THE JOURNAL OF THE AMERICAN CHESTNUT FOUNDATION

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INTRODUCTION
TO
THE JOURNAL OF
THE AMERICAN CHESTNUT FOUNDATION

The Journal of The American Chestnut Foundation is the work of many hands, and like the rest of the efforts of The American Chestnut Foundation at the present time, much volunteer labor by men and women who love the American Chestnut and are unwilling to let it pass into oblivion.

It is our intention to publish this *Journal* at least once a year in the beginning. We hope that it will be both a scientific journal and a means of communicating news and developments about the American Chestnut to dedicated non-scientists (such as the lawyer who is writing *this* Introduction) who care about trees in general, and the American Chestnut in particular. and wish to see it resume its place as the crowning glory of the American deciduous woodlands.

We intend to publish articles of interest to the scientific community and to tree lovers generally, and we solicit the views and the contributions of interested readers. If you have something you feel would contribute to the work of The American Chestnut Foundation and would be of interest to people who are concerned about the American chestnut, please send your manuscript to me, in care of Willeke & Daniels, Attorneys and Counselors at Law, Suite 330, 1201 Marquette, Minneapolis, Minnesota 33403-2433. All items accepted for publication will become the copyrighted property of The American Chestnut Foundation.

Donald C. Willeke
Secretary and General Counsel
The American Chestnut Foundation
Editor of *The Journal of The American Chestnut Foundation*

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BREEDING STRATEGY FOR A BLIGHT-RESISTANT AMERICAN CHESTNUT

BY MARY A. HOSIER, CHARLES R. BURNHAM
AND PAUL E. READ

Why is the American chestnut tree thought of and spoken of with such reverence? Not too many of us can remember walking through an Eastern United States hardwood forest dominated by the massive, straight-trunked chestnut trees. And not too many of us have ever had the feeling of being dwarfed by giant trees over 100 feet high and as much as 10 feet in diameter. Sixty years ago the American chestnut was the climax species in the Appalachian forests, and grew in a broad range from southern Maine to Alabama and Georgia and west to Indiana and Ohio. The loss of the American chestnut to an introduced blight was an ecological disaster even greater than the extinction of the Passenger Pigeon.

When lie colonists arrived in America, they found a tree that produced nuts superior in flavor but not in size to the European chestnut, *Castanea saliva.* That tree was the American chestnut, known to scientists as

Castanea dentata Due to .its decay resistance and beautiful straight grain, the abundant wood of the American Chestnut' provided fencing materials, shingles and siding for buildings, and a fine wood for furniture making. The trees were an important source of tannins for the tanning industry. The nuts are borne two or three at a time in a tough, prickly bur. They are released when ripe and felt to the ground. There was often a race between man, animals and birds to collect the prized fruit. The nuts were a unique food source, high in carbohydrates and low in fat, Their sweet, starchy meat provides an excellent rice or potato substitute and can be dried and ground into flour. For many families the chestnuts were an important cash crop. Farmers fed their hogs chestnuts to fatten and sweeten the meat before slaughter. Woodland animals relied heavily on the nuts for a food source, and suffered greatly from the loss of the chestnut. The wild turkey became nearly extinct through much of its natural range as the chestnut disappeared.

The American chestnut was the "bread and butter tree,, of the Eastern hardwood forest, Given all of its versatility, there has never been any other tree which matched it, The Appalachian area suffered greatly from its demise.

The chestnut met its foe sometime in the late 1890s, when the blight, a canker-causing fungus called *Endothia parasitica* (an ascomycete) was introduced on seedlings of Asian chestnut trees shipped into New York from the orient, As is often the case with initial exposures, the disease went unnoticed until 1904, when the Post reported damage was discovered in trees at the New York Zoological Gardens. Within five years, the entire region's trees were diseased and dying.

Transmitted by spores, carried by wind, water and animals, the fungus enters trees through wounds in their bark. Its mycelium grows and spreads until it girdles the tree and kills it. After the tree dies the stump will support growth of many sprouts which are also eventually killed by the blight.

Many factors favored the spread of the pathogen: a highly susceptible host densely spread throughout its range, a favorable climate, no natural barriers to limit spread, and an abundant spore population. The fungus can also live for a long time on several other trees, including the Pin Oak and the Southern Live Oak. By 1950 more than 80% of the American chestnut trees in the Eastern hardwood forest were dead; almost all of the rest were dying. Breeding work on the American chestnut was begun by the United States Department of Agriculture ('USDA") before the blight struck. In California, Luther Burbank hybridized several species of chestnut. including the American and Asian species. Asian species are smaller trees than the American, but they often produce larger nuts.

Breeding goals were modified by the USDA as the blight began to sweep a path of devastation, and efforts were directed to finding a resistant chestnut which had a size and growth habit like the American chestnut. The Connecticut Agricultural Experiment Station had a similar breeding program. Thousands of crosses were made between the American chestnut and resistant specimens of Chinese and Japanese chestnuts, hoping to find a tree that combined both the timber characteristics of the American tree and the blight resistance of the Asian trees. Unfortunately, no trees combining both characteristics were found and the USDA program was terminated.

New hope for the American chestnut came from a report in 1963 on the so-called "hypovirulence phenomenon," originally observed in Italy on the European chestnut. The term "hypovirulent" is defined by breaking the word into two parts: "hypo" means "less than" and "virulent" means "extremely poisonous or deadly." European scientists observed that some cankers on the European chestnuts were healing. A hypovirulent form of the fungus had overcome (or been the source of some form of infection for) the virulent one and had neutralized it. See "Hypovirulence - A Potential Biological Control for Chestnut Blight" in this issue.

While chestnut blight no longer appears to be a problem in Italy, where the chestnuts are regenerating from old roots, it has not yet been possible to spread the hypovirulence factor to large numbers of American chestnuts. Thus the search for trees which are blight resistant must continue.

In 1981, interest in breeding work to develop a blight-resistant chestnut was revived when Dr. Charles Burnham, Professor Emeritus in the Department of Agronomy and Plant Genetics, University of Minnesota, began to examine the problem. Dr. Burnham, who was trained as a geneticist and worked with hybrid corn, discovered in 1981 that the hybrids between the blight-resistant Chinese and the susceptible American chestnut had not been used to initiate successive crosses to the American chestnut, and he outlined the steps in a breeding program designed to produce blight resistant American chestnuts. This technique, common in corn breeding, is called "backcrossing." Geneticists and plant breeders agreed that it could work. Working together with Philip Rutter, a researcher and chestnut grower from Canton, Minnesota, and with Dr. Harold Pellett and the staff at the University of Minnesota Landscape Arboretum, the new program was initiated and backcross hybrids are now growing at several sites.

In 1983, Rutter recognized the need for financial support for this long-term project to insure its

continuation and to insulate it against the changing priorities so often encountered at public institutions. As a result, The American Chestnut Foundation was established with the help of Donald C. Willeke, a Minneapolis lawyer and tree enthusiast. This is a national non-profit organization the purpose of which is to obtain long-term financial support for the chestnut breeding efforts.

The sources of resistance for this program, as for earlier ones, are the two Asian chestnut species. *Castanea mollissima*, the Chinese chestnut, has the highest degree of resistance. Some wild populations are unaffected by chestnut blight. One form has a short stature, similar to an apple tree. Another type is a "tall" form, but is still not a timber-type tree like the American chestnut. *Castanea crenata*, the Japanese chestnut, has good resistance, but less than the Chinese chestnut. It flowers at an early age.

In contrast, the American chestnut, though susceptible to the blight, has a timber-type form and is very competitive in a forest situation. Large American chestnut trees are still growing in Michigan, Wisconsin and Minnesota, outside the natural range of the tree. Several hundred relatively large trees have also survived within the blight area. These either escaped the disease, or were saved by some hypovirulence factor afflicting the blight, or have resistance that is inherited.

All three types of chestnut trees, American, Japanese and Chinese have the same chromosome number (2n=24) and thus may be interbred to produced fertile hybrids.

How to get started? Were there any useful hybrids available? Information was obtained from Dr. Frederick H. Berry, a USDA chestnut breeder until about 1960 when the USDA work was terminated, now retired and living in Ohio, and Dr. Richard A. Jaynes, who has recently retired from the Connecticut Experiment Station where he has worked on the chestnut breeding program. Pollen from first-generation Chinese-American hybrids in New York and Indiana is being used in the new project in backcrosses on pure American chestnuts at the University of Minnesota and on isolated American chestnut trees in northern Iowa.

One hybrid tree from earlier USDA breeding programs (known as the "Clapper" tree) was a first backcross, and it survived the blight for 23 years. Pollen from graft increases of the "Clapper" hybrid was used for backcrosses in 1983 and 1984. The resulting seeds are second backcrosses.

With these and other sources of genetic material, The American Chestnut Foundation is now able to formulate a program whose main goal is to produce a population of blight resistant trees to be grown in seed orchards to produce nuts to re-establish the American chestnut not only in blight areas, but elsewhere throughout the United States.

What are the factors which argue for the success of this new program? Hybrids between resistant species and the American chestnut are more resistant than the American but less resistant than the Chinese species. This moderate resistance makes it possible to select backcross trees that carry resistance. The one study of inheritance of resistance which has been done indicates that blight resistance is a relatively simple genetic phenomenon, possibly limited to just two pairs of genes.

For most trees, resistance is an active process. The fungus invades and grows rapidly at first, then is slowed, then stops and is covered over by suberization (scar tissue). Screening techniques include injecting 3-5 year old trees with mycelia of known virulence, and then measuring the growth rate and size of the cankers.

What about the desired traits of the American chestnut, its timber-type growth form, forest competitiveness, and hardiness? These undoubtedly are complexity-inherited traits. The first generation hybrid theoretically has half its heredity from the American chestnut parent. Each backcross increases that by one-half: i.e. from 1/2 to 3/4 to 7/8 to 15/16. By the end of that third backcross. the trees will be almost identical to the American chestnut, but moderate resistance will have been added to those trees which survive. If the two-gene model is correct. we can expect one fourth of the backcross seedlings to have moderate resistance. Since chestnuts are self-incompatible (that is, more than one tree is needed to produce seed), trees with full resistance will be seen only when the backcross trees cross with each other. Seed orchards can be used to produce the big seed increase required. Currently the first backcross progeny are growing in Ohio, in an area where the blight is endemic. The additional crosses made in 1983 and 1984 will be grown there, too. Second backcrosses are growing in Tennessee, Virginia, and West Virginia in blight areas, and also in Minnesota in a blight-free area.

There is another aspect to the breeding program. What would be the response if there was available in the nursery trade a hardy chestnut tree that bears fruit at a young age, and grows like a backyard apple tree? This is the second goal of the breeding work. Hybrids from previous programs that have survived the blight can be used for this program. In China, the chestnut is an important foodstuff of high quality, so fruit from such hybrids should find

ready acceptance as a commercial or home garden orchard tree. Japanese and Chinese chestnuts are not hardy in northern areas of North America, but the American species could provide the hardiness.

Researchers in Dr. Paul Read's laboratory at the University of Minnesota Department of Horticultural Science and Landscape Architecture are finding that tissue culture is an effective propagation tool that could help to advance the breeding program rapidly. This technique causes rapid proliferation from a tiny piece of a chestnut shoot, and results in the formation of numerous small shoots. These miniature shoots, when rooted as "microcuttings" can be grown and handled in a fashion similar to conventionally propagated cuttings or seedlings. The potential value of this approach is manifold. Production of many identical plants would be extremely helpful. For example, if the backcrosses we now have are increased (cloned), all could then be grown in each of the test sites and in additional ones. Eventually, seedlings that survive the blight could be increased using tissue culture propagation and these could be used in additional seed orchards. Of course, such orchards would have to consist of several different tissue-cultured trees, since chestnuts are self-incompatible, and an orchard planted just to tissue-cultured increases of one tree would produce few, if any, nuts.

Perhaps we shall never again in our lifetimes experience that woodland walk among massive chestnut trees. It may even be optimistic to say that our children will have that experience. We are, however, left with a promise: The American chestnut now has more than a fighting chance.

Acknowledgments:

Mr. John Gordon, a nurseryman at North Tonawanda, New York, furnished pollen from the Earl Douglass Chinese-American first generation hybrids. Dr. John Shafer, Logansport, Indiana, furnished pollen from his first-generation hybrids, and also produced third-generation nuts from two blight survivors among one hundred second-generation USDA seedlings from Chinese-American hybrids. Dr. Richard A. Jaynes furnished pollen from the 'Clapper" clones and also crossed them with American chestnuts in 1983.

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About the Authors:

Mary Hosier, Junior Scientist, provides leadership to the chestnut tissue culture programs in the Department of Horticulture Science and Landscape Architecture of the University of Minnesota, and has successfully propagated numerous other species through tissue culture methods.

Dr. Charles Burnham is Professor Emeritus, Department of Agronomy and Plant Genetics at the University of Minnesota, and has been involved in plant breeding all of his professional life.

Dr. Paul E. Read, is a Professor in the Department of Horticultural Science and Landscape Architecture at the University of Minnesota, where he supervises the Tissue Culture Laboratory.

FIRST REPORT OF CHESTNUT BLIGHT IN MINNESOTA

D. W. French, E. Hayes, W. L. McDonald, and M. L. Double, Department of Plant Pathology, University of Minnesota,
Minnesota Department of Natural Resources, and last two authors,
Division of Plant and Soil Sciences, West Virginia University.

Endothia parasitica [Murr.] P. J. & H. W. And., the casual agent of chestnut blight, was found in southeastern Minnesota (Olmstead Co.) infecting a stand of 22 American chestnuts *(Castanea dentata* [Marsh.] Borkh.). This is the first report of *E. parasitica* in Minnesota. These trees were established in the late 1800's, and range in size from 18.0 to 56.6 cm, 1.4 m above the ground. All trees are infected and eight have Wed. The disease was not observed in a 1976 survey but has been active in this stand for the last few years. Other American chestnuts within 16 kilometers of this stand appear to be disease free. A 1975 report of *E. parasitica* on American chestnut in Whitewater Wildlife Area (Winona Co.) was negative.

The identity of the fungus was confirmed when perithecia were formed in pairings with mating types from West Virginia. In tests of vegetative compatibility, the Minnesota isolate was incompatible with all (37) West Virginia vegetative compatibility groups.

HYPOVIRULENCE: A POTENTIAL BIOLOGICAL CONTROL FOR CHESTNUT BLIGHT

BY WILLIAM L. MACDONALD
PROFESSOR AND HEAD, DEPARTMENT OF PLANT PATHOLOGY, COLLEGE OF AGRICULTURE AND FORESTRY, WEST VIRGINIA UNIVERSITY

The loss of the American chestnut as an eastern forest species is a classic testament to the destructiveness of plant pathogens. This disease reduced the tree from an economically significant species to a shrub that persists by sprouting. All early attempts to control the blight causing fungus failed so that by the 1940's there was little hope for the restoration of the species.

The recent discovery in Europe that some strains of the blight causing fungus are themselves diseased has provided a biological mechanism that eventually may lead to control of chestnut blight. This glimmer of hope dates back to the 195O's, when Antonio Biraghi, an Italian plant pathologist, discovered spontaneously healing cankers on European chestnut sprouts near Genoa, Italy. He suggested that either the pathogen had lost its virulence or that somehow the tree had developed resistance. It was not until the mid-1 960's, however, that Jean Crente, a French mycologist, cultured bark samples from the unusual cankers and discovered isolates of the blight fungus *(Endothia parasitica)* that differed from the common lethal forms. The isolates he observed were lightly pigmented orange in dramatic contrast to normal bright orange strains. Grente found that even though these lightly pigmented strains could infect European chestnut, the tree was able to contain the infection and grow in a reasonably normal fashion. Because of their reduced virulence, Grente called these *Endothia parasitica* isolates "hypovirulent".

While these findings were significant, the most astonishing discovery by Grente and his co-workers was that hypovirulence appeared to be transmissible. In laboratory tests, they found that normal strains became hypovirulent after coming in contact with a hypovirulent strain. Grente and other researchers have since demonstrated that hypovirulent strains contain a cytoplasmic factor(s) that can be transmitted from hypovirulent to virulent strains when the thread-like filaments of the two strains fuse. The cytoplasmic factor(s) now believed to be responsible for hypovirulence has some properties that are similar to a virus. Many of the Italian strains of *Endothia parasitica* are carrying these virus-like agents, which apparently are responsible for the natural biological control of the disease in Italy.

in the early 1970's, American researchers began to investigate the situation in

Italy to determine if the phenomenon of hypovirulence could be exploited to control chestnut blight in this country. Investigators at various institutions (Connecticut Agricultural Experiment Station, Duke University, University of Kentucky, Michigan State University, Virginia Polytechnic Institute, USDA, Utah State University and West Virginia University) are involved in research on various aspects of this problem. Initially, they found that the cytoplasmic factors of hypovirulence can be transmitted from European to American strains of *Endothia parasitica* with the same debilitating effects observed by Grente. Furthermore, lethal infections on American chestnut sprouts often were controlled by direct introductions of hypovirulent strains into virulent cankers. While these findings were encouraging, the task ahead is to determine if hypovirulent strains would disseminate adequately on their own, fuse with virulent strains and provide a natural level of biological control in our forests.

Evidence now is accumulating that natural dissemination and interaction of hypovirulent with virulent strains will occur. While proof of dissemination is encouraging it by no means insures that biological control will follow; there are a variety of obstacles. First, some virulent and hypovirulent strains are incompatible. This means that fusion between them may not take place readily and thus transmission of the debilitating virus-like agents may not occur. Secondly, many hypovirulent strains may be so weak from infection by the virus-like factors that they produce very few spores necessary to insure their own survival. Finally, in many locations, hypovirulent strains face an enormous natural population of the virulent forms of the fungus. Any artificial introduction of hypovirulent strains may be minuscule by comparison. In contrast, the single and most important competitive advantage hypovirulent strains possess is that the factors responsible for the debilitation are contagious. Thus, virulent cankers that become hypovirulent, not only may cease to be lethal but also may contribute to the reservoir of the hypovirulent inoculum in the forest

One of the most recent and encouraging events in the unfolding research on hypovirulence was the discovery of naturally debilitated strains of *Endothia parasitica* first in Michigan, and later in several other eastern states. In some Michigan locations these strains apparently account for the survival of significant numbers of American chestnut sprouts not unlike what has been recorded in Italy with the European chestnut While these north American hypovirulent strains have many features in common with the Italian ones, they are distinctly different in appearance when cultured. Thus, a variety of hypovirulent forms have entered the biological control picture

The task ahead is a formidable one and will require careful coordination of field and laboratory studies to understand the fundamentals and applications of hypovirulence. The ultimate goal of this research is to provide a practical biological control for chestnut blight in our eastern forests.

PROGRESS IN THE CURRENT PROGRAM FOR BREEDING BLIGHT -RESISTANT AMERICAN CHESTNUTS

BY CHARLES R. BURNHAM

The key to creating blight-resistant American chestnuts is successive back-crosses of resistant selections derived from crosses between resistant Asiatic species and the American chestnut

The American chestnuts being used initially for the crosses are in the University of Minnesota Landscape Arboretum and in northern Iowa. Those in one site in the Arboretum are now 27 years old; those in two other

sites are 14. Pollinations of bagged flowers from 1981 to 1984 were made by Dr. Harold Pellett and Susan Moe. The crosses in 1985 are being made by Dr. L. L. Inman.

Single, isolated much older American chestnut trees in four locations in northern Iowa have been pollinated from 1982 to the present by Philip A. Rutter President of The American Chestnut Foundation. He hand-pollinated the flowers. Bagging was not needed because single, isolated trees rarely produce nuts.

Pollen of Chinese ("C") x American ("A"), (Earl Douglass) first generation (F 1) hybrids was provided by John Gordon, a nurseryman at North Tonawanda, New York, from 1982 to 1985. Pollen from Dr. John Shafer's C x A F1 hybrids in Logansport, Indiana and in Tennessee was provided from 1982 to 1984. Nuts from those crosses are first backcrosses, *i.e.* A x C.A.

Trees from grafts of the "Clapper' first backcross (C.A x A) blight survivor are flowering at the Connecticut Agricultural Experiment Station, New Haven, Connecticut They were used for crosses in 1983 to 1985. Dr. Richard Jaynes made crosses with them in 1983 and also furnished pollen in 1983 and 1984. Dr. J. E. Elliston has furnished pollen in 1985 and is preserving pollen for use in 1986. Nuts from these crosses are second backcrosses, *i.e.* A x (C.A x A). The most blight-resistant backcross trees will be crossed with other American chestnuts. Crosses *between* the blight resistant selections will produce some trees that not only will breed true for blight-resistance, but also will be like the American chestnut in size and shape.

The trees produced by the backcrosses are being planted in blight areas. At present these are the Oberlin College campus in Ohio; Great Smokey Mountains National Park, Tennessee; Virginia Polytechnic Institute, Blacksburg, Virginia, and West Virginia University, Morgantown, West Virginia. The Minnesota sites are presently blight free.

The breeding programs described in this article have been made possible by volunteer efforts. The membership contributions to The American Chestnut Foundation to date, large and small, have been sufficient to purchase needed supplies

for crossing, seedling production, and development of techniques for vegetative propagation.

When funds are available, vegetative culture techniques will be used to produced replicates of each backcross seedling, so that each site in blight-testing areas will have all the seedlings from either the first **or** the second backcrosses. Eventually the blight-resistant selections can be replicated for seed orchards.

The following table summarizes the breeding progress to date:

First Backcross	~ Seedlings			Growing at
A x C.A	1982, 83	128	19	Oberlin College
A x C.A	1984	52	11	U. of Minn. Arboretum
A x C.A	1984	9	7	U. of Minn., St. Paul
Second Backcross	**~**	**~ Seediin~s**		**Grnwingat**
A x "Clapper"	1983	252	87	Great Smoky Mts., Tenn.
	Blacksburg, V~			
	Morgantown, W. Va.			
A x "Clapper˝	1983, 84	77	41	U. of Minn., St. Paul

Editor's Note: Dr. Charles Burnham is Professor Emeritus, Department of Agronomy and Plant Genetics at the University of Minnesota. Dr. Burnham initiated the breeding program described in the above article. For a more complete description of the principles involved in the breeding program, the reader is referred to "The Minnesota chestnut program: new promise for breeding a blight-resistant American Chestnut" by Philip A. Rutter and Charles R. Burnham, 73rd Annual Report of the Northern Nut Growers Association, *PA.. Aug. 1-4, 1982, pp. 81-90. A reprint of that paper will be supplied to readers requesting it and enclosing $1.00 to cover postage and handling. Address inquiries to the Editor,* The Journal of The American Chestnut Foundation, *clo Willeke & Daniels, Suite 330, 1201 Marquette. Minneapolis, Minnesota 55403-2455.*

THE PRESIDENT'S MESSAGE

BY PHILIP A. RUTTER
PRESIDENT OF THE AMERICAN
CHESTNUT FOUNDATION

This is the first issue of *The Journal of the American Chestnut Foundation. On* September 22, 1984, The American Chestnut Foundation held its first Annual Meeting at the University of Minnesota Landscape Arboretum.

Those are two important milestones. We are in the very early stages of our development, and our present capabilities are somewhat limited, but the future looks very bright indeed. We know what we want to do, and have an excellent idea of how to go about it. Please bear with us during this start-up phase if things seem to take a bit longer to get done (like this *Journal)* than you would like.

What do we want to do? Easily answered: we want to bring back the American chestnut, that paragon of the American forest.

"Easier said than done," some will say. "It has been tried before," others will add. "But never in this way," we retort, and we mean that in two ways.

The Foundation's current research emphasis is on breeding a blight-resistant tree. That *has* been tried before. Some are under the impression, in fact that it has been *done.* To be sure, several workers have trees that are resistant, but no one has trees that compete in a forest, grow as timber trees and, most important, breed true for resistance and American chestnut characteristics. These workers are to be congratulated for what they have accomplished, but we emphasize that the bulk of the breeding necessary to truly bring back the species remains to be done.

Thanks to Dr. Charles R. Burnham, an internationally prominent cytogeneticist and corn breeder, we now realize that the backcross method, successfully used for crop plants, has never been tried by chestnut breeders. Everything we know about chestnuts and genetics leads us to think this new approach can and will work.

And the Foundation itself is a new approach to the problem. In the past, chestnut research has been the province of agencies and institutions with broad goals and missions. Typically, when a key researcher with a personal interest in the chestnut has had to put down his work, the institutions involved have not been able to sustain the necessary interest and effort Several times (most recently only two years ago) very promising projects have been abandoned, and the stock resulting from years of labor were destroyed. Our Foundation, however, has one mission and one mission only: to find a solution to the devastating blight and restore the American chestnut. If, for some unforeseen reason, the current breeding program proves inadequate or if new problems arise, *the Foundation will still be here, and will go on, with* what has been learned, to the next step. The Foundation can outlast us all, if necessary.

At the moment, we do not believe it will be necessary. Our optimism is such that possibly only 20 years may be needed to reach the goal.

However, we have a problem facing us which must still be dealt with: the lack of money. (You knew I would get around to this, didn't you?) We know what to do, and most of how to do it; but as yet we lack the wherewithal to do it properly. Most of the research and other work (such as this *Journal)* now being done by and for the Foundation is being done on a volunteer basis. This has been enough to get things started, but it will not be enough to get things finished

Foundation administration is also being done on a volunteer basis. We have no paid staff. This means that fund raising to support the breeding effort moves slowly.

We need more members. And particularly now, in these early years, we need more from the members we already have. When you join at the lowest possible rate, you must realize that a sizable chunk of your membership fee has to go for the expenses of printing and mailing newsletters, this Journal and other correspondence. Here is a cleft stick: we know you would like more of your money to go straight to work breeding trees, but would you give, year after year, if you never heard a word about the progress your funding made possible? Not many would.

You, personally, can share the fundamental responsibility for bringing the chestnut back. Find us some new members. Talk us up; we are the best hope the chestnut has had for years. And please: increase your annual contribution. It matters a lot, and every dollar over the minimum goes straight to work.

I was interviewed some months ago by a reporter who was already fairly knowledgeable on the subject of chestnuts. "I understand you intend to have another try at breeding blight resistant chestnuts." he said. I corrected him. "No. We do *not* intend to try. We are going to *do* it" Indeed we are. But.

The current status of our Foundation is curiously like that of the chestnut itself: Great potential, great promise; but in need of some help to achieve that potential and to fulfill that promise. Only you can give that help.

Philip A. Rutter,

President
The American Chestnut Foundation

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The trees produced by the backcrosses are being planted in blight areas. At present these are the Oberlin College campus in Ohio; Great Smokey Mountains National Park, Tennessee; Virginia Polytechnic Institute, Blacksburg, Virginia, and West Virginia University, Morgantown, West Virginia. The Minnesota sites are presently blight free.

The breeding programs described in this article have been made possible by volunteer efforts. The membership contributions to The American Chestnut Foundation to date, large and small, have been sufficient to purchase needed supplies

for crossing, seedling production, and development of techniques for vegetative propagation.

When funds are available, vegetative culture techniques will be used to produced replicates of each backcross seedling, so that each site in blight-testing areas will have all the seedlings from either the first **or** the second backcrosses. Eventually the blight-resistant selections can be replicated for seed orchards.

The following table summarizes the breeding progress to date:

First Backcross	~ Seedlings			Growing at
A x C.A	1982, 83	128	19	Oberlin College
A x C.A	1984	52	11	U. of Minn. Arboretum
A x C.A	1984	9	7	U. of Minn., St. Paul
Second Backcross	**~**	**~ Seediin~s**		**Grnwingat**
A x "Clapper"	1983	252	87	Great Smoky Mts., Tenn.
	Blacksburg, V~			
	Morgantown, W. Va.			
A x "Clapper"	1983, 84	77	41	U. of Minn., St. Paul

Editor's Note: Dr. Charles Burnham is Professor Emeritus, Department of Agronomy and Plant Genetics at the University of Minnesota. Dr. Burnham initiated the breeding program described in the above article. For a more complete description of the principles involved in the breeding program, the reader is referred to "The Minnesota chestnut program: new promise for breeding a blight-resistant American Chestnut" by Philip A. Rutter and Charles R. Burnham, 73rd Annual Report of the Northern Nut Growers Association, *PA.. Aug. 1-4, 1982, pp. 81-90. A reprint of that paper will be supplied to readers requesting it and enclosing $1.00 to cover postage and handling. Address inquiries to the Editor,* The Journal of The American Chestnut Foundation, *clo Willeke & Daniels, Suite 330, 1201 Marquette. Minneapolis, Minnesota 55403-2455.*

STATE COORDINATORS OF INFORMATION FOR THE FOUNDATION

The goal of The American Chestnut Foundation is the restoration of a devastated species--not just the creation of a few resistant trees. Because of this larger goal, the work required is also more demanding.

One need is to maintain and utilize the genetic variability once found in the trees that ranged over such a large part of the eastern United States. If we are to have trees that will grow well in Maine, Pennsylvania and Georgia once more, then we must incorporate germplasm from all those regions in the breeding program.

Surveys of American chestnuts have been published for various states. Current information is needed on them and on the trees in other states. A tree questionnaire has been prepared for use in recording the information. Several people have already replied to the questionnaire and have sent leaf samples to Dr. Charles Burnham in St. Paul, Minnesota.

At the November, 1984 meeting of the Board of Directors of The American Chestnut Foundation, the Board authorized the appointment of State Coordinators to serve as leaders and to assist in collecting and organizing, for each state, the information on tree locations, number at each site, their health, accessibility, and the like.

Some may be willing and able to help with the actual breeding work, e.g. make crosses with pollen from backcross hybrids or from trees or other species that have blight resistance. Some may help with the establishment and maintenance of seed orchards when that stage is reached

The information will be useful also for those working on hypovirulence for control of the blight; and for the breeding work with the American chestnut survivors shown to have a degree of genetic resistance to the blight

Do you have the time? Do you have the interest? No Coordinators have actually been named The Foundation needs this help now.

If you are interested in becoming a Coordinator, or if you belong to a group willing to take on the task on a collective basis, please write to Philip A. Rutter, President, The American Chestnut Foundation, Badgersett Research Farm, RR I, Box 118, Canton, Minnesota, or call him at (507)743-8570 for more details.

Those who have single, isolated trees, or trees that are easy to hand pollinate, please contact Dr. Charles Burnham, Chairman, Scientific Steering Committee, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul, MN 55108. Home telephone (612) 644-7797.

THE DIRECTORS AND OFFICERS OF THE AMERICAN CHESTNUT FOUNDATION

The American Chestnut Foundation has been created by a group of scientists and other professional persons who are dedicated to the idea that the American chestnut can be restored using modern techniques of plant breeding and plant pathology. The Founding Directors of The American Chestnut Foundation are as follows:

Philip A. Rutter, President of the Foundation. Mr. Rutter is a plant breeder and researcher who operates Badgersett Research Farm near Canton, in southern Minnesota.

Dr. Charles Burnham, Vice President of the Foundation and Chair of the Scientific Steering Committee. Dr. Burnham is Professor Emeritus in the Department of Agronomy and Plant Genetics, University of Minnesota

Dr. David French, Treasurer of the Foundation. Dr. French is Professor and former Head of the Department of Plant Pathology, University of Minnesota.

Donald C. Willeke, Esq, Secretary and General Counsel of the Foundation. Counselor Willeke is an attorney with the firm of Willeke & Daniels, Minneapolis, Minnesota, and is a member of the bars of Minnesota, New York, Illinois and Iowa. He is the Chairman of the Minnesota State Shade Tree Advisory Committee.

Dr. Frederick H. Berry. Dr. Berry lives in Ohio. He was formerly a chestnut breeder with the United States Department of Agriculture.

Dr. Norman E. Borlaug. Dr. Borlaug received the Nobel Peace Prize for his work in crop breeding, and presently operates a laboratory in Mexico.

Dr. Cameron Gunderson. Chair of the Membership Committee. Dr. Gunderson is a physician with the Gunderson Clinic in Wisconsin.

Dr. Richard A. Jaynes. Dr. Jaynes is a horticulturist and chestnut breeder who recently retired from the Connecticut Experiment Station.

Dr. William L MacDonal& Chair of the Nominations Committee. Dr. McDonald is Chair of the Department of Plant Plathology at the University of West Virgini~

Dr. D. J. Merrell. Dr. Merrell is a Professor of Genetics and Ecology at the University of Minnesota

Dr. Carl k Mohn. Dr. Mohn is a Professor in the Department of Forest Resoucces at the University of Minnesota, working in the area of forest genetics.

Dr. Harold Pellett~ chair of the Annual Meeting Cornrnittee. Dr. Pellett is a Professor in the Department of Horticultural Science and Landscape Architecture at the University of Minnesota and is Director of Research at the University of Minnesota Landscape Arborefl~

Dr. R. L. Phillips. Dr. Phillips is a Professor of Genetics in the Department of Agronomy and Plant Genetics at the University of Minnesota:

Dr. Peter H. Raven. Dr. Raven is Director of the Missouri Botanical Garden.

Dr. Paul E. Rea& Chair of the Finance Committee. Dr. Read is a Professor in the Department of Horticultural Science and Landscape Architecture at the University of Minnesota and supervises the Plant Tissue Culture Laboratory.

Dr. Leon Snyder. Dr. Snyder is the Founder of the University of Minnesota Landscape Arboretum, and is Professor Emeritus in the Department of Horticulture Science and Landscape Architecture at the University of Minnesota:

Dr. Harrison B. Tordoff. Dr. Tordoff is Professor in the Department of Ecology and Behavioral Biology at the University of Minnesota

ANNUAL MEETING OF THE AMERICAN CHESTNUT FOUNDATION

The Annual Meeting of The American Chestnut Foundation will be held starting at 9:30a.m. on Saturday, 21 September 1985, at the University of Minnesota Landscape Arboretu:m, 3675 Arboretum Drive, Chanhassen, Minnesota 55317. It is expected that a variety of papers will be presented on aspects of research into chestnut breeding, hypovirulence, and other topics. The Foundation has been informed that Dr. Norman Borlaug, a Director of the Foundation, plans to attend the meeting. Members of the Foundation planning to attend the Annual Meeting should notify Dr. Harold Pellett at the University of Minnesota Landscape Arboretum of their intention to attend, so that adequate preparations can be made for the number of members expecting to attend.