PROCEEDINGS

OF THE

Ohio State Forestry Association,

AT ITS MEETING IN COLUMBUS, MARCH 28th, 1884,

TOGETHER WITH

A REPORT

UPON THE

FOREST CONDITION OF OHIO,

ILLUSTRATED BY CHARTS BY THE FORESTRY DIVISION

OF THE

United States Department of Agriculture.

Published by Order of the Legislature.

COLUMBUS:

G. J. BRAND & CO., STATE PRINTERS.

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FOR 1884.

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HON. LEO WELTZ,	I. N. LA BOITEAUX.

COMMITTEE ON ARBOR DAY EXERCISES,

JOHN B. PEASLEE, PH.D., *Chairman*,

HON. EMIL ROTHE,	COL. A. E. JONES,
PROF. W. H. VENABLE,	REUBEN H. WARDER,
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DR. FRANCIS PENTLAND,	HON. CHARLES REEMELIN.

HISTORICAL SKETCH OF THE OHIO STATE FORESTRY ASSOCIATION.

By ADOLPH LEUÉ, *Secretary.*

The Ohio State Forestry Association was formally organized in Cincinnati, January 13th, 1883, on which day the Constitution and By-Laws were adopted, and the officers elected. The attendance was small, amounting in all to but 13 men, all of whom were enrolled as members of the organization.

For the first three months, meetings were held once a week, and thereafter every two weeks.

The first committee appointed was that on Legislation, consisting of Judge Warren Higley, Gen. Durbin Ward and Hon. Emil Rothe. This committee was instructed to draft a bill in the interest of forestry in Ohio. After two preliminary reports, which were discussed by the Association, the committee presented, in the beginning of February, 1883, a bill, entitled, *An Act to encourage forest-culture in the State of Ohio*, which was adopted by the Association, and forwarded to Senator Horace Wilson, through whose efforts it passed the Senate, but in the House it was never brought up for second reading.

On January 22d, 1883, the Association, through a committee consisting of Dr. John A. Warder, Judge Warren Higley, Supt. John B. Peaslee, Hon. Emil Rothe and Adolph Leue, presented a memorial to the Congress of the United States asking the removal of the tariff on timber.

In addition to the foregoing proceedings, and others, less significant, the Association, aiming at mutual instruction in matters pertaining to forestry, listened at each of the meetings to a discourse on some forestal subject. The following is a complete list of the papers presented and discussed at these meetings :

"Planting of Trees on the Banks of Railroads." By Judge Warren Higley.

"Suggestion for a Library and Museum." By Prof. R. B. Warder.

"Among the Trees with the Poets." By Prof. W. H. Venable.

"Structure and Life of Trees." By Dr. John A. Warder.

"What we may Learn from Trees." By Hon. Chas. Reemelin.

On the 25th and 26th of April, 1883, an Ohio State Forestry Convention was held in Cincinnati, under the auspices of this Association. The convention took place in Melodeon Hall, where a very creditable exhibit of forest products had been arranged. The principal exhibitors were: The D. E. Albro Company, of Cincinnati, exhibiting its very fine collection of carefully finished specimens of foreign and domestic woods; Dr. John A. Warder, exhibiting his rare collection of cones and acorns, also a complete set of botanical specimens of all the different oaks growing in this country, and sections of wood; Adolph Leue, of Cincinnati, exhibiting a complete set of the forestry bulletins of the United States Census Bureau, also a number of maps and charts illustrating modes of forest-culture and forest management in Germany, and a collection of sections of wood, bark used for tanning purposes, and seeds; Dr. A. D. Binkerd, of Cincinnati, exhibited a large collection of wood grown in Pennsylvania; Waldo F. Brown, of Oxford, O., exhibited seeds and sections of *Robinia pseudacacia* (black locust) of different ages.

The exhibit, as a whole, was one of great interest, not only to those who attended the convention, but also to others, who would come in during the hours of recess.

The convention itself was extremely interesting. The papers presented were well prepared and well delivered. Some of them were published in full by the Cincinnati dailies, others in parts, and a few in periodical journals.

The following is a complete list of the papers entered for the convention:

- *1. Lessons to be learned from the Forests of Western Asia. By Prof. H. S. Osborn, LL. D., Oxford, O.
2. What is a tree? By John A. Warder, of North Bend, O.
3. The *pro* and *con* of Forestry. By W. I. Chamberlain, Secretary State Board of Agriculture, Columbus, O.
4. Two Letters on Forestry. By Hon. Cassius M. Clay, White Hall, Ky.
5. Is Forest Culture Profitable in this Country? By Hon. Emil Rothe, Cincinnati, O.
6. Hints on Tree-planting. By Bernhard E. Fernow, New York.
7. Tree-planting on Highways. By Hon. L. M. Bonham, Oxford, O.
8. Need of State Arboreta. By Prof. Wm. R. Lazenby, Columbus, O.
9. Our Next Problem. By Adolph Leue, Cincinnati, O.
10. Tree-culture on Prairies. By Isaac Smucker, Newark, O.
11. Natural Reproduction of Forests. By Dr. John A. Warder, North Bend, O.
12. Hints from Nature on Forest Culture. By M. C. Read, of Hudson, O.

13. Distribution and Geographical Range of the Forest-trees of North America By Dr. Geo. Vasey, Washington, D. C.
14. The Ruin of the Hills. By Dr. Dan. Millikin, Hamilton, O.
15. Exhibition of Forest-products and Forest-implements, in connection with Forestry Conventions. By Adolph Leue, Cincinnati, O.
16. Forest Administration in Germany. By Robert Kuehnert, Cincinnati, O.
17. Railroad Ties. By Albert Wetterstroem, Cincinnati, O.
18. Profits of the Culture of the Black Locust. By Waldo F. Brown, Oxford, O.
19. List of Plants in Hardin County, O. By W. C. Hampton, Mt. Victory, O.
20. Forests of the Allegheny Valley. By Dr. A. D. Binkerd, Cincinnati, O.
21. The Recent Ohio Floods (1883). By Prof. N. H. Egleston, Washington, D. C.
22. Trees in Mythology. By Prof. W. H. Venable, Cincinnati, O.
23. Life and Labors of Adolph Strauch. By Adolph Leue, Cincinnati, O.
24. Plan of Instruction in an American School of Forestry. By Adolph Leue, Cincinnati, O.

An excellent address on Forestry in general was delivered by Dr. Geo. B. Loring, Commissioner of Agriculture, Washington, D. C., on the evening of April 25th.

The successful celebration of Arbor Day in Cincinnati, which has become famous, was mainly due to this Association.*

In the meetings immediately following the Convention, the subject of "Forestal Experiment Stations," to which the attention of the Association had been called by the Secretary in his paper entitled "*Our Next Problem*," was taken up and discussed. The manner in which such stations are organized in Germany were duly considered, and the plans proposed for similar institutions in this country examined; the first was found impossible in this country, the latter impracticable. It was then (June, 1883,) that the Secretary laid before the Society a new plan, which after the meeting of the American Forestry Congress, held in St. Paul, in August, 1883, has become known as the *Ohio plan*, which was adopted. Convinced of the great utility of such Experiment Stations, a committee was appointed to devise ways and means to effect an organization of a Station in Ohio; this committee never reported, and consequently no organization was effected.

The illness and subsequent death of Dr. John A. Warder, the Honorary President of the Association, which occurred July 14th, 1883, was a great loss, not only to Ohio, but to the whole country.† His absence

*Ohio was the first State in which the schools took so prominent a part in the celebration of Arbor Day. It has been frequently remarked, that the 27th of April is too late for planting trees in Southern Ohio. The Association, fully aware of this, recommended in a circular, that the trees be planted earlier, and that on that day only the ceremonies be performed. The *modus operandi* is explained very elaborately in a report of the Committee on Arbor Day Celebration, which is now being published.

†An account of the life of Dr. John A. Warder is to be found in American Journal of Forestry for August, 1883, published by Robert Clarke, Cincinnati.

from the meetings was felt by every member, and it seemed as though the prosperity of the Association was going to decline; for during the summer months there were but a few meetings, and the attendance at each was small. The meeting of the American Forestry Congress in St. Paul, August 8 and 9, 1883, which was more largely attended by Ohioans than by representatives of any other State of the Union, gave new life and energy to the Society. The fall meetings were, as a rule, well attended. The old committee on law and legislation was enlarged, a committee on Forestal Experiment Stations appointed, arrangements for a general meeting in Columbus were instituted, and preparation for the celebration of Arbor Day in 1884 begun.

Early in 1884, the Committee on Law and Legislation, consisting of Hon. E. Rothe, Judge Warren Higley, Hon. Leopold Burkhard, General Durbin Ward, Dr. A. D. Binkert and Adolph Leue, drafted a Forestry bill, entitled, "A bill to encourage forest culture, the planting of shade trees on public highways, in parks, and other public places, and for the observance of Arbor day". The bill was forwarded to Senator Pruden, and by him introduced into the Senate.

The other Forestry Bill, entitled, "A bill to establish forestal experiment stations and to provide for instruction in forestry in the Ohio State University at Columbus", was drafted by the Secretary, Adolph Leue, and introduced into the House by Dr. Oscar F. Edwards.

Unfortunately, neither of the above bills passed.

MEETING IN COLUMBUS, MARCH 28, 1884.

Owing to the energy of Prof. Lazenby and the Franklin County Horticultural Society, the Columbus Board of Trade tendered to the Association the free use of its spacious hall during the session in that city. Vice-President Horace Wilson called the meeting to order at 2 P. M., and in his address of welcome made some very excellent remarks as to the necessity of attention to forestry; eulogized the Association for its untiring zeal in pushing the good work, and expressed the hope that through and by means of the sessions of this society, the people in Columbus and vicinity would catch some of that enthusiasm which so advantageously distinguishes the Cincinnati members.

The President, Judge Warren Higley, of Cincinnati, in his response on behalf of the association, congratulated the local committee upon their success in securing this spacious hall, which, in view of the important object of the Association and thus of the present meeting he thought ought to be filled. But, he continued, we need not be discour-

aged; this hall is but the place whence we speak to thousands of attentive listeners. The thoughts, the ideas expressed here, will be carried by the press to people near and far, not only in this country but even in other States. He then proceeded to read his paper on

THE IMPORTANCE OF FORESTS,

Which appears elsewhere in this report. A lively discussion followed, in which Prof. Lazenby, Emil Rothe, Leo. Weltz, Adolph Leue, and others participated.

Prof. Lazenby followed with some remarks from notes prepared for the occasion, giving the results of a series of daily observations of temperature taken by himself through a period of six weeks in open fields and the centers of forests. A study of the records shows that the temperature of the forests averaged 4° higher than that of the fields. The fluctuations and changes in temperature were less extreme and much less rapid in the woods than in the fields, and certain changes in the open country did not affect the woodlands until some time after. The observations were begun about the middle of January. February 12, an observation at 7:30 A. M. showed 7° F. in the woods and 18° F. in the open field, the latter point about 10 rods distant from the former. At 12:30 P. M., the same day, the thermometer marked 12° F. in the woods and 22° in the field—a fluctuation in the open field of 40° and of only 25° in the woodland.

At the close of these remarks, an interesting intellectual cross-fire, between Professor Lazenby, and Leo. Weltz, of Wilmington, ensued.

Prof. Edward Orton read a paper on "Hints from Nature on Forest Culture," prepared by M. C. Read, of Hudson, O., which appears in full in this report. The paper was discussed at some length, without either weakening or strengthening the assertions made in the same.

As it was not contemplated to hear any more papers during the afternoon session, Secretary Leue offered the following addition to the By-Laws, which was adopted:

"Non-residents of the State of Ohio may, at any general meeting, be elected corresponding members of the Association. Such members shall be exempted from all fees and dues, and shall enjoy all the privileges of regular active members, except the right of voting and of holding office in the Association."

The following-named gentlemen were then elected corresponding members:

Prof. N. H. Egleston, Washington, D. C.

Dr. George B. Loring, Washington, D. C.

Hon. H. J. Joly, Onebeck, Canada.
 Dr. F. Judeich, Tharand, Saxony, Germany.
 Oberförster Candidat Max Müller, Dresden, Saxony.
 Ex-Governor Horatio Seymour, Utica, N. Y.
 Hon. Cassius M. Clay, White Hall, Ky.
 I. H. Morgan, Amherstburg, Ont.
 Ex Governor Robert Furnas, Nebraska.
 William Little, Montreal, Canada.
 E. Steward Thane, Ottawa, Ont.
 Prof. William Saunders, London, Ont.
 Baron Rich v. Steuben, Germany.
 Prof. J. L. Budd, of Ames, Iowa.
 F. P. Baker, Topeka, Kansas.
 Dr. Franklin B. Hough, Lowville, N. Y.
 Prof. G. B. Northrop, Clinton, Ct.
 Prof. Robert B. Warder, Lafayette, Ind.
 Bernard E. Fernow, New York, N. Y.

Hon. Horace Wilson spoke-then at some length, upon the general need of knowledge in all the branches of forestry, citing examples which had come under his personal observation, especially as to the selection of proper trees for a given soil and a proper soil for given trees.

Hon. Emil Rothe, in making some remarks as to tree-planting on the roadside, asserted that it was ridiculous to say, "that bad roads are caused by trees on its sides," the fact being that bad roads are to be attributed to the laziness of the people.

At this point the meeting was adjourned to 7:30 P. M.

EVENING SESSION.

Promptly at 7:30 Judge Higley took the Chair and Adolph Leue the Secretary's desk.

Sup't John B. Peaslee, of Cincinnati, read a paper on "The Celebration of Arbor Day," which will be printed in full in another part of this report.

Hon. Emil Rothe, of Cincinnati, read a paper on "Profits in Tree-planting," which appears in full.

Prof. Wm. R. Lazenby made a few remarks on some specimens of Catalpa and Black locusts, which had been grown on the experimental farm of the University, and were brought to the meeting.

Adolph Leue, of Cincinnati, read a paper on "Forestal Experiment Stations," which appears in full, with a few additional notes, in the latter part of this report.

For want of time it was moved and carried to dispense with the reading of papers, when the following were read by title only :

1. "Notes on Tree Planting." By R. E. Fernow, New York.
2. "How Our Forests are Destroyed." By Albert Wetterstroem, of Cincinnati, Ohio.
3. "Tree Culture on Prairies." By Isaac Smucker, of Newark, Ohio.
4. "The Physiological Life of a Tree." By W. P. Bentley, of Wilmington, Ohio.

Prof. Edward Orton rose to ask what provisions had been made for publishing the papers presented at this meeting. The suggestion to have them embodied in the Agricultural Reports was counted by him unwise. Provision could be made for bringing them out in a separate edition, so that they might attract the attention they deserve. To secure their publication, the speaker further said that, he would gladly bear his share of the expenses.

Upon motion that a committee be appointed to devise ways and means of publishing these papers, the following committee was appointed by the Chair: Prof. Edward Orton, Prof. W. R. Lazenby, Hon. Leo. Weltz, John H. McMakin, Adolph Leue.

Mr. Fleming suggested that application be made to the State to publish the papers in the Horticultural Report, saying that about 5,000 copies could be struck off separately for the use of the Association.

It was then moved and carried that Mr. Fleming be appointed a committee of one to make such application to the Legislature.

After a few appropriate remarks by the President, thanking all who had been instrumental in making the meeting a decided success, the Association adjourned, subject to the call of the President.

ADDRESSES AND PAPERS.

FORESTS AND FORESTRY.

By HON. WARREN HIGLEY, Cincinnati, *President of the Ohio State Forestry Association.*

It may seem to you quite out of place for a lawyer to leave his office and take the platform to address the Arboriculturists of Ohio on a subject so nearly allied to their interests and so familiar by daily contact and observation. The reason I offer for this apparent presumption, is the fact that I was a farmer-boy, and had in youth the sturdy training which came from familiarity with the ax and the plow, the scythe,

the cradle, and the hoe, when the farmer was accustomed to take up his daily task at sunrise and continue until sunset, excepting the time necessary for his meals. The ten-hour system was not then recognized by the farmer, nor were mowers, and reapers and binders, and wheel-rakes, and wheel-cultivators in general use in those days, and some of them hardly dreamed of.

In those early years, the familiar contact with nature in her various forms made lasting impressions of her laws relating to vegetable growth—the necessity for planting on soil adapted to the proposed crop, and of alternating with pasture and corn with barley and wheat and clover. Nor did the growth of trees—fruit and forest trees—fail to be a study and a delight. The waving forests taught their lessons of beauty and of grandeur. The name of every tree that grew in the vicinity was familiar, and its comparative value for fire-wood or for lumber was known.

CENTRAL NEW YORK.

In those days, in central New York, much of the country was heavily wooded with forests primeval, and I remember when good body maple, and red and white beech sold in the city, three miles away, at from \$1.50 to \$3.00 per cord. The forests were rapidly felled, and the peach crop, which had never been known to fail, became uncertain, and soon after unlooked for. The winter's frosts proved too severe. The apricot and its luscious fruit was frozen out. The springs came later and later. The young cattle, once accustomed to be turned out into the wood-sheltered pastures on the first of April, were kept in the yard on dry food until the first or tenth of May. The saw-mills and grist-mills on the running streams were used less and less, until they were either removed, or left to decay with the dam that gave head to the waters. In summer, the ponds were dry. In spring, the streams were swollen and angry, the bridges carried away, and the hill-sides furrowed deep with the swift running waters.

POPULAR AGITATION IN OHIO.

These experiences and observations while young, and studies in later life, have impressed me with the great importance of the subject of Forestry, and of the necessity of introducing the principles and practices of its science into this country. To secure this, a great popular movement was inaugurated at Cincinnati, in the winter of 1882, which resulted in the organization of The American Forestry Congress, and what is still better, or rather the most important adjunct, the wide dissemination of important information on this subject through the public press of the country. I am proud to have been connected with this movement from the very beginning.

POLITICAL ECONOMY AND FORESTRY.

In the comprehensive study of Political Economy, though much is said of manufactures, of overproduction and tariff and trade, and little of the original causes of the under or overproduction of crops from the soil, the thoughtful farmer must nevertheless apply its principles to the basis of all prosperity in a country like ours—to the productions of the soil, and hence to the climate and health of the country—and this will necessarily impose the careful consideration of our forests past and present, and their influence upon the permanent prosperity of the whole

country. The student of history must conclude that, however faithfully the laws of Political Economy may be observed in manufactures and trade, foreign and domestic, they will fail to secure the permanent prosperity of this great nation, unless the subject of Forestry shall find its true place in the discussions of the learned, and the people be led to observe and practice the principles of its science. My former experiences and observations and my studies in later life have caused the interest I feel in this subject, and given what little knowledge and authority I have to speak upon it.

The subject is indeed vast in its importance to America, and touches the very springs of the nation's life. It demands the thoughtful and early attention of the philosopher and the statesman.

FORESTS IN THE UNITED STATES.

Originally the eastern, middle and southern states were almost entirely wooded, excepting a large portion of Texas and eastern and southern Indiana, while west of the line of prairie running south-west through Indiana, Illinois and Missouri to the Indian territory, the country was mostly destitute of wood south of the lake region.

The forests in these wooded districts were cleared to make farms for the early settlers, and of necessity; but the destruction has gone on since the necessity ceased, until the scarcity of valuable timber has become painfully apparent, and the broad farm districts stripped of their forests, are laid under contribution to supply the necessities for fuel, fences and buildings, from coal and timber imported from other places for the purpose. The rate of destruction, through the increasing demands for consumption, is rapidly going on, while the planting and re-forestation to take the place of the threatened dearth have hardly begun.

Let us now see how these forest supplies stand, and how the future promises, with regard to their continuance in the United States. We have as our only data the census of different periods; and the returns of 1880 show that, of our States and Territories, 9 had reduced their woodlands to below 10 per cent.; 5, to between 10 and 20 per cent.; 8, to from 20 to 30 per cent.; 11, to from 30 to 40 per cent.; and 4, to from 40 to 50 per cent., when this census was taken. In 10 States of the South and South-west the proportion was 50 per cent. or more, and in the whole United States the woodlands occupied 35 per cent. of the reported area.

I know of no facts more convincing as to the necessity for attention to forestry in this country than those found in our last census report, from which I take the following figures:

PARTIAL ESTIMATE OF THE CONSUMPTION OF FOREST PRODUCTS AS FUEL IN THE UNITED STATES DURING THE CENSUS YEAR ENDING MAY 31, 1880.

Number of persons using wood for domestic fuel..... 32,375,074

Estimated Consumption of Fuel for Domestic Purposes.

	Number of cords.	Value.
For home use	140,537,439	\$306,950,040
By railroads	1,971,813	5,126,714
By steamboats.....	787,862	1,812,083
In mining and amalgamating the precious metals.....	358,074	2,874,593
In other mining operations.....	266,771	673,692
In the manufacture of brick and tile	1,157,522	3,978,331
In the manufacture of salt.....	540,448	121,681
In the manufacture of wool.....	158,208	425,239
Total.....	145,778,137	\$321,962,373

Consumption of Charcoal.

	Bushels.	Value.
In the twenty largest cities.....	4,319,194	\$521,316
In manufacture of iron.....	69,592,091	4,726,114
In the production of precious metals.....	97,687	29,306
Total.....	74,008,972	\$5,276,736

In this table Ohio is estimated to consume for domestic purposes, exclusive of what is used in manufactures, 8,191,543 cords of wood, with an estimated value of \$16,492,574. Allowing an average yield of forty cords to the acre, it requires 204,788 acres of forest to supply the demand in this State one year for fuel alone.

THE LUMBERING INDUSTRY OF THE UNITED STATES FOR THE YEAR ENDING MAY
31, 1880.

Capital employed	\$181,186,122
Number of hands employed—Males.....	141,564
Females	425
Children and youth	5,967
Value of logs.....	\$139,836,869
Wages paid during the year.....	31,845,974
Feet of lumber (board measure) produced.....	18,091,356,000
Number of laths	1,761,788,000
shingles	5,555,046,000
staves	1,248,226,000
headings	146,523,000
Feet of spool and bobbin stock (board measure).....	34,076,000
Value of all other products.....	\$2,682,668
Total value of all products.....	\$233,367,729

The lumbering interest of Ohio for the year ending May 31, 1880, is estimated as follows:

Capital invested, \$7,944,412; number of hands employed, 15,277; value of logs, \$8,603,127; wages paid during the year, \$1,708,300; feet of lumber (board measure), 910,832,000; number of laths, 50,625,000; number of shingles, 24,875,000; number of staves, 214,245,000; number of sets of headings, 25,779,000; value of all the lumber products of Ohio (estimated), \$13,864,460. This, added to the estimated value of wood used for domestic purposes—to-wit, \$8,191,543—gives a total value of the product of the State for the census year of 1880, \$22,056,003; and this consumption is rapidly increasing through the demands of our growing population.

DECREASE OF FORESTS IN OHIO.

A comparison with the census returns of 1870 and 1880 shows a decrease of woodlands in the belt including latitude 37 degrees to 40 degrees, through which runs the Ohio River, extending westward across the Mississippi River, of from 34 to 26 per cent., being greatest in Ohio and Indiana.

Dr. Franklin B. Hough, formerly chief of the Forestry Department at Washington, D. C., in a recent article published in the Albany Evening Journal, says:

"In Ohio the returns made by assessors (which appear to be very reliable) show the tendencies of clearing the forests in a very strong light, and taking three periods for comparison we get the following results:

	Acres of woodland.	Decrease from former period.	Percentage of woodland to total area.
1853.....	13,991,228		55.27
1870.....	9,749,333	4,241,895	38.51
1881.....	4,708,247	5,041,086	22.71

"In 1881, 601,136 acres, or about 3 per cent. (not included in the woodlands), were lying waste.

"The amount of clearing, from 1870 to 1881, is shown to have been 5,041,083 acres, and at this rate it becomes an easy question to solve as to how long the remaining 4,708,247 acres will last. We have not figures to prove that these rates of clearing have been going on in the other states bordering upon the Ohio river, or supplying it by their drainage; but the connection between this denudation and the floods of the present and of recent years can not be mistaken. Last year the damages were estimated at \$60,000,000. There may have been less damage done this year (although the flood was five feet higher), because there was less property to destroy. In a letter from a friend in Marietta we are told that 400 houses floated past that place in the recent flood, which probably took off many that were not reached by the waters before.

"Nine years ago a million of dollars or more of property was destroyed at Rochester by a flood unquestionably occasioned primarily by the extensive clearings in recent years around the head waters of the Genesee river. The heavy rains and warm winds, which rapidly melted the snows and supplied the floods on that occasion, could not have had so immediate an effect in a wooded country.

"Passing from Winter floods, we find the other extreme in Summer droughts

which in recent years have become more frequent and distressing than were known in former years, and both may be traced unerringly to the same cause—the clearing-off of the woodlands which formerly tended to equalize these extremes and maintain a more uniform flow of waters throughout the year.”

RAIL ROAD TIES.

At the meeting of the Forestry Congress in Cincinnati, April, 1882, Dr. Franklin B. Hough, then chief of the Forestry Department, read a valuable paper on “Tree Planting by Railroad Companies,” in which he says :

“We have in the United States about 100,000 miles of railroads. The number of ties to a mile range from 2,200 to 3,000, and in some cases as high as 3,500. If we assume an average of 2,500 to the mile, we have 250,000,000 in use. They average eight feet in length, and about seven inches deep and eight inches wide, giving the contents of almost three cubic feet apiece, or in all 6,000,000 of cords. If piled cord-fashion, they would form a pile four feet high, eight feet wide, and 4,575 miles long. Placed end to end, they would span the earth fifteen times at the equator, or in one line would reach miles beyond the moon. Taking the average life of a tie at from five to eight years, and we shall need from 30,000,000 to 50,000,000 new ties a year for maintaining the present railroads of the country in constant use. Allowing 500 ties to the acre, we shall need to cut from 60,000 to 100,000 acres every year to meet this demand. To grow trees to the size necessary for ties will require an average of about thirty years, and we shall need, to keep up this supply, nearly 3,000,000 acres of forests, or about 2,500 acres for every hundred miles of road. This is equivalent to a belt of woodland twelve and one-half rods wide along the road, or about three times the right of way.”

THE INFLUENCE OF FORESTS UPON CLIMATE AND PRODUCTIONS.

Forests are not only valuable for their products, but their effect upon the climate and productions of the country is also of the greatest importance, as numerous examples in history, and accurate scientific experiments attest.

Dr. Ernst Ebermayer, Professor of the Central Forest Academy at Ashaffenburg, in Bavaria, has written a work of great interest on the subject of Forestry, from which I take the following facts :

For five years observations have been made in the Kingdom of Bavaria, at seven different points, respecting the influence of forests on the temperature and moisture of the atmosphere, on the evaporation of water, and on the quantity of rainfall, etc. The facts are based on 5,000 different observations, made during the years 1868 to 1872, with the help of instruments most ingeniously constructed for that purpose. With these, twice every day, at fixed hours and at all seven points, the temperature of the soil was measured for comparison in the forests as well as in the open fields, at the surface and at a depth respectively of one-half, one, two, three, and four feet. According to these, the mean annual temperature of the *forest soil* is, on an average, 21 per cent. lower than that in the open field, and the mean annual temperature of the *atmosphere in the forest*, is on an average 10 per cent. lower than that in the open field.

They show also the equalizing effect of forests in lowering the extreme summer's heat, and in lessening the extreme winter's cold.

The relative moisture is an average of 6 per cent. greater in the forest than in the open field—9 per cent. in summer and about 5 per cent. in the other seasons.

The principal distributor of warmth over the whole globe is the moisture of the atmosphere, without which it would be excessively hot in some countries and freezing in others.

Dr. Felix J. Oswald, in an article published in the April number of the North American Review, on "Changes in the Climate of North America," says: "The calorific influence of the Gulf Stream is generally overrated. When both Europe and North America were covered with continuous forests, the east shores of the Atlantic had the advantage of milder winters, but their summers were neither warmer nor dryer than ours. On the contrary, the seven seagirt peninsulas of Europe enjoyed the benefits of a maritime climate; droughts were so rare that their occasional occurrence was considered a portent; deserts, in the present sense of the word, were confined to Araby and central Africa. Northern Africa not only produced food enough for her own teeming population, but was the granary of the Orbis Romanus, an inexhaustible store-house of oil, wine, and wheat. Where now the oven-breath of the Harmattan sears the naked hills of Tunis, orchards, alternating with shady forests, once covered an extent of country which, in spite of frequent hunting expeditions, was to its Roman conquerors still a sylvan *terra incognita*, and in no sense an undesirable country, judging from the subsequent fierce contests for its possession. In eastern Algiers, the ancient Cyrenaica, De Baudin recorded 128° in the shade for eighteen successive days. The climate of the whole country must have become thirty degrees warmer; that of southern and central Europe at least twenty degrees. In the time of Xenophon, Greece had harder winters than modern Dalmatia; on the expedition against Corcyra, Socrates marched barefoot through the deep snow to silence the effeminate complaints of his young companions. Cyrus the Great used to pass seven months of every year at Babylon in the Euphrates valley, a 'region of perpetual spring,' as his biographer calls it, in the same valley where the dog-star now seems to rage perennially. Several poets mention the 'snowy summit of Mount Soracte,' a south Italian mountain of very moderate elevation. Tacitus speaks of frozen lakes in northern Italy, and his description of the German woodlands, 'horrid with frost,' would have answered the present state of affairs in northern Canada. Asia Minor has become the epitome of a dying continent. In Spain the agricultural value of the lowlands, which once attracted the Visigoths from their Danubian homes, has been reduced by more than eighty per cent. From Suez to Gibraltar the coast lands of the Mediterranean have wasted away in a decline, which seems to be the ultimate fate of all civilized countries. The burning drift-sand of the desert is perhaps the Wad-el-Har of the Koran, the fire-sea which is destined to engulf all things at the end of time. Planets die by dessication."

EFFECT OF FORESTS ON SPRINGS.

Mr. Marsh, in his treatise on "The Earth as modified by human action," says:—"It is an almost universal, and, I believe, well-founded opinion, that the protection afforded by the forests against the escape of moisture from its soil by superficial

flow and evaporation, insure the permanence and regularity of natural springs, not only within the limits of the woods, but at some distance beyond its borders, and thus contributes to the supply of an element essential to both animal and vegetable life. As the forests are destroyed, the springs which flowed from the woods, and consequently the greater water-courses fed by them, diminish both in number and volume. * * * The hills in the Atlantic States formerly abounded in springs and brooks, but in many parts of these States, which were cleared a generation or two ago, the hill-pastures now suffer severely from drouth, and in dry seasons furnish to cattle neither grass nor water."

ROOTS OF TREES AS CONDUCTORS.

Besquerel, the eminent French philosopher, illustrating the mechanical action of roots as conductors of the superfluous humidity of the superficial earth to lower strata, says: "The roots of trees often penetrate through sub-soil most impervious to water, and in such cases the moisture, which would otherwise remain above the sub-soil, and convert the surface earth into a bog, follows the root downwards, and escapes into more porous strata, or is received by subterraneous canals or reservoirs. When the forest is felled the roots perish and decay, the orifices opened by them are soon obstructed, and the water, after having saturated the vegetable earth, stagnates on the surface and transforms it into ponds and morasses. Thus, in La Brenne, a tract of 200,000 acres, resting on an impermeable sub-soil of argillaceous earth, which ten centuries ago was covered with forests, interspersed with fertile and salubrious meadows, has been converted, by the destruction of the woods, into a vast expanse of pestilential pools and marshes. In Cologne, the same cause has withdrawn from cultivation and human habitation not less than 1,000,000 acres of ground, once well-wooded, well-drained and productive.

Dr. Schadt, Professor at the University at Bonn, says, in his well-known work "Les Arbres":

"The sanitary condition of man and of domestic animals, as well as the growth of cultivated plants, immediately depends on the climate of the locality. Epidemics, unknown before, may, perhaps, be attributed to a climatic change, brought about by the destruction of forests.

FORESTS AND RAINFALL.

"The fertility of a country depends on its supply of forest land."

M. Blanqui, in his travels in Bulgaria, mentions that at Malta the rains have become so seldom since the trees have been cut away to make room for cotton, that at the time of his visit, in 1841, not a drop of rain had fallen during three years.

The fearful dryness which has desolated the Cape Verde Islands, may be, in like manner, attributed to the cutting off of forests. On the Island of St. Helena, where the forests have been largely increased within the last few years, the amount of rain has increased proportionately, and is now double that which fell annually at the time of Napoleon's sojourn there. In Egypt, the recent plantations have brought rains where they were almost unknown before.

FOOD TREES.

Dr. Oswald, from whose article in the North American Review I have already quoted, says :

"The starving farmer of the Old World takes refuge in emigration ; but when the exhaustion of the West American and Australian soil shall leave us no New World to fall back upon, when all the arable land from Maine to California shall produce its utmost, and yet insufficient crops, the significance of the *hic aut nusquam* will be brought home to the nonplussed cultivator, and necessity will enforce the earth-transforming rule that in an over-populated land of limited agricultural resources herbs and cereals must give way to arboreal plants. An acre of ground planted with bananas will feed as many persons as thirty acres of the best potatoes or twenty-five acres of wheat. In many parts of southern Europe the chestnut is the bread-plant. Of a most prolific variety which is cultivated in the highlands of the Apennines, and would thrive as far north as Connecticut, a single tree often produces several thousand sweet and mealy half-ounce nuts, which the Italians grind like corn, and use for various palatable farinaceous preparations, in nutritive value far superior to the potato and rye-bread diet of their northern neighbors. Xenophon mentions the 'chestnut-fed children of the Bythynian mountaineers—'boys as broad as they were long.' Olive-trees live six centuries, and after the tenth year an olive-garden produces fourteen times as much oil as the same area of any annual plant. The same holds good of the northern beech and the arborescent hazelnut. The prolific Turkish sugar-plum thrives on soil where neither sugar-cane nor sorghum would grow. *Baum-woole*, the German word for cotton, means literally *tree-wool*, and several tropical trees, especially the *bombacea*, could furnish that material in every desired quantity. *Bombax-wool* is almost as fine and strong as silk, and the length of the fiber might be improved by cultivation."

NEW YORK.

The Adirondack region of New York forms one of the most important water-sheds of America. Its thousands of lakes, fed by the slowly melting snows and abundant rains of that forest-covered mountainous region, feed with an almost constant supply the rivers flowing west and north to Lake Ontario and the St. Lawrence, the Mohawk and Hudson, whose waters mingle with the Atlantic through the "Narrows" and New York Bay, and exercise a most important influence upon the climate and productions of New York.

The Hon. Verplank Colvin, Superintendent of the New York State Adirondack Survey, and Secretary of the Commissioners of State Parks, made a report to the Legislature of New York in 1873, containing much valuable information on the subject of Forestry. Speaking of the influence of the Adirondack forests, he says :

"We (the Commissioners) believe that the great Adirondack forest has a powerful influence upon the general climatology of the State ; upon the rainfall, winds and temperature, moderating storms and equalizing throughout the year the amount of moisture carried by the atmosphere ; controlling, and in a measure subduing, the powerful northerly winds, modifying their coldness and equalizing the temperature of the whole State".

Again, he says : "All floods, however, are not to be attributed to the destruction

of the forests ; for in this, as in other things, there are exceptions to the rule, nevertheless, upon the Hudson river, the destruction of the Adirondack forest would have a calamitous effect. The deep winter's snows, accumulating upon the disafforested uplands, would remain unmelted till the thousand and three hundred square miles of the present wilderness water-shed might have a compact covering of snow equivalent to twelve inches of water. Spring, with its sunshine and showers, would suddenly release this latent ocean ; 36,241,920,000 heavy cubic feet of water might rush at once, down through the valleys to the sea. More than a quarter of a massive cubic mile of water hurled furiously into the narrow valley of the Hudson, it would sweep before it fields of ice, to crush and sink the strongest vessels, and ruin the warehouses on the wharves. While the Adirondack forests remain, these deep snows will be protected from the direct rays of the sun in Spring, and will slowly and gradually melt away. The general temperature of the region will consequently be low ; the air will not be overcharged with moisture, and sudden, heavy rains will be improbable."

SANTA CRUZ.

The little island of Santa Cruz, one of the West Indies, was noted, thirty-five years ago, for the abundance and richness of its tropical productions, the salubrity of its climate, and the wealth and prosperity of its inhabitants. It was also a favorite winter resort for those dwelling at the north, for ten or fifteen years later. But the vandalism of its inhabitants finally swept away its forests, and it has become a dry, arid, worthless desert,—so that of a thousand trees recently planted upon an estate, there has not one survived. Many of the old, wealthy creole families were reduced to poverty and the inhabitants to exile. The sad story was told me by one who had thus suffered.

The same is true of the Island of Curacao, which met the same fate thirty years earlier. It had been a garden of fertility, abounding in beautiful villas and terraced gardens, all of which became a broad, arid waste, without trees or a blade of grass to protect its parched surface from the hot sun and devastating blasts.

Almost within sight of Curacao is the coast of Spanish main, covered with the rankest vegetation, over which the burdened clouds shower down abundant blessings.

HISTORY OF FORESTRY.

From a letter addressed to Verplank Colvin, Superintendent of the Adirondack Surveys, by S. V. Dorrien, 1879, on the Historical Development of Forestry, etc., I gather the following facts :

Among the oldest forest ordinances, regulating the economy of state and other forests, we find one given by the elector Joachim, of Brandenburg, in 1547 ; also, one respecting the forests owned by the Count of Mansfield, given in 1585, by the Elector August, of Saxony, by virtue of his right of sovereignty. The earliest French forest laws date from the 16th century.

Reflecting upon the state of forestry in Germany about the year 1700, we may assert that everywhere, excepting perhaps the north-eastern portion, the science of forest economy was caused and promoted by sheer necessity.

Game and forest-keepers, with a more than usual knowledge of forest matters

became the first real foresters. Principally among these we count J. G. von Langen, a native of Brunswick, who, in the year 1740, introduced the first systematic working plan in the Harz mountains. About the same time we find in Prussia the transition from the irregular "*planter system*" to systematic management of the forests.

Frederick the Great, of Prussia, soon after his ascension to the throne (1740), made it a law to divide the forests into equal sections, and to fell the timber accordingly. Forest Academies were established in the years 1783, 1785, and 1790, at Berlin, Hohenheim, Kiel and Munich, and from this time dates the scientific knowledge of forest matters. But its full importance was only recognized at a much later period, when it was deemed advisable to consider the laws of nature and to apply the rules of general economy to the administration of forests.

The advanced state of the science of forestry in Europe is best illustrated by the fact that there are at present nineteen high schools or academies of forestry, with a full corps of distinguished professors, and an extensive and well-rounded course of study.

PRUSSIA.

Prussia has 20,000,000 acres of forests, 10,000,000 of which are private, and the remainder state, commercial and ecclesiastical. The income to the State from these forests is \$14,000,000, the expenses \$7,500,000, leaving a net profit of \$6,500,000 annually.

SAXONY.

The State forests of Saxony are nearly 400,000 acres, worked at an expense of \$500,000, yielding an income of \$1,750,000, and a net profit of \$1,250,000 a year.

BAVARIA.

The State forests of Bavaria are 3,000,000 acres. They return, after paying all expenses, about \$1.50 per acre per annum. About 20,000 acres are sown or planted annually, taking 35,000,000 plants and 1,000,000 lbs. of seed.

The greater portion of the forests of Europe are directly under governmental direction and management, and owned by the government. The control, therefore, is absolute, and the management systematic and progressive.

PROFITS FROM TREE-PLANTING.

In the very valuable report of R. W. Phipps, Esq., of Toronto, on the necessity of preserving and replanting forests, made at the instance of the Government of Ontario, I take the following figures, which, however, were compiled by him from an extensive report made on the subject by Capt. Walker, under the direction of the European Government.

HANOVER.

The forests of Hanover, under State management, amount to 900,000 acres, of which the Government forests are about 600,000 acres; and the cost of working these and all expenses connected therewith are about \$650,000 annually, the receipts being \$1,500,000, and the profits, therefore, \$850,000, or about \$1.50 per acre per annum.

AREA OF FORESTS IN EUROPE.

The Hon. Franklin B. Hough, who is perhaps the most authoritative writer on forestry in America, says:

"Assuming (what I think no one will deny) that wood, in an infinite number of ways, is absolutely needed for man's use, and that civilization could scarcely exist without it, let us see how the supply stands: In Russia and Finland the wooded area was some years since estimated at 40 per cent., mostly in the interior and northern part; and in the former, the greater portion upon the waters that drain into the Arctic ocean. In Sweden and Norway, it was 34.1 per cent.; in Australia, 29.4; in Germany, 25.1; in Turkey and Roumania, 22.2; in Italy, 22; in Switzerland, 18; in France, 17.3; in Greece, 14.3; in Spain, 7.3; in Holland and Belgium, .7; in Portugal, 5.1; in Great Britain, 4.1, and in Denmark, 3.7 per cent. of their whole areas.

"In all of the countries where the percentage is small, their supplies of timber are imported chiefly from the Baltic ports, and from Canada and the United States. How long the forest products of Northern Europe will meet the demand, is becoming a matter of anxious inquiry, not only in the countries that supply, but also in those that receive them, and even in Norway and Sweden they are anxiously asking one another, 'what shall we do next?' Great Britain, which has been almost wholly supplied by commerce with the timber needed for its use, is making diligent efforts to establish systems of forest management in India and Australia, and at the present time active preparations are being made for an international forestry exhibition at Edinburgh, with the design of awakening an interest in this subject.

Every other country in Europe has a system of forest management, and those of Germany and France in particular, are well devised and admirably well managed. The care of woodlands requires special qualifications in the agents having charge, and to secure this, special schools have been established by the governments, not unlike those of our Government at West Point and at Annapolis, for preparing young men for our army and navy. They have every appliance that can be used for instruction, and their students have much practical experience in the duties they are to perform."

CONCLUSION.

I have thus endeavored to show, by undoubted authorities, the great rapidity with which our forests are disappearing, the vast demand upon them for domestic and manufacturing purposes, the near approach of the time when our home supply will fail, and the immediate necessity of instituting means for the protection and replanting of the forests in America. Their beneficent influence upon the climate and healthfulness of the country, upon agriculture, and upon the general prosperity of the people, I have shown, I think, by unquestionable evidence. With these facts before us, our duty is plain. We must agitate these facts until they are understood and appreciated—until the representatives of the people of the great State of Ohio shall give us wise laws on the subject of forestry, and thereby aid in redeeming the waste places, and rendering them once more productive in valuable wood and timber, until the farmers and fruit-growers shall understand that a larger proportion of woodland than they now have in this State will greatly enhance their productions and enable them to calculate more surely upon the annual crop, until

the beauty of trees in the landscape shall enhance the pleasures of life and minister to the higher aesthetic nature of the people.

Love for trees is a beautiful sentiment to instill in the hearts of the young, and it is the sure stepping-stone to that knowledge and appreciation of the beauty and usefulness of trees and forests that will lead them to plant, to protect and to nurture trees—"God's first temples."

HINTS FROM NATURE ON FOREST CULTURE.

A PAPER BY M. C. READ,

Hudson, Ohio.

The successful culture of forests requires a careful study of the mode of growth of each tree, the character of the soil best fitted for its growth, and of all the conditions tending to secure the best and most permanent results. Nature is her own best teacher, and the more carefully we follow her teachings the better will be our success. Departure from them in any important matter will tend to failure.

If the acres in Ohio, reported as covered with forests, were real forests, and could be preserved, they would probably suffice for the best agricultural results in the State. The preservation of these forests is now of first importance, and all influences which threaten their destruction should be carefully studied.

Instances are not wanting where efforts to make these forests more valuable are hastening their destruction. Some years ago the large elms which abounded in many of these forests were considered of no value for wood or timber, and were cut down and burned for the potash they would yield. The suggestion thus offered, of the supposed advantage of cutting out the valueless trees, was in some instances followed, by cutting out all the shrubs and poorer varieties of trees, for the purpose of favoring the growth of the more valuable ones. The result was, that the forests were opened up to the influence of the surface winds which swept the fallen leaves into the ravines and bottoms, the native grasses steadily encroached upon the forest, preventing the growth of seedling trees, forming a thick carpet of turf, almost impervious to water, while the destruction of the mosses and the removal of the leaves permitted the ground to become deeply frozen in winter, so that the influence of the forest in absorbing and retaining the rainfall was greatly impaired. The trees upon the margin gradually died out, or were overturned by the winds, until the early and complete destruction of the forest became apparent. The axe was then employed to finish the work, the sickly residue of the forest was destroyed, and the land devoted to pasturage or the plow.

A natural forest has a thick undergrowth of shrubs, mosses, and herbaceous plants, which hold the fallen leaves in place, favor the absorption of moisture, keep the ground from freezing, prevent the access of winds, and secure that constant humid condition favorable to forest growth. The preservation of our forests requires that all these conditions be preserved as perfectly as possible, and the untoward influences of the adjacent deforested lands be in some way counteracted. Left to the

influences of natural agencies, most of our small patches of forest will die out on the margins; the grass will intrude upon them, preventing the growth of seedlings; the wind will drive the leaves toward the interior, tear down the large trees, and slowly eat away the whole forest. Here is a fitting place for that useless hedge plant, the yellow willow. It will grow readily under the shade of other trees, and planted as a fence around these patches of forests, it will make a complete wind-break, and counteract the effect of the deforesting of the adjacent land. Such protection, and the complete exclusion of domestic animals, will save these forests from destruction. It is doubtful whether they can be saved in any other manner. Where seedlings of the desired varieties do not spring up in sufficient numbers, seeds should be planted so as to keep the surface well stocked.

This work of the preservation and perpetuation of what we now have is so important in this State, as to justly claim our chief attention. On the few farms where the timbered lands are too small, they should, if possible, be made the nucleus of the new forest, and the hedge or wind-break of willows be so located as to include within its boundaries the whole of the area devoted to forest trees.

In the new planting, an effort should be made to secure as quickly as possible the conditions under which nature secures a healthy forest growth. This can be largely secured by the thick planting of a large variety of trees. Thick planting will soon secure the requisite shading of the ground, and will resist the action of the winds. If a plantation is made of one species only, the insect enemies of that tree will probably be so increased by this artificial increase of their appropriate food as to make them formidable enemies, which will not ordinarily be the case with a mixed plantation. In the latter case, as some will be surface, and others deep feeders, a thicker growth can be maintained without injurious interference.

The natural adaptation of particular trees to particular soils is so obvious, that no time need be taken up in the discussion of the necessity of recognizing this adaptation. No one, for instance, would plant elms on sandy ridges or rocky hills, or the chestnut on flat, clay land.

But there is an error, into which our nurserymen have been driven by the demands of their customers, which should be carefully avoided. Most men, in planting orchards, demand trees of large size, and to meet this demand, and at the same time furnish trees that will easily bear transplanting, they have resorted to severe root-pruning and frequent transplanting to force a mass of fibrous roots. Most of our fruit trees are naturally deep feeders, pushing their roots far down into the sub-soil for moisture and mineral food. A seedling apple tree of one year's growth has a long tap-root, generally larger and longer than the growth above ground. If left to grow undisturbed, until of such a size as the fruit-grower demands, it could be transplanted only with great difficulty, and with such a mutilation of its roots as would hazard its life. The nurseryman, therefore, plucks it up after one summer's growth, cuts this tap-root into several sections, making each a stock for a graft; these planted in rich, mellow soil, throw out a mass of fibrous roots, and soon become what are called strictly first-class plants. But they are essentially unnatural products, and the weak constitutions and short lives of our fruit trees may be easily accounted for by this practice. In so important a matter as determining that some trees shall push their roots along the surface of the ground, feeding upon the rich humus exposed to atmospheric influence, and forming a broad base of interlocking

roots, upon which the tree may stand, while others push their roots directly downward into the stiff, hard sub-soil, and anchoring themselves there by long tap-roots, nature makes no mistakes. It is for a purpose that these long tap-roots push themselves downwards; and that purpose is the health and vigor and long life of the tree. We fight against nature when we interfere with this tendency. The destruction of the tap-root of a hickory tree is almost as fatal as would be the destruction of all of the lateral roots of an ash. Each has its own mode of growth, and cannot be grown after the model of the other.

Most of our nut-bearing trees have this deep-rooted mode of growth. They cannot be grown in nurseries until three or four years old, and then transplanted, without such a mutilation of their roots as will greatly impair their value. If it is not convenient to plant the nuts in the places the trees are to permanently occupy, one year is as long as they should remain in the nursery. Each will then have a long tap-root and almost no lateral fibrous roots. It can be taken up with ease without any mutilation, and as easily replanted in the place it is to occupy. It will then have a natural growth, will get its food in the way nature intended it should, and, if the soil is a congenial one, will maintain a healthy and vigorous growth until it attains the stature of a perfect tree after its kind.

The mode of growth of the seedlings of all the trees we propose to plant should be carefully studied, and these deep-feeders never deprived of the instruments or members by which they seek their food. All surface feeders may be safely grown in nurseries until of good size and subjected to almost any degree of root-pruning, and, when planted out, will make a healthy growth. But if those with tap-roots are thus treated they will be comparatively worthless. If retained in the nursery, and root-pruned until the power of renewing the tap-root is lost, they will none of them make healthy, long-lived trees. If so small when transplanted that they are able to renew the tap-roots, their growth will be so checked that seedlings of one year's growth will, in a few years, surpass them in growth, and become more valuable trees.

ARBOR DAY CELEBRATIONS.

AN ADDRESS BY JOHN D. PEASLEE, PH.D.,

Superintendent of the Cincinnati Public Schools.

The time has come when the people of Ohio must wake up to the importance of preserving our forests and of planting trees, or our State will suffer the terrible consequences of this neglect before another half century has passed away. Hon. Emil Rothe, who has given the subject much study, in speaking of Ohio before the American Forestry Congress at Cincinnati, in 1882, said: "Let the hills be deprived of the rest of the protection which the forests afford, and half the area of our State will be sterile in less than fifty years." "The wealth, beauty, fertility, and healthfulness of the country," as Whittier justly says, "largely depend upon the conservation of our forests and the planting of trees." How can these truths be im-

pressed most effectively upon the minds of our people? In the first place, tree-planting associations, improvement societies, should be organized in every city, town, village, and country school district in the State, whose object shall be to plant trees along streets, by the road-sides, in parks and commons, around public buildings, in waste places; to distribute information in regard to trees and forests among the people, and to encourage tree-planting in every way possible. These associations, or societies, in conjunction with the schools, should hold tree-planting celebrations from year to year, but where such associations are not formed, the schools should conduct the exercises. The youth of our State must be instructed in the value and utility of forests—their influence upon climate, soil, productions, etc.—correct sentiment in regard to trees must be implanted in them if the best interests of the State are to be subserved; and the most impressive and attractive means of imparting the instruction, and of interesting the pupils in the subject is through the celebration of tree-planting. It is also the surest and best way of calling the attention of the people at large to it. It is, therefore, especially desirable that the section of the Forestry bill, now before the Legislature, which designates the third Friday in April as “Arbor Day,” and makes it a general holiday for all public schools that take part in the celebration of tree-planting, should become a law. The principal objects of the celebration are, to instill into the minds of children and older citizens correct sentiments in regard to trees, and to store their minds with information relating to forestry, and to the distinguished individuals in whose honor or memory each tree, or group, is planted, for I would have all the trees around which the celebrations take place dedicated to great authors, statesmen, soldiers—in brief, to famous men and women, whose lives have reflected honor upon our country; to the pioneers and distinguished citizens of each township, village or city, as the case may be, and thus “make trees,” as Holmes says, “monuments of history and character.”

In every place where sufficient grounds can be obtained, either in public parks or elsewhere, I would have memorial groves planted, and the “Arbor Day Celebrations” take place in them. Let there be a “Citizens’ Memorial Grove,” in which trees shall be planted from year to year by loving hands of the relatives and friends of those who have died; let there be a “Pioneers’ Grove,” in which all citizens, young and old, shall annually join in paying just tribute to the memory of those who endured the hardships and privations of a pioneer life.

“They vanish from us one by one,
In death’s unlighted realm to sleep;
And O! degenerate is the son
Who would not some memorial keep.”

Let there be an “Authors’ Grove,” in which the school children shall honor, by living monuments, the great men and women in literature, so that while they learn to love and reverence trees they will, at the same time, become interested in the lives and writings of distinguished and worthy authors. Let there be a “Soldiers’ Grove,” devoted to the memory of our patriotic dead. Yes,

Plant beautiful trees in honor of those
Whose memory you revere,
And more beautiful still they’ll become
With each revolving year.

And what monuments the trees, the monarchs of the vegetable world, become! They are more durable than marble itself.* Their grandeur will challenge the admiration of the beholder when the coeval marble monument at their base will lie in ruins, defaced by age and crumbling into dust. Well may the great historian, Benson J. Lossing, ask, "What conqueror in any part of 'life's broad field of battle' could desire a more beautiful, a more noble, a more patriotic monument than a tree, planted by pure and joyous children, as a memorial of his achievements? What earnest, honest worker, with hand and brain for the benefit of his fellow-men, could desire a more pleasing recognition of his usefulness than such a monument, a symbol of his or her own productions, ever growing, ever blooming, and ever bearing wholesome fruit?"

CELEBRATION BY THE CINCINNATI PUBLIC SCHOOLS.

In order to indicate the character and scope of the Arbor Day celebrations, I will here give a brief description of the celebrations held by the public schools of Cincinnati in Eden Park. For a fuller detailed account of the same I refer you to the last annual reports of the schools.

At the request of the projectors of the American Forestry Congress, which was organized in Cincinnati in the Spring of 1882, the Ohio Legislature passed a joint resolution, authorizing the Governor of the State to issue a proclamation each year, in which he should designate a day in April as "Arbor Day", and call upon the citizens of the State to devote that day to tree-planting. In accordance with the resolution, the proclamation was issued, designating the 27th of April of that year as "Arbor Day".

Acting in the spirit of the Governor's proclamation, the Board of Education of that city decided by a unanimous vote to dismiss the schools for two days, April 27th and 28th, thus giving the teachers and pupils an opportunity of participating in the tree-planting on Arbor Day and of attending the remaining exercises of the Congress. It occurred to me that it would be an important thing for the schools to plant trees in honor and memory of our great American authors, to be known as "Authors' Grove". A meeting of the Principals and Special Superintendents was called, at which it was decided that each of the schools and of the departments of Music, Drawing and Penmanship should select an author in whose honor or memory that school or department should plant a group of trees. About six acres were set apart in Eden Park, by the Board of Public Works, for "Authors' Grove". Selections on trees and forestry from various authors were sent to the several schools to be memorized by the pupils; also, information concerning historic trees of our country; and many facts of history giving the effects upon climate, soil, productions, etc., both of the destruction and of the renewal of forests were given to the scholars; these formed the basis of composition in the upper grades. In addition to the above, the teachers gave sketches of the lives of their respective authors, and the pupils learned selections from their writings.

*NOTE.—The natural age of the oak is from 1,500 to 2,000 years; of the elm, from 350 to 500 years; of the cypress, 350 years; of the larch, 600 years; of the yew tree, 2,500 to 3,000 years; of the maple, from 600 to 800 years; of the cedar, 800 years; of the linden, 1,200 years. There are trees now standing that are supposed to be over 5,000 years old.

In some of the schools, the boys were organized into companies, under the name of Forestry Cadets, as, the "Emerson Forestry Cadets", of the Hughes High School; the "Longfellow Forestry Cadets," of the Eleventh District School; the "Holmes Forestry Cadets", of the Twenty-second District School. The girls, and the boys not organized in companies, were called "Foresters", as the "Whittier Foresters", the "Franklin Foresters", and so on.

That the part taken by the pupils in the actual planting of the trees may not be misunderstood, I will state that experienced tree-planters did most of the work of setting out the trees previous to Arbor Day, and that the pupils finished the setting by filling around each tree soil left in heaps for this purpose.

On Arbor Day, Authors' Grove was distinguished from the others ("Pioneers' Grove", "Battle Grove", "Presidents' Grove", "Citizens' Memorial Grove", for the celebration of tree-planting was going on at the same time in each of these groves) by a large blue flag placed near the centre of the grove, and by small flags of the same color placed around the grove. At a given signal, the pupils, upward of seven thousand in number (at the celebration last year there were more than seventeen thousand present), arranged themselves, each school, around its special author's tree or group, and the exercises began. In general these exercises consisted of reading by the pupils their composition on forestry; of reciting individually and in concert the selections on trees; of giving sketches of the lives and writings of chosen authors; of declaiming extracts from their works; of reading letters from living authors or from the representatives and friends of those who have passed away; of singing; of the ceremony of throwing the soil, each pupil in turn, about the tree, and of appropriate talks by teachers and others. At the expiration of the time allotted to this part of the programme, the pupils came together, and, assisted by instrumental music, sang our national songs and others appropriate to the occasion. After this the pupils were dismissed to enjoy themselves in their own way in the great park. Thus ended what, perhaps, were the most interesting and profitable lesson the pupils ever had in a single day; for, in participating in the planting of this grove they have not only obtained a better knowledge of American authors and their literature, but have learned to care for and protect forest trees. Besides, the importance of Forestry has been impressed upon the minds of thousands of children by the celebration, few of whom knew before the existence of such a subject. The attention of parents, also, was attracted to it.

In giving a description of the celebration last Arbor Day, April 27th, 1882, one of the Cincinnati daily papers said:

"The eastridge of the park was thronged with associations, planting tablets (at each of fifty groups, planted the year before, in "Authors' Grove," a granite "marker" was placed last year, on which was cut in raised letters the name of the author and of the school planting the group. Each of the other groves referred to was marked by a large, flat sandstone, on which all the names were engraved) to the memories of the Presidents of the United States, the heroes of Valley Forge, and the pioneers of Cincinnati, in their respective groves, while the northern projecting slope of the ridge was occupied by fully 17,000 children in honoring 'Authors' Grove.' Viewed from the summit of the ridge, immediately west, the sight was one of the most animating ever brought before the eyes of Cincinnatians. The entire ridge, nearly a third of a mile in length, was occupied by those persons taking

part in the first-named ceremonies, while the slope designated was occupied by a dense mass of gayly-dressed children in active motion over a surface of about six acres, and whose voices, wafted across the deep hollow to the western ridge, sounded like the chattering from a grove full of happy birds. The eastern slope of the ridge was occupied by 1,500 or 2,000 spectators, who, reclining on the green spring sod of the grassy slopes, quietly surveyed the scene from a distance."

EDEN PARK ON ARBOR DAY.

The sentiment of the scholars in regard to trees, which was one of the direct results of the celebration, is clearly indicated by the fact that though there were thousands of children in Eden Park on Arbor Day, of both years, not one injured a tree in any manner. In contrast to this, a prominent writer for one of the leading journals of England, in an article strongly advocating the adoption by the public schools of Great Britain of the Cincinnati plan of celebrating tree-planting, said that in Epping Park, on every public holiday, the authorities employ a large force of special policemen to keep the people from wantonly injuring and destroying trees, and that, notwithstanding all the care and precaution taken to prevent it, trees are mutilated on all these public days.

SCHOOL CELEBRATIONS IN OTHER PLACES.

The Ohio State Forestry Association, recognizing the fact that the schools of the State must become one of the most powerful agents in carrying out the objects of the association, prepared a circular addressed to the trustees, superintendents and teachers of Ohio schools, requesting them to have the pupils under their charge celebrate Arbor Day with appropriate ceremonies. Previous to last Arbor Day this circular was sent to all parts of the State, and to many places outside of Ohio. It gives me pleasure to say that many schools, in and out of the State, celebrated the day, and that, as a consequence, thousands of trees were planted, and tens of thousands of school children outside of Cincinnati received instruction on and became interested in trees. Hon. B. L. Butcher, State Superintendent of the Schools of West Virginia, issued instructions to the city and county superintendents and to the teachers of his State, to celebrate tree-planting on our last Arbor Day, April 27th. This movement was supported by the entire public press of the State. One number of the *West Virginia School Journal*, of which Superintendent Butcher is one of the editors, was exclusively devoted to this subject. And on Arbor Day the schools of all parts of that State, assisted by thousands of public-spirited citizens, planted trees in the school grounds, by the road-side, around the homes of the children, and dedicated them to authors, statesmen, soldiers and distinguished citizens. The day was celebrated, after the Cincinnati plan, in many places of our own and of other States.

I mention these facts to show that the subject which I advocate is entirely practicable, and that it will be readily taken up, when properly presented to our people.*

*NOTE.—To assist in Arbor Day celebrations, and to furnish information to the people of our State as to the importance of trees on forests, a sixty-four page pamphlet has been prepared by me, with preface by Judge Warren Higley, entitled: "Trees and Tree-planting; with Directions and

Should the annual celebration of tree-planting, the preparation for which affords ample opportunity for imparting all needful information in regard to trees and forestry, become general in our State, the time would not be far distant when such a public sentiment would be formed as would lead to the beautifying by trees of every city, town, and village in Ohio, as well as public highways, church and school grounds, and the homes of the people in the country. In truth, within the next twenty-five years thereafter the general aspect of many parts of the State would be changed, as has been that of Connecticut within the last few years, through the instrumentality of her schools under the leadership of Hon. B. G. Northrop, and of her "Improvement Societies", which have been organized through his efforts. Pastor Oberlin, after whom Oberlin College, of this State, is named, required each boy and girl, before he would administer the ordinance of confirmation, to bring a certificate that he or she had planted two trees. If but the youth of Ohio could be led to plant their two trees each, how by the children alone could our great State be enriched and beautified within the next fifty years.

TREE-PLANTING FOSTERS A LOVE FOR TREES AND TREE-CULTURE.

The trees which the children plant, or which they assist in dedicating, will become dearer to them as year after year rolls on. As the trees grow, and their branches expand in beauty, so will the love for them increase in the hearts of those by whom they were planted or dedicated, and long before the children reach old age they will almost venerate these green and living memorials of youthful and happy days; and as those who have loved and cared for pets will ever be the friends of our dumb animals, so will they ever be the friends of our forest trees. From the individual to the general, is the law of our nature. Show me a man who in childhood had a pet, and we'll show you a lover of animals. Show me a person who in youth planted a tree that has lived and flourished, and I'll show you a friend of trees and of forest culture.

In this I speak from experience. The pets I had when a child led me to join the "Society for the Prevention of Cruelty to Animals". The trees I planted in early boyhood in front of my old New Hampshire Home have brought me before you to-day as the advocate of tree-planting and Arbor Day Celebrations.

THE CARY TREE.

In further illustration of what I have said, I will relate an incident in the lives of Alice and Phœbe Cary, Ohio's greatest daughters. In 1832, when Alice was twelve years old, and Phœbe only eight, as these little girls were returning home from school one day, they found a small tree, which a farmer had grubbed up and thrown into the road. One of them picked it up, and said to the other, "Let us plant it." As soon as said, these happy children ran to the opposite side of the road, and with sticks—for they had no other implement—they dug out the earth, and in the hole

Exercises for the Celebration of Arbor Day." The first part of the pamphlet (44 pages) is taken up with lessons from history, and other important facts, relating to forestry and tree-planting, while the second part (20 pages) is devoted to selections on trees, in prose and poetry, from various authors.

An edition of five thousand copies is now being published, under the auspices of the Ohio State Forestry Association, for general distribution.

thus made they placed the treelet; around it with their tiny hands they drew the loosened mold, and pressed it down with their little feet. With what interest they hastened to it on their way to and from school, to see if it were growing; and how they clapped their little hands for joy when they saw the buds start and the leaves begin to form! With what delight did they watch it grow through the sunny days of Summer! With what anxiety did they await its fate through the storms of Winter, and when at last the long-looked for Spring came, with what feelings of mingled hope and fear did they seek again their favorite tree!

But I must not pursue the subject further. It is enough to know that when these two sisters had grown to womanhood, and removed to New York City, they never returned to their old home without paying a visit to the tree that they had planted, and that was scarcely less dear to them than the friends of their childhood days. They planted and cared for it in youth; they loved it in age. That tree is the large and beautiful sycamore which one sees in passing along the Hamilton turnpike from College Hill to Mt. Pleasant, Hamilton county, Ohio.

OLD LIBERTY ELM.

It was the custom of our New England ancestors to plant trees in the early settlement of our country, and dedicate them to liberty. Many of these "liberty trees", consecrated by our forefathers, are still standing. I remember, when a boy, the interest I felt in "Old Liberty Elm," that then stood in Boston. That old tree was planted by a schoolmaster long before the Revolutionary War, and dedicated by him to the independence of the Colonies. Around that tree, before the Revolution, the citizens of Boston used to gather to listen to the advocates of our country's freedom; around it, during the war, they met to offer up thanks and supplications to Almighty God for the success of the patriot armies; and, after the terrible struggle had ended, the people were wont to assemble from year to year in the shadow of that old tree to celebrate the liberty and independence of our country. It stood there till within a few years, a *living* monument of the patriotism of the citizens of Boston. The sight of that tree awakened patriotic emotions in every true American heart. And when at last that old tree fell, the bells in all the churches of Boston were tolled, and a feeling of sadness spread over city and State. Even in Ohio, there were eyes that moistened with tears when the news came that "Old Liberty Elm" had fallen in a storm. Such was the veneration in which it was held.

WASHINGTON ELM.

Another of these "liberty elms" now stands in Cambridge, Mass. Under the shade of this venerable tree Washington first took command of the Continental army, July 3, 1775. How the affection of every lover of his country clings around that tree! What care has been taken of it, what marks of esteem have been shown it by the citizens of Cambridge, may be judged by those who have seen it standing, as it does, in the center of a great public thoroughfare, its trunk protected by an iron fence from injury by passing vehicles, which for more than a century have turned out in deference to this monarch of the Revolution.

(In this connection let me state that a few years ago, a number of American Scientists, in order to determine the amount of moisture given out by forest trees, se-

lected the "Washington Elm" on which to make their experiments. They calculated that the leaves of this tree would cover with a single layer 200,000 square feet of space, and that they gave out every fair day during the growing season, 15,500 lbs., or $7\frac{3}{4}$ tons moisture to the atmosphere.)

"Trees already grown ancient have been consecrated," says Lossing in a letter, "by the presence of eminent personages or by some conspicuous event in our National History, such as the Elm tree at Philadelphia, at which William Penn made his famous treaty with nineteen tribes of barbarians; the Charter Oak at Hartford, which preserved the written guarantee of the liberties of the Colony of Connecticut; the wide-spreading Oak tree of Flushing, Long Island, under which George Fox, the founder of the Society of Friends or Quakers, preached; the lofty Cypress tree in the Dismal Swamp under which Washington reposed one night in his young manhood; the huge French Apple tree near Ft. Wayne, Indiana, where Little Turtle, the great Miami Chief, gathered his warriors; the Elm tree at Cambridge, in the shade of which Washington first took command of the Continental Army on a hot summer's day; the Tulip tree on King's Mountain battle-field in South Carolina, on which ten bloodthirsty Tories were hung at one time; the tall Pine tree at Ft. Edward, N. Y., under which the beautiful Jane McCrea was slain; the magnificent Black Walnut tree, near Haverstraw on the Hudson, at which General Wayne mustered his forces at midnight, preparatory to his gallant and successful attack on Stony Point; the grand Magnolia tree near Charleston, S. C., under which General Lincoln held a council of war previous to surrendering the city; the great Pecan tree at Villere's plantation, below New Orleans, under which a portion of the remains of General Pakenham was buried, and the Pear trees planted, respectively, by Governor Endicott, of Massachusetts, and Governor Stuyvesant, of New York, more than two hundred years ago.

These trees all have a place in our National history, and are inseparable from it because they were so consecrated. My eyes have seen all but one of them; and patriotic emotions were excited at the sight. How much more significant and suggestive is the dedication of a young tree as a monument." (Extract from letter)

OTHER FAMOUS TREES.

A few famous trees of this country, not previously named, are given here. The "Burgoyne elm", at Albany, N. Y.: This tree was planted on the day the British general, Burgoyne, was brought a prisoner into Albany, the day after the surrender. The weeping-willow in Cop's burying-ground, near Bunker Hill: This willow, grown from a branch taken from the tree that shaded the grave of Napoleon at St. Helena, now waves over that of Cotton Mather, so noted in Salem witchcraft. Cop's burying-ground is so near where the battle was fought that a number of grave-stones can be seen to-day which were marked and broken by bullets fired by British soldiers in that battle. The ash-trees planted by General Washington at Mt. Vernon: These ashes form a beautiful row of immense trees, which are the admiration of all who visit the home of the "Father of his Country."

"WOODMAN SPARE THAT TREE."

I will close this paper with the familiar, beautiful and appropriate lines by Geo. P. Morris, entitled, "Woodman Spare That Tree," first, however, giving you a brief account of the way in which Mr. Morris came to write the poem.

In a letter to a friend, dated New York, February 1, 1837, Mr. Morris gave in substance the following account :

Riding out of town a few days since, in company with a friend, an old gentleman, he invited me to turn down a little romantic woodland pass, not far from Bloomingdale. "Your object?" inquired I. "Merely to look once more at an old oak tree planted by my grandfather long before I was born, under which I used to play when a boy, and where my sisters played with me. There I often listened to the good advice of my parents. Father, mother, sisters—all are gone; nothing but the old tree remains." And a paleness overspread his fine countenance, and tears came to his eyes. After a moment's pause, he added: "Don't think me foolish. I don't know how it is: I never ride out but I turn down this lane to look at that old tree. I have a thousand recollections about it, and I always greet it as a familiar and well-remembered friend." These words were scarcely uttered when the old gentleman cried out, "There it is!" Near the tree stood a man with his coat off, sharpening an ax. "You're not going to cut that tree down, surely?" "Yes, but I am, though," said the woodman. "What for?" inquired the old gentleman, with choked emotion. "What for? I like that! Well, I will tell you. I want the tree for firewood." "What is the tree worth to you for firewood?" "Why, when down, about ten dollars." "Suppose I should give you that sum," said the old gentleman, "would you let it stand?" "Yes." "You are sure of that?" "Positive." "Then give me a bond to that effect." We went into the little cottage in which my companion was born, and which is now occupied by the woodman. I drew up the bond. It was signed, and the money paid over. As we left, the young girl, the daughter of the woodman, assured us that while she lived the tree should not be cut. These circumstances made a strong impression on my mind, and furnished me with the materials for the song I send you.

Woodman, spare that tree!
 Touch not a single bough!
 In youth it sheltered me,
 And I'll protect it now.
 'T was my forefather's hand
 That placed it near his cot;
 There, woodman, let it stand;
 Thy ax shall harm it not!

That old familiar tree,
 Whose glory and renown
 Are spread o'er land and sea,—
 And wouldst thou hack it down?
 Woodman, forbear thy stroke!
 Cut not its earth-bound ties;
 O, spare that aged oak,
 Now towering to the skies!

When but an idle boy
 I sought its grateful shade;
 In all their gushing joy,
 Here, too, my sisters played.
 My mother kissed me here;
 My father pressed my hand—
 Forgive the foolish tear:
 But let that old oak stand.

My heart-strings round thee cling,
 Close as thy bark, old friend;
 Here shall the wild-bird sing,
 And still thy branches bend.
 Old tree! the storm still brave!
 And, woodman, leave the spot;
 While I've a hand to save,
 Thy ax shall harm it not.

GEORGE P. MORRIS.

LETTERS FROM AUTHORS.

A few of the letters from living authors, and from the representatives of others who have passed away, received by me on the occasion of the celebration of tree-planting by the Cincinnati public schools, are appended to my paper, to show how the subject is looked upon by great men and women of our country, whose opinions are far more important than my own.

[From J. T. Headley, Historian.]

MR. JOHN B. PEASLEE—DEAR SIR: It is gratifying to see Ohio take such deep interest in tree-planting, which is beginning so strongly to attract public attention. Setting apart one day for this purpose and making it a general holiday will add attractiveness to utility, and give it a deeper hold on the popular heart. But the happiest thought of all was to make it a holiday for the public schools, and have the children practically take part in it and set out groups of trees for their favorite authors. You thus not only connect trees with the associations of childhood and their pleasantest holidays, but with authors from whom they receive their earliest and best impressions.

We sometimes forget that the highest aim of education is to form right character—and that is accomplished more by impressions made upon the heart than by knowledge imparted to the mind.

The awakening of our best sympathies—the cultivation of our best and purest tastes—strengthening the desire to be useful and good, and directing youthful ambition to unselfish ends—such are the objects of true education. Surely nothing can be better calculated to procure these ends than the holiday you have set apart for the public schools.

Yours, very truly,

J. T. HEADLEY.

[From Oliver Wendell Holmes]

MR. JOHN B. PEASLEE—DEAR SIR: You and your friends have chosen a very pleasant and most useful way of commemorating some of the authors whom you think worthy of being remembered by their fellow-countrymen. I hope that the example set of planting trees as their monuments will do as much for American landscape as the best of our authorship has done for American literature.

The trees may outlive the memory of more than one of those in whose honor they were planted. But if it is something to make two blades of grass grow where only one was growing, it is much more to have been the occasion of the planting of an oak which shall defy twenty scores of winters, or of an elm which shall canopy with its green cloud of foliage half as many generations of mortal immortalities. I have written many verses, but the best poems I have produced are the trees I

planted on the hill-side which overlooks the broad meadows, scalloped and rounded at their edges by loops of the sinuous Housatonic. Nature finds rhymes for them in the recurring measures of the seasons. Winter strips them of their ornaments and gives them, as it were, in prose translation, and Summer reclothes them in all the splendid phrases of their leafy language.

What are these maples and beeches and birches but oles and idyls and madrigals? What are these pines and firs and spruces but holy hymns, too solemn for the many-hued raiment of their gay deciduous neighbors?

But I must not let my fancy run away with me. It is enough to know that when we plant a tree, we are doing what we can to make our planet a more wholesome and happier dwelling-place for those who come after us, if not for ourselves.

As you drop the seed, as you plant the sapling, your left hand hardly knows what your right hand is doing. But Nature knows, and in due time the Power that sees and works in secret will reward you openly. You have been warned against hiding your talent in a napkin; but if your talent takes the form of a maple-key or an acorn, and your napkin is a shred of the apron that covers "the lap of the earth," you may hide it there, unblamed; and when you render in your account you will find that your deposit has been drawing compound interest all the time. * * *

Believe me, dear Mr. Peaslee, very truly yours,

OLIVER WENDELL HOLMES.

[Extract from letter of Gen. Samuel F. Cary, cousin of Alice and Phoebe Cary.]

"Imparting to waste places more than their pristine beauty and associating the names of departed loved ones with our work is a poetic and sublime conception. It symbolizes our faith in a resurrection to a higher and better life when the hard struggles of this sin-cursed world are passed."

[From Moncure D. Conway.]

DEAR SIR: It is a great pleasure to me to think of the young people of Cincinnati assembling to celebrate the planting of trees and connecting them with the names of authors whose works are the farther and higher products of our dear old Mother Nature. An oriental poet says of his hero:

"Sunshine was he in a wintry place.
And in midsummer, coolness and shade."

Such are all true thinkers, and no truer monuments of them can exist than beautiful trees. Our word book is from the beech tablets on which men used to write. Our word bible is from the Greek for bark of a tree. Our word paper is from the tree papyrus—the tree which Emerson found the most interesting thing he saw in Sicily. Our word library is from the Latin *liber*, bark of a tree. Thus literature is traceable in the growth of trees, and was originally written on leaves and wooden tablets. The West responds to the East in associating great writers with groups of trees, and a grateful posterity will appreciate the poetry of this idea as well while it enjoys the shade and beauty which the schools are securing for it.

Very truly yours,

MONCURE D. CONWAY.

[Extract from letter of Prof. B. Pickman Mann, son of Horace Mann.]

"The project of connecting the planting of trees with the names of authors is a beautiful one, and one certain to exert a beneficial influence upon the children who participate in these exercises. The institution of an 'Arbor Day' is highly commendable from its artistic consequences, and can not fail to result in great benefit to the climate and to the commercial interests of the country when it becomes an institution of general adoption."

[From Prof. William A. Mowry, Ph. D.]

JOHN B. PEASLEE, PH. D.—MY DEAR SIR: The experience of the Cincinnati Schools will illustrate the importance of acquainting the youthful mind with our best authors and their productions.

I believe it is well agreed, also, that truths and facts are more firmly impressed upon the mind by object lessons than by any other means.

Moreover, the planting of trees and the cultivation of forests are but just beginning to be appreciated by our people as matters of great importance.

I conceive, therefore, that you have instituted one of the best educational projects of the age in organizing and carrying forward in a systematic manner the planting of trees in the public parks by the school children—attended by appropriate intellectual exercises, especially including the recitation of selections from these authors' best thoughts. Attended as these exercises will be with the parade and ceremony of a celebration, and with the attraction and pleasures to the young minds of a holiday, the exercises and what they symbolize will be deeply stamped upon the memory of the school children, and the entire effect upon them must prove to be of the most important and satisfactory character. I congratulate you and the children of your beautiful city on the inauguration of this excellent custom, and can not but believe it will be widely followed by the cities of our country.

Very respectfully yours,

WILLIAM A. MOWRY.

[Letter from Dr. Edward H. Parker, author of the lines placed at the head of Garfield's casket in the catafalque at Cleveland, beginning "Life's race well run."]

John B. Peaslee, Esq., Superintendent of the Cincinnati Schools:

MY DEAR SIR—Accept my thanks for the interesting account of the "Authors' Grove" and its ceremonies. Either or both is entitled to the thanks of the good people of Cincinnati. Trees, in their variety, are always a delightful study to me, and few, I think, really know how much of beauty and individuality there is in them. Such a grove near a large city will give valuable instruction to the young people, while the designation of the various groups, as commemorative of the distinguished men whose name each bears, will induce further inquiry as to who and what they are or were. They will find that there is something very interesting, almost very solemn to them, when in after years they stand by those saplings which they have planted and find them towering high above their heads and boasting the pomp of their lineage of ages. Here at best are "old families," a veritable aristocracy. * *

Believe me, yours, very respectfully,

EDWARD H. PARKER.

[From Mrs. Mary H. Russell, daughter of Mrs. Lydia M. Sigourney.]

WATERBURY, CONN., March 9, 1883.

MR. PEASLEE—DEAR SIR: I thank you for a copy of the Cincinnati *Times* received a day or two ago, containing an account of the work of the Public Schools in setting out forest trees in "Authors' Grove." It is a beautiful plan, worthy of the city where it has been originated and carried out.

I desire to express to you, and through you to the Twelfth District School, my appreciation of the memorial to my mother, Mrs. Sigourney, and to say what a peculiar interest she felt in this work of planting trees. She used often to speak with great admiration of the patriotism of her friend, the Hon. James Hillhouse, of New Haven, who beautified that city by planting with his own hand the elms which have since made it famous; and when she was notified, many years ago, that a young town in Iowa had been called Sigourney in her honor, she sent a sum of money to be expended in shade trees to ornament its public square. There seems a peculiar fitness in these living monuments to those whose names we would still keep with us now that their bodily presence has departed, and I trust that the trees may flourish and prosper, and keep green many years the memory of each one for whom they have been planted.

Yours very truly,

MARY H. RUSSELL.

[Extract of letter from John G. Whittier.]

"For many years I have felt a deep interest in the conservation of our forests and the planting of trees. The wealth, beauty, fertility, and healthfulness of the country largely depend upon it. My indignation is yearly aroused by the needless sacrifice of some noble oak or elm, and especially of the white pine, the grandest tree in our woods, which I would not exchange for oriental palms.

My thanks will be due to the Public School which is to plant a group of trees in your Eden Park in my honor. I could ask no better memorial. I have always admired the good taste of the Sokokis Indians around Sebago Lake, who, when their chief died, dug around a beech tree, swaying it down, and placed his body in the rent, and then let the noble tree fall back into its original place, a green and beautiful monument for a son of the forest."

ON TREE-PLANTING ASSOCIATIONS.

[Extract from letter of Susan Fennimore Cooper, daughter of James Fennimore Cooper.]

"The subject of forestry is one in which I have been very deeply interested for many years. In a volume on country life, published long since under the title of 'Rural Hours,' I already deplored the extravagant and senseless destruction of trees in our country, not only wild forests, but lesser woods and groves, and single trees of unusual beauty. There has been really a recklessness on this subject which may be called barbarous, and utterly unworthy of the civilization on which we pride ourselves. But, most happily, our people appear to be awakening to the vast importance of this question in different parts of the country. Some twenty years since a Village Improvement Society was organized in this neighborhood, whose object was the same in spirit as the noble Arbor Society of Ohio—the planting of trees for shade and or-

nament in the streets, near the gateways, in waste spots such as are found in every neighborhood, about springs, wells, and other positions where they would form pleasing groups—living pictures as it were—and the preservation of trees of more than common beauty and interest; all these entered into the work of the Improvement Society.”

[Extract from speech on Arbor Day, by Hon. B. G. Northrop.]

“Teachers can easily interest their pupils in adorning the school grounds. With proper pre-arrangement as to the selection and procuring of trees, vines or shrubs, Arbor Day may accomplish wonders. Many hands will make merry, as well as light, the work. Such a holiday will be an attractive occasion of social enjoyment and improvement. The parents should be persuaded to approve and patronize the plan. It tends to fraternize the people of a district, when they thus meet on common ground, and young and old work together for a common object, where all differences of rank, or sect, or party, are forgotten. The plantings and improvements thus made will be sure to be protected. They will remain as silent, but effective teachers of the beautiful to all the pupils, gradually improving their taste and character. Such work done around the school naturally extends to the homes. You improve the homes by improving the schools as truly as you improve the schools by improving the homes. ‘The hope of America is the homes of America.’ It has long been my ambition to improve the homes and home-life of our industrial classes and help them to realize that the highest privilege and central duty of life is the creation of happy homes, for the home is the chief school of virtue, the fountain-head of individual and national strength and prosperity. It is a worthy ambition to surround one’s home and children with such scenes and influences as shall make the everyday life and labors brighter and happier, and help one to go sunny and singing to his work. Our youth should early share in such efforts for adorning the surroundings of their homes, and planting trees by the wayside. How attractive our roads may become by long avenues of trees. This is beautifully illustrated in many countries of Europe.

“Arbor Day will become one of the institutions of the country, in which our boys and girls will take an eager share and genuine pleasure, and thus gain a liking for trees that will never be effaced. Nebraska has the honor of originating Arbor Day. Some ten years ago, at the request of its State Board of Agriculture, the governor appointed the second Wednesday in April as the day to be devoted to economic tree-planting, and it is claimed that twelve millions of trees were planted on that day. The successive governors have continued thus to recognize this day. The schools last Spring adopted the ‘Cincinnati plan’ of planting, ‘memorial trees.’

“The recent Spring floods and Summer droughts in Indiana, Ohio, and elsewhere, increasingly and now alarmingly destructive, are calling public attention to the cause and remedy as never before. The denudation of the hills and mountain sources of the springs is the leading cause of these freshets, and these can be remedied only by the extensive re-forestation of such lands. This great result, which must be the work of time, will be best accomplished by interesting the young, as well as the old, in tree-planting. The Arbor Day in schools will do immense good in this direction. We need to popularize and diffuse the sentiment of trees. This will best

secure their propagation and protection. The frequency of forest fires is the common objection to economic tree-planting. But let the sentiment of trees be duly cultivated, and they will be regarded as our friends, as in the case in Germany. The public need to understand that the interests of all classes are concerned in the conservation of forests. In Germany, Switzerland, Sweden, and other European countries, this subject is so taught in their schools that the people generally appreciate the value of trees and the need of protecting them. Hence, an enlightened public sentiment is a better guardian of their forests than the national police."

IMPROVEMENT SOCIETIES, OR TREE-PLANTING ASSOCIATIONS.

In order to facilitate the organization of Village Improvement Societies the following Constitution is given here. It is modeled after the constitution of the Laurel Hill Association of Stockbridge, Mass., and of the Wyoming and College Hill (Hamilton County, Ohio), Village Improvement Societies.

ARTICLE I.

This Society shall be called the ——— Improvement Society.

ARTICLE II.

The object of this Society shall be to improve and ornament the streets and public grounds of the village by planting and cultivating trees, establishing and protecting grass-plats and borders in the avenues, and generally doing whatever may tend to the improvement of the village as a place of residence.

ARTICLE III.

The business of the Society shall be conducted by a board of nine directors—five gentlemen and four ladies, to be elected annually by the Society—who shall constitute the board. This board shall, from its own number, elect one President, two Vice-presidents, a Secretary, and Treasurer, and shall appoint such committees as they may deem advisable to further the ends of the Society.

ARTICLE IV.

It shall be the duty of the President, and, in his absence, of the senior Vice-president, to preside at all meetings of the Society, and to carry out all orders of the Board of Directors.

ARTICLE V.

It shall be the duty of the Secretary to keep a correct and careful record of all proceedings of the Society and of the Board of Directors, in a book suitable for their preservation, and such other duties as ordinarily pertain to the office.

ARTICLE VI.

It shall be the duty of the Treasurer to keep the funds of the Society, and to make such disbursements as may be ordered by the Board of Directors.

ARTICLE VII.

No debt shall be contracted by the Board of Directors beyond the amount of available funds within their control to pay it, and no member of this Society shall be liable for any debt of the Society beyond the amount of his or her subscription.

ARTICLE VIII.

Any adult person may become a member of this Society by paying two dollars (\$2.00) annually. Any person not of age who shall plant and protect a tree, under the direction of the Board of Directors, or shall pay the sum of \$1.00 annually, may become a member of this Society until of age, after which time their annual dues shall be increased to two dollars (\$2.00), the same as other adults.

ARTICLE IX.

The annual meeting of the Society shall be held during the first week of October, at such place as the Board of Directors may select, and a notice of such meeting shall be posted in prominent places through the village. Other meetings of the Society may be called by the Board of Directors when desirable.

ARTICLE X.

At the annual meeting, the Board of Directors shall report the amount of money received during the year, and the source from which it has been received; the amount of money expended during the year, and the objects for which it has been expended; the number of trees planted at the cost of the Society, and the number planted by individuals; and, generally, all acts of the Board that may be of interest to the Society. This report shall be entered on the record of the Society.

ARTICLE XI.

This Constitution may be amended with the approval of two-thirds of the members present, at any annual meeting of the Society, or at any special meeting called for that purpose, a month's notice of the proposed amendment, with its object, having been given.

Men and women of Ohio, organize Tree-planting Associations! Boys and girls, plant, or cause to be planted, your two trees each!

PROFITS OF FOREST CULTURE.

AN ADDRESS BY HON. EMIL ROTHE,

Of Cincinnati.

This country is the youngest of all the civilized countries of the world. Its population has, until very recently, been engaged in a continuous combat against wild nature. The time at which dense forests were hindering and retarding the progress of culture, and when the woodman's ax had to open space for the plow and the spade, is within the clear remembrance of most of us. At first sight it seems therefore a paradox to advise the planting of new forests while the destruction of the

existing ones but a short while ago was a matter of necessity, and is still going on in several parts of the country. But it has become an accomplished fact, that a gradual deterioration of our climate and diminution of the fertility of the soil is already resulting from the wanton waste of the forests, and that scarcity of timber is either badly felt or impending in many localities.

We cannot close our eyes to the sad experience established by history, that the very best and most fertile regions of the eastern hemisphere, those in which the very cradle of civilization used to stand, have, by the destruction of their forests, been converted into deserts, and we have to expect that parts of our own blessed country will meet with the same fate, if reproduction is not immediately attended to.

Dr. Milliken, of Hamilton, in his excellent lecture, delivered at the last year's meeting of this Society at Cincinnati, exhibited a graphic description of the denuded hills of eastern Ohio, the productive soil of which is gradually being washed away by the rains, and which will certainly become desolate piles of rock, if not replanted with trees before the last layer of ground is carried down into the brooks and streams. At the same meeting, Dr. Loring, the U. S. Commissioner of Agriculture, furnished carefully compiled statistics, from which it appears that Ohio and Indiana are suffering an alarming decrease of their supply of timber.

Many patriotic thinkers and political economists have given timely warning, and are insisting upon energetic and practical efforts to remedy the evil by systematic reproduction of the forests in those localities in which the natural ones have already been exhausted. But, how shall it be done? Neither the federal authorities nor the State governments have so far paid any attention to this important subject. Private enterprise hesitates to take hold of it. We hear people say, "who guarantees it to be remunerative? It takes too long a time before any practical results of any consequence can be effected. We are not a slow-moving people. We have no time to wait for the growing of trees." All these objections are based upon erroneous suppositions.

Many millions of dollars of American capital are invested in various enterprises which require a much longer time to yield profit or income, and never pay nearly as well as systematic forest culture in the proper locality. Great fortunes are risked in wild speculations, in railroads which pay no dividends, in mining stocks which enrich only the agents, or brokers selling them, in lands and lots, which never attain the expected increase of value. But there is certainly no risk in forest culture. It produces an article of general and steadily increasing demand, and it can be calculated with almost mathematical certainty what profit may be derived from it and within what time.

The fact that it is highly remunerative in all Europe, where land is much higher in price than here, should justify the expectation that it will be profitable here. Our soil and climate produce a much larger variety of valuable timber than any European country. Several species of American trees are now cultivated there very extensively, because of the superior qualities of the same, and with a view to large profit therefrom. Our American hickory, black walnut, hard maple, and wild cherry, for instance, have none of their equals in Europe. They excite the envy of European carriage-makers, furniture men, and manufacturers of tools. They are now largely imported from America, but the forest-men of Germany and France are earnestly engaged in

raising them for the home market. Now, it is well known, that on this continent forest trees grow much quicker and comparatively taller than in the eastern hemisphere. Here the most useful trees attain their full developement in two-thirds of the time required in Europe, an advantage which can hardly be overestimated.

In the United States the consumption of timber *per capita* of the population is infinitely larger than in Europe, where no frame houses are built, where no new settlements are made, and where only a very small minority of the people are so situated that they may indulge in the luxury of fine furniture, buggies, and carriages. The parlor and sitting-room furniture of any of our skilled mechanics, or small shopkeepers, made up from black walnut, cherry, or ash, would amply do for many a European officer of more than ordinary rank. In the rural districts of Spain, Italy, France, and Germany, hardly one out of a hundred persons is able to buy furniture of what we would call the most common kind. Here in America, the proportion of the use of timber for furniture and carriage work to its production has become really alarming. Within the past twenty-five years, the price of such timber has risen at a rapid rate, and is still increasing. At any place not too distant from the ordinary transportation lines, every year's growth of a walnut, maple, or hickory tree represents a sure and respectable increase of the owner's capital.

The governments of Prussia, of several of the smaller German principalities, and of France, Austria and Italy, make forest-culture an unfailing source of a large yearly revenue. They find it profitable to buy tracts of inferior lands at prices equal to those of our best farming lands, and to stock them with timber. Many private landowners there also derive a large yearly income from their forests without ever diminishing the area of the same. Forests there are divided into enough equal parcels for yearly cutting, to give the trees sufficient time for development, and each parcel is immediately replanted after having been cleared. Excepting a few remote mountain districts, there are no more natural forests in Central and Western Europe. It is not profitable to let any forest tree remain growing, after it has attained full age, as the forester calls it. In Central Europe, oak grows to perfection in eighty to one hundred and twenty, beech and pine in thirty to fifty years. But it is not always intended to raise trees to full size, and it is really not so remunerative.

Only the better class of wheat or meadow-land nets a greater average revenue in twenty-five years, than well-managed forests—a fact which may at first sight seem incredible, but which is easily accounted for by comparison between the yearly expenses of grain culture and the trifling outlay required for the planting and maintenance of a forest after the trees have become two or three years old, and by taking in consideration the frequent failures of grain crops and the sure steadiness of the growth of trees. Planting may be done by children.

With all the advantages in our favor, why should forest-culture not be just as profitable in Ohio as in any part of Europe? Our supply of timber, fit for furniture, carriages, and even cooperage is almost entirely exhausted. The many timber lots distributed all over the State are very deceptive. Closer inspection will show that nearly all the good trees of larger size have long ago found their way to the saw-mills, and that only the wind-twisted and heart-rotten ones have remained. Spontaneous growth is not regular enough to be really profitable. The future supply of good timber in Ohio will consequently depend mostly upon systematic forest culture, and those first engaging in it will find ample remuneration for any capital or

labor employed. They may derive a fortune from comparatively poor land, unfit for grain crops and of little account for pasturage.

Locust, although being a very hard and solid timber, will make fence posts and pavement blocks in eight years from the seed, and large trees in twelve years. Its beautiful golden yellow color, mixed with jet black, makes it well adapted for elegant furniture. Catalpa, which makes the best railroad ties, grows even quicker. Hickory, now largely exported to Europe, and coming in great demand there, will prove exceedingly profitable. Sown in rows three feet apart, the nuts six inches apart, the young trees will grow up straight and slender. In five years, thinning out may commence, and hoop-poles may be sold; the next thinning out will give material for spokes and buggy fills; and the best trees, left standing at proper distances, will make a fine forest in less than twenty years. Black Walnut is a slower grower, but is getting so costly that it is worth while to think of planting it for speculation. Men below the age of thirty-five years will be able to reap a rich harvest from the cultivation of this valuable timber before they have passed the best time of life. A forty-acre lot of Black Walnut forest, now planted, will, in twenty-five years, make its owner independently wealthy, without requiring much outlay or labor. I am told that a gentleman, who twenty years ago, planted twelve acres of land, in Southern Indiana, with pecan nuts, made a fortune by it, and created the source of a large yearly revenue.

But the most profitable branch of forestry is certainly the cultivation of oak for tan-bark, on the renewal or Hackwald system. The acorns (about six bushels to the acre) will be laid six inches apart, and in rows three feet distant. The young saplings, taken out by thinning, may be used to great advantage in planting. In twelve years (under very favorable conditions even sooner) the trees will be large enough for cutting and peeling. New sprouts will grow out from the roots in the same year, and the second growth will prove more thrifty than the first. The revenue from such forests may be called perpetual. In Europe vast tracts of second-class land are forested in this manner, and many formerly unproductive estates have been made highly valuable by this very Hackwald culture. The bark of the young and middle-sized trees contains more tannin, and is, therefore, of higher value than that taken from old trees. Here in Ohio the bark of the chestnut-leaved oak is preferred to all others, and almost exclusively used. The tree is a more rapid grower than other varieties of oak, and is satisfied with the poorest of soil.

One of the most intelligent and experienced of the Cincinnati tanners informs me that in Cincinnati alone 18,000 cords of tan-bark are used per year, and even a larger quantity in Louisville. Seven trees, of a foot in diameter, will furnish one cord. The chestnut-leaved oak never forms entire forests by spontaneous growth, but is interspersed among other timber. My informant counted the chestnut-leaved oak-trees on a comparatively very well-stocked 1,500 acre lot in Pulaski county, Ky., and found them to number 3,500. At that rate, the tanneries of Cincinnati and Louisville alone would every year use up the trees spontaneously growing on about 100,000 acres of land. The few years since the Cincinnati and Southern Railroad has been in operation, a belt of fourteen miles on both sides of the road, and of about two hundred miles in length, has been almost totally depleted of that valuable variety of timber. The same gentleman ventures to predict that within twenty

years from now the entire supply of chestnut-oak bark in the United States will be exhausted. The price now varies from \$14 to \$28 per cord, and is steadily increasing. From carefully prepared reports of the forestry departments of the several German States and of Austria, it appears that an acre of properly cultivated Hackwald, of the age of twelve years, will furnish from four to five cords of tan-bark, and about six thousand feet of timber (board measure) fit for posts and for wagon-makers' work. The revenue from the wood covers all the expenses of planting and managing, leaving a surplus.

Under the existing circumstances, the foresting of inferior lands in Ohio, Kentucky, or West Virginia, could not fail to lay the foundation of wealth for those who would now engage in it. Large tracts of such lands are now lying waste. The income derived therefrom is now generally not sufficient to pay the taxes and interest on the original purchase money. By the means of forest culture, they might be easily turned into well-paying estates, and while they are now not much more than a public nuisance, they may become an ornament of the State, and a great benefit for the general public.

FORESTAL EXPERIMENT STATIONS.

A PAPER BY ADOLPH LEUE,

Secretary Ohio State Forestry Association.

Through the unwearied labor of a few men, scientists as well as political economists, and through the influence of the press, it has been shown and it is now fully understood that the prosperity of a country is to a very great extent dependent upon the proper condition and distribution of its forests. In view of this significant fact, it is indeed very strange that we, as a people, devote so little attention to forestry—that many of our State governments have even not recognized forestry as a subject worthy of any consideration, and that but in a few States laws have been enacted to promote this great interest. The cause of such profound indifference on the part of our fellow-citizens lies in their want of knowledge of the true condition of our forests, and of the constantly increasing demand upon forest products, and the consequent rapid decrease of the forest area. In support of this assertion, I need not refer you to the enormous destruction of the forests in Wisconsin and Michigan, nor need I point to the South, where the saw-mills are now making great havoc among the forests, and to the deplorable condition in which the denuded regions are left. Our own beautiful State of Ohio, once among the richest in excellent timber forests, has for years been unable to supply its own wants. Some of the most valuable timber-trees have almost entirely disappeared in some counties, and are rapidly dying in others on account of the harsh treatment they receive. Since 1853 there has been a constant decrease in the forest area of almost every county of Ohio, and this decrease has been more rapid during the years between 1870 and 1881 than during the years between 1853 and 1870. A glance at the remains of our woodlands reveals, that the most valuable and even the more ordinary kind of timber has been gathered from

them. When the rest shall have been cut, or shall have perished by age, or maltreatment, the forests will disappear; for, owing to the pernicious practice of utilizing woodlands for pastures, the natural rejuvenescence of forests was made impossible. The ruin of the prosperity of our fair State is unavoidable, unless effective measures be taken to supply the future demands upon timber and other forest products, by carefully husbanding of what we have and by planting new forests. Here our difficulties commence. We may indeed sooner expect a spendthrift to instantly cease all revelry and become a careful and economic manager of a nearly squandered fortune, and by personal effort amass another, than to expect a people, whose relation to forests has, we may say, by necessity been hostile for several generations to most economically husband an existing forest, and to plant, cultivate, and manage a new plantation. The late Dr. John A. Warder, whom future generations will call the father of American forestry, was right, when he emphatically declared that we neither know *where, what* nor *how* to plant. Now, there is no other alternative; we must learn this, and the sooner we commence, the better for us, for our fellow-men, for our children, and for our country.

We may learn this in two different ways, namely, deductively and inductively; deductively, by the slow and often unreliable way of experience: inductively, by the more rapid and reliable way of experimenting.

By way of illustrating which of the two methods is preferable, I beg leave to briefly call your attention to the history of the development of agriculture. From the earliest time up to the beginning of the nineteenth century it was a mere empirical art, resting, as it were, solely upon the traditional maxims of experience, without any signs of progress. But when, in the first part of the present century, Liebig and others subjected those ancient maxims of experience to a series of scientific investigations, a new era began to dawn upon the most important occupation of mankind. Since then, such investigations have been carried on in schools of agriculture, which have been established in all civilized countries, and have reached the highest point of perfection in the agricultural experiment stations. The result is most gratifying, for by means of these investigations and systematic experiments agriculture has been elevated to the dignity of an exact science.

This hasty glance at the history of the development of agriculture plainly indicates the course to be pursued in the attempt to raise forestry, the younger sister of agriculture, to the same dignity. A very successful beginning has already been made in Germany, where the idea of establishing forestal experiment stations originated. (1) One or more chief stations, with an appropriate number of subordinate stations, have been established in nearly every State of Germany. The great importance which the governments of the States in which they are established attach to those stations may be seen from the fact that in Germany about \$30,000 are expended annually for the maintenance of the same; and their number is steadily increasing. Austria, Switzerland, Italy, Spain, and even Russia, are following the example of Germany.

If those nations whose attainments in forestry are truly great, deem it advisable, and even necessary, to submit the maxims of long experience to a series of scientific investigations and systematic experiments, how much more should we, on this side of the Atlantic, ignorant as we are of almost everything pertaining to a reason-

able system of forestry, make an effort to base that system, for which we are longing and which we greatly need, upon scientific principles.

The need of forestal experiment stations in the United States and in Canada has long been felt, and the desire for the speedy establishment of the same has been expressed in various ways and at different times (*). But this has been to no effect, because of the want of a suitable plan of organizing the same. Our climate, the nature of our forest trees, the want of State forests and of trained foresters, render the adoption of the German plan inexpedient, and require a plan that shall be adapted to our peculiar circumstances, and at the same time meet the demands which can reasonably be made upon such an institution.

Convinced of the necessity of speedy action in this matter, I laid before the American Forestry Congress, at its meeting held in St. Paul, Minn., in August, 1883, the following plan of organization with special reference to Ohio :

I.

The object of the forestal experiment station in Ohio is the development of a rational system of forestry adapted to the wants of Ohio.

II.

The station shall consist of a *center* and an unlimited number of *primary* and *secondary* stations.

III.

The center of this station shall be the Agricultural College at Columbus, and shall be under the management of a director, whose sole duty shall be—

1. To preside over all the meetings of the committee on forestal experiment stations (see § VI.)
2. To ascertain the condition of the forests of Ohio, and the wants of forestry in this State, and to institute the necessary experiments and investigations.
3. To prepare plans of experimentation and to devise suitable formulæ for recording the work performed at the primary stations (see § IV.)
4. To attend to all the correspondence connected with the station.
5. To represent the forestal experiment station of Ohio at home and abroad.
6. To report to the General Assembly of the State of Ohio, on or before the second Tuesday of January of each year, the work performed at the station, and to render an account of the money expended in experiment and investigation, and of all other expenditures of the station.
7. To submit an estimate of the probable expenses of the station for the ensuing year.

IV.

The *primary* stations shall consist of at least three acres of ground, each, which shall be devoted to experimenting ; and the experiments, performed on the same shall be after a definite plan agreed upon by the Committee on Forestal Experiment Stations (see § VI.)

V.

The secondary stations shall be devoted to general investigations, such as analysis of soil, study of Forest-Botany and Forest-Zoology, testing the vitality of seeds of forest trees, determining the comparative value of forest products and testing the adaptability of the various kinds of woods for mechanical and technical purposes.

VI.

The directors of the forestal experiment station and the principles of primary and secondary stations shall constitute the Committee on Forestal Experiment Stations.

VII.

Each primary and each secondary station that may be adapted for making forestal meteorological observations, shall, at the desire of the principal of such station, be provided with the instruments necessary for such purpose.

The Forestry Congress not only heartily endorsed this plan (³), but, by a resolution, appointed a committee to recommend the adoption of the same to the several States of the Union and to the provinces of the Dominion of Canada (⁴).

To effect an organization, based upon the above plan, the first step to be taken is the appointment of a director, who, having ascertained the needs of forestry in Ohio, should proceed at once to organize both primary and secondary stations. In this, however, proper care should be taken in locating the primary stations as well as in selecting the parties for conducting the experiments and for making the special investigations; ignorant and unreliable persons should be rigidly excluded.

As the State of Ohio still owns certain tracts of land adapted for forest culture, it would not only be proper, but even advisable, to utilize the same for experiment stations and model forest plantations. But the immediate future of our forests depends, and will depend, chiefly upon the farmers, who almost exclusively constitute the owners of property that is available for forest culture. They are, therefore, the first to reap the benefit of a rational system of forestry, are thus directly interested in forestal experiments, and will, it may be confidently expected, assist in making the enterprise a success. But there is another and a more direct inducement for farmers to participate in this great and noble work. The experimentation is, to him who undertakes it, an excellent school of forestry, which not only charges no tuition, but rewards him with at least the nucleus of a forest, which will greatly enhance the value of his farm.

The readiness with which several very intelligent farmers of this Commonwealth have consented to perform on their own lands, and at their own expense, such experiments as the committee on forestal experiment stations may suggest, guarantees the success of the enterprise.

It is, however, not only the farmer who will be benefited by such forestal experiments; almost all of those engaged in the mechanic arts are more or less interested; while, for example, the builders, the cabinet-makers, the coopers, the carriage and wagon-makers, the manufacturers of matches, spools, bungs, lead-pencils, tool-

handles, and of other like articles, depend entirely upon the forest for the material used in their respective arts, there is scarcely any other industry which does not, in one form or another, draw upon the products of the forest. The great railroad and telegraph companies, which consume vast quantities of wood in the construction of their roads and lines, are greatly interested in this question. An abundance of forests, and a cheap method of raising them, will have a material effect upon the prices of the raw forest products, upon which the existence of such industries depends.

But the object of forestal experiment stations is not limited to forest-culture. To test the relative value of forest implements, to devise new methods of obtaining forest products, to find new uses for the same, and to discover new forest products for certain purposes, are very significant features of the secondary stations. While the primary stations aim to furnish the means by which to increase the wealth of the owners of forests, the secondary stations will call into existence new industries and promote those now in existence. It will therefore be to their own advantage, if these several industries foster this great enterprise by making direct researches, or by giving such information as will from time to time be asked of them, or by rendering pecuniary aid which will be needed for such investigation.

The scientific department of the station is of exceedingly great importance, and its development should have the immediate and most scrupulous attention of the director. Although this department should ever be considered a distinct feature of the forestal experiment station, it should never be isolated, but be conjoined with every experiment and investigation. The scientists and the practical forester must go hand in hand, else the object of the institution will not be attained.

Unfortunately, the various branches of science, which find application in forestry, have not been studied very extensively in this peculiar relation in this country; the terms Forest-botany, Forest-zoology, Forest-geodesy, etc., are almost unknown; whence only such specialists as are perfectly reliable and capable of making original investigations should be intrusted with the scientific work of a secondary station.

An experiment station organized according to this plan will, I believe, meet all the demands that can be made upon such an institution. It places the practical work, where it belongs, in the hands of those who are best qualified for it, and who are the recipients of the benefits resulting from the same. The State, by appointing a director, serves merely as an instrument to effect the organization, to collect the results, and to make them known through appropriate reports, which will become the solid foundation of a *system of forestry adapted to the wants and conditions of Ohio*.

NOTES.

(¹). For information as to what has been done in Germany, compare :

- a. Dr. Richard Hess: "Ueber die Organisation des Forstlichen Versuchswesens". Giessen. 1870.
- b. Dr. Franz Baur: "Ueber forstliche Versuchsstationen". Stuttgart. 1868.
- c. Dr. Richard Hess: "Die forstliche Unterrichtsfrage". Berlin. 1874.
- d. Dr. Bernhard Donkelmann: "Die Forstakademie Eberswalde". Berlin. 1880.
- e. Dr. Freiherr Ferdinand v. Seckendorf: "Das forstliche Versuchswesen."
- f. August Ganghofer: "Das forstliche Versuchswesen". Augsburg. 1878-1884.

g. Dr. Ernst Ebermayer: "Die physikalischen Einwirkungen des Waldes auf Luft und Boden". Aschaffenburg. 1873.

h. Dr. Ernst Ebermayer: "Geschichtliche Entwicklung der forstlich meteorologischen Stationen. Essay in "Forstliches Versuchswesen," bei A. Ganghofer, Vol. II, part 1, pp. 1-16.

i. Adolph Leucé: Forestal Experiment Stations in Germany; American Journal of Forestry, 1883, August number.

(2). The American Forestry Congress passed at its session in Cincinnati, in 1882, the following resolution:

Resolved, That it is the unanimous sentiment of this Forestry Congress now assembled at Cincinnati, Ohio, that the Congress of the United States should at a very early day take such proper steps and enact such further laws as will increase the forestry interest of this country, and to that end establish at the several agricultural institutions, both State and National, experimental forestry stations, to be constructed on the same general principles as those in Germany.

The above resolution was introduced by Senator Horace Wilson, of Columbus, upon hearing my paper on *Forestal Experiment Stations*, read before the Congress on the day previous.

On the 10th of February 1883, the late Dr. John A. Warder offered, at a meeting of the Ohio State Forestry Association, the following resolutions, which were adopted unanimously:

Resolved, That we beg of all the agricultural colleges established under the land grant of Congress, that they shall lose no time in planting State arboreta and establishing forest experiment stations, where all species adapted to the soil and climate shall be tested, and whence surplus seeds and plants may be distributed. Annual reports of these establishments to be made to the Governors or State boards of agriculture.

Resolved, That Congress be asked to establish one or more Experimental Forest Stations upon the public Domain, where the propagation and testing of useful trees shall be the leading object, with the collection of seeds and plants to be distributed by or under the direction of the United States Agricultural Department, to which bureau these stations shall make annual reports.

In April, 1883, I advocated before the O. S. F. A., in a paper, "Our next Problem," the speedy establishment of Forest Experiment Stations, and at a subsequent meeting submitted a plan of organizing such stations.

(3) The *St. Paul Daily Globe*, of August 9, 1883, had the following in reference to the plan submitted by the writer:

"Prof. N. H. Egleston, of Washington, and Mr. Memier, of Illinois, endorsed the paper very heartily, as a simple, practical plan that, it seemed them, would recommend itself to general favor.

"Judge Higley, of Cincinnati, briefly explained how the plan came to be adopted by the Ohio Association, detailing the efforts of the society to get State aid for forest culture, under the head of a State forester, from the failure of which came the plan outlined in this paper, and which, he said, was meeting with much better success than was anticipated.

"Dr. Hough, of Lowville, thought such a plan should have a strong claim upon the leading educational institutions of a State, which could most profitably conduct the experiments mapped out.

"Dr. G. B. Loring had no doubt that the stations provided for would prove a success in the great State of Ohio, but he thought these stations should be as closely allied with our colleges as possible. Time was, when the mention of a college in connection with agriculture or forestry met with ridicule. But that time has passed, and as a rule, legislators, backed by public sentiment, stand ready to grant all reasonable aid to such institutions, and he argued that the true road to final success in agricultural and forestal developments was these institutions; and as necessary means, he urged that the best of talent and highest cultivation be secured to conduct them, thus placing them upon that elevated plane which their importance demanded, and giving them their proper position in the scientific teachings of the day."

Prof. N. H. Egleston, now Chief of the Forestry Division at Washington, wrote to me under June 29, 1883:

"I am very glad to know that you have moved in this matter of establishing in Ohio forestal experiment stations, and so far as I understand your plan, it seems to me a good one. I have long thought the establishment of such stations one of the most important and first things to be done. I hope that you will be able to carry out your plan. The example of such a great central State will encourage others to follow in the same direction."

Robert Douglas, the well-known Arboriculturist of Waukegan, Ill., writes me under September 11, 1883, in reference to the experiments proposed: "Experiments of this sort will teach us more, even if planted on a small scale, than the past 20 years have taught us in all the theorizing at horticultural and forestry conventions."

(4.) That committee consists of Prof. N. H. Egleston, of Washington, D. C.; H. W. Morgan, of Amherstburg, Ont., with Adolph Leue, of Cincinnati, as chairman. Owing to the great distance at which the members of that committee reside, no meeting was effected, and no action has been taken.

TREE CULTURE ON PRAIRIES.

A PAPER BY ISAAC SMUCKER, *Newark, Ohio.*

The important preliminary work to be done to make *Forestry* a success is to enlighten, instruct, inform, educate the public mind; impress the people with the importance of it to them personally; show them how it will promote their own pecuniary interests; demonstrate to them that it will infallibly add to their wealth individually, as well as to the Nation's wealth, and that it will be promotive in various ways of comfort and health. All this and much more can be done, and ought to be done, with as little delay as possible.

Forestry, if properly fostered by National and State legislation, will add immensely to the wealth of all sections of our great country. This will be eminently true as to all the older States, as well as to some of those of more recent admission

into the Union, which in their primeval state were heavily timbered, but have since been largely despoiled of the most valuable portion of it. Of this there can be no reasonable doubt, provided that the legislation in question is sustained and enforced by the spontaneous and generally pervading sentiment of the people. And this suggests the necessity of an enlightened public sentiment in respect to *Forestry*, and no less the duty of those who are in a position to take a part in moulding public opinion.

And if *Forestry* can be made thus valuable in those old settled States that were once thickly covered with a dense forest of trees of enormous growth, since largely destroyed, but where there is still a considerable remnant of them left, of how much greater value would it be to the present large and rapidly increasing prospective occupants of the many millions of wholly treeless acres that now constitute our great western plains?

Believing that the promulgation of correct views and much-needed information on the subject would tend to the promotion of *Forestry* in the treeless sections of the United States, where, more than anywhere else, the dedication of a limited portion of the land to the cultivation of trees would advance the interests and augment the wealth of the settlers, where, in fact, the conversion of prairie into woodland would be of incalculable benefit, I propose to offer a few thoughts on "Tree Culture on our Prairies," trusting that I may be able to add somewhat to the interest now felt in the subject, and incidentally bring about good results. I am not able to offer much information based on personal experience in "Tree culture," having been more iconoclastic than otherwise, in that I have cut down more trees than I have planted, but my aim is to point out the way in which the cause of *Forestry* can be advanced and the welfare of the people be promoted.

High authority claims that *Forestry* ought to be promoted because of its favorable climatic effects—because it checks somewhat the waste of the water supply in dry seasons, by reason of diminished evaporation—because of its tendency to retard the flow of surface water into the usual channels during excessive rainfalls or unusual snow-melting seasons, thereby protecting to some extent against sudden inundations—and because of the admirable sanitary influence it exerts.

Belts of forest trees in prairie countries are of great value as storm-breaks, serving as a protection to crops, orchards, nurseries, barns, churches, school-houses, and domestic animals, and very much mitigate the furious wintry blasts that often rage around the homes of the settlers on our western plains. How much, then, would the comfort of the occupants of our now timberless regions be promoted by planting on each farm a small grove of berry-bearing, nut-bearing and fruit-bearing shrubs and trees, such as the blackberry, raspberry and huckleberry, the cranberry, the black haws, the wild-cherry, the service berry, and many others; of nuts, the pecan, the chincapin, the hazelnut, the chestnut, and others; and of fruit-bearing shrubs and trees, everything adapted to the soil and climate. This would be good *Forestry*, good Husbandry, too, although it has the appearance of a rather free intermingling of Horticulture and Pomology with *Forestry*.

If not deemed arrogant, I would take the liberty to urge it upon all the settlers on the treeless lands of the United States to plant, cultivate, protect, and by all available means promote the growth of the different varieties of useful trees, by judiciously selecting such as would be likely to have a rapid and vigorous develop-

ment—such as are best adapted to the various kinds of soils at their command, as well as to the climate—the live-oak for ship building; the walnut, the butternut, the wild-cherry, the curled and birds-eye maple, and others, for furniture; the chestnut, the blue and white ash, many varieties of oak and pine, and others, for fencing and building purposes; the hickory of different kinds, the apple, the beech, the maple, the cedar, all kinds of oak and other hard-wood trees, for the manufacture of wagons, carriages, agricultural implements, planes, tools, and everything else for which hard-wood is indispensable; and the bass or linden, the cottonwood, the poplar, the buckeye, the cucumber, the sycamore, the chestnut, many varieties of pine, and others of similar kinds, when trees of soft-wood, rapid growth and early maturity, are desired. As an inducement to the owners of prairie lands to carry into effect the foregoing suggestion, I would favor the exemption of all lands from taxation on which timber was successfully cultivated.

A further suggestion would be, the passage of a law giving liberal encouragement to the planting of suitable trees along the highways, not only the kind that would be useful for shade, but also for the fruit they bear, and especially the sugar maple, for the valuable products they yield.

On a large proportion of farms of a quarter or half section, the cultivation of a few acres of timber would not involve the disuse of much cultivable land for raising crops, or for ordinary farming purposes, as there are ravines, nooks, side-hills, hill-tops, comparatively barren knobs, swampy, marshy lands unsuitable for grain-growing, or waste lands of some sort not well adapted to the plow, nor profitable for pasturage, which could well be dedicated to *Forestry* purposes. But if there were no waste land, the few acres of prairie converted into woodland would be the most valuable part of the farm, even if it were of the least average natural fertility. The vigorous growth of a very few acres of timber land, in thrifty condition, which required but little, if any, labor, after having been well started, would certainly be of greater intrinsic value, and represent a greater annual profit in the enhancement in the value of the land and otherwise, or be more productive than a tract composed of an equal number of acres devoted to common husbandry, after deducting the cost of the labor involved in the cultivation of it. Ten acres of forest (perhaps even a smaller number), after having had a vigorous growth of fifteen years, would probably furnish for fuel and other purposes all the wood and timber required by the owner of a farm of ordinary size, and most of the necessary fruit in less than half that number of years. Small fruits, when carefully cultivated and the conditions for rapid growth are present, may be expected in three years, and the peach tree can be brought into bearing in four years, the cherry tree in five years, and the apple tree, the quince, the plum, and the pear tree in six years or less. And that would surely count more to him in dollars and cents, especially if he was in a wholly timberless locality and somewhat remote from a railroad where coal would necessarily be expensive, than the average annual profits yielded by the same quantity of land that was cultivated or in pasturage.

Another suggestion I offer in this connection is, that all guarantees that are practicable should be afforded by legislation and in every other possible way for the protection of all growing timber, whether cultivated or of spontaneous growth, against the terrible prairie fires that oftentimes rage so fearfully over large tracts of country, and are so very destructive to property, and not unfrequently even to human life

itself. Certainly means *can* and *ought* to be adopted to prevent the recurrence of prairie fires, if possible. The pecuniary interests of the people whose homes are on the prairies, the interests of *Forestry*, and, above all, the interests of humanity demand this. These conflagrations usually result from the carelessness, recklessness, or viciousness of hunters or sportsmen who use fire-arms in pursuing game in the autumn time, when dry grass and weeds, or other combustible substances that readily ignite, cover the surface of the ground. Prairie fires are largely destructive of nurseries, recently planted orchards, and of young trees generally, and render it difficult to make tree culture a success. *Forestry* encounters no greater obstacles than prairie fires, no more potent enemies than those who carelessly or viciously start them. In all cases where culpability attaches, either because of carelessness or viciousness, there ought to be legal authority to inflict adequate punishment. Certainly some efficacious means should be found to give assurance of immunity from the dire results of the acts of careless or reckless fowlers, tramps, and others, who cause such devastation on our prairies as are often witnessed."

I take it for granted that not many of the foregoing views would be seriously controverted by the great body of the owners and occupants of farms on our western plains. *They*, undoubtedly, more than all others, realize the full value of woodland; *they* know experimentally the full extent and nature of the privations its absence imposes; *they* have an every-day realization of the importance of having a sufficient quantity of forest on their farms to meet the current daily demands; *they* freely admit the indispensable necessity of planting and cultivating trees in order to have woodland, and that wood and timber cannot be had in sufficient quantities to serve their purposes unless they do so, except at large cost; moreover, they are willing to acknowledge their obligation to themselves, to posterity, and to the Commonwealth to thus promote *Forestry*.

Why, then (these facts being admitted), has *Forestry* made such slow progress on our prairies? Several reasons might be given; among them is the lack of faith with some in its success as long as they have no protection against prairie fires; another is the lack of capital; still another, is the want of time to devote to it, even if the inclination were present. But I am well assured that the chief reason will be found in the lack of information bearing on the subject. If a prairie farmer wishes to convert a limited number of his acres into woodland, he of course at once inquires into the best methods of doing so. Can it be best accomplished, and in the shortest time, by starting a nursery and afterwards transplanting from it, or by sowing or planting the seeds and nuts where the shrubs and trees are to remain? Shall he plant the walnuts where he wishes a walnut grove, the chestnuts, the hickory-nuts, the butternuts, the acorns, the beech-nuts where he wishes groves of those trees, or can it be done better otherwise? He should know the proper time in the year for sowing or planting seeds and nuts, and for transplanting, and what kinds of trees are best adapted to his soil and climate. He wishes to know just how he can grow a forest with the least labor and bring it into utilization in the shortest possible time, and with the smallest outlay of money. He also needs to be enlightened as to the best methods of sowing seeds, of planting nuts, and of transplanting shrubs and trees, and of the cultivation, protection and management generally of growing timber. In view of the foregoing facts, it seems to be quite clear that one of the prairie farmers' needs is a brief *Treatise on Forestry*, written in popular style, adapted

to the capacity of common minds—one that can be understood by every man that can read the English language; a book, in short, that shall contain all the information suggested in this paragraph, and everything else bearing on *Forestry* that every agriculturist on our prairies ought to possess; and further, said disquisition ought to be compressed into as small a space as practicable, not to exceed 200, or at most 300 pages (duodecimo), and furnished at a nominal price, so that it may find its way into as many homes as possible.

Is such a treatise accessible at present? I am not very familiar with the style and character of *Forestry* literature, and know not how well the public needs are met in this regard; but if there is no such book in the market, or, better still, one of smaller dimensions, than the one above suggested, it seems to me that the best service that can now be rendered to *Forestry* would be to take immediate measures to get just such a little book into the hands of a hundred thousand of the “tillers of the soil” on our almost boundless Western plains. And that could probably be well done, and speedily, by the *Ohio Forestry Association*. *Forestry* associations, also agricultural and kindred societies, would be appropriate and efficient instrumentalities to assist in placing such a volume in a hundred thousand libraries, where it would be accessible to half a million of readers eager to possess themselves of the valuable information it contained. The little book should not be copy-righted—then the aid of the local weekly newspapers, also of agricultural papers, and of other publications like the *New York Weekly Tribune*, and of many others that have well conducted agricultural departments, and circulate extensively on the prairies, could be invoked to “lend a helping hand” in imparting the valuable practical instruction it contained, by republishing the whole of it, in parts, or portions of it, at their discretion. *Forestry*, by the liberal and persevering use of such means, would receive a great impetus, and be more popularized than by the use of any or all other present available instrumentalities.

THE OHIO FLOOD OF 1883.

BY PROF. N. H. EGLESTON,

Chief of the Forestry Division at Washington, D. C.

[Read at Cincinnati, April, 1883.]

The recent flood of the Ohio River, so remarkable as a phenomenon, attracting the attention of the whole country by its unusual volume and the destruction of property, as well as life, which attended it, should not be allowed to subside without teaching, not only those in its immediate vicinity, but the people of the country at large, an important lesson. If the proper instruction to be derived from the disastrous occurrence can be brought home to the public so as to lead them to appropriate action in the future, the knowledge thus obtained will not be too dearly purchased, even at the cost of the sufferings and losses occasioned by the flood.

It has been known to the few for a considerable period that there is a connection between the condition of the forests of any country, and the floods and drouths which occur. It has been observed that where the forests along the courses of streams have been cut off, and in proportion as they have been cut off, both floods and drouths have increased. Multitudes of people, residents of the open country in distinction from those resident in cities, have observed that the streams with which they have been familiar from childhood have shrunk in size, while also more liable both to floods and drouths than formerly. They have known at the same time that a warfare has been waged upon the trees which has materially lessened their numbers, and in many cases exterminated them throughout considerable tracts of country. These several facts have been known to many, but they have failed to connect in the way of cause and effect. They have regarded them as separate and independent facts.

And yet it requires but a little observation to see that there is a close connection between these facts. If one will only notice the condition of the soil, or of the surface of the ground where trees have long been growing in masses, he can hardly fail to see that it must have an important influence upon streams flowing in their vicinity. The shelter of forest-covered ground from the sun's rays prevents the evaporation of its moisture, and the consequent comparative dryness and hardness characteristic of the open and unsheltered ground. In addition to this, the annual shedding of the foliage of the trees gradually accumulates upon the surface of the ground a covering of leaf-mold, sometimes reaching several feet in depth. This is of a light, loose, absorbent texture. The whole forest area thus becomes, as it were, a great sponge, which absorbs and retains the moisture that is precipitated from the clouds in the form of rain, or which results from melting snow, not allowing it to flow away at once, but, as it percolates slowly through the absorbent mass, sending it off in gentle and steady streams. And so it is well understood that the water-courses which proceed from forest-covered districts furnish a uniform and steady supply of water, whether for purposes of agriculture or transportation, or for manufacturing. Of course in regions where the snows accumulate to a considerable depth there will be an augmented flow of water, as these melt in spring-time, but it will not be so great as to occasion trouble or disaster. So, also, there will be some lessening of flow in mid-summer. But this will not be of an injurious character. The supply will be on the whole steady and uniform.

Quite different is the case where the forests have been removed. As the trees are taken away and the surface of the ground is exposed to the sun and wind, the first effect is to dry the spongy leaf-covering. As this dries the winds sweep it away. The spongy covering is thus gradually diminished. The falling rains or melting snows flow off more rapidly than before. The hill-sides begin to be marked by more numerous and deeper-cut water-courses. Finally, when the absorbent covering has been completely removed, and there is no longer anything to detain the water, it rushes off at once, after any considerable rainfall, or when the snows melt rapidly and fills the beds of the streams and rivers, and causes them to overflow their banks, often making floods which become disastrous because the natural channels are unable to carry off the rapidly accumulating waters. For the same reason, because there is no great spongy storehouse left to retain the water which falls from the clouds and to act as a reservoir supply, from which we might draw steadily through the

summer time, we are then liable to have drouths, from which much suffering in various ways arises.

Such is the simple explanation of the cause of floods and drouths as they ordinarily occur. The facts of the case, though they have been known by thoughtful observers among us for some time, have only of late years been brought before the general public. But in Europe they are much better and more widely known. The connection between forests and floods is there well understood, and in most European countries the due preservation of forests, on account of their recognized influence upon the water supply, as well as their climatic effects, is regarded as of the first importance. In many of them the Bureau of Woods and Streams is considered one of the most important departments of Government. In France the most stringent laws have been framed for the protection of forests. The owners of forests are not allowed, as with us, to cut their woodlands at their pleasure, but only to such an extent and in such places as may be designated by the forest masters appointed by the State. And where the forests have been cut off contrary to the law or before the legal restrictions were established, the Government insists that the ground shall be replanted, and if this is not done by the proprietor the Government, asserting the right of eminent domain, takes the land into its own possession and plants it, allowing the owner to recover possession, however, within a certain number of years on payment of the cost of planting.

We are only just beginning to learn the meaning and the importance of forestry, but we have begun to learn what is none too soon. In Sweden forestry is taught in the public schools. Every school-house, in the villages at least, is obliged to have sufficient land connected with it to allow of the planting and cultivation of trees and plants by the pupils under the direction of the teacher. Would that we had some such regulation in connection with our country schools. It would be healthful in more respects than one. It is greatly to the credit of Cincinnati that she is giving her schools practical lessons in forestry, a notable one of which was witnessed in Eden Park a year ago.

At the opening of the late session of Congress, forestry, for the first time, became a subject of attention in a Presidential message, and in the census of 1880, a compendium of which has recently been published, the attempt has been made for the first time to ascertain the extent and condition of our forests. The special agent to whom this work has been intrusted has published from time to time maps so constructed as to show the extent and character of the timber growth in the States and Territories. The map of West Virginia appeared on the 1st of March last, and offered itself at once as a clear and striking commentary upon the Ohio flood, which was at that very time arresting public attention. The map is so colored as to show at a glance the portions of the State from which the valuable timber has been removed, the regions of hard-wood forests, the regions abounding in spruce and those abounding in the white pine. As the eye glances at the western portion of the State it is seen at once that every affluent of the Ohio River has been stripped of the forests through which it formerly flowed. The Great and Little Kanawha, the Elk, the Guyandotte, the Big Sandy, not to mention lesser streams, all these have had their forests stripped away, except, perhaps, upon their very head waters. The map of the forests of Ohio has not yet been published, but doubtless it would present a similar picture,

while the map of Pennsylvania shows the Allegheny and Monongahela flowing through their long courses almost unshaded by forests.

With such pictures and such facts before us, can we doubt as to the cause of the recent devastating flood which rushed by and through this great city? It was simply that over this great river basin, embracing half a dozen States, the soil had been so far stripped of its trees and its leafy covering that it could no longer drink up and retain, even for a few days, the rain that fell upon it and the water formed by the dissolving snow, and so the combined waters of this great area slid down the smooth hill-sides and into the river channels at once. The task thus put upon the river courses, and especially upon that of the Ohio, was more than they could bear. The banks were overflowed, and wide-spread damage and disaster necessarily followed.

But it is said there have been other great floods; one, at least, nearly equal to the recent one, many years ago, before the forests were to any considerable extent destroyed. The fact is not to be denied. Nor do we need to deny it in order to establish the connection between the destruction of forests and the occurrence of floods. All rules have their exceptions. Some unusual combination of circumstances may occasion a flood even where forests abound. If there has been an extraordinary fall of snow during the winter, or if it has not dissolved gradually during the snow season, but has remained on the surface of the ground to be melted rapidly and all at once, as it were, and when the surface of the ground is, to a considerable extent, frozen and impervious, and especially if an uncommon rainfall adds its waters to the melting snow, then we may have a combination of influences that will produce a flood whether forests be abundant or not. But these are clearly exceptional cases, and the principle remains that forests do, as a general thing, protect the country adjacent to them from destructive floods, and from corresponding drouths. If we would avoid either or both of these evils we must protect our forests. If we have already brought these evils upon us by our reckless destruction of the forests, there is but one remedy. It is the reproduction of the forests by fresh planting, and as this is the only, it is also the sure remedy. The cry of the flood is, "Restore your forests," and the broken dams of the manufacturer, the desolated fields of the agriculturists, the choked channels of commerce and the pitiful faces of the hundreds and thousands who have lost property and become the victims of poverty and disease by reason of the floods, repeat the cry, "Restore your forests."

FOREST CONDITION OF OHIO,

AS SHOWN BY THE

Report of the Forestry Division of the United States
Department of Agriculture.

FOREST CONDITION OF OHIO.

The following letter, from Hon. George B. Loring, Commissioner of Agriculture, explains the character of the ensuing report. Acting upon its suggestions, Governor Foster, in a special message, called the attention of the Legislature to the subject, and action was taken by that body which resulted in the present publication. It will be seen that the chart is virtually the report, presenting in a graphic manner the very important facts with which it deals:

LETTER OF COMMISSIONER LORING.

DEPARTMENT OF AGRICULTURE,
WASHINGTON, D. C., *December 27, 1883.*

SIR: In the investigations which this department is prosecuting in regard to the condition of the country in respect to its forests, their distribution, the rate of their diminution, and so forth, a very complete report has recently been received in regard to the forest condition of the State of Ohio. This report is of more than usual value, because based largely upon official data. The forest area of the State is given by counties, as it existed at the dates 1853, 1870, and 1881. It will be seen from the figures that there has been a constant decrease of the wooded area in every county, and what is specially deserving of notice, that the decrease has been most rapid in the period since 1870.

The agent of the department has also constructed a graphic sheet, from the figures given in the tables, which shows at a glance the areas of cleared and wooded lands at the different periods named and the relative diminution of the forest area.

From the percentage of waste and woodland combined, as given in the final summation of table B., it will be seen that the forest area of Ohio is already below the limit which is consistent with the highest salubrity of atmosphere as well as the greatest prosperity of the agricultural and commercial interests of the State.

The facts set forth in the report are of such importance that I have deemed it advisable to communicate them to you, for reference to the Legislature soon to convene, or for such suggestions to that body as you may be disposed to make. I inclose, therefore, a copy of the report. Very respectfully,

GEO. B. LORING,
Commissioner.

His Excellency, CHARLES FOSTER, Governor, Columbus, O.

EXPLANATION OF CHART.

Each county is represented by a black line square. The left-hand vertical column "A." "A." represents the year 1853; "B." B, 1870, and "C." "C", 1880. The space between the columns represents the years intervening between the dates given. The horizontal red lines, numbered 10, 20, 30, etc., represents percentages. The blue line represents the amount of forest and cleared land at the dates given—1853, 1870, 1880. The dotted lines D. E. F. would show the proportion in forest at the given dates.

Table "A." represents Adams county as having 90.06 per cent. in forest in 1853, 43.98 per cent. in 1870, and 34.05 per cent. in 1880. The blue line commencing on column A. A., at 90.06, crosses column B. B. at 43.98, and stops on C. C. at 34.05. Then the dotted line F. shows the amount of forest in 1880.

The sudden declination of the blue line, after crossing the vertical column B. B. in most of the counties, shows the accelerated rate of consumption of the forests, and at the same ratio of consumption, in another decade, some of the counties will be treeless plains.

TABLE "A."

THE NUMBER OF ACRES IN FOREST, AND THE PERCENTAGE OF FOREST AREA BY COUNTIES IN THE STATE OF OHIO, AS REPORTED FOR THE YEARS 1853, 1870, 1881.

Counties.	Number of acres in forest.			Percentage of area in forest.		
	1853.	1870.	1881.	1853.	1870.	1881.
Adams.....	280,213	135,201	86,888	91.06	43.98	34.05
Allen	191,164	128,809	60,693	74.56	50.25	31.09
Ashland	107,596	75,190	47,866	40.92	28.60	20.71
Ashtabula.....	222,988	143,490	63,700	50.75	32.66	17.13
Athens	204,598	146,692	57,437	66.88	47.95	19.15
Auglaize	196,356	137,509	60,720	79.25	55.51	30.97
Belmont	140,046	97,179	57,994	41.51	28.81	19.59
Brown	159,719	103,889	52,185	52.28	34.00	20.27
Butler	100,671	64,975	36,198	34.71	22.40	18.70
Carroll	85,026	63,356	45,117	33.99	25.33	20.29
Champaign	112,143	81,050	62,667	42.28	30.55	23.97
Clarke	98,813	60,560	32,062	39.63	24.35	16.13
Clermont	(a)141,488	72,502	37,935	(a)50.00	25.62	17.31
Clinton	112,088	80,740	40,676	48.35	31.65	18.51
Columbiana.....	133,793	88,505	56,290	39.55	26.18	20.77
Coshocton	169,735	123,683	69,967	48.10	35.03	23.79
Crawford	114,535	76,714	43,111	45.20	30.42	20.73
Cuyahoga	114,372	85,652	25,748	41.65	31.19	12.97
Darke	256,200	172,603	82,040	68.08	45.86	26.78
Defiance	224,327	173,283	72,125	87.14	67.29	39.35
Delaware	156,688	96,665	50,234	55.31	34.12	21.13
Erne	57,550	43,409	13,862	36.51	27.53	11.40
Fairfield	125,772	89,409	50,219	39.75	26.67	17.93
Fayette	131,004	79,637	32,455	52.43	29.85	15.33
Franklin.....	165,409	103,908	38,346	49.29	30.96	15.52
Fulton	206,948	147,886	62,783	80.51	57.51	30.22
Gallia	192,497	126,045	59,523	66.99	43.87	26.49
Geauga	99,992	63,458	45,818	35.89	24.75	20.93
Greene	116,568	72,531	40,798	44.02	28.04	18.41
Guernsey	115,106	107,457	65,244	47.51	32.90	22.71
Hamilton	88,122	34,473	12,954	37.70	14.76	10.94
Hancock	235,398	161,055	80,713	69.82	47.77	27.77
Hardin	241,447	182,202	61,479	86.82	64.72	30.05
Harrison.....	96,580	65,375	41,442	37.65	25.48	19.12
Henry	(a)133,475	(a)118,240	60,073	(a)61.00	(n)45.11	38.13
Highland	168,334	107,490	65,095	48.64	31.04	21.39
Hocking	181,391	125,223	64,323	68.18	47.08	29.05
Holmes	95,224	(b)105,503	56,888	37.81	(b)41.09	16.53
Huron	155,289	89,519	44,434	50.73	29.24	16.42
Jackson.....	(a)195,411	109,070	42,637	(a)75.00	41.86	20.48
Jefferson.....	107,093	87,440	51,801	41.51	33.95	23.09
Knox	143,988	92,251	(c)62,241	43.69	28.01	21.68
Lake	50,795	32,828	13,657	36.88	23.86	17.45
Lawrence	245,655	194,516	38,213	88.25	69.88	19.73
Licking	181,718	111,861	66,575	42.52	26.18	17.45
Logan	142,139	120,823	58,421	50.53	42.95	25.42
Lorain	180,107	84,999	42,030	59.28	27.97	16.64
Lucas	162,023	131,235	26,599	81.00	65.60	26.18
Madison	132,999	90,612	24,659	45.45	30.98	11.75
Mahoning	96,100	68,754	41,537	36.50	26.15	20.15
Marion	130,142	90,359	39,480	51.28	35.61	19.56

Chart showing the condition of Forestry in each county in Ohio, for the years, 1853, 1870, 1880.

TABLE "B"—Continued.

Counties.	Number of acres in forest.			Percentage of area in forest.		
	1853.	1870.	1881.	1853.	1870.	1881.
Medina	76,840	60,938	43,237	29.39	23.31	18.44
Meigs	191,213	121,416	58,049	73.25	46.51	28.04
Mercer	(a)209,027	177,235	85,722	(a)76.67	63.58	38.58
Miami	120,822	82,621	33,350	47.81	32.69	18.15
Monroe	159,407	115,564	69,413	55.38	40.13	27.23
Montgomery	104,056	68,340	37,766	36.53	24.01	16.33
Morgan	136,465	90,038	51,658	52.38	34.57	22.12
Morrow	119,829	78,406	45,812	47.33	30.97	20.63
Muskingum	189,605	127,982	68,550	45.54	30.67	19.93
Noble	124,375	78,303	45,358	49.17	30.83	19.40
Ottawa	151,428	119,059	27,790	93.00	.09	25.89
Paulding	251,825	230,240	53,068	96.83	88.81	51.74
Perry	101,885	69,968	39,709	39.77	27.31	18.94
Pickaway	143,719	89,281	41,909	46.13	28.66	15.80
Pike	184,724	140,984	71,612	73.52	56.09	37.45
Portage	102,904	76,600	49,474	33.03	24.59	18.22
Preble	121,619	82,785	52,970	45.62	31.06	22.35
Putnam	265,072	216,320	83,844	87.98	71.81	39.13
Richland	127,173	88,797	62,549	41.27	28.81	22.85
Ross	214,485	161,084	102,206	48.73	38.88	30.26
Sandusky	163,213	110,156	49,352	63.85	43.07	22.92
Scioto	233,493	197,937	62,548	77.77	65.94	34.89
Seneca	171,980	117,151	65,128	49.81	33.93	21.96
Shelby	180,220	120,282	61,709	70.30	46.91	24.25
Stark	114,544	75,222	62,842	32.24	21.17	17.28
Summit	82,028	59,078	29,859	32.95	23.72	14.52
Trumbull	157,675	115,932	67,032	40.32	29.65	20.15
Tuscarawas	153,658	106,525	61,178	43.00	29.81	19.85
Union	187,958	131,873	44,993	69.00	48.40	13.30
Van Wert	236,088	186,408	76,448	91.30	71.11	43.59
Vinton	194,332	152,873	65,878	75.33	59.25	35.26
Warren	100,903	61,557	30,316	40.00	24.40	15.85
Washington	269,357	179,289	97,914	68.62	45.66	30.58
Wayne	154,676	94,933	58,726	45.20	27.40	20.50
Williams	201,113	145,051	64,529	75.96	54.76	29.55
Wood	337,760	267,946	86,067	88.19	69.98	34.92
Wyandot	161,476	115,336	72,585	63.17	45.13	28.75
Totals	13,991,228	9,749,333	4,732,092	55.27	38.51	20.79

NOTE—(a) Estimated. (b) Apparently erroneous. (c) Lands lying waste.

TABLE "B."

ACREAGE OF WOODLANDS AND LANDS LYING WASTE IN THE SEVERAL COUNTIES OF
OHIO, IN 1881.

Counties.	Acres of woodlands and waste.	Percentage to total area.
Adams	95,327	37.35
Allen	62,704	32.12
Ashland	49,619	21.54
Ashtabula	68,848	18.54
Athens	65,971	21.99
Auglaize	66,245	33.75
Belmont	68,757	23.11
Brown	61,027	23.71
Butler	46,697	24.13
Carroll	45,348	20.39
Champaign	62,667	23.97
Clarke	34,385	17.49
Clermont	54,329	24.79
Clinton	44,123	20.10
Columbiana	61,614	22.74
Coshocton	73,947	25.15
Crawford	44,094	21.20
Cuyahoga	30,879	15.55
Darke	89,649	29.27
Defiance	76,335	41.65
Delaware	52,378	22.03
Erie	18,839	15.49
Fairfield	53,999	20.35
Fayette	33,541	15.83
Franklin	44,022	17.81
Fulton	69,889	33.22
Gallia	66,251	29.49
Geauga	47,053	21.49
Greene	48,521	21.89
Guernsey	66,376	23.13
Hamilton	27,636	23.33
Hancock	82,881	28.99
Hardin	64,905	32.21
Harrison	42,248	19.49
Henry	62,034	39.38
Highland	71,443	23.81
Hocking	74,771	33.79
Holmes	66,287	18.13
Huron	48,148	17.79
Jackson	61,759	29.19
Jefferson	61,321	27.34
Knox	62,241	21.68
Lake	20,679	19.34
Lawrence	91,234	48.00
Licking	69,793	18.21
Logan	61,686	26.83
Lorain	43,106	17.17
Lucas	30,171	29.75
Madison	25,146	11.98
Mahoning	43,397	21.03
Marion	41,831	20.73
Medina	45,774	19.52
Meigs	63,366	30.60

TABLE "B."—Continued.

Counties.	Acres of woodlands and waste.	Percentage to total area.
Mercer	89,777	40.40
Miami	36,753	20.00
Monroe	78,002	30.59
Montgomery	49,544	21.42
Morgan	54,583	23.37
Morrow	47,768	21.50
Muskingum	77,540	22.22
Noble	47,730	20.42
Ottawa	38,212	35.54
Paulding	53,756	52.41
Perry	40,695	19.41
Pickaway	48,915	18.44
Pike	80,847	42.28
Portage	53,979	19.89
Preble	59,770	25.23
Putnam	85,811	40.53
Richland	67,523	24.66
Ross	127,524	37.57
Sandusky	55,388	25.72
Scioto	98,801	55.21
Seneca	66,772	22.52
Shelby	63,666	25.02
Stark	67,533	18.57
Summit	35,693	17.35
Trumbull	70,598	21.22
Tuscarawas	69,495	22.55
Union	45,675	13.51
Van Wert	78,620	44.82
Vinton	81,264	43.61
Warren	36,173	18.92
Washington ..	106,642	33.30
Wayne	64,929	22.66
Williams	66,995	30.69
Wood	89,031	36.13
Wyandot	74,413	29.47
Total	5,309,383	25.13

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