a myriad of wildlife, PA-TACF volunteers, and researchers from the area.

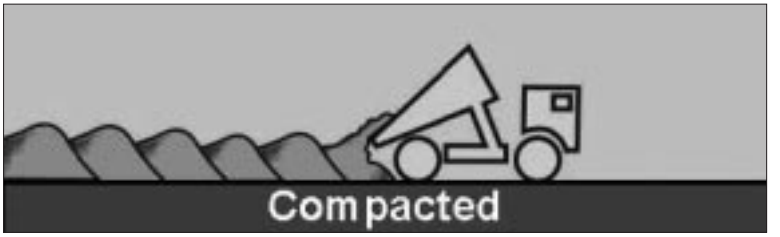
In 2007, Grove City College student Katie Schroeder, under the supervision of her advisor Dr. Jan Dudt, established baseline data capturing on the trees left in the Haun orchard. Each tree has been tagged and will be tracked for growth and fruiting in the future. These data will be about to serve as a foundation on which to build further research on fallowed orchards in the future.

## OHIO

### Strip-mine Plantings

Though breeding work continues, and the chapter is finding new American chestnuts throughout the state on which to breeding advanced backcross material, OH-TACF has been focusing efforts on stripmine planting work.

With the help of chapter volunteers, the chapter's secretary Dr. Brian McCarthy, a professor of ecology at Ohio University, planted about 1200 American chestnut seedlings. That study is looking at several different treatments, including: (1) ripping the soil, (2) plowing and disking the soil, (3) ripping and then plowing and disking the soil, and then, of course, (4) a control where nothing is done. To




Cartoon depicting the concept of applying loose dumps of soil over compacted, strip mined land.

date, all of the treatments have had far greater survival, upwards of 90%, than the control plots where survival is only about 50%.

Likewise, Dr. Carolyn Keiffer, the chapter's vice-president and a professor of ecology at Miami University of Ohio, has been looking at the effect of planting American chestnuts and advanced backcross chestnuts in loose dumps (Figure 3). One of Dr. Keiffer's student's, Jenise Bauman, is looking at the effect of mycorrhizae on plantings of chestnut on stripmines. Mycorrhizae are certain types of fungi that grow on tree roots and often help them uptake nutrients from the soil. It's long been held that these associations are highly beneficial for tree species and Jenise is looking to find out which ones work best. It might also be that native fungi will colonize trees planted on stripmines, in which case artificial placement of these fungi at the time of planting may not be necessary, or it will dictate which kinds should be used.

## INDIANA

### 4th Generation Breeding Completed: Seed Orchard Establishment

In 2007, the Indiana Chapter finished the required 20 lines of breeding within the Clapper source of resistance. In addition, the chapter bred their first seed lots of $BC_3F_2$ seed! Though the chapter completed their first inoculations four years ago, they were only able to inoculate one line ($CL_{287}$), and there won't be any more additional Indiana-derived $BC_3$ lines for a few more years. In the meantime, the chapter has had a plot of land set aside for a $BC_3F_2$ orchard at Potawatomi Wildlife Park in Tippacanoe, IN, which is in northern Indiana.

In order to reserve this site and begin laying out the seed orchard, the Indiana Chapter took pollen from two of the Pennsylvania Chapter's selected lines ($WV_{419}$ and $BE_{325}$) to make testing $BC_3F_2$ materials. The 584 seed acquired from those crosses will be planted at the Potawatomi Wildlife Park planting in the spring of 2008.

### Reforestation Studies

Like several of the other Chapters, the Indiana chapter is also starting to explore various techniques of re-establishing American chestnuts into the forests. Starting this year, the chapter has created research plots at 5 dif-

ferent locations — Crane, Purdue, Whippermans, Murrdocks, and Brown - in hopes of better understanding chestnut establishment. As more information is available, it will be published here.

Along the same lines, former Indiana Chapter president and professor of forestry at Purdue University Dr. Doug Jacobs published an article in Biological Conservation (3) that summarizes some of the issues surrounding the future re-establishment of American chestnuts. Dr. Jacobs also discusses the potential ecological implications - both good and bad - of the restoration of the American chestnut.

## REGIONAL PERSPECTIVES FROM MARYLAND AND VIRGINIA—ACROSS THE POTOMAC

Robert Strasser, TACF Research Technologist, Hood College

Despite the summer's intense dryness during the hottest part of the season, controlled pollinations in both Maryland and Virginia yielded nuts in large numbers during 2007. These successes were the welcome outcome of hard work by members of both state chapters, and have set the stage for a very busy Spring in 2008. Clearly, there are some green thumbs in our midst, with good eyes for detail.

In March and April, we look forward to planting close to 3,000 nuts combined in both states. It will be satisfying for our members to watch them grow into regionally adapted trees that play an important role in The American Chestnut Foundation's backcross breeding program in the Northern Appalachians and piedmont here in the Mid Atlantic United States.

### MARYLAND

In Maryland, the goal of completing 20 lines from the Clapper source of resistance was accomplished in 3 years upon tallying the results of the 2007 field season. Much to our relief, all seven of the pollens sent from Meadowview this year yielded at least 100 $BC_4$ nuts on each of the seven Maryland mother trees pollinated during the summer. This was a potential concern because some pollen was delayed two extra days in shipping via FedEx, but to no apparent detriment: All generated healthy and viable looking nuts. The total number of Clapper $BC_4$ nuts

harvested was 1,447.

Additionally, two selected trees at the ThorpeWood orchard were pollinated to advance the Musick source of resistance in the state to the $BC_2$ level. They were successfully pollinated with Maryland *Castanea dentata* pollen from four counties, including our first native forest tree from Western Maryland's Green Ridge State Forest, as well as with pollen from the current state champion tree in Baltimore County. We now are over halfway to the goal of generating 10 lines from the two selected trees at ThorpeWood, and have two entire orchards dedicated to this purpose. This is especially significant in light of the fact that nuts from 2006 pollinations on one of these trees, TW50, performed well against *Phytophthora cinnamomi*. We share the concern that this disease may continue to expand its range of distribution, and that we should also be selecting for resistance to this soil pathogen as well as to blight as we pursue chestnut restoration in the South and beyond. The 2007 Musick pollinations yielded 433 nuts in 5 crosses.

Almost 4,000 open pollinated American chestnuts, many hundreds of Chinese from half a dozen sources, and 101 $F_1$s from two crosses were also harvested in 2007.

## MD Hypovirulence Updates

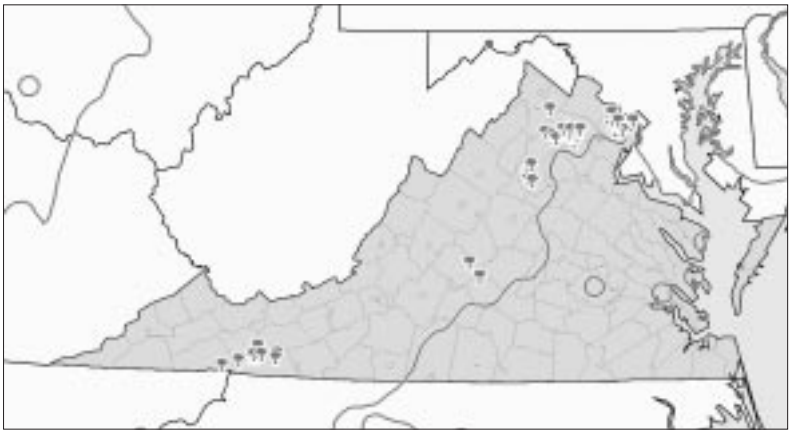
Another chapter highlight for the year included the inoculation of dozens of trees at Sugarloaf Mountain with hypovirulence soup, a mixture of several strains of blight converted to hypovirulence by transfection with viral elements that reduce its effectiveness at attacking the cambium of chestnuts. Seven hypovirulent strains provided by Dr. Donald Nuss at the University Of Maryland's Biotechnology Institute and Mark Double of West Virginia University were used. Some 209 cankers on dozens of "forty-year-old" trees were treated. This systematic and carefully documented effort may yield some interesting information about the establishment and dispersal of these blight strains in the field, and the chapter looks forward to making observations next season of the treated trees.

We also have developed a very successful and growing partnership with the Izaak Walton League: Three of their chapters are now sponsoring chestnut orchards in Maryland. The league's national headquarters, located in Montgomery County, also hosted a special educational event in the Spring which allowed TACF members from several states to dis-

cuss administrative processes and visualize goals for the organization's future.

## VIRGINIA

The Virginia Chapter is charged with advancing the Graves source of resistance using trees in the northern and central part of the state, and establishing orchards from these local pollinations. The chapter's first efforts at controlled pollinations were carried out principally in two areas, the Washington DC suburbs, and on several very nice large surviving chestnut trees near the town of Marshall, in Fauquier County in the northwestern part of the state. Four different Meadowview pollens were applied to five trees, four of which produced nuts successfully. The total yield from these pollinations was 473 Graves backcross nuts



caption

Several very promising prospects are being considered or prepared for planting with Virginia backcross chestnuts in the future. These include the Blandy Farm, owned by the University of Virginia and the location of the state's arboretum, Roland Farm, and the Mount Zion Church Preservation Association. All have been through preliminary evaluation as sites for growing chestnuts, and in all probability two of them will be planted with the chapter's first backcross nuts in the Spring of 2008. The chapter looks forward to a lasting and fruitful working relationship with these partners.

The Virginia Chapter has also been lucky to have the efforts of George Mason University student Thomas Burke. In 2007, Tommy researched the native American chestnut trees of Virginia, collected spatial data, and compiled an image rich report on the trees and their status in the state. Figure 4 shows the current status of identified mother trees in the state.

# SOUTHERN APPALACHIAN REGIONAL SCIENCE REPORT

Paul H. Sisco, Regional Science Coordinator, Asheville, NC

## Father tree program a great success

This summer the Meadowview staff allowed volunteers from the southern chapters to bring pollen to Meadowview to use on $BC_2$ and $BC_3$ trees that are not currently being used in the national program. This father tree program was a "Great Leap Forward", helping the people in our region make a lot more seed and to use pollen from trees that are difficult to use as female parents. It also fostered a cooperative spirit, with Tennesseans and Alabamians bagging trees that would eventually be pollinated by Kentuckians and Georgians, and vice-versa. We tried to be good guests at the Research Farms and hope to be invited back next year.

Volunteers from the Tennessee, Alabama, Georgia, Kentucky, and Carolinas chapters worked together to bag and pollinate trees at Meadowview

## Second annual Southern Regional Meeting

The second annual Southern Regional Science meeting was held at the University of Tennessee at Chattanooga on February 24. Over 50 people attended, including members of all five southern chapters, Gerry Cormier of the Ozark Initiative, Meadowview staff, and Sara Fitzsimmons from TACF's Penn State office. Hill Craddock of the University of Tennessee - Chattanooga, acted as local host. Fenny Dane of Auburn and Joey Shaw of UT-Chattanooga reviewed their progress to date in analyzing the patterns of chloroplast DNA in Ozark and Allegheny chinkapin and American chestnut. Stacy Clark of the USDA Forest Service discussed her chestnut silvicultural projects in Alabama and Tennessee, while Joe Schibig of Volunteer State Community College described the distribution of American chestnut in Mammoth Cave National Park. Joe James of the Carolinas Chapter reviewed his results to date in screening chestnut families for resistance to *Phytophthora cinnamomi*. Last but not least, Sara Fitzsimmons distributed templates for recording chapter data in a format that can be incorporated into a national database Sara is developing.

## Characterization of confounding Castanea pumila populations in the Southeast United States

Report of Hill Craddock and Joey Shaw,
Univ. of Tennessee at Chattanooga

North American *Castanea* species are taxonomically problematic; botanists have acknowledged as many as seven species and hypothesized that C. pumila, Allegheny chinquapin, and *C. dentata*, American chestnut, interbreed and produce a naturally-occurring hybrid, *C. neglecta Dode*. Three species may be recognized today: *C. dentata*, *C. pumila* and *C. ozarkensis*, the Ozark Chinquapin. In the southeastern United States, American chestnut and Allegheny chinquapin can be difficult to identify because of variable morphologies and putative hybridization. We are exploring chloroplast markers that can be used to differentiate between the three North American taxa at the molecular level. We plan to use the markers to test a confounding, possible hybrid population in northern Georgia (the "Pocket"), and also to look for potential introgression in sympatric populations in the Southeast.

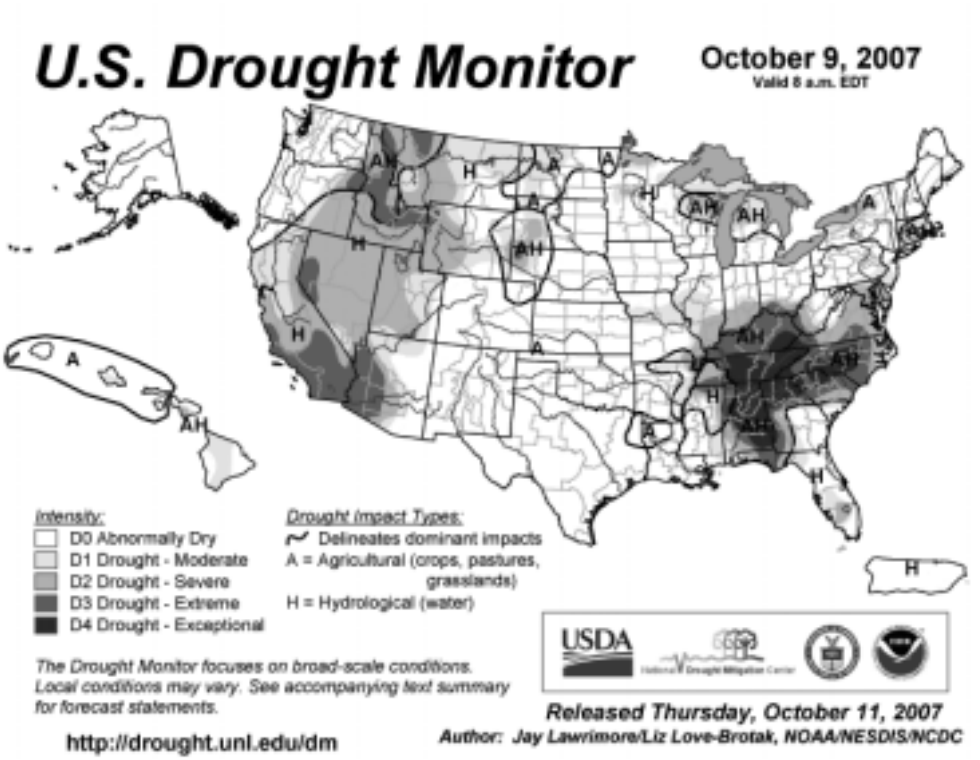
## Breeding for Resistance to Phytophthora cinnamomi

Joe James of the Carolinas Chapter and Steve Jeffers, Phytophthora expert from Clemson University, continue their multi-year experiment to determine which TACF backcross families have resistance to *Phytophthora cinnamomi*, an organism that can destroy the root systems of American chestnut trees. In the summer of 2007, Joe has expanded to 12 horse troughs and is screening many $BC_3$ and $BC_4$ lines created especially for this experiment.

Joe James increased the size of his screening experiment this year and added an irrigation system

These results, together with our preliminary observations that almost all the $BC_3$ and $BC_4$ families have been completely killed this year, indicate that more than a single gene is controlling resistance, or that resistance is linked to some Chinese trait against which we are actively selecting. A $BC_1$ family was created this year from the cross of the Adair County, KY, American x a Nanking $F_1$ hybrid at Meadowview to allow mapping of loci correlated with resistance. John

Frampton and his student Mollie Bowles at NC State attempted such mapping two years ago, but they have not been able to get good inoculation of their $BC_1$ trees in pots. We are hopeful that the James/Jeffers horse trough technique for screening will be more successful.




The summer of 2007 brought one of the worst droughts on record and had much of the South in a state of emergency. These conditions severely hampered both survival and growth in many Southern Region orchards.

## CHAPTER NOTES

**Kentucky:** Plantings continue on different types of reclaimed surface-mined soil as a thesis project of Michael French. Kentucky is leading the way in this effort.

**Tennessee:** Over 4,000 seed were produced this summer. Chapter orchards are beginning to bloom. Active cooperation is being sought with universities, Federal and state agencies to expand plantings. Since April 2003, more than 60 named cultivars and six species were planted in a commercial-scale chestnut cultivar trial at the farm of Jeremy Bramblett. In response to a late Spring freeze, all Chinese-based cultivars experienced either severe die-back or complete death. Interestingly, grafted TACF $B_2F_2$s and 'Paragon' were not affected at all.

**Alabama:** Pollen collected from several Alabama trees was used at Meadowview. Severe drought caused problems, but fortunately an irrigation system had been installed at the main chapter orchard on TVA land at Muscle Shoals.

Steve Barilovits, IV, (left) and Tim and Abigail Chesnut (right) helped in the "Father Tree" pollinations at Meadowview.

**Georgia:** Severe drought killed most seedlings in the ground. Berry College will install an irrigation system for use in their orchard next year. Father tree pollinations at Meadowview were a success. Chapter will host beginning of 2008 Appalachian Trail chestnut hike in early March. Cooperation sought with several organizations for new planting sites.

**Carolinas:** Chapter is near completion of 20 Clapper lines using high-altitude trees (>3500' elevation). The next chapter project will be to use pollen from lower-altitude trees in the father tree program. These families will be screened for Phytophthora resistance before planting.

**Ozark Initiative:** Drought also severely impacted Ozark chinkapin project. This group may try to participate in Father Tree Program at Meadowview next year.

1 Rothrock, R.E., Polin-Mcguigan, L.D., Newhouse, A.E., Powell, W.A. and Maynard, C.A. (2007) Plate flooding as an alternative Agrobacterium-mediated transformation method for American chestnut somatic embryos. Plant Cell, Tissue and Organ Culture 88: 93-99
2 Welch, A.J., A.J. Stipanovic, C.A. Maynard, and W.A. Powell. (2007) The effects of oxalic acid on transgenic Castanea dentata callus tissue expressing oxalate oxidase. Plant Science 172:488-496.

3 Jacobs, D.F. 2007. Toward development of silvical strategies for forest restoration of American chestnut (Castanea dentata) using blight-resistant hybrids. Biol. Conserv. 137(4):497-506.

# Castanea Guide: A Quick Comparison of Chestnut Species

| | CHINKAPIN | JAPANESE | EUROPEAN | CHINESE | AMERICAN |
|---|---|---|---|---|---|
| **Leaf Taper to Stem** | straight | curved | curved | curved | straight |
| **Taper to tip** | straight | curved | curved | curved | straight |
| **Teeth** | 1-3 mm, small, sharp, no hook | Tiny, often only bristles, no hook | Big, sharp or rounded, no hook | Large or small, no hook | 6mm, big, sharp, and often curved (hooked) |
| **Leaf Underside** | *Sun leaves noticeably hairy | Sun leaves noticeably hairy | Sun leaves noticeably hairy on some specimens but not others | Sun leaves obviously hairy | Sun leaves not hairy, long sparse hairs only on midrib |
| **Twig (those that have overwintered at least one year)** | hairy tips, purple or brownish grey | Pink to light red, large white **lenticels | Stout, dark, brown, small white lenticels | Hairy tips, Tan to pea green Large elliptical yellow lenticels | Slender, smooth, hairless reddish brown, small white lenticels |
| **Bud** | Up to 3 mm, downy dark red, pointed, longer than wide, sticks out from stem | Glossy brown, As long as it is wide (rounded) | Dark red, fat and globular | Hairy, tan, dull brown to black, rounded and flat against stem | Up to 6mm, smooth, reddish brown to yellow, pointed, or longer than it is wide, sticks out from stem. |
| **Nut*** ** | 1 nut, ½" tip pointed with a round cross section | 2-3 nuts, 1-2" no sunburst pattern at base, moderate brown | 2-3 nuts, 1-2 " no sunburst pattern, dark brown, black stripes | 2-3 nuts, ¾- 2", rounded hairy tip, no sunburst pattern, often light brown | 2-3 nuts, ½ -1", pointed tip, top ⅓ to ⅔ downy, sunburst at base |
| **Taste****** | sweet | not sweet | starchy | sweet | sweet |
| **Resistance to blight:** | None | Moderate | Slight | High | None |

*Sun leaves arethose leabes that are most exposed to the sunlight on a tree.
** A lenticel is an aerating organ on the surface of a twig or branch. They may appear as bumps on the surface of twigs.
*** Nut size may vary a lot within each species. Sizes provided are maximum possible.
****Taste refers to those commonly found in the U.S. and may not reflect that of all members of a species.
Be aware that all chestnuts can cross-pollinate, so that a tree that seems clearly of one species or another, may actually be a mix of two or more different types of chestnuts, known as hybrids. Please refer to TACF's website www.acf.org for more information on identifying American chestnuts.

The American Chestnut Foundation is incorporated in the State of Virginia. It is exempt from tax under §501(c)(3) of the Internal Revenue Code, and is qualified as a public supported organization under §509(a)(1) and §170(b)(1)(a)(vi) of the Code. Donors to The American Chestnut Foundation may deduct contributions as provided in §170 of the Code.

*The Journal of The American Chestnut Foundation* is published twice yearly by The American Chestnut Foundation.

**The Journal of The American Chestnut Foundation welcomes submissions about the American chestnut from writers and researchers.**

- **Submissions must conform to *The American Chestnut Foundation Writing Guidelines*. Copies are available on TACF website: http://www.acf.org/journal.htm.**
- **All submissions are published at the discretion of TACF Editorial Review Board, and are subject to editing.**
- **Manuscripts to be considered for publication are limited to 1,500 words of text plus tables, figures, and references, and must be submitted electronically via e-mail to journal@acf.org, or on a disc or CD via ground mail.**
- **For more information please contact The American Chestnut Foundation.**



## THE AMERICAN CHESTNUT FOUNDATION

469 Main St., Suite 1, P.O. Box 4044 • Bennington, VT 05201-4044
802-447-0110 • www.acf.org • chestnut@acf.org

Enclosed is my membership support of:

- ❒ $5,000 or more Chestnut Leaf
- ❒ $1,000-4,999 Gold Leaf
- ❒ $500-999 Silver Leaf
- ❒ $250-499 Bronze Leaf
- ❒ $100-249 Green Leaf
- ❒ $40-99 Regular Member
- ❒ $15 Student
- ❒ Additional Gift to my State Chapter $___
  (*Please circle one: AL, CT, GA, IN, KY, MA, MD, ME, NC/SC, NY, OH, PA, TN, VA, VT/NH)*

Please make check payable to:
*The American Chestnut Foundation.*

Name _____

Address _____

City/State/Zip _____

Telephone _____

E-mail address _____

We welcome the opportunity to talk with you personally and confidentially about your interest in philanthropic bequests to The American Chestnut Foundation. Please contact Marshal T. Case, President and CEO at 802-447-0110, or use the form below.

Have you already named The American Chestnut Foundation a beneficiary in your estate plans?

If so, please use the form below to let us know, so that we may express our gratitude. Requests for anonymity will be strictly honored.

❒ I have provided a bequest to The American Chestnut Foundation in my will.

❒ Please contact me confidentially about planning a bequest to The American Chestnut Foundation.

Name _____

Address _____

City/State/Zip _____

Telephone _____

E-mail address _____