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DISCLAIMER

The articles published in the Annual Reports of the Northern Nut Growers Association are the findings and thoughts solely of the authors and are not to be construed as an endorsement by the Northern Nut Growers Association, its board of directors, or its members. No endorsement is intended for products mentioned, nor is criticism meant for products not mentioned. The laws and recommendations for pesticide application may have changed since the articles were written. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The discussion of specific nut tree cultivars and of specific techniques to grow nut trees that might have been successful in one area and at a particular time is not a guarantee that similar results will occur elsewhere.

**NORTHERN
NUT GROWERS ASSOCIATION
REPORT
OF THE PROCEEDINGS AT THE
EIGHTH ANNUAL MEETING**



STAMFORD, CONNECTICUT

SEPTEMBER 5 AND 6,

1917

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CONSTITUTION

ARTICLE I

Name. This society shall be known as the NORTHERN NUT GROWERS ASSOCIATION.

ARTICLE II

Object. Its object shall be the promotion of interest in nut-bearing plants, their products and their culture.

ARTICLE III

Membership. Membership in the society shall be open to all persons who desire to further nut culture, without reference to place of residence or nationality, subject to the rules and regulations of the committee on membership.

ARTICLE IV

Officers. There shall be a president, a vice-president and a secretary-treasurer, who shall be elected by ballot at the annual meeting; and an executive committee of five persons, of which the president, two last retiring presidents, vice-president and secretary-treasurer shall be members. There shall be a state vice-president from each state, dependency or country represented in the membership of the association, who shall be appointed by the president.

ARTICLE V

Election of Officers. A committee of five members shall be elected at the annual meeting for the purpose of nominating officers for the following year.

ARTICLE VI

Meetings. The place and time of the annual meeting shall be selected by the membership in session or, in the event of no selection being made at this time, the executive committee shall choose the place and time for the holding of the annual convention. Such other meetings as may seem desirable may be called by the president and executive committee.

ARTICLE VII

Quorum. Ten members of the association shall constitute a quorum, but must include a majority of the executive committee or two of the three elected officers.

ARTICLE VIII

Amendments. This constitution may be amended by a two-thirds vote of the members present at any annual meeting, notice of such amendment having been read at the previous annual meeting, or a copy of the proposed amendment having been mailed by any member to each member thirty days before the date of the annual meeting.

BY-LAWS

ARTICLE I

Committees. The association shall appoint standing committees as follows: On membership, on finance, on programme, on press and publication, on nomenclature, on promising seedlings, on hybrids, and an auditing committee. The committee on membership may make recommendations to the association as to the discipline or expulsion of any member.

ARTICLE II

Fees. The fees shall be of two kinds, annual and life. The former shall be two dollars, the latter twenty dollars.

ARTICLE III

Membership. All annual memberships shall begin with the first day of the calendar quarter following the date of joining the association.

ARTICLE IV

Amendments. By-laws may be amended by a two-thirds vote of members present at any annual meeting.

Northern Nut Growers' Association

EIGHTH ANNUAL MEETING

SEPTEMBER 5 AND 6, 1917

STAMFORD, CONNECTICUT.

The eighth annual meeting of the Northern Nut Growers' Association was called to order at the Hotel Davenport, Stamford, Connecticut, at 9.30 A. M., the Vice-President, Prof. W. N. Hutt, presiding in the absence of the President, Mr. W. C. Reed.

The meeting opened without formalities with a short business session.

The report of the Secretary was read and adopted as follows:

REPORT OF THE SECRETARY-TREASURER.

Balance on hand date of last report	\$ 21.45	
Receipts:		
Dues	255.00	
Advertisements	36.00	
Contributions	15.00	
Sale of reports.	26.65	
Contributions for prizes	46.75	
Miscellaneous	.89	
	-----	\$401.74
Expenses:		
Printing report	\$158.60	
Miscellaneous printing	19.00	
Postage and stationery	45.91	
Stenographer	40.30	
Prizes	57.00	
Litchfield Savings Society	65.00	
	-----	\$385.81
Balance on hand		----- \$15.93

Total receipts were a little greater than the year before, receipts from dues a little less. There are several new life members, ten in all now, and the secretary has followed the course adopted some time ago of depositing receipts from life memberships in a savings bank as a contingent fund.

There are 138 paid up members, compared with 154 last year. Fifty members have not paid their dues and there seems to be no other course but to drop them, after repeated notice, though some are old friends.

Four members have resigned and there has been one death, that of Mrs. Charles Miller, of Waterbury, Connecticut.

We have added but 28 new members during the year, while we have lost 55.

There have been 358 members since organization, of whom we still have 138, 220 having dropped out.

Mr. T. P. Littlepage, as chairman of the Committee on Incorporation, reported at some length on the advisability and the possibilities.

On motion of Mr. R. T. Olcott, the question of incorporation was left in the hands of the committee with power.

The following Nominating Committee was elected: Col. Van Duzee, Mr. Weber, Mr. Bixby, Mr. Smith, Mr. Ridgeway.

The following Committee on Resolutions was appointed by the Chair: Dr. Morris, Mr. Bartlett, Mr. Olcott.

Moved by Mr. Littlepage: That the association request the Secretary of Agriculture to include in his estimates of appropriations for the next fiscal year a sum sufficient, in his judgment, to enable the department to carry on a continuous survey of nut culture, including the investigation and study of nut trees throughout the northern states, such nut trees including all the native varieties of nuts, hickories, walnuts, butternuts and any sub-divisions of those varieties, and that a committee of three be appointed to interview the secretary personally to have this amount included in the appropriation.

[Motion carried.]

Mr. Olcott recalled that last year the National Nut Growers' Association secured an appropriation, and he suggested that this would make it easier for the Northern Nut Growers to do so this year.

MR. BARTLETT: It occurred to me that the boy scouts, with their great membership and being often out in the woods, would be valuable to the nut growers' association in hunting native nuts. I took up the matter with Dr. Bigelow of the Agassiz Association, who is also Scout Naturalist and I think he can tell us more about getting the boy scouts interested.

DR. BIGELOW: I would suggest that you enlist also the interest of other organizations for outdoor life. If I knew a little more definitely what is wanted it could be exploited in definite terms in Boys' Life, the official organ of the Boy Scouts of America, which has a mailing list of over 100,000, and which reaches ten or twenty boys each copy. So you have nigh on to 1,000,000 members who would be reached in this way. My predecessor, Mr. Ernest Thompson Seton, has organized the Woodcrafters, which consists of both boys and girls. It seems to me that their service should be enlisted. They have done remarkably good work. And there are other organizations such as the Camp Fire Girls. I would suggest that some of you formulate a resolution and let me have a copy of it to publish in Boys' Life.

DR. MORRIS: I will say one word in harmony with Dr. Bigelow and the possibility of enlisting the interest of these organizations. One of our members, I think Mr. Weber, has found on a tributary of the Ohio River a thin shelled black walnut that came down with the flood. He has found two specimens at the mouth of the stream and he knows that this particular thin shelled black walnut grows somewhere up that stream. He would give \$50 to anybody who would find that black walnut tree.

I will give five dollars every year to any boy scout who wins any of our prizes. That is a permanent offer. Or I will enlarge it perhaps, after we discuss the matter further by including the Camp Fire Girls. I will add others to that list. I will give five dollars to any member of one of those organizations affiliated with us who wins any nut prize in any year, in addition to our regular prizes. Furthermore we will offer to name any prize nut after the discoverer, so that his or her name will go down in history, perhaps causing much fame.

DR. BIGELOW: I have had my attention called to the fact that in the West the beech trees are heavily laden with nuts. It suddenly dawned on me that in all of my boyhood experience as a hunter and trampler, I had never seen one edible beech nut in Connecticut. I know there are many beech trees around Stamford, but I have not been able to find any nuts. I have advertised for them but although I have received more than a hundred packages from over the rest of the country, I have not seen one single beech nut from Connecticut. Some of the old-timers say they were once plentiful. I wonder whether beech nuts have disappeared from Connecticut as have potato balls.

DR. MORRIS: In the lime stone regions they commonly fill well. I have a great many beech trees on my place from one year to more than one hundred years of age, and they came from natural seeding, but the seeds in this part of Connecticut are very small and shrivelled. They are not valuable like the ones in western New York, for instance, and I do not remember even as a boy to have known of eastern beech trees with well-filled nuts. Many of these inferior nuts will sprout, however.

MR. LITTLEPAGE: I think Dr. Bigelow has hit upon a point of a great deal of interest. For example, on my farm in Maryland I think there are perhaps three or four hundred beech trees of various sizes,

probably none of them under ten years of age and up to fifty, and in the four years that I have been observing these beech trees, there has never grown upon them a single full, fertile beech nut. I have observed very carefully. On my farm in Indiana I have been observing the same thing for probably ten or twelve years, and I have never seen a single filled beech nut. There are some beech trees there two feet in diameter.

PRESIDENT'S ADDRESS.

W. C. REED, INDIANA.

(Read by the Secretary.)

FELLOW MEMBERS NORTHERN NUT GROWERS' ASSOCIATION, LADIES AND GENTLEMEN:

Our association convenes today under changed conditions not only in this country but throughout the world. Upon the United States rests the burden of feeding the world, or at least a large portion of it. With seven-tenths of the globe's population at war, surely this is a mammoth undertaking.

The government is urging the farmer to increase his acreage of all leading grain crops, to give them better cultivation, and is guaranteeing him a liberal price.

CROP VALUES.

Crop values have increased until today there is land bringing more than \$100.00 per acre for a single wheat crop. Corn has sold above \$2.00 per bushel, beans at 20 cents per pound, and hogs at \$20.00 per 100 pounds on foot.

LABOR ADVANCES.

With these high prices all along the line the price of labor has advanced to the highest point ever known. Surely it is up to the American farmer to husband his resources by the use of labor-saving machinery, by using the tractor and other power machines to conserve horse feed, by the cultivation of all waste land possible and by practicing economy and thrift.

MORE INTENSIVE AGRICULTURE.

In the more intensive agriculture that is urged upon us the Northern Nut Growers' Association can do a splendid work by the interesting of all land owners in the conservation of the native nut trees and the planting of grafted nut trees in gardens, orchards and yards, to take the place of many worthless shade trees.

HIGHWAY PLANTING.

With the government and states working together in the establishment of market highways and the building of permanent roads, now is the time to urge the planting of trees that will last for this generation and the ones that are to follow. In sections of the country the different kind of nut trees suitable could be selected and, if planted and given proper care, would be a source of large income in the years that are to come.

Community effort is needed for such work and if the members of this association will use their influence it will help to bring this about. There is one county in England where all the roadsides have been planted to Damson plums, which has not only made the landscape more beautiful and furnished the people with much fruit, but the past season has furnished many tons of plums that were picked half ripe for the manufacture of dyes that had become scarce owing to the war.

If such a movement as this had been taken in this country in the planting of nut trees in former years our roadsides today would be more beautiful, the country more healthy, the farmer more independent, having these side crops that require little labor and that could be marketed at leisure. Our soldier boys might today have sealed cartons of nut meats included in their rations on the European battle fronts that would be very acceptable as food and add little to their burden.

NUT MEATS IN PLACE OF PORK.

If every land owner had enough nut trees to furnish his family with all the nut meats they cared to use, and all the nut bread they would eat, it would go a long way in solving the high cost of pork and beef. The better grafted varieties of the black walnut are specially well adapted for use in nut bread and can be grown in many places where pecans and English walnuts will not succeed so well.

WHAT THIS ASSOCIATION HAS ACCOMPLISHED.

In looking backward over the past eight years since this association was organized it might be well to review some of the things accomplished. When this organization first came into existence there was a small demand for budded and grafted nut trees, but none were to be had in the hardy northern varieties. Interest was created, best individual trees have been located and new varieties introduced. Methods of propagation have been worked out, public opinion has been moulded, government investigation has been fostered, commercial planting of northern nut trees made possible, and today pecans, English walnuts and best varieties of grafted black walnuts may be had in quantity. This association has caused thousands of nut trees to be planted that would otherwise not have been. Some may ask the question, has it paid? Individually I would say it has not, but collectively it has, and will pay large dividends to future generations by making it possible for a larger food supply at a minimum cost.

CARE OF TRANSPLANTED NUT TREES.

It might be well to urge greater care in the cultivation of transplanted nut trees. Trees should be set fall or early spring while perfectly dormant. If bodies are wrapped the first summer and first winter it will prevent much trouble from sun scald. If mounds of earth one foot high are banked around trees before first cold weather it will often prevent bark bursting which may be caused by freezing of the trees when full of sap, caused by late growth. This mound can be removed the next spring and in case of any winter injury you have plenty of fresh healthy wood to produce a top.

Cultivation should commence early in the spring and be kept up until September first. Never allow weeds to grow or ground to become crusted. Nut trees form new rootlets slowly the first summer and require special care. After the second summer they will stand more neglect, but extra cultivation will be rewarded with extra growth at all times.

FINANCES.

In looking over the treasurer's report at Washington I find a balance of \$21.45, reported at last meeting under date August 14th, 1917. Treasurer reports balance on hand of \$14.13 and no obligations. I think he is to be congratulated on being able to make ends meet and issue the reports.

After going over the budget for the coming year I think that we may be able to keep up this record if the membership committee will look after new members and see that all old members renew their membership promptly.

PLACE OF MEETINGS.

Owing to present war conditions the president would recommend that selection of the next place of meeting be left to executive committee to be fixed later after conditions and crops for next year are better assured. It would seem that some central location might draw the largest attendance and be of greatest benefit to the association for the coming year.

NUT EXHIBITS.

Nut exhibits should be encouraged as much as possible and prizes offered when finances will permit, or where members offer special premiums. This effort will bring out varieties that are worthy of propagation and valuable trees will be saved to posterity. These exhibits can often be held in connection with local horticultural meetings. It is well for our members to keep a watch for such chances.

REASONS FOR OUR LIMITED KNOWLEDGE AS TO WHAT VARIETIES OF NUT TREES TO PLANT.

PROF. W. N. HUTT, NORTH CAROLINA.

Agriculturally this continent is about three centuries old. Horticulturally its experience has scarcely reached the century mark. Practically all the commercial fruit industry of the United States is the product of the last half century. Relatively speaking we are quite young and therefore there are a great many things about nut-growing that we may not be expected to know. In the older lands of Europe and Asia they have a horticultural experience going back from ten to twenty centuries.

In this new country the pioneers had necessarily to confine themselves to the fundamentals and it is to be expected that their horticultural operations were confined to a very narrow maintenance ratio. As the country was cleared up and developed certain sections were found to be especially suited to fruit culture. About these centers specialized fruit-growing industries were developed.

These planters tried out all available varieties and developed their own methods of culture. As these industries developed horticultural societies were formed for the exchanging of ideas and experiences. In 1847 the American Pomological Society was formed as a national clearing house of horticultural ideas.

The first work the society undertook was to determine the varieties of the different classes of fruits suitable for planting in different sections of the country. Patrick Barry, of Rochester, one of the pioneers of American horticulture was for years the chairman of the committees on varietal adaptation and did an immense amount of work on that line. At the meetings of the society he went alphabetically over the variety lists of fruits and called for reports on each one from growers all over the country. This practice was kept up for years and the resulting data were collated and compiled in the society's reports. In this systematic way the varietal adaptations of the different classes of fruits were accurately worked out for all parts of the country. A similar systematic roll call of classes and varieties of nuts grown by the members of this association would be of immense value to intending planters of nut trees.

In northern nut-growing, however, it may be questioned if we are yet arrived at the Patrick Barry stage. What we need is pioneer planters who have the courage to plant nut trees and take a chance against failure and not wait for others to blaze the trail. It needs men of vision and courage to plant the unknown and look with hope and optimism to the future. So many are deterred from planting by the fact that nut trees are tardy in coming into bearing and uncertain of results. In these stirring times we want men of nerve in the orchard as well as in the trenches. We need tree planters like Prof. Corsan who, at a former meeting of this association when joked about planting hickories, replied that he wasn't nervous and could watch a hickory tree grow. It takes nerve to be an innovator and to plant some radically different crop from what your conservative neighbors all about you are planting.

The Georgia cotton planters wagged their heads and tapped their foreheads when Col. Stuart and Major Bacon turned good cotton land into pecan groves. But the thousands of acres of commercial pecan orchards now surrounding these original plantings showed that these pioneer pecan planters were not lunatics or impractical dreamers, but courageous men of vision, thirty years ahead of their time.

Nut tree planting is not all waiting. It will give the busy man some surprises as I have reason to know from my own limited experience. Ten years ago when I planted my first experimental orchard I set about preparing several other lines of quick maturing experimental work, for I did not expect those trees would have any thing to report for a decade or so. You can imagine how surprised and delighted I was when on the third year there was a sprinkling of nuts, enough to be able to identify the most precocious varieties. The surprise increased to wonder the next year when there was an increased number of nuts on the trees that had borne last year and a number of new varieties came into bearing. In the eighth year when an 800-pound crop of nuts changed that experimental planting into a commercial pecan orchard, I was, to use a sporting phrase, "completely knocked out of the box." The man who thinks there are no thrills in tree planting has something yet to learn. It is the surest sign of a real true-blue horticulturist that he wants to set some kind of new tree or plant.

It is the rarest kind of a plantation that has on it no waste land. Fence rows, ditch banks and rough or stony places are to be found on practically every farm. Such spots too often lie waste or galled or at best are covered with weeds, briars, bushes or useless scrubby trees. These waste places would make a fine trial ground for testing out nut trees. A few fine walnuts, pecans or hickories, or rows of chinquapins and hazels would add profit as well as beauty to these waste and unsightly places found on most farms.

Following old conservative methods the average farmer sets about his house and buildings unproductive oaks, elms and maples, with scarcely a question of a thought that there are as handsome shade trees that will produce pleasure and profit as well. On our lawns and about our door yards we could plant to advantage the Japanese walnut and the hardier types of pecans and Persian walnuts. It would be of interest to try a few seedlings of these classes of nuts. If such practices were followed in the planting of nut trees it would not be long until new and valuable sorts would be found and a great deal of data made available to intending nut planters. I believe that a great deal of good would result from the preparation and dissemination of a circular encouraging farmers in nut planting.

This association is doing a valuable work in offering prizes to locate high class seedling nut trees that will be worthy of propagating. Sooner or later valuable sorts will be found in this way. In this connection it will be wise for this association to solicit the active co-operation of the horticultural workers in the different states. The workers of the agricultural colleges, experiment stations and extension service do a great deal of traveling and have special facilities for getting in touch with promising varieties. The horticulturists of some states have made nut surveys of their states to ascertain their resources in the way of valuable varieties and of conditions suitable for nut culture. The interesting bulletin, "Nut Growing in Maryland," gotten out by Prof. Close, when he was State Horticulturist in Maryland, is a very valuable contribution along this line. It would be well for this association to solicit the co-operation of the trained horticulturists in the northern states to make nut surveys and ascertain definitely the valuable varieties already growing within their borders and what are the possibilities for the production of these types for home purposes for commercial growing. A few of the state experiment stations have taken up definite experimental and demonstration nut projects and are doing valuable work in this line. This

association should memorialize the directors of the other stations to undertake definite nut projects and surveys and get the work under way as soon as possible.

While endeavoring to stimulate private, state and national investigations in nut culture, the author would be very remiss if he failed to recognize the very valuable work already done by the zealous, painstaking and unselfish pioneers of northern nut growing. Messrs. Bush and Pomeroy have given to the country and especially to the north and east, two valuable hardy Persian walnuts. Our absent president, Mr. W. C. Reed, of Vincennes, Ind., is doing a great deal in the testing and dissemination of hardy nut trees. Our first president, though an exceedingly busy surgeon and investigator in medicine, finds time to turn his scientific attention to the testing and breeding of nut trees. Some of our brilliant legal friends, too, find time to pursue the elusive phantom of ideal nuts for northern planting.

We cannot go through the growing list of nut investigators nor chronicle their achievements, but we know that when the history of American horticulture is written up ample justice will be done to their labors and attainments. Let each of us do our part in the building up of the country by the planting of nut trees. Let us plant them on our farms, in our gardens and about our buildings and lawns. Let us induce and encourage our neighbors to plant and do all possible to make nut planting fashionable until it becomes an established custom all over the land. It will not then be long before valuable varieties of nut trees will be springing up all over the country. This association will then soon have a wealth of available data at hand to give to intending planters in all parts of the country.

A MEMBER: In Europe they raise a great many nuts that they ship to this country, chestnuts, hazels and Persian walnuts. I understand they grow usually in odd places about the farms, but the aggregate production amounts to a great deal. We could very well follow the lead given by Europe in that particular, at least.

I think we could have for dissemination circulars which would stimulate people to plant nut trees more widely than at present.

THE SECRETARY: This question of nut planting in waste places always comes up at our meetings and is always encouraged by some and frowned upon by others. I do not think we ought to recommend in an unqualified way the planting of nut trees in waste places. I have planted myself, lots of us have tried it, and found that most nut trees planted in waste places are doomed to failure. I do not recall an exception in my own experience. I understand that in Europe the road sides and the fence rows are planted with trees and the farmers get a part of their income in that way. But with us in Connecticut nut planting in waste places does not seem to be a success. It is quite different when you come to plant nut trees about the house and about the barn. They seem to thrive where they don't get competition with native growth and where they have the fertility which is usually to be found about houses and barns. In fact, I have advocated the building of more barns in order that we might have more places for nut trees. I think we should plant nut trees around our houses and barns where we can watch them and keep the native growth from choking them, and where we can give them fertility and keep them free from worms. The worms this year in Connecticut have been terribly destructive. My trees that I go to inspect every two or three weeks, at one inspection would be leafing out, at the next would be defoliated. If such trees are about your house where you can see them every day or two you can catch the worm at its work. So for experimental planting I think places about our houses and barns can be very successfully utilized. When it comes to commercial planting, I think we must recommend for nut trees what we do for peach trees. We must give them the best conditions. I am hoping from year to year that somebody will come forward to make the experiment of planting nut trees in orchard form and give them the best conditions, as he would if he were going to set out an apple or peach orchard. The association has made efforts by means of circulars to interest the experiment stations, schools of forestry and other agricultural organizations. A number of the members of such organizations are members of the association. The work has been taken up to some slight degree in such places as the School of Forestry at Syracuse. I do not recall any others at this moment, although there are some. I will read part of a letter from Professor Record of the Yale School of Forestry: "The only reasons I can think of why the consideration of nut trees is not given more attention in our school are (1) it comes more under the head of horticulture than forestry (2) lack of time in a crowded curriculum (3) unfamiliarity with the subject on the part of the faculty." We would like to interest these faculties in nut growing. We look upon them as sources of education but evidently we are more advanced than they are in the subject of nut growing and it is up to us to educate them.

COL. VAN DUZEE: Right now when you are at the beginning of nut growing in the North you cannot over estimate the value for the future of records. My heart goes out to the man who comes to us as a beginner and wants to know something definite. Our records are the only thing we can safely give him. The behavior of individual nut trees, the desirability of certain varieties for certain localities—those things are of tremendous value.

No doubt you know that in California they have come to the point in many sections where they keep records of what each individual tree does. I began that some years ago with the commercial planting that I have had charge of for the last twelve years. We now have an individual tree record of every nut produced since these trees came into bearing—about 2500 trees. I went further than that—I kept a record of the value of the different nuts for growing nursery stock so that I might grow trees that would be the very best produced in our section. Now the years have gone by and I have a ledger account with every tree in that 2500 and I know exactly what it has

given me. I know how many nuts it has produced. You would be surprised to see the wide discrepancy in those records, the different behavior of individual trees. I wish I could talk to you longer on that subject. It is something I am very enthusiastic about.

By virtue of the records we have kept for years I have found a source of supply for seed nuts and nursery stock which has proved to be a constant performer. I bud this nursery stock from trees with individual records that have proved themselves to be good performers, I have found that certain varieties have proved themselves not worthy of being planted, and certain other varieties have proven themselves at least promising. This last year I took 100 Schley, 100 Stuart, 100 Delmas and 100 Moneymaker trees and planted them all on the same land. Now these trees, you understand, are grown from the stock grown from a nut that I know the record of for years. I know its desirability. The buds are from selected trees whose records I have. More than that, I alternated the rows and the trees in the rows. These trees are now where they have got to stand right up and make a record so that we will know ten years from today what is the best variety for our section.

I do not think I can make myself as clear as I wish I could this morning, but here is the point. If anybody comes to me I can tell him definitely, and I have records in my office to show, what the different varieties are doing and what soil they are growing in. Here in the north where the industry is in its infancy now is the time to start records. When I saw the subject of Professor Hutt's paper, the "Reasons For Our Limited Knowledge as to What Varieties of Nut Trees to Plant," it occurred to me that if you don't now start right in making records, ten years from today you will still have existing one of the principal reasons why you don't know.

MR. KELSEY: I started out four years ago with English walnuts. I read the account of Pomeroy and so I got a half dozen trees from him. They all died. I got five or six trees from Mr. Jones. I think this is the third year and one of those has some nuts on. I have got now about 150 trees planted in regular rows where I am cultivating them. But I was going to say that four years ago I sent to Pomeroy and asked him if he wouldn't send me a few nuts as a sample. He sent me 16. I cracked two of them. Fourteen of them I put in. I didn't know how to put them in so I took a broom handle, punched a hole in the ground and stuck them in the bottom. I never thought I would get any results from them. They came up in July. They did not come up quick. I suppose I had them so deep. I set them out three years ago. Some of them are as high as this room in three years on cultivated land set out in rows. They have never borne any. No one knows how long it takes for a seedling to bear. It may be two years, or five years, or ten.

DR. MORRIS: I want to bear witness on the point that Col. Van Duzee made, the matter of keeping records. The man who keeps good records is a public benefactor because what he learns becomes public property upon the basis of available data. Every one of us should pay attention to that point which Col. Van Duzee has brought out. Unfortunately my records have been kept by my secretaries in shorthand notes and I have had four different secretaries in ten years, and each with different methods of shorthand. They have not had time to write up all the notes, and so I find it difficult to present good nut records when busily occupied with professional responsibilities, which must come first. I had one field filled with young hybrid nut trees. A neighbor's cow got into that field and the boy who came after the cow found her to be refractory. The boy began to pull up stakes with tags marking the different trees and threw them at the cow. Before he got through he had hybridized about forty records of nut trees.

THE CHAIRMAN: As a horticulturist along experimental lines I find the trouble is to get people to plant trees and properly plant them. I do not think that the average farmer knows how to plant trees. That is why they get such poor results. They plant them where anybody with intelligence would not plant them. We find in the South that we can grow trees if there is protection against fire and stock. If fire is kept out and stock is kept from grazing, nature will cover the land with forest trees. I think that will go a long way to getting nut trees. But a man planting something as valuable as a nut tree wants to take a little more pains than that. I have seen Mr. Littlepage's place where he is raising handsome trees, but he has planted crops around each tree and there is plenty of plant food. You can grow trees almost anywhere if you make the conditions favorable. In hedge rows and odd places, if the forest soil is preserved, you can grow almost any kind of a nut tree. These conditions must prevail or we must make them prevail.

Just another point on the matter of home planting. I wouldn't be a very good preacher if I didn't carry out my own practices. Just to show my faith by my works I want to say that I took out every shade tree at home and put a nut tree in its place. Down south where shade is very valuable they said "that man is very foolish to cut down nice elms and maples like that and put nut trees in their place." It did look so then for a while. Now I have some handsome pecans and Persian walnuts and Japanese walnuts, and this year I get my first dividends from a tree five years old. Of course we have taken care to preserve their symmetry, but I think our nut trees come pretty close to being our best shade tree. I will challenge anybody to find a handsomer tree than a well-grown pecan. It is a very stalwart tree with its branches of waving foliage, which is the characteristic of an ideal shade tree, and yet, in addition to that, it produces in the fall magnificent nuts. So the proposition of home planting is one that pays quick dividends on attention given. I think I have convinced my neighbors that it is a good deal better to raise handsome nut trees than poplars. My neighbor planted Carolina poplars at the same time. He was out there the other morning raking up the leaves and that is all he will have to do until Christmas time.

THE DISEASES OF NUT TREES.

S. M. McMURREN, WASHINGTON, D. C.

MR. PRESIDENT AND MEMBERS: It is a source of great regret with me that I cannot report to you some new and horrible disease attacking nut trees. This makes a more interesting talk.

Last year in Washington I talked to you briefly about the Persian walnut blight which we had definitely established as occurring in the East. Last March the National Nut Growers' Association got very busy and so amended the agricultural appropriation bill that all the funds for national nut investigation were spent for pecan investigation, so it left us up in the air for work in the north. We have, however, been able to continue our observations with the Persian walnut blight and there is only one further point to be emphasized and brought out at this time. Those of you who have informed yourselves on this matter know that the serious period of infection on the Pacific Coast is in the spring. It is a blossom blight. During the past two years the period of infection in the East has been in the late summer and it has not been serious on that account. It is well known that in certain dry springs on the Pacific Coast this blight does not occur and those years the growers are assured of good crops. I think that this investigation, and the bulletin which will soon be forthcoming, will not act as a discouragement for those who want to plant Persian walnuts. I think it should not but should rather encourage planting of these nuts. In spite of the presence of this disease on the Pacific Coast the walnut industry has grown to be very profitable, and if it proves that late infection is the rule in the East there is every reason to believe that the disease will not be so serious. That is practically the only walnut disease worthy of attention at present.

The filbert disease is a fungus disease and Dr. Morris and others are authority for the statement that it can be readily controlled by cutting out.

DR. MORRIS: I will show this afternoon that it can be controlled in a way.

DR. McMURREN: We in the department have not been in a position to do any work on the hazel blight so far. The hazel blight is interesting in that it illustrates a principle in plant diseases which it is well to know, that most of our serious plant diseases fall in one of two classes; either a native disease on imported plants or an imported disease on native plants. This filbert blight is very slight on native hazels but very serious on imported European hazels. I do not think there is anything more on the filbert disease, but Dr. Morris will have some interesting things to show you this afternoon.

I want to interject a remark here about the business of planting trees for commercial crops along the road sides. There is more to be considered than the mere matter of planting a tree. Insect pests and diseases have to be taken into consideration. There is nothing that an apple orchard planter more hates to see than a tree out of the orchard. It doesn't receive proper attention and is apt to be a source of disease. I believe that wherever the nut industry has been established on an orchard scale it is a matter that should receive careful thought before trees are planted on the road side. When you have an adequate fertilizing department and can give it careful attention the same as trees in the orchard, all right. But they do not as a rule receive it. Roadside planting perhaps sounds very attractive on the surface and is probably a very good plan in some cases, but I think it is open to grave objections where an orchard industry is in the same section.

THE SECRETARY: I am sorry that Mr. C. A. Reed is not here to take up the discussion of the walnut blight, because I think he takes a little more serious view of it than Mr. McMurren.

MR. McMURREN: I know he does.

THE SECRETARY: That is right that Mr. Reed does, and I am glad he is here (Mr. Reed having just entered) to talk it over. Mr. Jones is also here. Mr. Jones is a close observer and has followed it in the field from the beginning. This matter of walnut bacteriosis is a very important one. Here is the walnut industry just in its infancy. We want to know whether this walnut bacteriosis is threatening such proposed industry seriously or not. We know it is a very serious thing in California. Can we safely begin planting English walnut trees or is the question of the seriousness of bacteriosis so serious that we should not plant extensively until we know more about it. Mr. McMurren has been saying a few words about bacteriosis in which he has not given us an impression of seriousness. I think Mr. Reed will give us some remarks on that matter.

MR. REED: I do not like to go up against Mr. McMurren. He is the disease man. He is the last word in the government. I am only a second fiddle when it comes to diseases but I must say that I have not a very optimistic feeling over the blight situation. I have been depending very largely on him to give us information.

THE SECRETARY: Where did you find it, Mr. Reed?

MR. REED: Speaking for the East only, for the part of the country that we are directly interested in, I have visited a number of the walnut sections. I think I have tried to reach all of them and in nearly every place that I have been to in the last year or two there has been blight. Several of the orchards that have been most widely advertised have blight, according to Mr. McMurren's identification. I went all the way from Georgia to Northwestern Pennsylvania and Northern New York State last year to be present when the crops were gathered from orchards of those sections, and in one of those orchards, one at North East, Pennsylvania, the crop was what I would call

about 65 per cent failure due to blight. The other orchard, one near Rochester, was not badly blighted, but there was a very light crop, not over 10 per cent of a crop, but still there was some blight there. Now, I do not know just what Mr. McMurren has said. I do know that he does not feel very badly alarmed over the blight situation in the East and I would rather hear him talk and Mr. Rush, and Mr. Jones.

MR. BARTLETT: I would like to know what the chief characteristics of the blight are.

MR. McMURREN: The ordinary late infection in the East begins with a little spot on the husk around the 1st of July, and that merely spreads until just about the time they fall off the tree. When the blight infection strikes it it stains the nut badly. The point I want to make is that you get the nuts anyhow. Mr. Littlepage, do you recall the trees in Georgetown? The blight there is a very late infection. It is not a thing that I can say should be discouraging. Blights are all over, the pear blight, the apple blight, the lettuce blight. If we can make the crop in spite of it I don't see why we should be unduly alarmed. I think there are a good many other factors to be taken into consideration in planting on a large scale and to make the question hinge on the blight is not right. Spraying is of no avail. I don't think the walnut growers should be discouraged because even in California where it is most serious the industry is still profitable.

MR. JONES: Some times the husk worm may spoil the husk and that may be confused with the blight. So far Mr. Rush has had the blight ever since I have known his trees. Last year the blight was more prevalent than this year. This year I estimated the loss in the nuts about 10 per cent. Last year I think it ran one-quarter.

THE SECRETARY: Would those nuts be ruined?

MR. JONES: Some of them would be and some of them not.

THE SECRETARY: One-quarter would be affected by blight and some of those would be good but not all?

MR. JONES: I don't know what proportion. If the nut when taken out of the husk is black, it would not be worth much. You can eat them but they are not marketable.

NOTES ON THE NUT BEARING PINES AND ALLIED CONIFERS.

DR. ROBERT T. MORRIS, NEW YORK

Among the food trees of the world of the nut bearing group the palms with their many species of cocoanuts probably stand first, the pines next, and the chestnuts third in order, so far as food supply for various peoples is concerned. Then come the almonds, walnuts, hazels, hickories and other nut bearing trees, the nuts of which have been somewhat carelessly looked upon as luxuries rather than as an important pantry full of good substantial calories to be turned into human kinetics.

The pines and allied conifers like *Araucaria* and *Podocarpus* will take their respective places in furnishing food supply for us all when the need comes. Such need is already close upon our new vista of war supplies. The squirrels and mice this year will eat thousands of tons of good food that our soldiers would be glad to have. The particular advantage in planting nut bearing pines rests in the fondness of these trees for waste places where little else will grow, and they need less attention perhaps than any other trees of the nut bearing group. For purposes of convenience in description I shall group all of the conifers together under the head of pines in this paper, although in botany the word "Pinus" is confined to generic nomenclature.

Up to the present time we have not even developed our resources to the point of utilizing good grounds very largely for any sort of nut tree plantations. In accordance with the canons of human nature men work hardest, and by preference, with crops which give them small returns for their labor. Riches from easily raised crops go chiefly to the lazy folks who don't like work. On the way to this meeting some of you perhaps noticed near Rye on the west side of the railroad track, a chicken farm on a side hill and a rich bottom land which had been ditched and set out to about three hundred willow trees along the ditch banks. Now if the owner of this property had set out English walnuts in the place of the willows, each tree at the present time, at a low estimate, might be bearing five dollars worth of nuts per year per tree, and I am, sure that would be a much larger income than the owner gets from his chickens—an income obtained certainly with much less trouble, because neighbors cannot break in at night and carry off walnut trees of such size. Two or three weeks from the present time you will observe people everywhere in this section of the country raking up leaves from various willows, poplars and maples, when they might quite as well be raking up bushels of nuts of various kinds instead of just leaves.

I presume that the extensive planting of pine trees for food purposes will have to wait until we have advanced to the point of putting other kinds of nut trees upon good ground first. Pines will be employed for the more barren hillsides when the folks of three hundred years from now begin to complain of the high cost of living.

Among some thirty or more species of pine trees which furnish important food supply for various peoples I exhibit nuts from only sixteen species today, because much of the crop comes from Europe and from Asia. I could not obtain a larger variety of specimens on account of the present interest of people in the game which military specialists play wherever industrious nations have saved up enough money to be turned over to their murder experts. In the pine trees we have opportunity for combining beauty and utility. As a group they are mountain lovers preferring localities where the air drainage is particularly good, but many of them will grow thriftily and will fruit well on low grounds. Fine nuts range in character from the rich, sugary, oily and highly nitrogenous nut of the Mexican piñon to the more starchy *bunya bunya* of Australia, as large as a small potato and not much better than a potato, unless it is roasted or boiled. Yet this latter pine is valuable for food purposes and the British Government has reserved one forest of the species thirty miles long and twelve miles wide in which no one is allowed to cut trees.

The nut of the *Araucaria imbricata* has constituted a basis for contention among Indian tribes in Chile for centuries, and perhaps more blood has been shed over the forests of this pine than over any other single source of food supply in the world. We do not know if the *Pinus imbricata* will fruit in the climate and at the latitude of New York, but I know that at least one tree of the species has lived for twenty years on the Palmer estate here in Stamford.

Some of the smaller pine nuts like those of the single-leaved pine, or of the sugar pine, are delicious when cracked and eaten out of hand, but the smaller pine nuts are pounded up by the Indians with a little water and the thick, rich, creamy emulsion like hickory milk when pressed out, is evaporated down to a point where the milk can be kept for a long time without decomposition. In addition to the nuts of the sugar pine, the Indians collect the sugar of dried juice which exudes at points where cuts have been made in the tree for the purpose. Incidentally, the sugar pine is one of our finest American trees anyway. Botanists tell us that it grows to a height of two hundred and seventy-five feet, and travellers say that it reaches three hundred feet. The latter people having actually seen the trees we may know which estimate to accept.

Aside from the beauty of most pines and the majesty of some of them, their utility is not confined to nuts alone. Timber and sap products are very valuable. The sugar pine in the latitude of New York is hardy, but does not grow as rapidly as it does in the West. The same may be said of the Jeffrey bull pine, but I shall show you some thriftier trees of this latter species tomorrow on my property. A very pretty striped nut is that of the *Pinus pinea*. This is the Italian pignolia, and you may buy them in the confectionery stores in this country. They are used as a dessert nut chiefly, but form an important food supply in some parts of Europe. The Swiss stone pine, *Pinus cembra*, is one of the hardy nut pines, fruitful in this vicinity, and the *Pinus Armandi*, the Korean pine and the Lace-bark pine from central China, are hardy and fruitful in this vicinity, to our knowledge.

Two very handsome pine nuts are those of the Digger pine, *Pinus Sabiniana* and the Big-cone pine, *Pinus Coulteri*. Both trees are hardy in this latitude, but I have not been able to locate any which are of bearing age as yet. The nuts have a rich dark brown or nearly black and tan shading. The nut of the Digger pine is very highly prized by the Indians and is larger and better in quality than the nut of the Big-cone pine which looks so much like it.

Nuts of the Torrey pine have been somewhat difficult to secure for planting, because they are esteemed so highly for food purposes that they have been collected rather closely by local people in the small area in which this species is found, on our Pacific Coast. It is improbable that the Torrey pine will be hardy much above our most southern states.

We do not advertise dealers in our association as a rule, but Mr. Thomas J. Lane, of Dresher, Pennsylvania, is not likely to make any great fortune from his sale of pine nuts to us. Consequently, I am stating at this point that Mr. Lane has offered to go to the trouble of securing pine nuts from different parts of the world for our members who wish to plant different species experimentally. I have given him a list of species to be kept permanently on file, and the list is marked in such a way that ones which are known to be hardy, semi-hardy, or fruitful in the latitude of New York may be selected for experimental planting. I hope that some of our southern planters will plant South American, Asiatic, African and Australian species of nut pines for purposes of observation. Mr. Lane will get the seed for them.

I have included among the specimens here today nuts of the ginkgo because that tree belongs among the conifers in natural order. It is an ancient tree which should not fit into this time and generation, but it has gone on down past the day when it belonged on earth. Its prehistoric enemies have died out, so the ginkgo tree has come rolling along down the centuries without enemies and at the same time with many peculiarities. Comparatively few of the trees are females, but the tree grows heartily in this latitude and one may graft male ginkgos in any quantity from some one female. The nut of this tree is rather too resinous to suit the American palate, but the Chinese and Japanese visitors to the Capitol grounds at Washington greedily collect the nuts from a bearing female tree growing there.

Most of the pine nuts have a resinous flavor, but as a class they are so rich and sweet that this is not disagreeable. The nuts of the single-leaf pine and our common piñon, *Pinus edulis*, are delicious when eaten out of hand and both of these trees are hardy in this latitude, but they do not grow as rapidly here as they do upon the arid mountains and under the conditions of their native habitat.

In Europe and Asia pine nuts for the market are cracked by machinery or by cheap hand labor, and I presume that we may eventually hull some of the smaller ones as buckwheat is hulled. If

the contents of the smaller nuts are extracted by the Indian method of grinding them up with a little water and then subjecting them to pressure, the waste residue will probably be valuable for stock food of the future, very much as we now use oil cake.

When planting nuts of pine trees I would call the attention of horticulturists to one very important point. The nuts must be planted in ground that does not "heave" in the spring time when the frost goes out. Many of the pine nuts send down a rather slender root at first without many side rootlets, and when the frost opens the ground in the spring the young trees are thrown out and lost. Here is another point of practical importance. Do not plant pine seed where stock can get at the young shoots in March. The little gems look so bright and green, so fresh and attractive when the snow goes off that cows and sheep, deer, squirrels and field mice will all try to collect them. Young pines should be grown in half shade during their first two years. They will require weeding and nice attention on the part of a lover who wishes to be polite to them.

QUESTION: Is there any difficulty in harvesting the crops, do the cones shed?

ANSWER: With some species the cones are shed before they are fully opened. They are collected and stored until the nuts can be beaten out. Other species retain the cones until the nuts have been shed. The branches are shaken and the nuts collected from tree to tree by the beaters and spread out upon the ground.

Sometimes coarse sheeting or matting is carried from tree to tree by the beaters and spread out upon the ground.

QUESTION: At what age will they bear?

ANSWER: Pines bear rather late as a rule. I doubt if very many of them will bear in less than 10 years from seed.

QUESTION: Would it be possible to produce grafted trees?

ANSWER: Yes, without much difficulty. Undoubtedly you could get bearing wood from old trees and graft on young trees, or graft on other species. They may be grafted back and forth like the ornamental firs and spruces of the nurserymen.

QUESTION: They don't compass, do they. If you cut them off, do shoots come out of the stumps?

ANSWER: Not as a rule. Adventitious buds belong to few pine trees. They graft conifers when the stocks are young.

QUESTION: Of those that you suggest, what would be the best here?

ANSWER: The Korean, the Bungeana or lace-bark, the Swiss stone pine, and the Armandi. These can be counted on to bear in the vicinity of New York. Several other species not yet tried out may bear well here, but I have not gone over the trees on estates very extensively as yet with that question in mind.

QUESTION: Are any of these specially good for the South?

ANSWER: Yes, most of the pine nuts that I have shown here will grow south of Maryland and seven of the best pine nuts in the world belong to our Southwest.

QUESTION: Is there any more trouble with the cows and squirrels over nut pines than there is with ordinary pine trees?

ANSWER: No, excepting that you don't miss the ordinary kinds so much. It is largely a matter of comparative interest.

NOTES TAKEN ON AN EXCURSION TO MERRIBROOKE, THE COUNTRY PLACE OF DR. ROBERT T. MORRIS, AT STAMFORD, CONN., SEPTEMBER 5, 1917.

DR. MORRIS CONDUCTING THE PARTY.

(1) Taylor shagbark hickory tree, overhanging the entrance-gate. A tree remarkable for annual bearing and for nuts of high quality, thin shell, large size, and excellent cleavage. Among hundreds of hickories examined, many of them in response to prize offers, this tree at the entrance furnishes one of the very best nuts of the lot.

(2) Buckley hickory (*Hicoria Buckleyi*) from Texas. Supposed not to be hardy in this latitude. Perfectly hardy, but not growing as rapidly as it does at home. Very large roundish thick shelled nut with a kernel of good quality if you can get it. Kernel has a peculiar but agreeable fragrance.

(3) Another southern species, the North Carolina hickory (*Hicoria Carolinae-septentrionalis*). Note the small, pointed, dark colored buds and beautiful foliage. The tree is perfectly hardy in Connecticut. This shagbark bears a small thin shelled nut of high-quality and it will be particularly desirable for table purposes. The tree grows thriftily in Connecticut.

- (4) Carolina hickory. Grafted on native shagbark.
- (5) A group of Korean nut pines (*Pinus Koraensis*). Raised from seed and now six years of age. One of the valuable food supply pines of northern Asia. Like most eastern Asiatic trees the species does well in eastern North America.
- (6) A central Asian prune (*Prunus Armeniaca*). Without value for the fleshy part of the drupe, but with a nut like that of the apricot, highly prized for its kernel. The tree is hardy and thrifty, but rather vulnerable to a variety of blights belonging to *Prunus*.
- (7) An ordinary black walnut grafted to the Lutz variety. A very large nut with good cleavage, good color and good quality.
- (8) Alder-leaved chestnut (*Castanea alnifolia*) from central Georgia. One of the most beautiful of the American chestnuts, with more or less of the trailing habit, running over the ground like the juniper, and apparently not subject to blight. In Georgia it is an evergreen, but in Connecticut it is deciduous, although sometimes a few green leaves are found in the early spring if they have been covered by snow or by loose dead leaves during the winter. The nut is of high quality and fair size. There are a number of hybrids between this and other chestnuts at Merribrooke, but not bearing as yet.
- (9) A group of common papaws (*Asimina triloba*), two of them grafted. The Journal of Heredity offered a prize of fifty dollars for the best American papaw, and the prize was awarded to the Ketter variety, the fruits of which weigh about one pound each. Seven little trees of this species were secured and two larger papaw trees grafted from cuttings when the seven were set out. Papaws grow well in this part of Connecticut, and because of the high quality of the fruit should be more largely planted.
- (10) Mills persimmon. One of a group of several varieties that are being cultivated in this country. Hardy and thrifty in Connecticut.
- (11) A group of Jeffrey bull pines (*Pinus Jeffreyi*) from Colorado. One of the nut pines. Supposed to do its best in the arid mountains of the West. Perfectly hardy and thrifty with beautiful bluish-green foliage in Connecticut.
- (12) Himalayan white pine (*Pinus excelsa*). One of the nut pines and with remarkably handsome foliage.
- (13) A group of Chinese pistache nut trees (*Pistacia sinensis*). At Merribrooke it has the habit of frequently growing twice in one year and sometimes three times in one year. The shoots will grow a foot or more and then make resting butts early in July. After about ten days of resting the buds burst, new shoots grow again and rest for the second time in the early part of September. If we have a warm moist fall the buds burst for the third time and make a third growth. This third growth winter-kills without injury to the tree, however. The significance of the growth presumably relates to the tree being an inhabitant of an arid country, where it has adapted itself to the rainfall of that country. I do not know if the trunk adds a new ring of wood after each resting period, but it likely enough does so.
- (14) Moneymaker pecan. Perfectly hardy and thrifty. It has not borne as yet and there may be a question of the season being long enough for ripening the nut. At the left a Stuart pecan, that comes from the very borders of the Gulf of Mexico. Sometimes the smaller branches winter-kill badly and at other times they do not. It is remarkable that a tree from the shores of the Gulf of Mexico should live here at all in the winter.
- (15) A field of six-year-old trees. Most of them the result of placing bitternut hickory pollen on staminate butternut flowers. The trees have not borne as yet and we can not tell if they are true hybrids or parthenogens. Parthenogenesis occurs readily with many nut trees. Pollen of an allied species which does not fuse with the female cell to make a gamete may, nevertheless, excite a female cell into division and the development of a tree. Such a tree would be expected to show intensified characteristics belonging to the parent. This lot of trees notable for the fact that some are very small for their age and some very large.
- (16) A group of Japanese chestnuts. They blight and die and blight and live and are not given much attention as they are of little value anyway. The chestnut blight (*Endothia parasitica*) attacks the Japanese chestnut about as freely as it does the American chestnut. The trees do not die from it quite so quickly and may bear for some years before dying.
- (17) A group of Japanese persimmons in a protected corner of a west-facing side hill. Most of the Japanese persimmons are not hardy in Connecticut, but an occasional variety given a moderate degree of protection will manage to live pretty well. They are uncertain trees, however, as two of the trees grafted to Bennett Japanese persimmons from Newark, N. J., had two-year-old shoots winter-killed this year. These were on low ground. I shall put my other Bennetts on hill sides.
- (18) American sweet chestnut grafted upon Japanese stock. Ordinarily Asiatic and American chestnuts do not make very satisfactory exchange stocks. In this case the American chestnut happens to be doing very well. The variety is known as the Merribrooke. Among the many thousands of chestnut trees here when I bought the place this one bore the best nut of all, very large and of high quality, and beautifully striped with alternate longitudinal stripes of dark and light chestnut color. The parent tree was one of the very first to go down with the blight ten years ago, and the standing dead trunk was removed at the time when I cut out five thousand dead or

dying chestnut trees. Stump sprouts of the Merribrooke variety survived for grafting purposes, and I have now kept the variety going by patient grafting ever since, on new stocks, hoping to carry the variety along until this epidemic of blight runs out of its protoplasmic energy.

(19) Ordinary Japanese chestnut. With fairly good crop of large nuts, but not of good quality, except for cooking purposes.

(20) A group of hybrids resulting from placing the pollen of the Siebold Japanese walnut upon the pistillate flowers of our butternut. The young trees have not borne as yet.

(21) Hybrids between the common American hazel and the European purple hazel. There are a number of these hybrids, and none of them with nuts better than those of either parent, consequently I give them little attention. Some of the hybrids, not as yet bearing, may prove to be more valuable. We have to make lots of hybrids in order to get a small percentage of important ones. In this particular lot the hybrid has taken on a habit of the mother parent, the common American hazel, growing long stoloniferous roots, an undesirable feature.

(22) The Golden Gem persimmon, laden with fruit. Grafted upon the stock of a staminate common persimmon.

(23) Early Golden persimmon. Bearing heavily, a variety grafted upon common persimmon stock.

(24) A group of Chinese chestnut trees (*Castanea mollissima*). Very beautiful trees, worthy of a position on almost any lawn, the foliage is bright and shining, and the thrifty growth very attractive. The species is practically immune to blight, sometimes at a point of injury bark blight will appear, but it spreads very slowly, is easily cut out and does not reappear at that point. It will be a success in Connecticut. The nut is not quite up to our native chestnut in quality, but it is larger in size and a better nut on the whole. The tree comes from the original home of the blight, and the two plants having lived together for ages the law of survival of the fittest has given us this chestnut tree, which can largely take the place of our lost American chestnut. The tree does not grow to be quite so large as our chestnut, but I am making hybrids between this species and three species of American chestnuts, and may find some remarkable ones eventually.

(25) Two young nut pines with lost labels. I shall probably not be able to determine the species until they bear cones.

(26) A number of black walnut trees grafted with several varieties of English walnut (*Juglans regia*). There is particular advantage in grafting English walnut upon black walnut stock for the reason that mice are extremely destructive to English walnut roots in winter time. Furthermore black walnuts will grow in soil that is distinctly acid in reaction, while the English walnut demands a neutral or alkaline soil. The nearest tree of this group had new shoots of the Rush English walnut nearly six feet long, which blew off last week in a wind storm because they had not been braced sufficiently. It is very important when grafting nut trees to fasten strong bracing sticks alongside of vigorous shoots and tying them with sisal tarred cord, which holds good for two years.

(27) Appomattox pecan, Busseron pecan, and Major pecan. All three trees growing very thriftily and all set nuts this spring, but did not hold them. This is the habit of young hickories and walnuts rather largely. None of my pecan trees are old enough as yet to fruit well. I do not know what varieties will find our season long enough for ripening purposes. That particular feature of pecan raising is quite as important as the mere question of hardiness in Connecticut.

(28) A little old butternut tree by my garden. This has been the mother of practically all my hybrids between butternuts and other species of walnuts. This little old tree bears flowers every year and is very conveniently situated for hybridizing work.

(29) An English walnut tree near the garden gate is growing thriftily, making sometimes four feet in a year, but as a seedling has not borne as yet.

(30) Pecan seedling with buds of Busseron recently inserted. They are fastened in place with waxed muslin and then painted with ordinary white paint. I use that a great deal in place of grafting wax, but make the paint thick and heavy so that little free oil runs in between the cambium layers when grafting or budding. Paint seems to be harder and better than liquid grafting wax if it has no free oil.

(31) A rapidly growing Chinese walnut (*Juglans sinensis*). Very much like *Juglans regia*. The nuts have prominent sutures and the kernel is rather more oily than that of the English walnut, but of very good quality, nevertheless.

(32) A number of hickory trees of different species grafted by my favorite method, unless we call it "budding." I call it "the slice graft," and have not known any one else to try it. A slice of bark from one inch to four inches in length is removed from the stock and this area is fitted with a slice of about the same length and breadth, carrying a bud or spur cut from the guest variety. On one of these young hickories you observe I made three slice grafts and all of them have taken with a very thrifty growth of the Taylor variety. One point of importance, I believe, is to have the slice from the guest variety a trifle smaller than the slice from the host stock. The guest slice is bound firmly to the host with waxed muslin.

(33) Paragon chestnut heavily loaded with burs. This particular tree is said to belong to a variety that is much advertised, but there is some question if it is a peculiar variety of the Paragon,

because Mr. Engel, of Pennsylvania, is said to have furnished his own Paragon chestnut scions when the other people were short of stock. If the nursery firm that has put out this Paragon chestnut on the market with so much vigor and at such expense had been a little more frank everybody would have profited. They have made a point of advertising the Paragon chestnut as blight resistant, which it is not; consequently, the country is full of disappointed customers. The dealers should have said something more or less as follows: "This chestnut blights freely, but it bears so well and so abundantly and with such a good nut that people can afford to plant it in large acreage and let it blight, carrying it along with about the degree of attention that one would naturally give to good apple trees." Had the dealers only said something like that, the members of our Association who receive very many letters from all over the country asking about this particular chestnut would have advised its purchase in large quantities. Prospective customers are shy of nurserymen in general. They write to members of our Association asking who is reliable. People have learned what we stand for.

(34) A hybrid between a pecan and a bitternut hickory. A large handsome thin shelled nut, but bitter. The great vigor of growth of the seedlings of this hybrid, which comes from Mr. G. M. Brown, of Van Buren, Ark., would seem to make this hybrid variety of remarkable value as grafting stock for other hickories. The nuts are exceptional in carrying the type form of progeny.

(35) Two rows of many species of nut trees planted in thick glazed earthenware pots. The pots are about four feet in depth and with round perforations. I had these made to order. I sunk them in the ground to the level of the rim and then planted these trees in the pots under the impression that they would remain dwarfed on account of the confinement of the roots, and that I would have a conveniently placed series for experiments in hybridization. The experiment was not a success. I knew that growing trees would move rocks, but had no idea that roots protruding through these holes in heavy glazed earthenware would be able to break the pots. The roots have done just that, and whenever a tree in a pot becomes large enough the protruding roots break the pot to pieces, and the tree marches straight along to its original destiny.

(36) One of a group of European chestnuts from seed brought me by Major L. L. Seaman. The parent tree is famous in England for its enormous size and heavy bearing; it is said to be centuries of age and is growing upon the estate of Sir George B. Hingley, Droitwich, Worcestershire, England. My young trees are growing very thriftily. They are showing some blight spots, but this has been controlled by cutting out and painting.

(37) A group of vigorous young trees, the result of placing pecan pollen on the pistillate trees of Siebold walnut. They show the Siebold parentage so distinctly that I imagine them to be parthenogens, but we cannot tell to a certainty until they bear fruit.

(38) A hillside set out with a large number of common bush chinkapins from the East, tree chinkapins from Missouri and a number of hybrids. The chinkapins and the alder-leaved chestnuts on this side hill have been so blight resistant as to require almost no attention, and for that reason I am making hybrids between the chinkapin and the alder-leaved chestnut and the Chinese chestnut in the hope of making an excellent combination of chinkapin quality and Chinese size. Up to the present time none of my hybrids have been as valuable as either parent, with the exception of two. Two of the hybrids bear nuts about the size of the average American sweet chestnut and of first rate quality. These two hybrid trees have shown no sign of blight as yet.

(40) A hybrid between an American chestnut and a chinkapin. It blights freely like its American parent. Some of the hybrids do that while others show the resistance of the chinkapin parent. This particular tree grows lustily, and I have taken the trouble to cut out the blight every year. The leaves and general appearance are very closely like the common American chestnut. When it first began to bear, the nuts were of the chinkapin type, a single nut to the bur and hardly to be distinguished from other chinkapins. A year or two later the nuts changed in appearance, becoming distinctly lighter in color and with peculiar longitudinal corrugations of the shell. A year or so later still the tree made another change, and it now bears two or three nuts to the bur like the American chestnut, the nuts retain their light color and peculiar corrugation.

(41) A group of European hazels (*Corylus avellana*). Several years ago the Prince of Colloredo-Mannsfeld was visiting Merribrooke. His Highness was much interested in the experimental work in nut trees and later sent me a number of hazel nuts from one of his estates in Bohemia. Among the hazel bushes which grew from these nuts there was one which bore large, long, thin-shelled nuts of high quality. This bush, as you observe, has rather small dark leaves and stout, crooked branches. At one of the meetings of the Association I spoke of the bush as having a bony look, and Prof. J. Russell Smith referred to it in discussion as the "Bony Bush" hazel, and that name has been retained. I have grafted a number of other American and European hazels from this bush and I have sent scions to friends.

(42) A Cook shagbark hickory from Moscow, Ky., grafted upon bitternut stock. This variety bears a very large thin-shelled, irregular nut, with rather poor cleavage, but the quality of the kernel is of such distinct value that I prize the variety.

(43) An example of the spur graft. A common T cut is made in the bark of the stock and then a slice of guest bark carrying a small branch or spur is inserted. In this particular case I put in a branch about ten inches in length and you see that it is growing very well.

(44) My beautiful Merribrooke chestnut grafted upon an ordinary American chestnut stock

growing by the roadside. Five years ago I noticed this little chestnut tree growing by the roadside with two stems. One of the stems was blighted and I cut it off and stopped the blight for the time being. The following year the other stem blighted and I trimmed out the blight and sprayed the stem with pyrox. In the following year I grafted the stock, but blight appeared at another point, the blight was cut out, and the stem again sprayed. In the following year blight appeared again, but at another point, and after cutting it out I put on tanglefoot, simply because I happened to have some with me when passing the tree. This year the stem has blighted again and I have cut out the blight and sprayed it, and I shall now whitewash a large part of the stock with whitewash containing a little carbolineum. The graft now in its third year is bearing one big bur. The interesting point is that this tree has blighted every year for five years, and I have kept it going along by giving it attention. This means if we are willing to take the trouble we can get the best of the blight, even with such a remarkably vulnerable tree as this one proves to be.

(45) A barren hillside covered with very handsome red pines eleven years of age, some of them grow nearly two feet per year. The soil is sandy and gravelly glacial till which will raise little else beside feather grass and sumac. The red pines are not nut pines, and attention is called to them incidentally because of their value for growing upon this sort of soil.

(46) A Korean chestnut filled with burs. The Korean chestnut does not blight quite so readily as the American chestnut, and certain individuals are fairly blight resistant. I raised several hundreds of them, but almost all of them are dead. A fairly large number are growing well and bearing without much attention. The nut is pretty good, but coarser than that of the American chestnut.

(47) A group of Tamba chestnuts from Japan. This is the favorite chestnut of the Japanese. I secured a number of the nuts, sprouted them and planted them out here in rows, intending to transplant them to permanent sites later. Finding that they were going to blight badly, I have neglected them and have allowed them to stand. One little tree among them bore a single bur at eighteen months of age and has borne steadily ever since with a heavy crop this year. This particular tree has not blighted, but its nut is coarse and of little value.

(48) When collecting walnuts I obtained a lot of nuts from a correspondent from the Mogollon Mountains in Arizona. The nut resembles that of *Juglans rupestris*, but is larger and thicker shelled. No one knows whether it is an undescribed species or only a distinct variety of *Juglans rupestris*. Several of the nuts sprouted, but various accidents happened to them and this tree now, seven years old, is the only one of the lot living. It looks very different from any American walnut I have ever seen. In fact, it looks so much like a stunted heart nut that I suspected that one of these nuts might have gotten into the lot by accident. In digging down about the stem, however, I found only the shells of a Mogollon walnut. We can not tell what the tree will bring forth, as it is not bearing as yet.

(49) Two groups of chestnut trees of the McFarland variety, about eighteen years of age. They grow and blight and bear, but have not blighted to the point of killing altogether. They have been neglected because the nut has not much value.

(50) A group of Merribrooke hazels. Some years ago I devoted several weeks to examining hundreds of hazel bushes in this part of the country, where they are a pest, and I also visited other hazel localities at a distance. Among all the bushes examined the best nut was found on my own property and I learned later that this particular bush had been known among the boys of the locality for a century. The nut is of large size for an American hazel, thin shelled, of high quality. This group consists of transplants of root progeny from the parent bush.

(51) A Horn hazel (*Corylus cornuta*, commonly wrongly designated as *Corylus rostrata*). A species fairly abundant in Connecticut, and I transplanted these bushes because they happened to have a tremendously long involucre. The nut of the horn hazel is not of such good quality as that of the common American hazel, and I have not succeeded in making hybrids between this and other hazels as yet. The hazels are very ancient in descent and each species likes to retain particular identity.

(52) A number of stocks of red birch, white birch and scrub oak grafted with European hazels and chinkapins, but the grafts all died. The grafting was done as an experiment in the hope that we might possibly utilize our waste lands which are covered with birch and scrub oak by grafting these trees with hazels and chinkapins. Some of the grafts lived for such a long time and put out such long shoots that the experiment will be tried again next year. It would not seem worth while, excepting for the fact that it was a bad spring for grafting anyway, and hazels did not even catch on hazels, though they caught freely last year. The Japanese do grafting on stocks widely different from the scions, but we have not developed that particular feature in this country as yet.

(53) Asiatic tree hazels (*Corylus colurna*). This species makes a tree as large as the common oaks and bears heavily. The nut is about the size of that of the common American hazel. The tree is very beautiful, and I am using it for grafting stock and for hybridizing.

(54) Sprouting cages. A double row of galvanized wire cages sunk four inches into the ground and about four inches free above ground, filled with sandy loam and used for sprouting any nuts which are to be employed in experimental work. Each cage is fitted with a cover of galvanized wire, the purpose of which is to keep out rodents which are so destructive to planted nuts. In these cages there are now a large number of hybrid nut trees growing, and they will be transplanted to permanent sites or to the garden for culture next spring.

(55) Japanese heart nut (*Juglans cordiformis*). The tree is supposed by some botanists to be a form of the Siebold walnut, but it has quite a different appearance. It has an open habit with large leaves and nuts which are suggestive of the conventional heart. The quality of the nut is very good, much like that of the Siebold, but the nut is larger and compressed. The tree is very hardy and is almost tropical in appearance. It has not been planted very largely in this county, but it undoubtedly will be eventually.

(56) Siberian walnut. The tree looks much like the Siebold walnut in general appearance, but with smaller leaflets, and the nut is very much like our butternut, but smaller and with much rougher shell.

(57) Two pecan trees that I bought from a nursery about twelve years ago. They have not borne as yet and being seedlings we cannot know if they will be of value. I shall probably graft them next year and not wait for them to bear their own nuts.

(58) Two large Siebold walnuts only twelve years of age, but growing in rich ground and sometimes making five feet of growth in a single year. They were well filled with nuts two weeks ago, but the red squirrels have cut down all of the nuts including numbers which I hybridized with English walnut pollen this spring. On one of the lower branches of one of the Siebold walnuts is a long thrifty graft of the Lutz black walnut that I put in this spring, simply because I happened to cut off the lower branches of the Siebold that were shading the garden, and I happened to have some of the black walnut scions with me at the time. It will not be allowed to remain on this tree.

(59) A cross between our Siebold walnut and our butternut, now about eight years old, but growing thriftily. It has not borne nuts as yet. I have a number of these trees and they appear to be good hybrids.

(60) A group of Kaghazi Persian walnuts. A valuable variety and one of the so-called English walnuts, a term that we use for convenience because the name has become established in this country by the market men, not by the botanists.

(61) A thrifty young Chinese seedling persimmon (*Diospyros lotus*).

(62) Little trees of one of the nut pines (*Pinus edulis*). They are at their best in the arid mountains of Arizona, and the species is very important as furnishing a food supply for the Indians. The little trees are hardy here in dry soil among the rocks, but do not grow rapidly. Mine have been in more than six years and are not more than six inches in height, but are very pretty.

(63) The Chinese Tamopan persimmon. The tree is very handsome, with large glossy leaves, but somewhat tender in Connecticut and requiring protected exposure. The fruit of the Tamopan is as large as a very large apple.

(64) Several trees five years of age, the result of English walnut pollen on Siebold walnut pistillate flowers. The trees are growing very thriftily, but they show the Siebold characteristic without much evidence of the English walnut parentage.

(65) A field of Pomeroy English walnuts, notable for their beautiful white bark. The trees have been in over eight years and set nuts for the first time this year. As seedling trees we cannot tell what they will do when in full bearing.

(66) Two species of nut bearing pines from which the marking labels have become lost, and I shall not be able to determine the species until they bear cones. One of them is very beautiful, with long leaves and pleasing bluish green foliage.

A VISIT TO THE ESTATE OF THE LATE LOWELL M. PALMER, NOTABLE FOR ITS COLLECTION OF TREES AND SHRUBS, DR. MORRIS CONDUCTING.

Here we see the Ginkgo trees, two of them bearing. The Ginkgo belongs by descent to the coniferous tree group. A very fine tree with nuts that are highly prized by the Asiatics, but somewhat too resinous for the American palate. Most of the Ginkgo trees are males, but one may graft any number of males with bearing female scions.

An *Araucaria imbricata* grew for twenty years on this place, and we have only just learned that it died last year. This pine is one of the most important of the nut pines and furnishes a large food supply in South America. The fact that one tree lived for twenty years in this latitude means a great deal.

A number of European hazel bushes are growing on the property and bearing heavily. A large heart nut tree, but bearing small nuts, is growing well. Several of the Himalayan nut pines (*Pinus excelsa*) beautify the property, and one of the trees, heavily laden with cones, is at least fifty years of age. Another one of the nut-bearing pines (*Pinus paviflora*, from Japan) is represented by several specimens on the Palmer property, and one little tree apparently less than ten years of age, is heavily loaded with cones. Incidentally we may examine here a trifoliate orange filled with

fruit. It is growing in a well protected corner of the grounds. Mr. Webber sent some valuable trifoliate hybrids to Merribrooke. One variety lived through the winter, but made a crippled start in the spring. Some day we may have good trifoliate orange hybrids in Connecticut if the Buckley hickory, Stuart pecan, Arizona walnut and imbricated pine grow here.

A dinner was held at the Hotel Davenport on the evening of the 5th, at which about thirty-five members and guests were present. After dinner the public was admitted and the following papers were read, Mr. Collingwood being a guest of the Association:

DR. KELLOGG: I feel a great interest in the work of this Association and a great sympathy with it. I feel that you are all working for me and I am doing what I can to promote your interests also. That is, I am trying to create a market for your products.

ADVENT OF NUTS INTO THE NATION'S LIST OF STAPLE FOODS.

DR. J. H. KELLOGG, MICHIGAN.

In these days when a condition of food shortage exists in the greater part of the civilized world, any question which concerns a nation's food supply is of public interest.

Food conservation is the great question of the hour. Visions of vanishing steaks and chops alarm the overfed and rising prices of all foodstuffs pinch the bills of fare of the poor.

It may easily be shown that most of all the hardships which the civilized world is suffering as regards food supply is due to lack of understanding and of foresight.

The fundamental error is the popular faith in the high protein ration. The physiologists are at least partly at fault. Liebig's dictum, which made protein the essential food factor in supporting work, has misled the whole civilized world for more than half a century. The dietaries of institutions, armies, whole nations have been based upon a conception which modern science has shown to be utterly false, and the result has been an economic loss which staggers belief, and a destruction of human life and efficiency which overshadows every other malign influence.

To properly appreciate the place of nuts in the national dietary we must have in mind a clear conception of the nature of food as revealed to us in the light of modern laboratory studies of human nutrition and metabolism.

Food is to an animal what soil is to a plant. It is the soil out of which we grew. What we eat today is walking around and talking tomorrow. The most marvelous of miracles is the transmutation of common foodstuffs into men and women, the transfiguration of bread, potatoes and beefsteak into human intelligence, grace, beauty and noble action. We read in holy writ how the wandering Israelites were abundantly fed in the Assyrian desert with manna from the skies and marvel at the Providence which saved a million souls from death, forgetting that every harvest is a repetition of the same miracle, that each morsel of food we eat is a gift of Heaven conveyed to us by a sunbeam. Food is simply sunshine captured by the chlorophyll of plants and served up to us in tiny bundles called molecules, which, when torn apart in our bodies by the processes of digestion and assimilation release the captured energy which warms us with heat brought from the sun and shines out in human thought and action.

It is less than a century since Liebig and Lehmann and their pupils began to unravel the mystery of food. In recent years no subject has received more assiduous attention from scientific men, and none has been made the object of more constant or more profound research than the questions of food and food supply. The feeding of animals and men is without question the most pressing and vital of all economic problems.

The labors of Voit and Pettenkofer, Rubner, Zuntz, Atwater, Benedict, Chittenden, Mendel, Lusk and Hindhede have demonstrated that there is the closest relation between food supply or food selection and human efficiency. In fact, it has been clearly shown that the quality of the food intake is just as directly and as closely related to the question of human efficiency as is the quality and quantity of gasoline to the efficiency of an automobile.

In fact it has been established as a fundamental principle in human physiology that food is fuel. Life is a combustion process.

The human body is a machine which may be likened to a locomotive—it is a self-controlling, self-supporting, self-repairing mechanism. As the locomotive rushes along the iron road, pulling after it a thousand-ton cargo of produce or manufactured wares or human freight sufficient to start a town or stock a political convention its enormous expenditure of energy is maintained by the burning of coal from the tender which is replenished at every stopping place. The snorting-monster at the head of the rushing procession gets hungry and has to have a lunch every few miles along the way. After a run of a hundred miles or so the engine leaves the train and goes

into a roundhouse for repairs; an iron belt has dropped out or a brass nut has been shaken off. Every lost or damaged part of the metal leviathan is replaced, and then it is ready for another century run.

The human body is wonderfully like the locomotive. It pulls or carries loads, it expends energy, it consumes fuel and has to stop at meal stations to coal up; it has to go off duty periodically for repairs. The body needs just what the locomotive needs—fuel to furnish energy and material for repair of the machinery.

Food differs from fuel chiefly in the one particular, that in each little packet of food done up by Mother Nature there is placed along with the fuel for burning a tiny bit of material to be used for repair of the machine. In other words, food represents in its composition both the coal and the metal repair materials of the locomotive. The starch, sugar and fat of foods are the coal and the protein or albumin is the metal repair stuff. Here we see at once the reason why starch and sugar and fat are so abundant in our foodstuffs, while protein or albumin is in quantity a minor element.

But there are other differences between food and common fuel which are worthy of mention. The water and the salts are essential to meet the body's needs, especially the various mineral elements, lime, soda, potash and iron. All these we must have—lime for the bones and nerves, soda and potash to neutralize the harmful acid products of combustion processes, and iron for the blood.

All these are found in normal foodstuffs, but in greatly varying proportions, so that a pretty large variety of foods must be eaten to make sure that each of the different food principles required for perfect nutrition are supplied in ample quantity.

In recent years science has discovered another and most surprising property of food in which it transcends all other fuel substances as a diamond from the Transvaal outshines a lump of coal. Natural food contains vitamins. It has long been known that an exclusive rice diet sometimes causes beri-beri, a form of general neuritis, and that a diet of dry cereals and preserved food in time gives rise to scurvy, but the reason was a profound mystery. In very recent years it has been learned that the real cause of beri-beri and scurvy is the lack of vitamins which are associated with the bran of cereals and so are removed in the process of polishing rice and in the bolting of wheat and other grains.

Vitamins do not enter into the composition of the body as do other food principles, but they are somehow necessary to activate or render active the various subtle elements which are essential to good nutrition.

There are several kinds of vitamins. Some are associated with the bran of cereals, other with the juices of fruits. Some are easily destroyed by heat, while others survive a boiling temperature. The discovery of vitamins must stand as one of the most masterly achievements of modern science, even outshining in brilliancy the discovery of radium. It was only by the most persevering efforts and the application of all the refinements of modern chemical technic that the chemist, Funk, was able to capture and identify this most subtle but marvelously potent element of the food. This discovery has cleared up a long category of medical mysteries. We now know not only the cause of beri-beri and scurvy and the simple method of cure by supplying vitamin-containing foods, but within a very short time it has been shown that rickets and pellagra are likewise deficiency diseases, probably due to lack of vitamins, and in a recent discussion before the New York Academy of Medicine by Funk, Holt, Jacobi and others, it was maintained that vast multitudes of people are suffering from disorders of nutrition due to the same cause.

Osborne a few years ago conducted experiments which demonstrated that something more than pure food elements and salts is essential for growth and development. They found that rats fed on starch and fat lived only four to eight weeks. When protein was added they sometimes lived and grew and sometimes remained stunted or died. It was thus evident that proteins differ. Their observations proved very clearly that there are perfect and imperfect proteins. The protein of corn, zein, for example, was shown to be incapable of supporting life. With the addition of a chemical fraction, tryptophan, obtained from another protein, the rats lived, but did not grow. By adding another fractional protein, lysin, the rats were made to thrive.

A minute study of the subject by Osborne, Mendel and numerous other physiologic chemists have shown that a perfect protein is composed of more than a dozen different bodies called amino-acids, each of which must be present in the right proportion to enable the body to use the protein in body building. Each plant produces its one peculiar kind of protein. The protein of milk, casein, is a perfect protein. Eggs and meat, of course, supply complete proteins, but among plants there are many imperfect proteins.

McCullum has demonstrated that grains, either singly or in combination will not maintain life and growth. The same is true of a mixture of grains with peas or navy beans. Another element is lacking which must be supplied to support life and growth.

With these facts before us we are prepared to inquire what place in the dietary are nuts prepared to fill? With few exceptions nuts contain little carbohydrate (starch or sugar). They are, however, rich in fat and protein. On account of their high fat content they are the most highly concentrated of all natural foods. A pound of nuts contains on an average more than 3,000 calories or food units, double the amount supplied by grains, four times as much as average meats and ten times as much as average fruits or vegetables.

For example, according to Jaffi's table, ten of our common nuts contain on an average 20.7 per cent. of protein, 53 per cent. of fat and 18 per cent. of carbohydrate, as shown in the following table:

	Protein	Fat	Carbohydrate
Almonds	21.4	54.4	13.8
Peanuts	29.8	46.5	17.1
Filberts	16.5	64.0	11.7
Hickory	15.4	67.4	11.4
Pine nut	33.9	48.2	6.5
Walnut	18.2	60.7	13.7
Pecan	12.0	70.7	18.5
Butternut	27.9	61.2	5.7
Beechnut	21.8	49.9	13.8
Chestnut	10.7	7.8	70.1
	—	—	—
Average	20.76	53.08	18.23

Meat (round steaks) gives 19.8 per cent. of protein and 15.6 per cent. of fat, with no carbohydrate. A pound of average nuts contains the equivalent of a pound of beefsteak, and in addition, nearly half a pound of butter and a third of a loaf of bread. A nut is, in fact, a sort of vegetable meat. Its composition is much the same as that of fat meat, only it is in much more concentrated form.

There can be no doubt that the nut is a highly concentrated food. The next question naturally is, can the body utilize the energy stored in nuts as readily as that supplied by meat products, for example.

The notion that nuts are difficult of digestion has really no foundation in fact. The idea is probably the natural outgrowth of the custom of eating nuts at the close of a meal when an abundance, more likely a super-abundance, of highly nutritious foods has already been eaten, and the equally injurious custom of eating nuts between meals. Neglect of thorough mastication must also be mentioned as a possible cause of indigestion following the use of nuts. Nuts are generally eaten dry and have a firm hard flesh which requires thorough use of the organs of mastication to prepare them for the action of the several digestive juices. Experiments made in Germany showed that nuts are not digested at all, but pass through the alimentary canal like foreign bodies unless reduced to a smooth paste before swallowing. Particles of nuts the size of small seeds wholly escaped digestion.

Having been for more than fifty years actively interested in promoting the use of nuts as a staple food, I have given considerable thought and study to their dietetic value and have made many experiments. About twenty-five years ago it occurred to me that one of the above objections to the extensive dietetic use of nuts might be overcome by mechanical preparation of the nut before serving so as to reduce it to a smooth paste and thus insure the preparation for digestion which the average eater is prone to neglect. My first experiments were with the peanut. The result was a product which I called peanut butter. I was much surprised at the readiness with which the product sprang into public favor. Several years ago I was informed by a wholesale grocer of Chicago that the firm's sales of peanut butter amounted on an average to a carload a week. I think it is safe to estimate that not less than one thousand carloads of this product are annually consumed in this country. The increased demand for peanuts for making peanut butter led to the development of "corners" in the peanut market, and more than doubled the price of the shelled nuts and to a marked degree influenced the annual production. The nut butter idea also caught on in England.

I am citing my experience with the peanut not for the purpose of recommending this product, for I am obliged to confess that I was soon compelled to abandon the use of peanut butter prepared from roasted nuts for the reason that the process of roasting renders the nut indigestible to such a degree that it was not adapted to the use of invalids. I only mention the circumstance as an illustration of the readiness with which the public accepts a new dietetic idea when it happens to strike the popular fancy.

Ways may be found to render the use of nuts practical by adapting them to our culinary and dietetic customs and to overcome the popular objections to their use by a widespread and efficient campaign of education. Other nuts, when crushed, made most delicious "butters," as easily digestible as cream, since they did not require roasting. I later found ways for preparing the peanut without roasting.

The fats of nuts, their chief food principle, are the most digestible of all forms of fat. Having a low melting point they are far more digestible than most animal fats. Hippocrates noted that the stearin of eels was difficult of digestion. The indigestibility of beef and mutton fat has long been recognized. The fat of nuts much more closely resembles human fat than do fats of the sort mentioned. The importance of this will be appreciated when attention is called to the fact that fats entering the body do not undergo the transformation changes which take place in other foodstuffs; for example, protein in the process of digestion is broken into its ultimate molecular units. Starch is transformed into sugar which serves as fuel to the body, but fats are so slightly modified in the process of digestion and absorption that after reaching the blood and the tissues

they are reconstructed into the original form in which they are eaten, that is, beef fat is deposited in the tissues as beef fat without undergoing any chemical change whatever; mutton fat is deposited as mutton fat; lard as pig fat, etc. When the body makes its own fat from starch or sugar, the natural source of this tissue element, the product formed is *sui generis* and must be better adapted to the body uses than the animal fat which was *sui generis* to a pig, a sheep or a goat. It is certainly a pleasant thought that one who rounds out his figure with the luscious fatness of nuts may felicitate himself upon the fact that his tissues are participating in the sweetness of the nut rather than the relic of the sty and the shambles.

It is also worthy of note that the fat of nuts exists in a finely divided state, and that in the chewing of nuts a fine emulsion is produced so that nut fats enter the stomach in a form best adapted for prompt digestion.

Another question which will naturally arise is this: if nuts are to be granted the place of a staple in our list of food supplies will it be safe to accept them as a substitute for flesh foods?

Beef steak has become almost a fetish with many people, but the experiments of Chittenden and others have demonstrated that the amount of protein needed by the body daily is so small that it is scarcely possible to arrange a bill of fare to include flesh foods without making the protein intake excessive. This is because the ordinary foodstuffs other than meat contain a sufficient amount of protein to meet the needs of the body. Nuts present their protein in combination with so large a proportion of easily digestible fat that there is comparatively little danger of getting an excess.

It is also worthy of note that the protein of nuts is superior in quality to that of grains and vegetables. The critically careful analyses made in recent years have shown that the proteins of nuts, at least of a number of them, contain all the elements needed for building up complete body proteins, in other words, nuts furnish perfect proteins, which are not supplied so abundantly by any other vegetable product.

This fact places the nut in an exceedingly important position as a foodstuff. In face of vanishing meat supplies it is most comforting to know that meats of all sorts may be safely replaced by nuts not only without loss, but with a decided gain. Nuts have several advantages over flesh foods which are well worth considering.

1. Nuts are free from waste products, uric acid, urea, carmine and other tissue wastes.
2. Nuts are aseptic, free from putrefactive bacteria and do not readily undergo decay either in the body or outside of it. Meats, on the other hand, are practically always in an advanced stage of putrefaction, as found in the meat markets. Ordinarily meats contain from three million to ten times that number of bacteria per ounce, and such meats as hamburger steak often contain more than a billion putrefactive organisms to the ounce. Nuts are clean and sweet.
3. Nuts are free from trichinae, tapeworm and other parasites, as well as the infections due to specific disease. Nuts are in good health when gathered and remain so until eaten. The contrast between the delectable product of the beautiful walnut, chestnut or pecan tree and the abattoir recalls the story of the Tennessee school teacher who was told when she made inquiry about a certain shoulder of pork which had been promised in part payment of services, but had not arrived: "Dad didn't kill the pig." "And why not," said the teacher. "Because," replied the observing youngster, "he got well." Nearly all the cows slaughtered are tuberculous. They are killed to be eaten because too sick to longer serve as community wet nurses.

That nuts are competent to serve as staple foods might be inferred from a fact to which Professor Matthews, of the New York Museum of Natural History, calls attention to, to wit, that our remote ancestors, the first mammals, were all nut and fruit eaters. They may have gobbled an insect now and then, but their staple food was fruits and nuts, with tender shoots and succulent roots, which is still true of those old fashioned forest folks, the primates of which the orang outang, the chimpanzee and the gorilla are consistent representatives, while their near relative, also a primate, civilized man, has departed from his original bill of fare and has exploited the bills of fare of the whole animal kingdom.

The keeper of the famous big apes of the London Zoo informed me that they were never given meat. Even the small monkeys generally regarded as insectivorous, were confined to a rigid vegetarian fare and were thriving.

Whole races of men, comprising many millions, live their entire lives without meats of any sort, and when fed a sufficient amount are wonderfully vigorous, prolific, enduring and intelligent. Witness the Brahmins of India, the Buddhists of China and Japan and the teeming millions of Central Africa.

Carl Mann, the winner of the great walking match between Berlin and Dresden, performed his great feat on a diet of nuts with lettuce and fruits. The Finn Kilmamen, the world's greatest runner, eats no meat. Weston, the long-distance champion, never eats meat when taking a long walk. The Faramahara Indians, the fleetest and most enduring runners in the world are strict vegetarians. The gorilla, the king of the Congo forests, is a nut feeder. Milo, the mighty Greek, was a flesh abstainer, as was also Pythagoras, the first of the Greek philosophers, Seneca, the noble Roman Senator, and Plutarch, the famous biographer. The writer has excluded meat from his diet for more than fifty years, and has within the last forty years, supervised the treatment of more than a hundred thousand sick people at the Battle Creek Sanitarium on a meatless diet.

Even carnivorous animals nourish on a diet of nuts with other vegetable foods and cooked cereals. The Turks mix nuts with their pilaff of rice and the Armenians add nuts to their baalghoor, a dish prepared from wheat which has been cooked and dried.

That nuts are not only competent to serve as a staple food, but that they may fill a very important place as accessory foods in supplementing the imperfect proteins of the grains and vegetables is shown in a very conclusive way by an extended research by Dr. Hoobler, of Detroit.

Before describing Dr. Hoobler's experiment I may be allowed to explain that some years ago, in 1899, I was asked by the then United States Secretary of Agriculture to undertake experiments for the purpose of providing a vegetable substitute for meat. Dr. Dabney said there was no doubt that the time would come when such substitutes would be needed on account of the scarcity of meat. I succeeded in developing several products which have come to be quite widely known and used more or less extensively in this country and Europe. Among these were Protose (resembling potted meat) and malted nuts, a soluble product somewhat resembling malted milk. It was noted that the malted nuts when used by nursing mothers greatly increased the flow of milk and promoted the health of the infant. Recently Dr. Hoobler undertook an extensive feeding experiment with nursing mothers and wet nurses as subjects. He made use of these nut preparations as well as of ordinary nuts and compared the results with various combinations into which meat and milk entered in various proportions. He found that a diet of fruits, grains and vegetables alone gave a very poor quality of milk, but when nuts were added the result was a milk supply superior in quantity and quality to any other combination of foodstuffs, not excepting those which included liberal quantities of milk, meat and eggs. From this it appears that nuts possess such superior qualities as supplementary or accessory foods that they are able to replace not only meats, but even eggs and milk in the dietary. The full account of Dr. Hoobler's interesting observations will be found in the Journal of the American Medical Association for August 11, 1917.

Extensive feeding experiments are now being conducted at the research laboratory of the Battle Creek Sanitarium, which it is hoped will develop still other points of interest respecting the superior nutritive properties of the choicest and most remarkable of all the food products which are handed to us from the fertile laboratory of the vegetable world.

Another and most interesting phase of my subject is the relation of nut feeding to anaphylaxis. This newly coined word perhaps needs explanation for the benefit of my lay hearers. For many years it has been known that some persons were astonishingly sensitive to certain foods which indeed appeared to act as violent poisons. Oysters, shellfish, mutton, fish and other animal products, as well as a few vegetable products, especially honey, strawberries and buckwheat, were most likely to be the cause of these violent disturbances. More recently it has been found that cow's milk very often shows the same peculiarity. It is now known that this remarkable phenomenon is due to the fact that the body sometimes becomes sensitized to certain proteins which thereafter act as most violent poisons and may cause death. Sensitization to animal proteins is much the more frequent. In such cases nut products become a very precious resource. This is especially true with reference to cow's milk.

Liquid nut preparations have saved the lives of hundreds of infants within the last twenty years. I have had the pleasure of meeting several fine looking young people who owed their lives to nut-feeding when other resources had failed. One case was particularly interesting. A telegram from a well-known Senator at Washington announced the fact that his infant daughter and only child was dying from mal-nutrition, as cow's milk and all the known infant foods had been found to disagree. I advised nut-feeding, and fortunately the prescription suited the case and the little one began to improve at once. When the physician in attendance learned that the child was eating nuts he vigorously protested, declaring that such a diet was preposterous and would certainly kill the infant, but the child flourished wonderfully on the liquid nut diet, eating almost nothing else for the first three years of her life, and today is a splendidly developed young woman, a brilliant witness to the food value of nuts.

I have by no means exhausted the physiologic phases of my subject, but will now turn a moment in concluding my paper, to its economic aspects.

The high price of nuts is constantly urged as an objection to their use as a staple. It is probable that a largely increased demand would lead to so great an increase in the supply that the cost of production, and hence the cost to the consumer, would be decreased. But even at the present prices the choicest varieties of nuts are cheaper than meats if equivalent food values are compared. This is clearly shown by the following table which indicates the amounts of various flesh foods which are equivalent to one pound of walnut meats.

Beef loin, lean	4.00	pounds
Beef ribs, lean	6.50	"
Beef neck, lean	9.50	"
Veal	5.50	"
Mutton leg, lean	4.20	"
Ham, lean	3.00	"
Fowls	4.00	"
Chicken, broilers	10.00	"
Red bass	25.00	"

Trout	4.80	"
Frogs' legs	15.00	"
Oysters	13.50	"
Lobsters	22.00	"
Eggs	5.00	"
Milk	9.50	"
Evaporated cream	4.00	"

But the great economic importance of the encouragement of nut culture in every civilized land is best shown by comparing the amount of food which may be annually produced by an acre of land planted to nut trees and the same area devoted to the production of beef. I am credibly informed that two acres of land and two years are required to produce a steer weighing 600 pounds. The product of one acre for one year would be one-fourth as much, or 150 pounds of steer. The same land planted to walnut trees would produce, if I am correctly informed, an average of at least 100 pounds per tree per annum for the first twenty years. Forty trees to the acre would aggregate 4,000 pounds of nuts, or 1,000 pounds of walnut meats. The highest food value which could be ascribed to the 150 pounds of beef would be 150,000 calories or food units. The food value of the nut meats would be 3,000,000 calories, or twenty times as much food from the nut trees as from the fattened steer, and food of the same general character, protein and fat, but of superior quality.

One acre of walnut trees will produce every year food equal to:

14,000 lbs. red bass (a ship load).
 3,000 lbs. beef (five steers).
 7,500 lbs. chicken broilers.
 15,000 lbs. lobsters.
 10,000 lbs. oysters.
 60,000 eggs (5,000 dozen).
 4,000 qts. milk.
 A ton of mutton (13 sheep).
 250,000 frogs.

And when one acre will do so much, think of the product of a million acres.
 Ten times the product of all the fisheries of the country.
 Half as much as all the poultry of the country.
 One seventh as much as all the beef produced.
 More than twice the value of all the sheep.
 Half as much as all the pork.
 And many millions of acres may be thus utilized in nut culture.
 And the walnut is not the only promising food tree. The hickory,
 the pecan, the butternut, the filbert and the piñon
 are all capable of producing equal or greater results.

A single acre of nut trees will produce protein enough to feed four persons a year and fat enough for twice that number of average persons. So 25,000,000 acres of nut trees would more than supply the whole people of the United States with their two most expensive food stuffs. Cereals and fresh vegetables, our cheapest foods, would be needed for the carbohydrate portion of the dietary. Just think of it. A little nut orchard 200 miles square supplying one-third enough food to feed one hundred million of citizens. The trouble is the frogs and cattle are eating up our food supplies. We feed a steer 100 pounds of food and get back only 2.8 pounds. If we plant 10 pounds of corn we get back 500 pounds. If we plant one walnut we get back in twenty harvests a ton of choicest food. In nut culture there is a treasury of wealth and health and national prosperity and safety that is at present little appreciated.

Here is a veritable treasury of wealth, a potential food supply which may save the world from any suggestion of hunger for centuries to come if properly utilized. Every man who cuts down a timber tree should be required to plant a nut tree. A nut tree has a double value. It produces valuable timber and yields every year a rich harvest of food while it is growing.

Every highway should be lined with nut trees. Nut trees will grow on land on which no other crop will grow and which is even worthless for grazing. The piñon flourishes in the bleak and barren peaks of the Rockies.

The nut should no longer be considered a table luxury. It should become a staple article of food and may most profitably replace the pork and meats of various sorts which are inferior foods and are recognized as prolific sources of disease.

Ten nut trees planted for each inhabitant will insure the country against any possibility of food shortage. A row of nut trees on each side of our 5,000,000 miles of country roads will provide for

a population of 160,000,000. With a vanishing animal industry, nut culture offers the only practical solution of the question of food supply. As the late Prof. Virchow said, "The future is with the vegetarians."

THE IMPORTANCE OF NUT GROWING.

H. W. COLLINGWOOD, NEW JERSEY.

In these days the importance of most things is valued in figures. I never was good at figures. It seems to me that you can do anything you like with figures, except make them clear, yet it was the failure to figure that gave me my first idea of the importance of nut culture. Some 50 years ago a small boy on a New England farm could not, or would not, do his sums in the old Coburn Arithmetic. It made no difference that the teacher called it Mathematics, and pointed it with the end of a hickory stick. By any other name it was not sweet.

This boy got stuck on a question about a hare and a hound. It appeared that the hare jumped a rod at a time, and made 33 jumps a minute. The hound started 200 feet behind the hare. This hound made 18 ft. at a jump, and made $32\frac{1}{2}$ jumps a minute. Now, would the hound catch the hare before they got to a hickory tree half a mile away?

I am glad they introduced that hickory tree because the question was a hard nut at best and needed brain food. I couldn't tell where the hare would be, and I can't now; nor do I believe that some of you wise heads, grown hairless with constant thinking, could really tell how the hare came out. If I saw one of my children headed for me with such a problem in hand, I confess that I should make a prompt engagement outside. The old folks who brought me up, had sterner ways of enforcing education. They decided that the boy should live on brown bread and water until he did that example. In order to assist hunger in bringing the boy to it, after the first day showed that the boy was still going, the old gentleman hunted up all the axes and hatchets, scythes and knives on the place, and made the boy turn grindstone while he held the implements on. Greek met Greek. The boy wouldn't give in, and the old man couldn't and preserve his dignity, but try as he might the old man could not tire out the boy; the old hands gave out first, and the old man straightened his back and gazed at that wonderful boy. Now it wasn't in brown bread and water to sustain strength and will in that way. Not when there are baked beans for supper and you can smell them! The old man had to acknowledge a higher power which beat him. He wouldn't do it openly, that was not the New England way, but he did it on the second night by helping the boy to baked beans and fried potatoes without a word. The old man went to his death thinking that he had a most wonderful boy, and the little fellow did not give his secret away. Now we may have it as a slight contribution to the importance of nut culture. The sustaining power which carried the boy through his trial was the hickory nut. There was a pile of them in the attic, and the boy on the quiet, cracked and ate a quart of them every day. That boy could not spell protein to save his life, and carbo-hydrates would have scared him off the floor, but the nuts and the brown bread gave him a balanced ration which did everything except find out about the hound and the hare. I think it would have required a balanced ration fed to an unbalanced brain to settle that problem.

Now I think the importance of the nut industry must come to the general public in that way, through the stomach rather than through the mind. The human mind is a marvelous piece of mental machinery, so is the machine which sets type or weaves fine cloth, yet both are powerless unless the fire pot under the engine, or the stomach of the man, are kept filled with fuel or food. I have heard very old men tell of the prejudice which existed against coal, years ago, in New England, when attempts were made to introduce the new fuel. Cord wood was the local fuel, people knew what it was, and its preparation provided a local industry. The introduction of coal meant destruction for this local business of wood cutting, and wiped out the value of many a farm. Coal had to win its way against prejudice and local interest, and it only won out by showing power. I am sure that 75 years ago, if some visionary Yankee had said that coal would be so freely used in New England that cord wood would be almost unsaleable, the public would surely have given him that honorary title which goes with prospective and persistent knowledge, "nut."

In like manner the importance of nut growing will not be truly recognized until we can show a man in the most practical way that nuts provide the energy to be found in beef steak. It is said that knowledge creates an atmosphere in which prejudice cannot live. I know an old man who is absolutely settled in his conviction that New England has degenerated because her people have given up eating baked beans and cod fish balls, and introduced the sale of these delicacies in the West. That man says, with convincing logic, that in the old days when New England lived on brown bread and baked beans, we produced statesmen on every rocky hillside, and we dominated the thought of the nation. Now, he says, we have not developed one single statesman since the canned baked bean industry took our specialty away from us. The only way to convince him is to produce a dozen statesmen out of men who are willing to subscribe to a diet of nuts. I have a friend who says he feels like throwing a brick every time he passes a modern laundry. He says the invention of the linen collar kept him a poor man. His grandfather invested the family fortune in the stock of a paper collar factory. Many of our older men remember the time when we all wore paper collars, and bought them by the dozen in boxes. It seemed like a sure thing when the old man put all his money into it. He figured that by 1915 there would be 40,000 people in this country, each one wearing at least 200 paper collars a year, something like the hound and the

hare, perhaps, but he didn't know that the hare in this case would drop dead, and the hound double his jump, as happened to paper and linen collars. Some one invented the modern linen collar. The laundry service started up, and paper collars disappeared with the family fortune. Now, my friend must work for a living, and throw mental bricks at the laundry. In a way every new habit, or every new interference with the thought and method of the plain people must run the gauntlet and submit to just such violent changes.

Now the future of the nut business, which contains the importance of the industry, depends upon our ability to make the plain, common people understand that in the future we must cut our beef steak and our chops off a nut tree. We have made some of the brainy people understand this already, but the hound is still chasing the hare, and he is several jumps behind. You may say what you will, or think as highly as you like of your own place in society, but the world is not run or pushed on by the brainy people. They may steer it for a while and master it, but only at the permission of what I may call the stomach people, who always sooner or later rise up and dominate things. A gild-edged, red line edition of nut knowledge will get the few or select class, but in order to make the industry truly important we must make a homely appeal to the plain people. It seems to me that one of the most effective nut documents yet issued is that bulletin by George Carver, a colored man at the Tuskegee Institute. Carver simply makes his appeal to the Southern farmer, and he gives him 45 ways of cooking and eating peanuts. I rather think that Carver's work in trying to get the Southern negroes to eat more peanuts and more cow-peas has done about as much for the race as the academic instruction given in the college.

On the principle that "Like begets like," I feel sure that the continued practice of cracking the shell to get at the sweet meat inside will tend to put more phosphorus and less lime into the skull of the race. I once explained the nut proposition to an energetic man and he said: "Fine—the theory is perfect—now hire a man who lives on rare beef to get out and fight for your proposition and you will put it over!"

Last year I went up into New York State with a prominent public man, who was to make a speech. This man was delayed, and in order to get there he had to jump on the last platform of the last car. He had eaten no lunch, and only a light breakfast. He said he should surely fail in his speech because he was faint from lack of food. I asked him what he would eat if he had the chance. He said soup, half a chicken, potatoes and asparagus, and apple pie. I told the train boy to bring samples of everything he had, and we finally selected an apple from Oregon, a banana from Mexico, a box of figs from California, some pop corn from Massachusetts, chocolate from Venezuela, and salted nuts from Louisiana. The air and the sunshine and the water seemed to be produced in New York, but nothing else. A great dinner for a New York man, but to his surprise it satisfied him, took the place of the chicken, and carried him through his speech with a strong punch. It seems to me that one trouble with our nut propaganda is that we go at it in such a way that the pupils regard us somewhat as "nuts," and why should the man who becomes a specialist on any subject, and airs it on all occasions, be called a nut? We shall have to admit that men are called such names. I think it is because we let our brains work somewhat like the oyster or clam, and secrete a hard shell of formal knowledge around the sweet meat of condensed human nature, for that is what all useful knowledge is. We must crack our shell of formal knowledge and grind it up finer before we can put it into the think works of the plain people.

While I was working up the Apple Consumers' League some years ago, I ran upon the fact that Corbett, the prize-fighter, consumed 3 dishes of apple sauce every day while training. Now, I had used the statement that J. P. Morgan always had a baked apple for his lunch, but I got small results from that story. Few people ever expected to make millions, and Morgan was out of their class. Every man carried a punch, which he wanted to enlarge and make effective. If Corbett used apple sauce to oil his arm for a knock-out blow, every man with red blood wanted apples. Now we must work our nut campaign in some such popular way, if we expect to put a nut on the wheel of progress. The fact that Prof. Johnson, or Dr. Jackson, or the Rev. Thompson, or Judge Dixon, or Senator Harrison, find strength and comfort from eating nuts, is very important and very pleasant, but 99 per cent of our people never expect to enter the learned profession, and they must not get the idea that these professions stand around the full use of nuts like a barbed wire fence. Most men must live and work in the rough and tumble of life, and at present they think red meat is the sustaining power for that sort of stuff. We must change their point of view. Let us find athletes, baseball men, wrestlers, fighters, runners, men who stand well in popular sports and who will publicly state that they substitute nuts for meat in part at least. We must put this thing into the popular imagination of the plain people if it is to be of full importance. When some fellow with a new brand of cigarettes wants to develop a trade among young men, he gets some noted ball player to write a letter stating his love for that brand. I think we should follow that plan somewhat in putting our nut campaign before the people. Two years ago the Oregon Agricultural College sent a football team East. The college was almost unknown here, but I asked one or two football men about it. They laughed at these Pacific Coast athletes. Here was a college they said which had issued a bulletin advising the people to send their children to school with nut sandwiches instead of meat. This man said that such training could only result in puny, half grown men, and he doubted if this team would last half way across the country. Those Oregon boys lined up a team of giants. They simply wiped the earth with most teams of their class, and left behind the cracked shells of a long line of reputation, with the sweet meat well picked out.

Personally I believe that within 25 years, 50 at the latest, our people will be absolutely forced to accept a diet of nuts in place of our present proportion of meat. As I see it, the time is coming when increased population and shortage of available land will make prime, beef nearly as scarce

as turkey and venison are today. Not only so, but I think knowledge will slowly but surely lead men to change their diet from choice. My children will live to see the time when the acre nut orchard on the average farm will be considered just as useful and as much of a necessity, and far more profitable, than the present chicken yard. In that day I think the nut industry will rank in food importance second only to that of corn, and I believe that the greatest change will be found here in New England, for I believe that nut culture is to change history, and readjust population and industry to some extent. Frankly, I expect my children to live to see the time when the hickory nut in New England will rank far above the walnut industry in California or in France. I think this nut culture will, in time, bring a greater income to the New England States than all its fruits and grain combined today. Out in the wild woods on some New England hillside there are growing today strains or varieties of nuts which will do far more for this section than the Baldwin apple, or the Bartlett pear have ever done. They will be found, tamed and propagated.

You may, if you like, call me a dreamer, or what is the same thing, a "nut." I can stand that, for have I not in my short span of life seen dreams come true. Suppose the wandering hunter, or the farmer's boy, who discovered the Baldwin apple in the woods of Massachusetts, had gone back to his home and stated that the time would come when this beautiful red fruit would grow wherever it found a suitable climate, that it would revolutionize horticulture, bring millions of dollars to New England, and find its way throughout the world wherever the sails of commerce are blown. They might have hung him as a witch or dreamer, and yet, his dream would be no more improbable than what I say of nut culture in New England. I have seen the telephone, the flying machine, the gasoline engine, all grow from the vain dream of a crazy inventor to public necessities, and as surely as fate the nut industry is to bring back to the old hillsides of New England much of the profit and the glory of old days.

THE PROPER PLACE OF NUT TREES IN THE PLANTING PROGRAM.

BY C. A. REED, NUT CULTURIST,

U. S. DEPARTMENT OF AGRICULTURE.

In the planting of trees for most purposes, it is now possible to exercise practically the same degree of choice with regard to special fitness as is employed in the selection of men for positions or tools for a piece of work. The fruit grower in every part of the country has his special species and pomological varieties from which to choose. The foresters and landscape gardeners have their species and botanical varieties or improved strains to pick from.

Among the important purposes for which trees are planted the production of native nuts is singularly behind. The leading species of native nut-bearing trees include the hickories, the walnuts, the chestnuts, the pines, and the beech. Of these, one of the hickories, the pecan, is the only species which has so far been developed by cultivation as to become of importance for the production of an orchard product.

The timber of the pecan is less valuable than is that of most other hickories, and is in commercial use only as second-class material. However, it is the most important species of nut-bearing tree in the United States. Its native and introduced range includes the fertile lands of the plains of practically the entire southeastern quarter of the country. It is neither an upland nor a wet land tree. In the United States it is not found in the mountainous sections, nor, to any important extent, south of Middle Florida. In Mexico, it is occasionally found on mountain sides at considerable elevations and by some is supposed to be there indigenous. However, according to "Pomological Possibilities of Texas," written by Gilbert Onderdonk, of Nursery, Texas, and published by the State Department of Agriculture in 1911, its success at those altitudes is vitally dependent upon the water supply. In each case investigated by Mr. Onderdonk, while upon official trips made for the United States Department of Agriculture, he found the pecan trees to be adjacent to some stream, either natural or artificial. "At Bustamente," says Mr. Onderdonk, "one hundred and seven miles beyond Laredo, are pecan trees two hundred years old that have been watered all their lives and have continued productive. From these trees, grown from Texas pecans, pecan culture has been extended until there are now thousands of thrifty pecan trees under irrigation. One owner of a small lot sold his water right when his trees were about seventy-five years old, and when the writer visited his grounds fourteen years later, every one of his trees was either dead or dying."

We may yet find the pecan to be suitable for plateau or mountain land growth, but as Mr. Onderdonk reports was the case in Mexico, it is also the case here. The species must have ample water. With the proper amount of moisture, neither too much nor yet too little, there is no way of predicting to what altitudes or even latitudes it may be taken. Its northernmost points of native range are near Davenport, Iowa, and Terre Haute, Indiana. Iowa seed planted in 1887, at South Haven, Michigan, on the eastern shore of Lake Michigan, at a latitude of about 42½ degrees, have never been seriously affected by winter temperatures. However, they have fruited but little. So far as the writer can ascertain the crops of nuts have been insignificant both as regards quantity and character. Dr. Deming reports a large tree at Hartford, Conn., at a latitude of nearly

42 degrees which, judging from a photograph which he took several years ago, was then 3 feet in diameter and quite at home, so far as growth was concerned.

Other planted trees are fairly numerous along the Atlantic Coast between Washington and New York. There is one in the southern part of Lancaster County, Pa., near Colemanville, but so far as is known to the U. S. Department of Agriculture, important crops of nuts have never been realized from any of these northern trees. Crops from the native trees in the bottoms north of latitude 39 degrees or approximately that of Washington, D. C., and Vincennes, Indiana, are fairly uncertain. Northern nurserymen are now disseminating promising varieties of pecans from what has come to be known as the "Indiana district," which includes the southwestern part of that state, northwestern Kentucky and southwestern Illinois. In many respects these varieties compare very favorably with the so-called "papershells" of the southern states. They are believed to be of very great promise for northern planting in sections to which they may be adapted. However, before any northern varieties are planted for commercial (orchard) purposes, they should be fully tested as to their adaptability in the particular section where the planting is to take place. The commercial propagation of northern varieties of pecans began less than ten years ago; the first attempts were not generally successful, and as a result there are no budded or grafted trees of northern varieties yet of bearing age.

Aside from the pecan there are no named Pomological varieties of any native nut now being propagated, with very few exceptions. So far as these exceptions are concerned, it is probable that fewer than one hundred budded or grafted trees of such varieties are yet of bearing age, and of such as have attained the age at which fruit might be expected, exceedingly few have borne in paying quantities for any number of consecutive years. Therefore, with reference to the planting of native nut species for profit, the truth of the situation is simply this: In the ordinary course of events, with the exception of the pecan, years of experimentation in the testing of varieties and in a study of their cultural requirements must be gone through before any native species of nut-bearing trees can be planted in any of the northern states with a certainty of commercial return from nuts alone which would be comparable with that of many other crops which already are upon a well established commercial basis in this part of the country.

With reference to two of the foreign species of nuts which have been introduced, the situation is quite different. In order of commercial importance of the nuts now grown in this country, two foreign species, the Persian (English) walnut and the almond, stand second and third, respectively, the pecan, which is an American species only, being first. With these exceptions, the foreign introductions are all in the experimental or test stage, and while possibly the European hazel (filbert) may now be making a strong bid for commercial recognition in the northwest, and the pistache in parts of California, neither species can yet be recommended for commercial planting.

With the exception of a few hardshell varieties of almonds, which are practically as hardy as the peach and which are suitable only for home planting, as they are in no way to be compared with the almond of commerce, there is now no indication that this species is destined ever to be come of commercial importance east of the Rocky Mountains.

The Persian or so-called English walnut is of commercial importance in this county only in the far Western States. In the South, it has thus far failed altogether. In the North and East it has held out gleams of hope, first bright, then dull, for more than a century. There is no way of telling the number of trees of this species which have been planted in the northeastern section of the country, but let us imagine it to have been sixty thousand. Of these fully fifty per cent have succumbed to climatic conditions; twenty-five per cent have been but semi-hardy, and possibly twenty-five per cent have attained the bearing age. A part of each of the last two classes have borne crops of commercial size for a number of years. Some have produced nuts of good size and quality. A great many of all those surviving are now proving susceptible to a walnut blight upon which Mr. McMurrin is to report tomorrow. A liberal estimate of the present number of bearing Persian walnut trees in this part of the country would be ten per cent of the original supposed sixty thousand or six thousand trees. Of these, the writer has positive knowledge of none which are now bearing crops of nuts in such quantity, and of such size, and quality and with such regularity and which have so borne for such length of time as to encourage commercial planting. Few of the eastern grown nuts are so free from tannin as to be really pleasing to the taste, or favorably comparable with the best nuts of the market. The writer is now closely watching the best known varieties which the nurserymen are putting out, but at the present time there is no variety which, in his judgment, should be commercially planted without further testing.

The proper place for such partially improved species, as are most of the nut producers hardy in this section at the present time, is that in which they may be used for more than the single purpose of nut production. Most of the species of the botanical family *Juglandaceae*, to which the walnuts and hickories belong, are slow growers, and as such, are objectionable to the average planter. In answer to this, it may be said that among trees, slowness of growth is invariably associated with longevity of tree and its value when cut as timber. Also, when due pains are taken, it is possible to select species which are exceedingly satisfactory in the landscape. Several of the slides, which are to follow, illustrate the individual beauty of selected nut trees, and some show their effective use in the landscape.

Foresters are now advocating the planting of trees in waste places in the country, especially about farm buildings. There are, perhaps, no conspicuous waste places with a greater aggregate area than the strips along the public highway. In certain foreign countries, these strips are

planted to fruit trees and the right of harvest awarded to the highest bidder. The revenue so obtained goes a long way toward keeping the highways in good condition. It is possible that this practice may sometime be introduced into the United States, but until public opinion is radically changed, the planting of fruit trees along the highways can not be expected to yield any satisfactory returns to the public. The experience of Dr. Morris who planted cherry trees along the public road past his farm here in Connecticut, where we have just been, is typical of what, under present conditions, might be expected in any part of the country. When the cherries were ripe, automobile parties came for many miles to pick the fruit, and when that in the highway was gone, the cherries from the nearby orchard were taken. In both cases, the branches were broken down and the trees left in badly mangled condition. Dr. Morris then tried nursery-grown and expensive evergreens, but on Sundays, automobile parties came again with spades and shovels and dug up the trees.

The ratio of population to tillable land in this country is not such that, for a long time to come, the American people as a whole will be pressed into the using of highway land for the production of crops or into respecting the right of the public to harvest such crops as might be grown in its highways. Therefore, for the present, except in densely populated, or in more than ordinarily well regulated communities, it would be useless to advocate the planting of ordinary fruit trees along the public roadways.

Irrespective of the possible value of their crops, fruit trees of most species are both too small and too short-lived to be suitable for highway planting. With nut trees, the situation is entirely different. The native walnuts, most species of hickories and the American beech are large-growing and long-lived trees. In addition, they are capable of withstanding severe temperatures; they are tough and strong and not liable to injury by storm or while being climbed by ordinary persons; and they readily adapt themselves to a wide range of soil, moisture, and climatic conditions.

Ordinary species of nut trees can not be recommended for the dual purpose of timber and nut production, as, for the former purpose, the trees should be planted close together in order to induce length and straightness of trunk with a minimum of top or bearing surface, while for the latter, they should be planted in the open and given space for the maximum development to bearing surface and a minimum length of trunk. The great demand for hickory in the making of axles, wheels, and other vehicle parts and handles for tools, and for walnut in the manufacture of furniture and gun stocks, makes it not only possible but common practice to use these woods in short lengths. Therefore, both species planted along the highways and in other waste places might profitably be converted into their timber upon reaching maturity, if their crops of nuts should prove to be of small commercial value.

The butternut, *J. cinerea*, is a less symmetrical grower than are the black walnuts. The timber is less valuable and the nuts are cracked with greater difficulty. Nevertheless, it is the most hardy of any native species of *Juglans*. Its kernels are rich in quality and of a flavor more pleasing to some persons than that of any other nut. Cracking the native butternut and marketing the kernels affords the rural people in many sections a fairly profitable means of employment during the winter months. Its native range extends farther north than does that of either the eastern black walnut, or that of the shagbark hickory, *Hicoria ovata*, and considerably beyond that of the shellbark hickory, *H. laciniosa*. Therefore, in view of its hardiness, and the merit of its kernels, it is well worthy of consideration for planting in the most northern parts of the country.

Were it not for the blight which is now making practically a clean sweep of destruction over the eastern states, wherever the native chestnut is found, the American chestnut, *Castanea dentata*, would certainly be entitled to leading consideration as a highway, an ornamental or a nut producing tree. Unaffected by blight or other diseases, it is one of the largest-growing and most graceful species in the eastern United States. The European chestnut is nearly as susceptible to this blight as is the American species. The chestnuts from eastern Asia now appear to be sufficiently immune to offer a practical solution to the situation by their introduction into this country. However, they commonly lack the sweet agreeable flavor of the American species and need hybridizing in order to improve their quality. This, the Federal Department of Agriculture is now doing, and in due time, there may be something to offer in ample quantity which will make a satisfactory substitute for the native species. Exclusive of the Asiatic species and the government hybrids, there are now no available species which can be recommended for planting in the blight affected area, and these should be planted only for test purposes.

The pines referred to at the outset of this article as being important nut producers are all western species found only on the mountains and nowhere under cultivation. There are at least fourteen American species. Representatives are found in most of the Rocky Mountain states. The most important species is *Pinus edulis*. It is found at altitudes of from five to seven thousand feet in the mountains of New Mexico, Arizona and northern Mexico. In favorable years, the seeds are gathered in enormous quantities under the name of "piñons," or according to the Mexicans, "pinyonies." The nuts are rich in flavor but small and difficult to extract from the shells. They are not well known in the eastern market, but in the southwest they form a highly important article of food for the Indians and Mexicans. These pines are exceedingly slow growers and not of graceful form. They could scarcely be considered for ornamental planting, except at the altitudes to which they are common, and then; probably, only where some more satisfactory shade trees would not succeed.

Among all American species of trees, it is probable that in a combination of beauty, longevity,

strength and hardiness, the American beech, *Fagus grandifolia*, is unexcelled. Although commonly looked upon as being a northern species, its range extends south to northern Florida and west to the Trinity River in Texas. It is most familiar as a clean-barked, spreading tree, with low head, and a height of from fifty to sixty feet. However, its form depends largely upon environment. The writer has seen it in the bottoms of southwestern Georgia, in common with the magnolia, growing to a height of from seventy-five to one hundred feet and with trunks of two feet in diameter extending upward in a manner which, with regard to height and uniformity of size, compared favorably with the long-leaved Georgia pine. The nuts of the beech are rich in quality and of excellent flavor, but owing to their small size and the great difficulty attending the extraction of the kernels, they are not ranked as being of direct importance for human food. Their principal use in this country is as a mast crop for turkeys and swine, for which they serve a most useful purpose. Crops which can be used in this manner to good advantage, thus practically obviating the problems of harvesting, storing and marketing, are certainly well worth thinking about in these days of labor scarcity.

There are few large sections of the United States adapted to the growing of trees to which some nut-bearing species is not suited. Most species of nut trees are as capable of producing shade and ornamental effect, and are as hardy and lasting as any others which might be mentioned. In addition, they produce an edible product which is entering into the list of staple food products with great rapidity. The present scarcity of meats and the consequent high prices are compelling the substitution of other products. The superiority of nuts over practically all other products which are available, as substitutes, scarcely needs argument. Already, nuts are being pressed into service as rapidly as production permits, and perhaps more so than prices and comparative food values justify. Singularly enough, this section of the United States, which is the oldest and most thickly populated portion of the country, and that within which the greatest number of edible species of nuts are indigenous, is today practically without pomological varieties for planting. Within this area, individuals have made tests of species and varieties for many generations, yet little progress has resulted. The obvious need is for further test on a large scale. A better opportunity for the making of such a test could scarcely be imagined than that of highway planting.

Pomologists are firmly recommending the exclusive use of budded or grafted trees. But this advice applies only to orchard planting for the purpose of commercial production. Until more and better varieties are known and their merits established, that portion of the country lying north of the pecan belt and east of the Rocky Mountains, must await the development and trial of new varieties. Seedlings must be planted in large numbers from which to select varieties. The process is too slow and the percentage of varieties which may be expected to be worth while too small for it to be possible for the individual to make much headway during an ordinary lifetime. Our present system of national highways by which all parts of the country are being connected is perfecting the opportunity. The general planting along these great national highways of elm, oak, poplar, tulip, cedar, hemlock, magnolia, pine or any other species which, unless cut, are capable of producing no crop other than that of shade, would hardly be in keeping with the present need for utility. It would be giving a questionable degree of thought to the welfare of future generations.

To the list of nut trees as utility trees there might be added the sugar maple, and certain species of prolific-bearing oaks. The former could be drawn upon for the making of syrup and sugar, and the acorns from the latter could be put to good use as hog and turkey food. In wet sections, willows might prove useful from which to cut material for baskets, furniture, or tying bundles.

A way of overcoming the objection of slow growth of some of the nut species might be the alternate planting of quick-growing species which would furnish shade in a minimum length of time, and which could be cut for pulp or other purposes by the time the nut trees reach maturity.

A practical objection to highway planting of nut trees is that unless cared for, such trees are in danger of becoming breeding places for diseases and insect pests which would quickly spread to nearby orchards. However, such planting in numbers too small to be worth caring for is not to be considered. Already the country is agreed that the maintaining of the middle of the road in such condition that it can render maximum service is a paying investment. The suggestion here made is only as the next step in highway investment. It is a proposition to make more comfortable and attractive the present system of roadways, and at the same time to help develop new varieties of nut trees for orchard planting. Unless such new varieties are soon to become available, a large part of the country will presently find itself dependent upon outside sources for its principal substitute for meat and its main supply of vegetable fats.

A little thought should be able to work out a sound program for the planting of utility trees on practically every highway in this country.

Since this manuscript was completed, attention has been called to a reference to a war use of the horse chestnut, which appears on page 18 of the July number of "My Garden," a monthly publication, with headquarters at 6 Bouverie Street, Fleet Street, London. As the heading "NEW USE FOR HORSE CHESTNUTS," and its sub-head "Cereal Saving," both indicate it may be of interest to the American people, although the production of horse chestnuts in this country is not large. The article which is credited to The Times, is as follows: "An important war time use has been found for horse chestnuts by the systematic collection and transport of all the nuts that can be obtained to the centre where they can be utilized. Up to the present time cereals have been necessary for the production of an article of great importance in the prosecution of the war.

Under the direction of the Food (War) Committee of the Royal Society, which acts for and in consultation with the Royal Commission on Wheat Supplies, the Minister of Food, and the Minister of Munitions, experiments have been carried out during the winter to find a substitute for these cereals, and thus to set them free for food supplies. Brilliant work has ended in the difficulties being overcome, and the proof that the seeds of the horse chestnuts answer the purpose admirably. Except as food for deer and goats the seeds have, in the past, been practically a waste crop, and they can be used instead of cereals, essential for human consumption, without interfering with any existing industry or interest.

"The organization for the collection and transport of all that can be obtained is being rapidly perfected. When the time comes it will be the privilege and duty of every owner of a tree or trees to help and to give facilities for the collection of the nuts. Every ton of chestnuts collected will set free an equivalent amount of grain. The tree being chiefly grown for ornamental purposes occurs most freely in towns and private gardens. In some towns it is the practice to remove the young nuts from the trees in July so as to prevent them from being stoned and broken by boys later on when the "conker" demand begins. Urban authorities and park-keepers must discontinue the practice this year. Chestnut Day, early in next autumn, will have a far wider observance and significance this year than any Chestnut Sunday at Bushey, or than Arbor Day over here, or even in America. For once the small boy will collect the nuts with the full approval of the owner.

"To prevent any misapprehension it should perhaps be made clear that the horse chestnuts will not themselves be used as food. They are required for another purpose altogether, and the only way in which they will help the food supplies of the country is by setting free cereals which have now to be consumed in the production of a necessary article."

THURSDAY, SEPT. 6, 1917.

Meeting called to order at 9.30 A. M.

The Nominating Committee reported the renomination of all the officers. The Secretary was instructed to cast one vote for these candidates.

[Carried.]

Moved and carried that the selection of the time and place for next meeting to be left to the Executive Committee with especial consideration of a joint meeting with the National Association at Albany, Georgia.

SOME INSECTS INJURING-NUT TREES.

BY W. E. BRITTON, STATE ENTOMOLOGIST, CONNECTICUT.

Nut-bearing trees, like other kinds of trees, are attacked by insect pests. Some kinds are seriously injured by them; others scarcely at all. Some of these insects are borers in the trunk and branches; some devour the leaves; some feed inside the nuts and ruin them; some suck the sap from the stems and leaves.

I shall make no attempt in this paper to enumerate these pests. Time forbids. I shall only mention a few of the most obvious and most serious, and where possible, point out control measures.

THE WALNUT CATERPILLAR.

Datana integerrima G. & R.

During the month of August clusters of blackish caterpillars bearing white hairs, may be seen stripping the terminal branches of black walnut, butternut and hickory trees. This is called the walnut caterpillar, and it has been very abundant in Connecticut this season. Many small trees have been entirely stripped and large ones almost defoliated. There is only one brood each year in Connecticut, though two occur in the southern states, and the pupae winter in the ground. The adult is a reddish brown moth, having a wing-spread of about one and one-half inches. Clipping off the twigs and crushing the mass of caterpillars is perhaps the simplest control method on small trees. Spraying with lead arsenate will prevent defoliation.

THE FALL WEB-WORM.

Hyphantria cunea Drury.

Though a general feeder attacking all kinds of fruit, shade and forest trees, the fall web-worm commonly feeds upon the foliage of nut trees, especially hickories, causing considerable damage in the South. The adult is a white moth, having a wing-spread of an inch or more, appearing in midsummer and laying its egg-cluster on the under side of a leaf. The young caterpillars make a

nest at the end of a lateral branch by drawing the leaves together with their webs. These nests usually appear in July and August, though in Connecticut there is a partial second brood and usually a few nests of the early brood may be found in June. In the South there are two complete generations. When the larvae have exhausted their food supply, they extend their nest by taking in fresh leaves, but always feed inside the nest, differing in this respect from the tent caterpillar which makes its nests here in May. When fully grown the caterpillars are about one and one-fourth inches long, with brown bodies covered with light brown hairs, and may be seen crawling about seeking a place to pupate. They soon go into the ground where they transform, the adults emerging the following year.

The best remedies are (1) clipping off and burning the nests when small, and (2) spraying the foliage with arsenical poison.

THE WALNUT BUD MOTH.

Acrobasis caryae Grote?

Inconspicuous nests containing small caterpillars are often found at the ends of the new shoots of *Juglans regia*, seriously injuring them, and sometimes killing the trees. One small tree two feet high was killed, and thirty-five pupae were found in the nests at Dr. Morris' farm in 1912. The adult is a small gray moth with a wing expanse of about three-fourths of an inch. There are three broods each season in Connecticut, the larvae appearing about June 1, July 10 and August 18.

By spraying the foliage with lead arsenate (3 lbs. in 50 gals. water) this insect can be controlled. One application should be made about June 1, followed by a second about July 10.

Though this insect is thought to be *Acrobasis caryae* Grote, it is often difficult to distinguish some of these species in this genus without a knowledge of their food habits and seasonal life histories. We possess such knowledge regarding this species which we have studied and reared in Connecticut, but it is lacking in connection with adult specimens in the United States National Museum labeled *caryae*, which superficially seemed identical with ours. Further study, therefore, may prove this to be an undescribed species. There are other bud-worms attacking nut trees, especially in the southern states, where they cause considerable damage to pecans.

THE WALNUT WEEVIL OR CURCULIO.

Conotrachelus juglandis LeC.

Probably the most serious enemy of *Juglans*, in Connecticut at least, is the walnut weevil or curculio, *Conotrachelus juglandis* LeC. The larvae tunnel in the tender shoots, often ruining the new growth, and they also infest the nuts. The adults feed upon the shoots and leaf petioles. Observations on the different hosts indicate that *Juglans cordiformis* and *J. sieboldiana* are preferred, and the most severely injured, followed in order by *cinerea*, *regia*, *nigra* and *mandshurica*.

Though described as early as 1876, little was known about the life history of this insect until the studies were made at the Station in 1912 by Mr. Kirk and the writer. Formerly it was supposed that this insect attacked and injured only the nuts or fruit, and Dr. Morris in 1909 seems to be the first on record to observe the injury to the shoots of *Juglans regia*. It was on the trees of Dr. Morris here in Stamford and those of Mr. H. L. Champlain at Lyme that the life history studies were made. There is but one brood each year, and the winter is passed in the adult stage. The beetles appear the latter part of May and feed upon the stems and leaf veins during the egg-laying period, which extends from the last week in May up to August 1st. The eggs are laid in irregular crescent-shaped punctures, similar to those of the plum curculio, and hatch in from six to twelve days, depending upon the weather.

From four to six weeks are necessary for the development of the larvae, and when mature they go into the ground where they remain for about ten days an inch or so beneath the surface. They then pupate, and from sixteen to twenty days later the adult beetles emerge. They fly to the trees and eat small holes chiefly at the base of the leaf petioles, but must early go into winter quarters as they are seldom seen after the first week in September.

This insect occurs throughout the Eastern United States, but seems to cause more injury in Connecticut than has been noted elsewhere. The remedy is to spray the new shoots and under side of the leaves about June 1, with lead arsenate (6 lbs. of the paste in 50 gallons of water), to kill the beetles when feeding on the leaf petioles.

THE NUT WEEVILS.

Balaninus sp.

Several kinds of nuts are attacked and injured by long-beaked snout beetles or weevils belonging to the genus *Balaninus*, the chestnut probably being the most seriously damaged. All of them feed inside the nuts or fruit during the larval stage, and the larvae are without legs. As both the methods of attack and the life history are similar for all species, they will be considered here in a group. For the sake of distinguishing them, however, their names are mentioned.

Larger Chestnut weevil, *Balaninus proboscideus* Fabr.
Lesser Chestnut weevil, *B. rectus* Say.
Hickory nut or Pecan weevil, *B. caryae* Horn.
Hazelnut weevil, *B. obtusus* Blanch.
Common acorn weevil, *B. quercus* Horn.
Mottled acorn weevil, *B. nasicus* Say.
Straight-snouted acorn weevil, *B. orthorhynchus* Chittn.
Sooty acorn weevil, *B. baculi* Chittn.
Confused acorn weevil, *B. confusor* Ham.
Spotted acorn weevil, *B. pardalus* Chittn.

All of these weevils pass the winter in the ground in the larval stage, transforming to pupae about three weeks before the adult beetles emerge, which varies from June, when they are usually few and scattering, to September, when they have become abundant. Thus there is a single brood each year, and the larval period lasts from three to five weeks in the nuts and some ten months in the ground, from two to eight inches below the surface.

The control of these weevils is difficult, and ordinary methods such as spraying are not effective. In fact little can be done other than destroying the weeviled nuts, which may be fed to hogs. When first gathered the nuts may be fumigated with carbon disulphide. About two fluid ounces of the liquid should be used for each bushel of nuts and placed in a shallow dish on top of the nuts, which should be enclosed in a tight box or barrel. The period of fumigation should be from 12 to 24 hours. Where nuts are not to be used for seed they may be thrown into boiling water for about five minutes—just long enough to kill the weevils. The nuts are then dried and sold. Most of the weeviled nuts will rise to the surface and may be discarded, but this test is not absolute and cannot be depended on to distinguish the sound from the weeviled nuts.

HICKORY BARK BEETLE OR BARK BORER.

Scolytus quadrispinosus Say.

Outbreaks of the hickory bark borer occur periodically throughout the northeastern United States, and during the past five years many hickory trees in this vicinity have died.

The adult is a small black beetle appearing in May and June, which eats holes in the axils of the leaf stems causing them to fall early—usually in July and August. Brood galleries are then made longitudinally just under the bark of the trunk by the female, and a row of eggs is placed along either side of this brood chamber. On hatching the grubs, which are at first very small, tunnel at right angles to the central chamber, each making its own separate gallery. These galleries never meet or cross each other, but must necessarily diverge toward their extremities as they become larger. The effect of this is to girdle the tree which soon dies. The larvae pass the winter under the bark, finish their development in the spring, pupate, and the adults emerge in May and June from small round holes about the size of bird shot.

For control measures, Dr. Hopkins advises examining the trees during the fall and marking all dead and dying trees within an area of several square miles. Then between October 1 and May 1, cut all such trees and dispose of the infested portion to destroy the insects before the adults emerge.

Many forms of treatment have been devised and recommended by tree doctors for the control of this insect. Some of them may be worth trying; most are of doubtful value, and some are absolutely injurious to the trees. On July 3, 1914, some affected hickory trees on the Station grounds were sprayed heavily with powdered lead arsenate, 4 lbs. in 50 gallons of water, to which one pint of "Black Leaf No. 40" was added. Two days later many dead beetles were found on the tar walks under the trees, and a few were observed each day up until about the middle of August. Most of the trees treated, however, had been so badly injured by the insect that they were removed. Since then this insect has caused little damage on the grounds, though a few hickory trees still remain. In 1901 an outbreak of the hickory bark beetle caused the death of 110 trees on the Hillhouse place in New Haven; then the destructive work of the insect ceased and the few remaining hickory trees are still standing and in fairly good condition. I mention these instances to show that nature's control methods through parasites and natural enemies is far more effective with certain pests than any which man has yet devised. Of course, we hope that in the future man will make better progress along this line.

THE PAINTED HICKORY BORER.

Cyllene pictus Drury.

There are several borers attacking the wood of the trunk of the hickory, but one of the commonest is the painted hickory borer. It also occasionally attacks black walnut, butternut, mulberry and osage orange. In hickory especially the larval tunnels are often found in the wood when trees are felled. There is probably one brood annually and the winter passed in the pupa stage, though it may possibly hibernate as a larva. Its life history is not fully understood. It is a common occurrence in Connecticut, and specimens are sent me every year, for the adult beetles to emerge in March from firewood in the house or cellar and crawl about seeking a chance to escape. The housewife fears that a terrible household pest has descended upon her, and with fear and trembling invokes the aid of the Agricultural Station.

The beetles appear outside in April and May, and probably oviposit soon afterward. They are about three-fourths of an inch in length and are black, prettily marked with golden yellow.

The insect can be controlled only by the old arduous methods of digging out, and injecting carbon disulphide into the burrows.

Several other long-horned beetles are borers in the hickory and other nut trees. Then, too, the leopard moth, *zeuzera pyrina* Linn., and the carpenter worm, *Prionoxystus robiniae* Peck, may be found occasionally in most any kind of tree.

The chestnut tree (if it has thus far escaped the blight or bark disease) may show small, deep tunnels into the wood of trunk and branch, made by the chestnut timber worm, *Lymexylon sericeum* Harr. Slow-growing woodland trees are more apt to show these galleries than trees of rapid growth standing in the open.

There are a number of tussock moths, sawflies, beetles, etc., which feed on the leaves of nut trees. Spraying with lead arsenate will prevent damage. There are also many sucking insects attacking them, such as the hickory gall aphid, and several species found on the leaves. Some of these may be controlled by spraying with a contact insecticide such as nicotine solution or kerosene emulsion.

In the Southern States, pecan trees are attacked by some of these insects which I have mentioned; there are also many more which cannot even be mentioned in the time allotted to this paper. Information may be obtained regarding them, by any one interested, and for this purpose I have appended a short list of publications.

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A MEMBER: Early in the spring I noticed something on the hickory trees swollen and bright red in color, so that the trees were conspicuous from a distance. Later insects emerged which appeared to be these little gnats that fly in swarms.

DR. BRITTON: From the description I am not able to say what it was, but it was probably one of those gall flies, a great many species of which exist and which attack all kinds of plants. They do not, as a rule, cause very serious damage, and I can not suggest any particular remedy. Did it interfere with the growth of the tree?

A MEMBER: I noticed what seemed to be the same insect on the grape vines.

DR. MORRIS: I would call attention to one pest that is very destructive to hazels; unless watched closely it will produce serious injury. That is the larvae of two of the sawflies. Dr. Britton was unable to determine off-hand the species of the specimens I sent him, but you may know the sawfly larvae by their habit of collecting in a row like soldiers around the edge of the leaf and when the branch is disturbed, their heads and tails stand up. These sawfly larvae need looking after and can be killed by spraying. They usually collect on two or three leaves at a time.

I would like to ask about a bud worm that attacks the leaf of the hickory near the axil, sometimes very extensively, but not very injuriously. At the same time it makes deformities. Colonies of this insect select certain trees, for instance, the Taylor tree that you saw yesterday is infected with this particular bud larva. The base of a petiole becomes enlarged two or three times, and you will find one white worm at the bottom. This colony is confined to this one tree, and the very next tree adjoining the Taylor has its branches intertwining, but is not bothered at all, so far as I can determine.

This colony habit is also true of the hickory nut weevil—the hickory weevil makes the Taylor tree

a colony house, whereas I haven't found a single weevil in nuts of the adjoining hickory tree that has its branches intertwining.

That colony habit is, perhaps, a weak point with the weevil, and it may enable us to eradicate them by concentrating our attention upon their colony trees.

One point in regard to the chestnut weevil. When our chestnuts began to die here, I supposed that the chestnut weevils would immediately turn to my chinquapins for comfort. Weevils attack the chinquapins so extensively in the South that Mr. Littlepage said chinquapins would not be acceptable to Dr. Kellogg because they furnished so much animal diet. (Laughter). Curiously enough, the chestnut weevils did not go to my chinquapins. These chinquapins bear full crops, heavy crops, and one will almost never find a chestnut weevil in the nuts. I have found now and then a little weevil, about half a dozen altogether, that attacks the involucre at its point of attachment to the chinquapin. This looks like the chestnut weevil, but perhaps, only according to my eye, very much as all Chinamen look alike to one who has never seen them before.

The matter of carbon disulphide for the painted hickory borer. I have used that apparently successfully, but I didn't tunnel through six feet of hickory tree afterward to see whether the borers were dead or not. It is a successful treatment for apple borers. I have no trouble with the apple borers now. I simply clean off the entrance of the hole, the "sawdust," and then with a little putty spread out with my hand make a sort of putty shelf below the hole, then I squirt in a few drops of carbon disulphide with a syringe, turn up the putty and leave it adhering to the bark, closing the hole. You can do that very quickly, and it spares a good deal of perspiring and backache.

The black walnut. On one of my black walnut trees there is a serious pest, a very little worm which infests the involucre. The black walnuts of this tree fall early. I found that same worm last year also extending to the Asiatic walnuts, so that a great many Japanese walnuts fell early as the black walnuts fall, as a result of this little worm's working in large numbers within the involucre. I sent some specimens to New Haven for the species to be observed. This will be a very serious matter if it is going to involve the English walnuts as it does on Long Island. I have found the same thing, apparently, on Long Island in the black walnut, in the English walnut, and in the pecan. It causes a serious drop of these nuts at Dana's Island, near Glen Cove, Long Island.

THE EXTENT OF THE HARDY NUT TREE NURSERY BUSINESS.

R. T. OLCOTT, NEW YORK.

For obvious reasons this subject may well be considered as constituting a gauge of commercial nut culture in the North; it is therefore of much more importance than the mere title would suggest. If there is merit in all that has been preached regarding the planting of budded and grafted trees instead of seedlings; and if it is still true, as we have long observed, that the propagation of named varieties of nut trees, and especially of hardy nut trees, is successful almost solely in the hands of experts, the progress of commercial nut culture in the northern states rests largely in the hands of the nurserymen. We may even go further and assert that it rests for the present mainly in the hands of a few nurserymen who have persistently studied the problems pertaining to the taming of a denizen of the forest, and have persevered with experiments in the face of repeated failure; for, as editor of the *American Nurseryman*, I am in a position to state that with a few exceptions nurserymen generally have not attempted to prepare to supply a demand for hardy, northern-grown, improved nursery nut trees. Seedling walnuts and hickories have been procurable for years from nurseries all over the country, as is shown by nursery catalogue listings; and at least two concerns—one at Lockport, N. Y., and another at Rochester, N. Y.,—have advertised nut tree seedlings extensively, despite the universal nursery practice of budding or grafting or layering practically all other kinds of trees and plants offered for sale as nursery stock—simply because it is not easy to propagate nut trees, and these nurserymen would take advantage of the growing demand for nut orchards.

Within established nut circles all this is commonly known. It was my purpose in referring to these conditions to direct the attention of those not posted to what has been done by a half dozen or more conscientious nursery concerns in an endeavor to supply material of quality for the starting of nut orchards or the planting of isolated trees in response to the arguments set forth in behalf of nut culture. My subject lies at the very base of the formation of this association; for was it not with the idea of directing into safe channels interest which might be aroused in nut culture that the pioneers of the industry in the North organized and convened repeatedly to select and propagate and recommend certain varieties? As the result of years of concentrated effort selections have been made and varieties have been named—and to some extent recommended—throughout the northern states. Now and for some time past the public has had opportunity to purchase and plant carefully grown budded and grafted true-to-name nursery nut trees of varieties having in the parent trees exceptional characteristics deemed sufficient to warrant propagation and dissemination. I need not go into the matter of years of patient effort on the part of a few nurserymen and of a few investigators who entered the lists solely for the love of Nature's developments.

This, in brief, is the rise of the hardy nut tree nursery business. Now, what of its extent? There are upwards of two thousand propagating nurserymen in the country, but those who have made a specialty of hardy, northern-grown nut trees are few. They include the Vincennes Nurseries, W. C. Reed & Son, Vincennes, Ind.; the Indiana Nurseries, J. Ford Wilkinson, Rockport, Ind.; the McCoy Nut Nurseries, R. L. McCoy, president, Evansville and Lake, Ind.; the Maryland Nurseries, T. P. Littlepage, Bowie, Md.; J. F. Jones, Lancaster, Pa.; J. G. Rush, West Willow, Pa.; C. K. Sober, Lewisburg, Pa., and some in the northwest.

As showing the extent of the business, Mr. Reed, of Vincennes, reports demand for nut trees increasing. He had to return orders unfilled last spring. His nurseries have 3,000 to 4,000 Persian walnut trees and about the same number of pecan trees for fall sales; also about 1,000 grafted black walnut trees. There are growing in the Vincennes nurseries ready for budding and grafting 50,000 black walnut seedlings and 50,000 pecan seedlings. Mr. Reed said recently: "Owing to the extreme difficulty of propagating nut trees in the North, I think the demand will keep up with the supply."

Mr. Jones sold last year about 8,000 nut trees which went to points all over the country; not many to California, or to the far South; a good many to New Jersey, New York, Maryland, Virginia, West Virginia, Pennsylvania, Ohio, Indiana, Illinois, Missouri, etc. The largest order was for 600 trees. A number of orders were for 100 to 300 trees. New Jersey leads in planting, he finds, with Virginia a close second, in large orders. In small orders, Pennsylvania leads with him.

Mr. McCoy has done a great deal of experimenting with grafts and he is still at it. He has 40 acres mostly under nut tree cultivation, and has a considerable number of trees for sale.

Anyone who has seen the handsome nut tree catalogue issued by Mr. Littlepage, of the Maryland Nurseries, must have been impressed with the great care taken to produce the attractive trees and nuts there depicted. These nurseries have been recently established and not a great number of trees have yet been offered for sale, but Mr. Littlepage has 150,000 seedling nut trees in his nurseries for propagating purposes.

Mr. Sober's nurseries are devoted almost entirely to the cultivation of chestnut trees. Mr. Rush's specialty is the Persian walnut. Mr. Wilkinson naturally specializes in Indiana pecan trees. At Rochester, N. Y., James S. McGlennon and Conrad Vollertsen have produced interesting results with filberts imported some years ago from Germany. They have five-year-old bushes bearing; these have proved hardy in every way and they have no blight. The nuts compare favorably with the best of the imported kinds. Nursery stock will soon be ready in quantity, and they now have 500 plants suitable for transplanting.

Filbert and walnut are the only nut trees grown commercially to any extent in the nurseries of the northwest. A few almond and chestnut trees are grown there, but the demand for them is very light. J. B. Pilkington, Portland, Ore., a well-known grower of a general line of nursery stock, advertises French, Japanese and Italian chestnut trees and the American Sweet. Filberts are being produced to a considerable extent. At present the nurseries cannot supply the demand for filbert plants, owing to the limited number of mother plants in the northwest. Practically all the nurseries have Barcelona and Du Chilly for sale, and a number have the Avelines. From one nursery or another De Alger, Kentish Cob and a few other varieties can be had. Persian walnuts are grown on a larger scale. Groner & McClure, Hillsboro, Ore., are the largest exclusive walnut nurserymen in the northwest. They produce close to 6,000 grafted trees annually. These sell at 90c. to \$1.00 per tree in lots of 100. The Oregon Nursery Company, Orenco, Ore., produce a large number of both grafted and seedling walnut trees, asking up to \$2.00 per tree for grafted and 35 to 50c. for seedlings. Many of the smaller nurseries procure their nut trees from California nurseries. Each year the proportion of seedlings planted is less. Franquette is the popular variety that is propagated.

The Northern Nut Growers' Association and one or two other similar organizations have labored for years to extend interest in nut culture. The files of the secretary of this association will show in heaps of letters and piles of newspaper clippings the marked success in view of the means that were at hand. And it has all been upon a high plane. The campaigns have been marked by the utmost degree of conscientious effort to arrive at the truth regarding, adaptability of varieties and cultural methods. This work is still in progress—indeed, the need for it will never end. But in the opinion of the writer there should from this day go hand in hand with investigation and experiment a very practical application to orchard purposes of what has been learned. The sooner northern nut trees come into bearing in grove form the sooner will general interest in nut culture increase. I would urge constant effort in that direction; even, if need be, to the exclusion of some of the further study on varieties.

There are now grown in northern nut tree nurseries approved by this association named varieties of pecans, Persian walnuts, black walnuts, hickories and some other nuts amply sufficient to start orchards. The pecan growers of the southern states selected and experimented and discussed for a time—and then they planted. Mistakes were made, but these were discovered quicker by grove planting. Now they are shipping improved varieties of pecans by the carload, at \$12,000 per car. Naturally interest in pecan culture in the South is widespread. With bearing orchards of nut trees in the northern states, similar interest will be manifested; and then we shall all see the real progress which comes of producing commercial results. Has not the time arrived to put into practical operation what has been learned in the last eight years? I believe this association could wisely consider the policy of confining discussion in the open session of its annual meetings to topics relating to behavior of varieties in orchard form and commercial cultural methods—at least

to the handling of the planted tree by the public, whether isolated or in orchard rows—and reserve for executive sessions the discussion of varieties and methods not yet at a stage for formal endorsement by the association. It seems to me that any other policy obscures the issue which, I take it, is to foster the extension of nut culture. How can nut culture be practically extended if the public is constantly confronted with features of the experimental stage? Persons mildly interested in nut culture, as the result, perhaps, of association propaganda, drift into our meetings or make ad interim inquiry and receive for membership enrollment, or otherwise, printed matter relating almost wholly to experimentation in nut work. No wonder their interest wanes a short time afterward and many of them are not heard from again. What most of them expected was information as to varieties of improved nut trees available, where to get them and how to treat them when planted. Discussion by the experts is not for them; they will reap the result of that in due time.

Now, the extent of the hardy nut tree nursery industry is directly dependent upon all this. If that extent is not yet great, it is due undoubtedly to the newness of the industry. But it is also due in part to conditions which have been referred to. I wish especially for the purposes of this address that this association were an incorporated body so that I could speak of it as such and not seem to be criticising individuals. What has been done by our officers and members has been very necessary. It is of the future that I speak.

Nut brokers, wholesale grocers and manufacturers of confectionery are calling for crop and market reports of nuts. A letter from a large commission house in San Francisco, importers and exporters, says that what is wanted is information as to growing crops of nuts and market conditions. Other brokers and dealers ask the same thing. The *American Nut Journal* has given crop and market conditions of southern pecans and California walnuts and almonds; and, in peace times, of foreign nut crops. What else is there to give? The native nut crop? But that concerns this association about as much as the blueberry and huckleberry crops of the Michigan and Minnesota barrens concerns the horticultural societies and the National Apple Growers. What the brokers, wholesale grocers and commission merchants want is crop and market reports on cultivated nuts. But where are they? The public and the middlemen are calling for nuts. And these people write that they are not interested in cultural methods.

The hardy nut tree nursery business is what it is and will be what it will be just in proportion to the character of the crop and the market report. Interest in nut culture generally will lag or increase in just the same ratio. This is the eighth annual convention of this association. Will the sixteenth annual meeting see a greatly augmented membership without a practical incentive?

I have said that this association has recommended to some extent the planting of nut trees—the named varieties. I believe that what is needed is a publicity campaign bearing upon the planting of the varieties now on the market. When other varieties come on they may receive proper attention. Native nuts are in great demand. The varieties considered by this association are the best of the natives. Is that not sufficient basis to proceed on? Has not this association officially endorsed the varieties grown by the nut tree nurserymen we have referred to, by officially endorsing those nurserymen? Having endorsed the named varieties grown for sale by the nurserymen on its approved list can this association consistently do otherwise than to urge without hesitation the planting of those varieties by the public?

DR. MORRIS: Mr. Olcott spoke on the almonds of the Pacific Coast. Here in the east it was said yesterday that only hard shelled almonds would thrive. That has been my experience with one exception. I got from a missionary some soft shelled almonds of very high quality and thin shelled. There were about twenty of those almonds, I ate two and planted the rest. The ants enjoyed the sprouting cotyledons of all but one. That one lived and thrived and grew in two years to a height of about four feet. In its third winter it was absolutely killed. Now that means that somewhere in Syria there is a soft shelled almond of very high quality that will live three years in Connecticut according to accurate record. It may live fifty years here if well started and protected when young.

THE CHAIRMAN: You showed us some hard shelled almonds I believe from your place.

DR. MORRIS: The hard shelled almonds do pretty well on my place if looked after. I have had trees that bore nearly a bushel each, but the chief difficulty is due to the leaf blights. Almond trees are quite subject to leaf blights. As long as I sprayed the almond trees frequently they did well but I had several other things to do and couldn't keep it up.

A MEMBER: The Association has a list of nurserymen who are reliable and who will furnish reliable trees. It occurred to me in line with the spirit of Mr. Olcott's paper, if it would be practicable, for the Association to get up a little paper on approved varieties of trees for planting. That may seem foolish to suggest but a good many members who come in here are very green on the subject of nut growing. It may have been done but if it has I am not familiar with it.

THE SECRETARY: A good many requests are received by the secretary for information as to what nut trees to plant. My advice usually is that they get the catalogues of all the different nurserymen on our approved list and select from those catalogues as many nut trees of each variety recommended by the nurserymen as they wish and give them the best cultural conditions they can. I don't see that we can recommend any particular varieties. There are few enough grafted varieties of nut trees obtainable, and I do not see that we can, as an association, recommend any particular varieties. I would like to have suggestions.

MR. OLCOTT: I Don't Think It Is Advisable for the Association To go into that detail. I think that as the association has endorsed a list of nurserymen, so long as those nurserymen keep within boundary and retain that endorsement that is sufficient guarantee to the public.

MR. REED: We cannot recommend the different varieties because they have not been tested out and fruited. In the National Nut Growers' Association data are obtainable because they have been worked out by experiment stations and by individuals. But in this association where varieties are just being discovered and have not been disseminated and tried we have got to test them. We haven't got developed beyond the infant class in this Northern Nut Growers' Association.

A MEMBER: I realize that the thing is in an experimental stage, but since I have been at this meeting I have been asked by two different people here if I could give them any information as to what varieties to plant. That is a very live question for a person here for the first time and he wants a primer.

THE SECRETARY: We had a circular, now exhausted, giving the best information known at that time. It gave the method of procedure from the cultivation of the land until the nut trees were advanced several years in their growth, covering it in detail in so far as it lay in the secretary's ability to give it at that time. The same advice perhaps would not be given now but it would be practically the same thing. It may be desirable that we reprint something of the kind for the person who wants to begin the cultivation of nuts and has no knowledge on the subject.

MR. JONES: I think the association might do something of the kind. We could have a map of the states for instance, and have that outlined in belts and varieties specified that would be somewhat likely to succeed in those belts.

MR. CHAIRMAN: I think it is only a question of time when that will be done. In the National Association that has been worked out, what they plant in Florida what they plant in west Georgia, what they plant in Mississippi, and what they plant in all the different sections. I think it is only a question of time when it will be worked out by this association. Every year will bring in new data. You will find in the National Nut Growers' Association that good reports on new varieties of nuts from year to year keep accumulating. From that we get data very definite for certain varieties. I expect the members of this association will know lots of them. They have become past history in nut growing in the south. We have got past those poor things and in to something that is definite and satisfactory.

MR. BARTLETT: Would it be possible and advisable for the association to have such a thing as an experimental orchard, provided they could get somebody to take care of such a place? There is a man in this room who has plenty of room and facilities for taking care of an orchard.

THE CHAIRMAN: That is worthy of attention but I do not know whether the association is in a position to take care of it. In my paper yesterday I spoke about putting it up to the experiment stations.

COL. VAN DUZEE: The experiment stations are at the service of the people and if you will call upon your stations repeatedly they will respond eventually. It is going to take some little time but it seems to me that they are the logical people to carry it out. We have found in the south that the behaviour of varieties in different localities was so different that we have been obliged to wait until each locality had something of history to guide us. I suppose it would be a very good plan if all who are interested in nut culture in the North would convey the information to their experiment stations that they are desirous of having these orchards established. Eventually the country could be covered with little experimental plots where the information obtained would be reliable, where the work could be under the supervision and inspection of people who are paid by the state for that purpose.

Now in regard to the publicity. We have followed a plan for a number of years in the South of publishing frequently what we call Nut Notes. They were gathered together by the editor of the Nut Grower. Whenever an item of interest to the public came to him in his exchange and from any other source, he made a paragraph of it and then at the end of the month, or perhaps two months, he would publish a little circular "Nut Notes," and that would be run off in some large number, and distributed to the nurserymen, or other interested people, and they would simply enclose it in their correspondence. They would send them to the local papers all through the South so that the things that were found worthy of dissemination in the way of new records and new ideas were constantly being sent to the local papers and to the interested people in that way. I have a vast sympathy for Dr. Deming. He is not drawing a princely salary and he has a lot of things to do. I know his heart is in this work and he would be glad to do these things but he must have help. These two ways I suggest to you are ways we have found in the South to accomplish a considerable work. Make a demand upon your experiment stations that this work be taken up and get Mr. Olcott to print the slips and then get the nurserymen who are interested and the local newspaper people to publish the nut notes that become available from time to time.

MR. OLCOTT: I have knowledge of these circulars of Nut Notes sent out by Dr. Wilson in the South and have thought of doing something like it but have not gotten at it yet. I have exchanges and notices coming in that could be summarized just that way and even more extensively but I haven't had time to do this work.

THE SECRETARY: I think this proposal of Mr. Bartlett's is very important and I promise Mr. Bartlett and Mr. Barrows that all the members of this association will help. I am sure Dr. Morris will be glad to give advice about planting this orchard. I haven't the slightest doubt that Mr. Reed will go

there in his position as Nut Culturist of the Department of Agriculture. I think we ought to go ahead and do that without waiting for the Connecticut authorities, but at the earliest opportunity begin to try to interest them. They are not interested enough to go into it now. Some of the members of this association have got to start this thing and then we have got to interest the men at the agricultural experiment station. Two of them were here yesterday and have expressed their interest in the subject. We hope eventually that they will take full charge of such work which really ought to be in the hands of self perpetuating institutions and not in the hands of individuals. I can assure Mr. Bartlett of the hearty co-operation of this association in any planting of that kind and I wish that the steps might be taken at once to begin such a planting.

DR. MORRIS: I would be only too glad to give him some trees to start with.

MR. JONES: The nurseries growing these trees would be glad to cooperate and supply these trees at reduced prices for this experimental orchard.

THE CHAIRMAN: There seems to be lots of interest in this matter but it ought not to be on a voluntary basis. It might be interesting to you to have an idea of how we have done that further south. In North Carolina we have definite nut projects on our experiment station's list. The work is outlined and funds appropriated for carrying it out, and workers and funds are assigned to that particular project. They have a regular definite program and when a project is once begun that project has to be reported on. It cannot be discontinued. It has to be continued until it is worked out. In that way we are getting something definite and we have some machinery to work with. At first we had no commercial nut growing. We instituted a nut survey of the state. We issued instructions for our extension men to look out for nut trees on the farms. Then we made a list of the growers and orchards. There we made experimental planting and we made them in every section of the state so as to find out what varieties were best for the different sections. We had difficulty in finding varieties for all of our conditions. We had experiment orchards in all of the various sections of the State which have been conducted now for ten years and we have very definite data. The man who writes in to me for information can be answered shortly. Every year we are getting new data. I think every tree that we can get from any nursery catalogue that I can find is in those experimental orchards. Every year eliminates a few. If the stocks are good we work them over. There is no uncertainty about it. It is either a positive or a negative result. These results are published just as soon as they can be. It is part of our experiment work just as we experiment with cotton or apples or corn. I made a suggestion in my paper for work of this kind here and I thought it would be picked up by the Committee on Resolutions, but it was not acted on. To get this matter crystallized and get it to the attention of the experimental station I think that the secretary ought to be empowered to write officially to the directors of the experiment station in the various states asking that a nut survey be made of those states and that nut projects be entered upon and especially the testing of the varieties that have been found in the various states.

DR. BRITTON: Representing the Connecticut station I can say that the men there will be glad to help you, but they are in the same position as Dr. Deming, doing all they can at present, more than they ought to do, and most of the funds for that reason are arranged for in definite projects. That being the case, it will be necessary to provide for a future appropriation. During his war we are all short handed. I have four young men working in my department who have not had a day's vacation this summer—more work than they can do. At present we have no one connected with the station who is a specialist on nuts, and it would mean getting in a man to work up this subject. But I think that can be brought about in time. Of course if the legislature is asked for any appropriation, this association or those interested in growing nuts would have to help get the appropriation for the state.

THE SECRETARY: Prof. Hutt is State Horticulturist of his state and he is also a specialist on nuts. He lives in a state where nut culture is much further advanced than it is here, consequently it has been, it seems to me, a good deal simpler for him to accomplish results there than it is for us here. I approve of grasping this opportunity and going ahead with it and at the same time following up the suggestions of Dr. Britton of trying to get the appropriation in order to enable the agricultural experiment station to take action.

MR. OLCOTT: I move that the secretary be asked to communicate with the experiment stations in the various states along just the lines you suggested for the purpose of getting started.

The motion, duly seconded, was passed.

MR. OLCOTT: I would like to make another motion that the association do whatever it can to take advantage of this opportunity that Mr. Bartlett has just spoken about, and I would move that the matter be put in the hands of the secretary with power to act.

Mr. Webber seconded the motion and it was carried.

NUT TREES FOR SHADE.

FRANCIS A. BARTLETT, CONNECTICUT.

Were we to limit our shade trees to those trees which alone produce edible nuts we would then

have a greater assortment of trees than one could hardly suppose, and not only would be varieties be numerous but they would embrace many of our most noble and most beautiful trees.

Let us consider the varieties from which we may draw. In so doing let me ask why, with all these trees, we really need other trees which in themselves are no more ornamental and are non-producing.

Of the oaks there are many, while the nuts or acorns are seldom eaten by man, yet they have often composed his diet when other foods have failed. In many parts of the South this nut has been the principal food used in the fattening, or possibly the sustaining food, of the native razor-back hog.

Our native beech produces the small triangular nuts which have been sought by the boys and girls of centuries and are as popular today as of hundreds of years ago. The beech will grow to immense size and may live sometimes for centuries. A beautiful bright smooth foliage makes it very desirable as a park tree and it does not lose its charm in winter. On an extensive lawn it makes a very desirable tree but in close proximity to the house the one objection there may be is that the dead foliage seems to cling to the twigs sometimes the entire winter. This objection is more pronounced, however, in the younger trees than in the older ones.

Our native black walnut is a magnificent tree which can compare favorably with the finest oak in size, in shape, in picturesqueness and above all, in its huge nuts, which are both wholesome and delicious. Were it not for the great value of its wood for making gun stocks and for cabinet work we would today have hundreds of these trees growing, where now but few can be found; yet there are individual specimens with spread of over 150 feet and as magnificent and majestic as the finest oak.

Our native chestnut; let us not think of it in memory only, though the pride of our forests seems to have left us after the scourge of the chestnut blight. Unless the history of all scourges has been upset we will find some tree somewhere sometime that is blight resistant and then from this tree we will produce and propagate the chestnut back to its own. At least, as far as an ornamental and useful nut-producing tree is concerned. Should we find no tree in all this huge area which is disease-resistant we have at least one hope in the chestnut brought from China, where for probable centuries this disease has been present, but unable to destroy its host, the chestnut. Already in this country there are thousands of these seedlings growing which are apparently disease-resistant. The tree itself compares very favorably with our native tree. We will yet grow our favorite chestnuts and our children will yet enjoy them as we have done in the days of our youth.

We must not forget the chinkapin, the little brother of the chestnut, but a better fighter of its enemies, for this latter tree is almost resistant to the blight and will bloom and bear nuts while only a little tree, and the nuts are sweet and good. Then, too, it is not necessary to climb the tree to gather the nuts for the tree being small the nuts can almost be gathered from the ground. For planting over rocky banks and hillsides nothing is more handsome. The dark green foliage dotted here and there with the bright green burrs always attracts favorable attention and comment.

Our butternut, too, cannot be omitted, for there are few better flavored nuts than the butternut. Though hard to crack, this fault, if it may be a fault, will soon be overcome, for we will find a tree with thin-shelled nuts somewhere. They are no doubt present and when we do find such a tree we may all propagate from it. Though the tree is a rather irregular grower and is susceptible to certain bark diseases yet it has its place in the home planting for its compound leaves and light bark always shows prominently in the landscape. This tree sometimes grows to an immense size. At my early home in Massachusetts one huge butternut stood in the yard. Though the tree died long before I became especially interested in old trees I remember that we counted the annular rings and as near as I can recall the figures for its measurements and rings were 13 ft. in circumference and 80 annular rings. The trunk was perfectly solid and showed no signs of decay. Many bushels of nuts were gathered from this one tree yearly and I can remember the long winter evenings when we sat in the kitchen cracking the nuts from this old tree. Some have said the butternut is unsatisfactory as an ornamental tree but let me add—do not neglect it in the planting plan for it will give you much pleasure, and, too, the meats are well worth the trouble in cracking the nuts even though a bruised finger may result.

To the family of the walnut we are indebted to Japan for the beautiful and tropical foliage of the Japanese walnut, *Sieboldiana*. Although the tree has many characteristics of the butternut the foliage is much more luxuriant and it is an admirable tree for planting in the open lawn. The individual fruit of the *Sieboldiana* walnut is similar in appearance to that of the butternut and is borne in clusters or racemes, sometimes as many as twenty or more in a cluster, and is equal in every way to that of the butternut but the nuts being smaller contain a much less quantity of meat.

The king of the walnuts, *Juglans regia*, sometimes called Madeira walnut, Persian walnut, Spanish walnut and English walnut, is the finest of the nuts as far as the fruit is concerned, and is a handsome tree growing to immense size with large spreading branches and almost tropical foliage. For over 150 years this tree has been growing and thriving in our immediate neighborhood, producing bushels of nuts annually, yet few people whom we have met will hardly believe that the English walnut will thrive in this northern latitude. There is one specimen of this tree today with which I am familiar in Tarry town, N. Y., which is over 2 feet in diameter, with a spread of 75 feet or more and nearly 100 feet in height. While the tree has not produced

regularly yet it bears a few nuts each year and sometimes numbers of bushels.

The English walnut always attracts attention on account of its symmetrical growth and its luxuriant foliage. As a shade tree there are few better.

Of the nut family the one truly American tree of which we should be duly proud is the hickory, this tree being found in no other part of the world, with the exception of China, but North America. As a park or roadside tree there are few trees that can compare with it,—upright in growth with a beautifully rounded head, sometimes growing to immense size and producing nuts almost annually. Of this group of trees we have the shellbark, shagbark and pignut. The pignut being of little value as far as the nuts are concerned, yet having smaller and possibly more luxuriant foliage than the shagbark or shellbark. The shagbark is the nut most sought for by the younger generations and bids fair to become a nut of considerable importance.

It seems strange that in the long history of the hickory or shagbark more has not been done in the improvement of the nuts in the growing of large thin-shelled and sweeter nuts. Trees bearing such nuts do exist and I think most of us can recall certain trees in our boyhood days that produced nuts of far superior quality than are ordinarily found from the common tree. At least, I can recall one tree from which twenty-five years ago there was produced a very large fine sweet nut which was sought by all the children in the neighborhood. This tree, however, has passed away with hundreds of others, either by the hickory bark beetle or the axe.

It is well to mention the filbert and hazel. While not really trees the filbert sometimes reaches a height of 5 ft. or more with very luxuriant foliage in the summer and in the early spring the catkins are very prominent and attractive. There is no reason why the filbert should not be grown more extensively even though it is affected by blight or canker. We are assured that this can be readily cut away with less trouble than the ordinary treatment of trees.

Of the hazel there are two kinds, the common hazel and beaked hazel, both native here. While the nuts of these shrubs are really too small to be of any commercial value yet I believe we will find nuts growing somewhere that are as large as our imported filberts.

Of the pines and evergreens there are a number which produce nuts of which Dr. Morris has told us. Some of them are rapid growing trees and there seems to be good reason why we should not plant out evergreens which produce fruit and are just as attractive and fine as those evergreens which produce shade only.

I have not mentioned one tree which I believe to be the most promising for this locality—that is the pecan. It has been demonstrated that we can grow the pecan on our native hickories and from what I have seen of the wonderful growth of the first year of the bud I am sure we will be able to produce as fine pecans as can be produced in any section of the country, and further than that, we have an unlimited number of native hickories on which we can graft this finest of nuts. The pecan is hardy in this locality and farther north. I have seen it grown to a fair sized tree in Connecticut. I have seen it on the south side of Long Island and have seen one tree planted possibly over 100 years near Oyster Bay, L. I. which today is more than 3 ft. in diameter and reaches possibly 75 ft. in height. The pecan, too, is fruiting on Long Island and I believe we will have it fruiting in this locality within the next two or three years. During the last few years I have talked with numbers of people, many of them owners of large estates who could hardly believe it is possible to grow the English walnut and pecan in this latitude.

I have said that were we to limit our shade trees to those trees alone which produce edible nuts we would then have a greater assortment than one could hardly suppose. Each and every one of the trees I have mentioned were they not to produce a single nut would in themselves equal or surpass almost any tree in beauty and majesty.

Were we to develop a park and limit the plantings to nut trees alone how attractive such a park might be—the taller trees in the background to be of the black walnut and beech. These trees to be banked with the smaller trees of the butternut and English walnut. Over the rocky places we could plant the chinkapin and hazel. We could then put in specimen trees of the hickory and pecans with groups of filberts, dotted here and there with plantings of nut bearing pines. I believe such a planting would be as attractive as a planting of an added number of our ordinary shade trees. Let us imagine what the return from such a planting might mean to the public or the owners. In fifty years from this time, and in speaking of nut trees looking forward to fifty years is but a comparatively short time, our roadside trees could be replaced by nut bearing trees which are as attractive as any shade tree. I have no doubt that in this city alone were the roadsides planted with nut trees and these received reasonable care the returns from these trees would pay the entire city and town tax.

DR. MORRIS: Mr. Bartlett said that the hickory belonged only to North America. That was supposed to be the case until very recently Mr. Meyer, an agricultural explorer, found an open bud hickory in China.

MR. OLCOTT: Mr. Bartlett said he hoped the day would come when the filbert and hazels would be produced in this country. I saw last week the report of a crop in Rochester, New York, on five-year old filbert bushes that had been pronounced as good as imported nuts in quality and certainly were in size, and finer in coloring. I have some photographs of the trees on which they

grew. These were the trees which were described in detail in a paper read at the National Nut Growers' Association at Nashville last year by Mr. McGlennon, of Rochester. He told me that all he said at that time stands, with the addition that since then he has had proof regarding the absence of blight and the extreme hardiness of the trees and their continued bearing. The trees are grown for propagating purposes and not for fruit, and therefore they are not in their best condition for bearing. Mr. McGlennon is a business man of Rochester, with no special experience except that he became interested in some southern pecan plantings. Afterwards the filbert planting came up and he worked with Mr. Vollertson, who was experienced in this work in Germany. He and Mr. McGlennon imported 22 kinds of filberts from Europe. They are so far blight-proof and extremely hardy and are bearing.

MRS. IRWIN: I would like to say that I do not think there is enough publicity given this organization. There are a number of people, to whom I casually mentioned yesterday, that I had become interested in this thing, but they had not seen the Advocate and knew nothing about the meeting. They are interested, I think, and it seems to me that an organization for growth must have publicity and a lot of it.

A MEMBER: We were discussing this morning why we did not have a larger number of people here from Stamford and Greenwich. It is the merest chance I saw the notice. I have been interested for some time. I think there should be greater publicity because only by large membership can we get the growth and the standing that we want.

DR. MORRIS: Even a good many people in the vicinity who knew about this conference and said they would be interested to come, have not appeared. Our meeting came to Stamford this year because there are so many wealthy people interested in horticulture in Stamford and Greenwich. Very large funds are required for development of this subject, experimental orchards, publication and publicity. We believed here we would strike the sort of men to further public interest in the subject. This is by all means the smallest local attendance, however, that we have ever had since the beginning of the Association in any part of the country.

THE SECRETARY: We have never had the advertising more thoroughly done. Mr. Bartlett and Mr. Staunton and Dr. Morris and I have all worked at it; notices have been in at least three of the New York papers, clippings of which have been sent me, and articles in Ansonia and Hartford papers; articles and programs have been sent repeatedly to Stamford, Greenwich, Darien, Port Chester, Danbury, Ridgefield and New Canaan papers. Dr. Morris has written personal letters. And then, too, there are the signs around here. I don't know what other measures could have been taken.

DR. MORRIS: My chauffeur, who is in the Naval Reserve, and doesn't know about nuts at all, dropped in casually yesterday, but stayed through the whole session. That shows what interest might be aroused if only you can catch people. No trouble to hold them when captured.

Every person who has come into this association has done so because of something from the heart within.

MR. BIXBY: On this subject of publicity, I have done something in a very humble way that I thought might help, and this year I am planning to do it to a little larger extent. I have been very much interested in the butternut. The concern with which I am associated has a connection with general stores throughout the country, so I sent circulars calling attention to the butternut prizes to the general stores in the smaller towns throughout New Hampshire and Vermont. That circular invited the people who had specimens of butternuts that they thought superior to send them to Dr. Deming, and in the same circular I called attention to the fact that there were prizes for other nuts, and invited them to communicate with Dr. Deming. It was all done in the name of the Association.

PROF. HUTT: When we started our meeting we announced a question box.

THE SECRETARY: We expected to have a revised proof of our question box to be distributed among the audience, but it has not come. I would like to ask any one who now desires to ask questions relative to nut culture to do so and I think he will be able to get answers from members present. I had better begin by propounding a question myself that has been asked often—what variety of nut trees to plant—and I am going to make a short answer myself, just to bring about discussion. For early bearing, and encouragement to the nut grower, plant chinkapins, hazels, or filberts, many varieties, so that they will pollenize one another, and plant Japanese walnuts, early bearing and beautiful trees. For later results plant Persian walnuts, the Franquette and Mayette varieties, which are old standard ones. If you want to go a little bit more experimentally, plant pecans, say the Indiana and Busseron varieties, both from the Indiana district, and both hardy, though neither of them have fruited here. Plant some black walnuts, say of the Stabler and the Thomes varieties, which are the best known, and plant a few shagbark hickories. There are very few varieties to be had in the shagbark. We don't know much about the Kirtland, although that is one of the best nuts. We know little of the bearing records of these trees. I leave this answer for emendation, addition or correction.

DR. MORRIS: Has anybody any Kirtland hickories in stock grafted for sale?

MR. JONES: 100 to 150.

DR. MORRIS: Have you any Weicker?

MR. JONES: Yes, some are in stock for sale.

DR. MORRIS: Hales's hickories?

MR. JONES: No, not grown.

DR. MORRIS: The Hales' nut is big, too coarse and not very good.

MR. JONES: The kernel is yellowish.

DR. BRITTON: I would like to ask Dr. Morris what time of the year he would advise pruning the Persian walnuts here in Stamford.

DR. MORRIS: The editor of a horticultural journal at one time set out to get opinions about the best time for pruning peaches. There were opinions from all points as to whether peach trees should be trimmed in winter, spring, summer or autumn, and summing up all of the replies, the editor said, "We have come to the conclusion that the right time to prune peach trees is when your knife is sharp." I presume that that in a way will apply to almost all trees. Pruning the walnut trees in the spring when sap is flowing freely would not be desirable, I should think. Walnut trees need very little pruning. Very few of the nut trees need pruning, excepting the hazels. These need to be pruned in order to put them in good head. And possibly some of the hickories, but for the most part I doubt if pruning is desirable, save for broken branches. I leave that to Mr. Jones.

DR. BRITTON: The reason why I asked the question is that when we were carrying on this investigation with the walnut weevil, we found that when branches were cut early in the spring there was nearly always a bad wound that did not heal over. It died back around the place. But when we cut branches later, from the first to the middle of June, when the growth was taking place, it healed over very smoothly without leaving any bad scars, and I was wondering whether that happened over the region where the Persian walnut was grown.

DR. MORRIS: I am glad to have that observation that the wounds did not granulate and heal well. I have noticed that the shag bark hickory cannot be cut well for scions in the spring without injuring the rest of the limb on the tree. I have cut back the Taylor tree's lower branches, in order to cut off scions, and almost every branch from which I have cut scions is dead or dying. That is perhaps in line with the observation of Dr. Britton. Some of the juglandaciae cannot be cut in the spring.

MR. JONES: I have found that in cutting scions of walnut trees when the sap is running the tree bleeds and makes a bad wound and doesn't heal over. It dies back. But if you cut those any time in the winter when you have say two or three days without freezing, they will not bleed then nor in the spring when the sap comes up. Also, if cut after the growth is well started, they won't bleed very much.

MR. WEBER: Are back numbers of the Journal available?

THE SECRETARY: All of our reports.

MR. WEBER: I would suggest for the benefit of uninitiated persons that they get the back numbers, also send to each of the accredited nurserymen and get a copy of each, catalogue and then study the back numbers and the catalogues. They will be pretty well posted, as all the nut catalogues are well illustrated and contain a great deal of information, and it will take them out of the realm of hazy knowledge they now have on the subject.

MR. JONES: The Government has some excellent bulletins in line with this work.

MR. SMITH: I would like to get some information about spring and fall planting in Massachusetts.

A MEMBER: I advise planting in the spring. Where the ground freezes heavily in the winter, plant in the spring. In the South you don't have any injury from cold.

MR. WEBER: I have planted trees in the fall and the tops winter-kill down to the grafts. I had them wrapped and still they were winter-killed, or else the wrapping killed them. Persian walnuts and Indiana pecans. They threw a good shoot in the spring, however, and made a very good growth.

I move that a vote of thanks be extended to the local committee for making this convention a success, and a rising vote of thanks to show Dr. Morris the appreciation of the convention.

The convention thereupon adjourned.

APPENDIX.

I report on soft shell almonds as follows:

In February, 1914, I ordered from Armstrong Nurseries, Ontario, California, the following trees:

- 10 four to six ft. Jordon Almond trees
- 10 four to six ft. I. X. L. Almond trees
- 10 four to six ft. Ne Plus Ultra Almond trees

The trees were shipped in March of the same year and healed in until May. The farm on which these trees were planted is situated on the south shore of Lake Ontario, in Wayne County, New York. This district is a large producer of peaches and apples. The trees were planted twenty feet apart in a sandy loam soil in line with a young apple orchard. This soil is especially adapted to peach growing. The entire orchard was given clean cultivation with intercrops until the Spring of 1917. For two years potatoes were grown among the trees, and for one year cabbage. The land was limed and fertilized with both natural and chemical fertilizers. Cultivation of the tree rows stopped about the 1st of August, the intercrops about the 15th of September. For the year 1917 the trees were grown in sod. The trees were pruned similar to the peach trees, and have made somewhat less growth than a peach tree would make under the same conditions.

The lake on the boundary of the farm tempers the climate conditions of this location so that the opening of the season is about two weeks later than the average, and the date of the first frost is two to three weeks later. On this account the trees have had a better opportunity to ripen the wood for the winter period after cultivation ceases. During these winters the thermometer has gone as low as four degrees below zero without winter killing those trees which survived. Six trees of the thirty originally planted are now living. All others died the first winter after being set out. Unfortunately, the trees were not labeled at the time of getting out so I am unable to indicate what varieties lived through. Of the six trees living, three blossomed scantily this year, but all the blossoms proved false. I think there is no particular cause for discouragement on this account, as we have the same experience with peach trees. That is, they often bear a number of blossoms the first year, and none of them come to maturity. All the trees appear to have buds for next year. Some of these should develop into blossoms, and unless there is a frost after the blossoms come out in the spring of 1918, there may be some nuts produced. The final test as to whether or not these trees can be brought into bearing, will come next spring. The site upon which the trees are planted, as mentioned before, on account of the proximity of the lake, is more favorable than most locations for peach growing, and if the experience of the peach growers in New York State is any index, there would be little opportunity for success with almond trees, except under similar conditions.

M. E. WILE.

I am pleased to advise that the hardy soft shell pecan trees I have planted in Virginia, and the hardy English walnut trees are all growing finely. I find it just as easy to get a budded pecan tree to grow as it is to get an apple tree to grow. I am telling my friends about this all over Ohio, Indiana, Kentucky and Tennessee as well as Virginia. They have planted a good many trees and all report favorably.

My advice is to plant pecan and English walnut trees as they are just as beautiful and useful for shade as any other kind, and in addition to this they will produce a large amount of the healthiest and most nutritious of food for the human family.

I am very much indebted to the Northern Nut Growers Association for the knowledge obtained along this line. You can rest assured that I will try and pass it along as I go.

JOHN S. PARRISH.

ATTENDANCE

R. T. Olcott, Rochester N. Y.
Mr. and Mrs. C. A. Reed, Washington, D. C.
Irwin R. Waite, Stamford, Ct.
Prof. W. O. Filley, State Forester, Connecticut.
Prof. Record, State College of Forestry.
A. C. Pomeroy, Lockport, N. Y.
S. M. McMurrin, Washington, D. C.
Harry E. Weber, Cincinnati, Ohio.
Fitch A. Hoyt, Stamford, Conn.
Wm. H. Bump, Stamford, Ct.
Wilber F. Stocking, Stratford, Ct.
J. A. Seitz, Greenwich, Ct.
L. C. Root, Stamford, Ct.
John Rick, Redding, Pa.
F. A. Bartlett, Stamford, Ct.
J. F. Jones, Lancaster, Pa.
R. H. G. Cunningham, Stamford, Ct.
Col. C. A. Van Duzee, Cairo, Ga.
John H. Hohener, Rochester, N. Y.
C. L. Cleaver, Hingham, Mass.
Fred A. Smith, Hathorne, Mass.
Dr. Lewis H. Taylor, Washington, D. C.
W. H. Druckemiller, Sunbury, Pa.
W. G. Bixby, Brooklyn, N. Y.
Mr. and Mrs. C. S. Ridgway, Lumberton, N. J.

Miss Marie Brial, Stamford, Ct.
J. E. Brown, Elmer, N. J.
A. M. Heritage, Elmer, N. J.
Dr. R. T. Morris, N. Y. City.
T. P. Littlepage, Washington, D. C.
Gray Staunton, Stamford, Ct.
J. L. Glover, Shelton, Ct.
Dr. E. F. Bigelow, Stamford, Ct.
Prof. W. N. Hutt, Raleigh, N. C.
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