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American Forestry

The Forester

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THE AMERICAN FORESTRY ASSOCIATION.

ORGANIZED APRIL, 1882.
INCORPORATED JANUARY, 1897.

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PUBLISHER'S ANNOUNCEMENT.

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No. 117 Corcoran Building, Washington, D. C., where all communications should be addressed.

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Make all checks, drafts, etc., payable to THE FORESTER.

New Members.

Since the last issue of THE FORESTER the following names have been added to the membership of the American Forestry Association:

James S. Bunnell, San Francisco, Cal.

W. E. Valk, Washington, D. C.

J. S. Swan, Denver, Colo.

Benjamin T. Gault,

Glen Ellyn, Du Page County, Ill.

Miss Alice Hooper, Roxbury, Mass.

Gust. Moser, Missoula, Mont.

Brian L. O'Hara, Québec, Canada.

OBJECTS OF THE AMERICAN FORESTRY ASSOCIATION.

The objects of this Association, given in the charter, are more specifically stated as follows:

TREE PLANTING.

Tree planting should be encouraged not only for shade and ornamental purposes in streets and parks, but more especially for the protection of country homes and farm lands, particularly upon the treeless plains of the West. For this purpose this Association will bring together and disseminate information concerning desirable species of trees, methods of planting and protection, and shall obtain suggestions derived from experience in various portions of the country.

FOREST PROTECTION.

The forests should be protected from wanton or careless destruction, especially by fire, not only from the fact that trees add to the resources of the country but also because of the influence the forest cover may exert in ameliorating climate and in conserving water supplies. As a means of furthering forest protection this Association encourages the collection of information concerning the water resources of the country, the extension of agriculture through irrigation, and the increase of manufacture through the use of water power.

FOREST MANAGEMENT AND RENEWAL.

The management of the existing forests so that they may continue to yield increasing

supplies of merchantable timber is of primary economic importance. This Association will endeavor to aid or advise owners of forest land as to technical methods of making them of permanent commercial value and of renewing forest areas injured by fire or neglect.

FOREST UTILIZATION.

The forests of the country should be made to yield the greatest possible benefits to present and future generations, both by producing timber crops and by less direct means. Lumbering is an inseparable factor of the best forest protection and management, and should be so conducted as not to destroy the productive capacity of the land. It is believed that saw logs, mine timbers, railroad ties, etc., can be cut without the usual accompanying destruction of the forests. This Association will endeavor to promote all these lumber interests.

STATISTICS.

Facts concerning the distribution of the timber and wood lands, the species of trees, the rate of burning or cutting, are of first importance to a clear understanding of the problems of forestry in America. This Association will, therefore, endeavor to stimulate the collection of statistical information of this kind.

EDUCATION.

This Association will endeavor to call to public attention the importance of forest protection, conservation, and utilization, through the public press, through lectures, through the schools, and otherwise.

PUBLICATION.

In order to assist in the diffusing of information, this Association will publish a journal or periodical, in which the various topics above enumerated will be discussed.

LEGISLATION.

Since much of the destruction of the forest resources of the country can be traced to defective legislation, both State and National, this Association will endeavor to use its influence toward the enactment and enforcement of better laws.

BY-LAWS.

ARTICLE I.

Name.

The name of this Association shall be "The American Forestry Association."

ARTICLE II.

Objects.

The objects of this Association shall be the discussion of subjects relating to tree-planting, the conservation, management, and renewal of forests, and the climatic and other influences that affect their welfare; the collection of forest statistics; and the advancement of edu

cational, legislative, or other measures tending to the promotion of these objects. It shall especially endeavor to centralize the work done and diffuse the knowledge gained.

ARTICLE III.

Members.

Sec. 1. Any person may become a member of this Association, as hereinafter provided.

Sec. 2. Members shall be divided into five classes: Patrons, Life Members, Active Members, Associate Members, and Honorary Members.

Sec. 3. Any person contributing at one time the sum of one hundred dollars (\$100) to the permanent fund of the Association shall be a Patron. Any person may become a Life Member by the payment of fifty dollars (\$50) at one time. Patrons and Life Members shall not be liable for annual dues. Active Members are those who pay the annual dues of two dollars (\$2). Associate Members are the members of any local Forestry Association which shall vote to affiliate itself with the American Forestry Association, under such rules as the Board of Directors may adopt. Honorary Members shall be the officers of State, Territorial, Provincial, or other forestry associations, or the delegates from such associations, or the delegates of any Government.

Sec. 4. Applications for membership shall be referred to and voted upon by the Board of Directors at any regular or called meeting therefor.

Sec. 5. All members except Associate and Honorary members shall be members of this corporation and shall be entitled to vote and hold office in said corporation.

ARTICLE IV.

Officers.

Sec. 1. The officers of this Association shall be a Board of Directors, a President, a Vice President for each State, Territory and Province represented in the Association, a Treasurer, a Recording Secretary, and a Corresponding Secretary.

Sec. 2. These officers shall be elected by ballot at the annual meeting of the Association, and shall serve one year, or until their successors are elected. Vacancies occurring during the year may be filled by the Board of Directors.

ARTICLE V.

The Board of Directors.

The Board of Directors shall have the control and management of the funds and property of the Association. The Board shall consist of eleven (11) members, and shall elect its own Chairman and Secretary. The latter shall have the custody of the corporate seal. The Board shall have power to fill any vacancy occurring therein, the appointee to serve until the next annual meeting. The Board shall take, receive, hold, and convey such real and personal estate as may become the property of the Association for the purposes of the Association set forth in the certificate of incorporation and in Article II above. A majority of

the Board shall be a quorum. The Board shall meet one-half hour before the annual meeting of the Association, and at such other time as it may be called together by its Chairman.

ARTICLE VI.

The President.

The President shall preside at all meetings of the Association.

ARTICLE VII.

Vice President.

In the absence of the President, a Vice President shall preside at the meetings of the Association; and in the absence of all of them a President pro tem. shall be elected by the meeting.

ARTICLE VIII.

The Recording Secretary.

The Recording Secretary shall keep a record of the proceedings of the Association and the Board of Directors and shall be custodian of all documents, books, and collections ordered to be preserved.

ARTICLE IX.

The Corresponding Secretary.

The Corresponding Secretary shall conduct the correspondence of the Association. He shall keep a list of members, with their residences, and shall notify members of the time and place of all meetings of the Association.

ARTICLE X.

The Treasurer.

The Treasurer shall have the custody of all moneys received. He shall deposit and invest the same in such manner and to such extent as the Board of Directors shall direct, and shall not expend any money except under the direction or approval of the Board of Directors. The financial year of the Association shall close on November 30 of each year.

ARTICLE XI.

Meetings.

The annual meeting for the election of officers and the transaction of such business as requires to come before the entire Association, shall be held on the second Wednesday in December, at such hour and place as the Board of Directors may determine.

A quorum shall consist of fifteen (15) members of the Association (Patrons, Life members, or Active members), as specified in section 5 of Article III.

Special meetings may be called by the Board of Directors.

ARTICLE XII.

Dues.

The annual dues for Active members shall be two dollars (\$2) payable in advance upon the first day of January.

The Board of Directors shall have power to remit the annual dues of a member.

ARTICLE XIII.

Amendments.

These By-Laws may be amended by a three-fourths vote of the members present and entitled to vote at the annual meeting of the Association.

Seventeenth Annual Meeting.

In accordance with Article XII of the Constitution, the annual meeting of The American Forestry Association was held on December 14, 1898, at the hall of the Cosmos Club, Washington, D. C.

Owing to illness, President Appleton was not able to be present. The meeting was called to order soon after eleven o'clock A. M., by Col. J. D. W. French, Vice President for Massachusetts.

Mr. Pinchot, Chairman of the Executive Committee, read the following report of the work of the Committee for the past year :

REPORT OF THE EXECUTIVE COMMITTEE.

The Executive Committee of The American Forestry Association is the representative of the Association located at the Capital, to attend to the current work of the Association and keep in touch with the progress of the forest movement all over the country. It is proper at this time to state somewhat in detail what the Committee has done during the past year, for the information of the members of the Association.

The Committee has held seventeen meetings. It has passed upon and approved all bills, none of which have been paid without a warrant signed by the Chairman of the Committee. It has elected 128 new members, and has voted to drop from the membership list several who were in arrears, and who seemed to have lost interest in the Association. It has considered a large number of propositions submitted for approval, and has extended its aid to such as seemed wise and commendable.

Two meetings of the Association were held during the year; in Boston and Omaha. Those who attended the Boston meeting will not soon forget the generous hospitality extended to them by the Massachusetts members. The Omaha meeting was also successfully conducted, and at each meeting many valuable papers were read, and there was much interesting discussion. Most of these papers have already been published in THE FORESTER. The advantage of having them appear so soon after the meetings is, it is thought, apparent to every one.

Soon after the Association began issuing THE FORESTER, which happened during the past year, a subcommittee on Publication was appointed, which acted as an editorial staff for the magazine. During the summer all these members were obliged to be out of town, and the magazine suffered in consequence. It was therefore decided to secure some one to edit THE FORESTER, and devote all his time to it,

Mr. Joseph B. Thoburn, of Denver, formerly Secretary of the Colorado Forestry Association, has been engaged, and there is every reason to believe that THE FORESTER will become a valuable and influential journal in its own field. Arrangements are being made whereby the National Geographic Society and The American Forestry Association will occupy office rooms together, on a business basis, to their mutual advantage.

The most important work of your Committee during the past year has been its contribution to the successful endeavor to ward off the threatened attack upon the forest reserves set apart by President Cleveland, which had been suspended for one year prior to March 1, 1898. In the last Sundry Civil Bill the Senate inserted a proviso suspending the President's order setting apart these reserves, and restoring them to the public domain. Your Committee, on April 2, decided to take action and sent out circular letters to all members of the Association urging immediate protest. On April 13 a memorial was sent to all members of Congress, urging that the Senate amendment, if adopted, be limited to one year. Still later, specific amendments to the Sundry Civil Bill were suggested to the committees of the House and Senate. The efforts of this Association were in line with and were assisted by those of officials and private individuals, and the combined protest had its effect. The House refused to agree to the Senate amendment, and the reservations were saved.

During the past year, there were submitted to the Association some eighty-nine designs for a corporate seal. A competent jury of well-known artists and architects passed upon these designs, and decided that no one of them was possessed of sufficient merit to warrant your Committee in paying the prize of \$100 offered to the successful competitor. The designs were exhibited at the Cosmos Club in this city, and surprise was expressed that they should have been so unsatisfactory.

In June last the Association met with a loss in the resignation of Dr. B. E. Fernow as Chairman of the Executive Committee and Editor-in-Chief of THE FORESTER. His peculiar fitness for the position, his ability, his jealousy of the rights of this Association, and his untiring and aggressive enthusiasm for the work, have been of very great value to the Association, and have contributed in no small degree to the progress it has made and the influence it has wielded. The retirement of Dr. Fernow, to take charge of the New York State College of Forestry at Cornell, is regretted by none more than those who have been so long associated with him in the work of the Executive Committee.

The progress of forestry in the United States, during the year which is about to end,

has been most satisfactory. Public sentiment throughout the West, which, soon after the proclamation of the Cleveland Forest Reserves, was in an attitude of bitter opposition, has continued the remarkable change begun during the year which followed the proclamations, and at present opposition has practically died out. The only conspicuous exception is in the State of Washington, where the Republican platform contained a clause asking for a restoration to the public domain of all those portions of the forest reserves valuable for agriculture, mining or timber. In the Black Hills, where the protest was perhaps more vigorous than elsewhere, it has been replaced by the most cordial feeling, so that the Black Hills Forest Reserve has been increased by nearly half a million acres with the full assent and co-operation both of the local population and of their representatives in Congress.

Four new forest reserves have been created since the eleven suspended reserves emerged from that condition on the first of last March. These are the Pine Mountain and Zaca Lake Reserve in Southern California, of 1,644,594 acres, the Prescott Forest Reserve, of 10,240 acres, the Black Mesa Reserve of 1,658,880 acres, and the San Francisco Mountains Forest Reserve, of 975,360 acres, all in Arizona. In addition, the boundaries of the Pecos River Reserves in New Mexico, have been changed and enlarged to embrace 120,000 acres more, and those of the Black Hills Reserve have been similarly changed, with an estimated increase of 433,440 acres, a decrease of 189,440 and a final total of 1,211,680 acres.

The care and protection of the forest reserves has been entrusted to the General Land Office. For that purpose an appropriation of \$175,000 was made by the last session of Congress, and during the summer the work of organizing a forest force has been begun.

The report of Mr. Frederick V. Coville, Botanist of the Department of Agriculture, on Forest Growth and Sheep Grazing in the Cascade Mountains of Oregon, brought the question of forest grazing to public attention in a thoroughly scientific and practical manner for the first time. No other single factor has contributed so much toward a settlement of this most important question. The approval of Mr. Coville's plan by the sheep men was instant and widespread.

The foundation of the New York State College of Forestry, with Dr. Fernow as Professor of Forestry and Dean of the Faculty, and Mr. Roth as his assistant, is the most notable step yet taken in forest education in the United States. The last available report gives the names of 39 students of Cornell University who are participating in the courses of the school.

During the year another forest school, on simpler lines, was begun at Biltmore, in North Carolina, under the direction of Dr. C. A.

Schenck. Four students are in attendance on the thoroughly practical courses of the school.

The mapping and description of the forest reserves, under the direction of Mr. Henry Gannett, of the U. S. Geological Survey, has proceeded very satisfactorily during the past year. Nineteen reserves have so far been examined, and statistics of standing timber have been collected for Washington, Northern Idaho and part of Oregon. The Association is particularly to be congratulated on the prospect of possessing, in the near future and for the first time, reliable statistical statements of forest resources in some of the most interesting portions of the country.

The resignation of Dr. Fernow from the Division of Forestry was followed by the appointment of Gifford Pinchot as Forester of the Department of Agriculture, and by the reorganization of the work of the Division. The attention of the Division is to be directed hereafter to field work, as fully as the circumstances will permit. A plan of the Division, outlined in Circular No. 21, by which it undertakes to assist private owners in the care of their forest lands, has been responded to by applications for such assistance which cover about 1,100,000 acres.

The action of the International Paper Company, in appointing Mr. Edward M. Griffith, a trained forester, to assist in the management of its timber lands, is a notable step forward in the progress of forestry, since this company is by far the largest producer of wood pulp in the United States. Mr. Austin Cary has been appointed by another company for a similar purpose.

The purchase of forest land by New York State, in the Adirondacks, under the appropriation of \$1,000,000, had resulted, at the last report of the Forest Preserve Board, in the expenditure of more than \$900,000 and the acquisition of over 250,000 acres at an average price of \$3.685 per acre. The school forest of the New York State College of Forestry, of about 30,000 acres in extent, has recently been added, only, however, as prospective State property, since it will belong to Cornell University for a term of years before reverting to the State. Pennsylvania has acquired 55,681 acres of wild lands as the result of an admirable plan for the creation of State forest parks at the head-waters of important streams, and the rebate provided by law in the taxes of timber lands is beginning to be widely claimed. Forestry associations have been established in Utah and Massachusetts, and the latter has been exceedingly active in forwarding the good work.

One of the ends for which the Association has been striving for many years, namely, the establishment of a Government system of forest administration, having now been attained, the members of the Association can devote their energies to no more important object than the

maintenance of a public interest which shall insure efficiency in the administration of the forest reserves.

The report was received and approved.

The Treasurer's report was then presented, as follows:

TREASURER'S REPORT, 1898.

George P. Whittlesey, Treasurer, in account with The American Forestry Association, Dr.

To Balance December 15, 1897.....	\$ 907 35
To Annual Dues.....	1,026 00
To Life Membership Fees (7).....	350 00
To Donations.....	37 00
To Sale of Proceedings.....	12 65
To Subscriptions to FORESTER.....	1 00
To Interest on Bonds and Bank Deposits.....	113 63
	<hr/>
	\$2,447 63

By THE FORESTER.....	\$960 13
By Printing.....	258 15
By Clerk Hire, Postage, Express- age, etc.....	255 84
By "Forest Leaves" for 1897.....	320 32
By Seal Design.....	9 73
By Binding.....	3 00
By Balance on hand November 30, 1898.....	640 46
	<hr/>
	\$2,447 63

Respectfully submitted,

GEO. P. WHITTLESEY,
Treasurer

The Chair appointed Messrs. F. H. Newell, George W. McLanahan and Charles A. Keffer as the Committee on Nominations; Messrs. Gifford Pinchot, F. V. Coville and W. S. Harvey, Committee on Resolutions, and Messrs. George B. Sudworth and Henry S. Graves, Auditing Committee. The Treasurer's report was referred to the last-named committee.

Mr. F. H. Newell presented the following report of the Corresponding Secretary, which was accepted:

REPORT OF CORRESPONDING SECRETARY.

Since the last annual meeting 128 new members have been elected. Not all of these have qualified by payment of dues, but most of them undoubtedly will comply with this requisite. There have been eight resignations and four deaths reported, leaving a total annual membership of 748, and life membership of 74, making a total of 822.

We have lost, by death, four of our most active members: Hon. Gardiner G. Hubbard;

Mr. J. O. Barrett, of Brown Valley, Minn.; Mr. George H. Parsons, of Colorado Springs, and Hon. J. M. Forbes, of Milton, Mass.

The corresponding secretary has been away much of the time since July, or has been pressed by other duties. For this reason the collections during the year have been less than usual and the accessions of new membership have not been what was hoped.

F. H. NEWELL.

Mr. Newell moved that the Constitution be amended, and offered certain suggestions, which he stated had had the approval of the Executive Committee. After some discussion they were adopted, as follows:

Resolved: 1. That the title at the head of the several Articles adopted February 5, 1897, be changed from "Constitution" to By-Laws.

2. That Article III, Section 3, be amended by changing "Executive Committee" to Board of Directors.

That Section 4 be similarly amended.

3. That Article IV, Section 1, be amended by striking out the words, "and an Executive Committee."

4. That Article V be amended by changing the word "President" to Chairman.

5. That Article VIII be amended by changing "Executive Committee" to Board of Directors.

6. That Article IX be amended by striking out the sentence, "He shall receive annual dues and receipt for the same in the name of the Treasurer."

7. That Article X be amended by striking out the words, "or the Executive Committee as authorized by said Board."

8. That Article XI be canceled.

9. That Article XII be amended by changing "Executive Committee" to Board of Directors.

On motion of Mr. Coville, the Board of Directors was authorized to choose Vice Presidents for Cuba, Puerto Rico, Hawaii, and any other countries they thought best.

After a recess of fifteen minutes the Committee on Nominations reported the following list of officers for 1899, who were duly elected:

President, Hon. James Wilson, Secretary of Agriculture.

Vice President for the District of Columbia, Mr. George W. McLanahan.

First Vice President, Dr. B. E. Fernow.

Corresponding Secretary, Mr. F. H. Newell.

Recording Secretary and Treasurer, Mr. George P. Whittlesey.

Directors, all the above and also Messrs. Charles C. Binney, Edward A. Bowers, Frederick V. Coville, Henry Gannett, Arnold Hague and Gifford Pinchot.

On motion of Mr. Keffer, the Board of Directors was directed to revise the list of Vice Presidents.

In reply to questions by Col. French, Mr. Newell stated that Mr. Joseph B. Thoburn had been secured to edit THE FORESTER, and through it strengthen the Association and increase its influence.

Col. French stated that Gen. Appleton thought that a portion of the money left over from the Boston meeting could be devoted to the expenses of THE FORESTER, probably a hundred dollars or more.

On motion of Mr. Newell, a vote of thanks was given to the contributors of this fund, and it was also agreed to send each of them THE FORESTER for 1899.

Mr. Pinchot, for the Committee on Resolutions, reported the following resolutions which were unanimously adopted:

Whereas, It is essential for intelligent lumber operations and the proper utilization and preservation of the forest resources of the United States that statistical information of a reliable character shall be acquired as to the kinds and quantities of timber in all the States and Territories; and

Whereas, The Division of Forestry of the United States Department of Agriculture is eminently qualified to gather this information, it is therefore

RESOLVED, That the American Forestry Association, at their annual meeting held in Washington, December 14, 1898, petition the Senate and House of Representatives of the United States that provision be made and that a suitable appropriation be passed to enable the Division of Forestry of the United States Department of Agriculture to gather this information either in advance of, or in connection with, the Twelfth Census.

Whereas, It is of essential importance that the foundation of a knowledge of forestry in future citizens be laid in educational institutions, therefore be it

RESOLVED, That the American Forestry Association welcomes with great satisfaction the foundation of schools of forestry in Cornell University and at Biltmore in North Carolina and the extension of nature-study connection with forestry in Normal and other schools

Whereas, The forest work of the United

States Government is distributed among three agencies: the General Land Office and the Geological Survey, both in the Department of the Interior, and the Division of Forestry in the Department of Agriculture; and

Whereas, The Association is gratified by the liberality of Congress in providing for forest investigation, survey, and administration, but deplors the loss of money and energy resulting from lack of concentration in the execution of forest laws, therefore be it

RESOLVED, That the American Forestry Association urges on Congress the wisdom and economy of a unification of these varied agencies in a single Bureau adequate in resources and equipment to the great work involved.

In reply to a question by Col. French, Mr. Pinchot said he would be delighted to welcome any students of forestry who might come to the Department of Agriculture, and would help them both in the office and in the field.

Mr. Coville said the Secretary of Agriculture fully appreciates the value of making the Department a school of post-graduate work, and cordially favors it. He thought there were at least three such students now in the Department.

Mr. Sudworth, for the auditing committee, reported that they found the Treasurer's accounts to be correct and approved his report.

A telegram having been received from Dr. Fernow that his train was late, and that he would arrive about two o'clock, the meeting then, on motion of Mr. Coville, adjourned to meet at three P. M.

About a dozen members enjoyed a cozy and sociable lunch at the Hotel Wellington, only regretting that the attendance had not been larger.

At the afternoon session Dr. Fernow was given the floor, and said in part that he had just completed a detailed report on the work of the Forestry Division of the Agricultural Department, which he had sent to Congress. He had reviewed not only the division work, but the whole forestry movement in the United States from its beginning, tracing its growth to the present time. No one man or set of men can exert a controlling influence in any line, but in forestry this Association has been the prime mover. He thought the era of plowing the field had

now closed, and that the era of sowing the seed is now coming. He gave considerable attention to the College of Forestry at Cornell, explaining the courses of study given by himself and Dr. Roth, and stating that some 35 students are at work this year, many from the agricultural department of the University. He thought that agriculture and forestry would become more and more closely connected as time went on. The Cornell College would publish bulletins now and then, discussing questions of technical forestry. He described the new forest tract on which the college is to demonstrate lumbering for profit, intro-

ducing various methods in order to show what are failures and what are successful. He believed the so-called German methods would be found successful and sound. The tract will also be used to teach practical forestry and silviculture to students. The land has been given to Cornell for thirty years, and so does not come under the restrictions of the State Constitution as to cutting.

On motion of Mr. Keffer, a vote of thanks was tendered the Cosmos Club for kindly allowing the Association the use of its hall.

The meeting was then adjourned.

New Growth on Burned Areas in Colorado.

PROF. C. S. CRANDALL.

It would be interesting to know with some degree of exactness the time required to start a new forest growth on a burned area, but recorded observations are wanting. Some areas may and do remain bare for long periods, while others will develop new growth within a comparatively few years. The time may thus vary greatly, because growth is dependent upon local surroundings. Denuded areas in the subalpine region, where the rainfall is commonly greater than below, show the influence of the abundant moisture in the quality and vigor of the herbaceous vegetation which first follows a fire, but observation leads me to the conclusion that in the higher altitudes the forest trees are much slower in starting, and that they start in less numbers and develop much more slowly than in the lower regions.

That several years commonly elapse between the burning and starting of new coniferous growth seems indicated by the following observations, the first in the canon of the Cache la Poudre, on a tract that was burned, according to reliable authority, in the summer of 1881. As examined in 1894, thirteen years after burning, grasses were abundant among

the dead logs, there were a few shrubs, and a scattering growth of Pines, the largest of which was twenty inches high and seven years old. Here it was apparently six years after the fire that the first Pine tree started. The other observation was made on a tract extending south and west from Chambers' Lake, which was burned over in July, 1890.

I passed through the burned district a month after the fire, and was greatly impressed with the absolute desolation. No green thing remained; the ground and everything upon it was clad in somber black; animal life was absent, and there was something so oppressive in the desolate solitude that I was glad to reach green timber again. A second visit to this tract was made four years later, in July, 1894, and it was with a feeling of keen disappointment that I noted how slight a change four years had wrought. The intense blackness had been subdued in some degree by the action of the elements; some trees had fallen and others were losing their bark; but the general appearance of desolation remained. A few struggling plants of grasses and sedges were the only evidences of returning vegetation.

In noting the conditions that seem favorable to the starting and development of a new forest growth, I have frequently seen confirmation of the often repeated and generally accepted statement that north slopes are more quickly

quickly. Differences in the two slopes are apparent even at the time of burning, and, owing to greater dryness, vegetation on the south slope will burn more completely. On the north slope the tangle of unconsumed remnants serves



DESOLATE SOLITUDE.

covered by new growth than southern. There are exceptions, however. The reason for the difference of growth on the slopes rests, apparently, in the more vigorous action of the sun upon the south slope. The nearly perpendicular rays melt the winter snows, exhaust the soil moisture and parch vegetation very

as a protection to the young growth and nurses it beyond the critical stage, while on the south slope the young plants, unprotected from the fierce rays of the sun, succumb quickly and the slope remains barren.

Fort Collins,
Colorado.

Forests in Their Relation to Irrigation.

BY HENRY MICHELSON.

In the northeastern part of Spain, directly south of the Pyrenees, lies the valley of the Ebro River. In its upper course, this river gathers its waters in a region of mountain forests and pastures. In its middle course there is a region deserted because of its lack of water. The devastation of forests and the lack of irrigation works account for large tracts of country that have become barren and bereft of population. The southwestern portion of the plateau comprising Estremadura is a broken, mountainous country. Originally the land here was protected by oak and chestnut forests in such a way as to make agriculture possible, while droves of pigs were fed upon mast. Shepherds found it necessary to bring their flocks into this region to avoid the rigorous winters of the interior highlands. The result has shown the inveterate hate of the shepherd for the forest. Little by little this natural covering has been stripped away, the climate has been altered and Estremadura is now considered the most backward part of Spain. The agriculturist of Spain has not properly prized the two heritages which his environment indicates to have been the most valuable of his original possessions. He has wasted the forests and has neglected to properly preserve and employ the supplies of water at his hand. Agriculturally, Spain was probably in better condition when the Moors possessed it than now.

The denudation of forests in the Volga Valley, and in fact throughout the whole of the center and south of Russia, has had for its effect the diminution of the rainfall and the impoverishment of soil. Scarcity is almost continuous even in the black soil districts, famine is always on the horizon and every few years the specter of want enters the doorway of millions of Russian homes. Much of the soil, in European

Russia, vast as it is, is rapidly becoming exhausted.

That the forests at the sources of all rivers which rise at high altitudes consist mainly of coniferous trees, which not only shield the snow from rapid melting, but also by their dense shade prevent rapid evaporation of the ground water. To denude the mountain side by axe or fire is followed by an early disappearance of fallen snow, destruction wrought by soil erosion, drying up of springs, the formation of torrents which are destructive of everything within the path of the waters, and, for the irrigator, the necessity of constructing reservoirs for water storage.

Wherever the mountains have been cut bare it is vain for the husbandman of the plains below to hope for water for his crops during the growing season, for the moisture will evaporate and disappear so soon as the spring sun shall have warmed up the barren cliffs. We know that creeks which did run the year around at the advent of the white man have now barely water enough to run for three months. Colorado is preparing for itself the fate of Spain. The early explorers describe it as a land of snowy peaks, sparkling rivers, dense woods covering the foothills into the plains. At the present time we find the greater part of its forests destroyed, its timbers wasted by fire, its streams lacking water and its agricultural part depending on reservoirs to supply the crops. As the peaks are denuded of their coniferous trees, the snowfall will melt rapidly, the summer will have no water supply for the parched fields of the plains below.

The winter of 1897-8 was snowless and fears were entertained that the beautiful valley of the Cache la Poudre would be unable to raise a crop during the season of 1898. A very opportune snow-storm which occurred in the beginning of the month of May, fortunately took

away the necessity for the first irrigation usually required in that month, and for the irrigation of the vast potato fields in August, water was used which had been stored in reservoirs during former years. The irrigating farmer thus lives from hand to mouth, trusting in providential measures, which he has no right to expect, while the lumberman, with axe and fire, destroys the source of his supply.

And the Colorado farmer is not the only sufferer. There are in Nebraska some three millions of acres fit for irrigation; all of them dependent for their water supply upon the river Platte. This river would carry a steady volume of water all the year round, were its sources permitted to pour out their liquid streams as nature ordained they should. As it is, Nebraska will have to build reservoirs to store flood water for the use of her farmers during the summer season.

There is but one way out of the difficulty. The governments, both Federal and State, must apply the remedy before it shall be too late. What is required is a reasonable forest service by men trained for the work. We do not advocate a cessation of the lumber business at all. That lumber should be cut is quite essential to the well-being of the forest itself, but it should be cut in a sensible and scientific manner.

Where fires are kept out of the forests and sheep are not permitted to destroy the young trees, nature is apt to repair damages by spontaneous growth. Even

where fires have destroyed the woods, a second growth springs up, if the erosion of the soil has not been too severe to permit this. What is desired is to save whatever timber may be still standing.

The Danish Government, since 1865, has been engaged in planting trees on the peninsula of Jutland. A sandy stretch of some 200 miles in length has been made use of and a forest of some forty miles in breadth planted thereon. The influence of this 30-year-old Pine forest on climate and health has been marvelous, and the timber has paid for its own planting during the last ten years.

When such results can be achieved by a country of small resources and an inhospitable climate, on land so light that it was necessary to plant firs and junipers mixed, the latter being designed to protect the roots of the former from being laid bare, what may we not do in a country such as this where conditions are so much more favorable?

The United States has reason to look after the preservation of its forests. There is hardly a season that we do not hear of reduction of most promising crops by drouth and hot winds, and in many prairie States the yield per acre has become less than it ought to be.

We, of the West, should teach the irrigationist farmer unceasingly thus:

"If you wish for an abundance of water, see to the preservation of the woods at the sources of the rivers."

Report of Wisconsin Commission.

The State Forestry Commission which was appointed under an act of the Legislature of 1897 for the purpose of inquiring into the matter of better forestry legislation, has completed its report and delivered it to the printer. The commission consists of George B. Burrows, of Madison; H. C. Putnam, of Eau Claire, and Ernest Bruncken, of Milwaukee.

The report calls attention to the misapprehension which still widely prevails as to the meaning of the word "forestry." That art or profession is not synonymous with arboriculture, which is merely a branch of the subject. Neither has it anything to do with the growing of ornamental trees in parks. It is simply the business of utilizing forest lands for profit. The improvement of prevailing

forestry methods is urged by the commissioners, not on sentimental grounds, but as a matter of dollars and cents.

The report next calls attention to the fact that there are in the State large tracts of land which will return better profits if used permanently for raising wood crops, than if converted into agricultural land. It should therefore be the policy of the Government to promote this use rather than the clearing of these lands for farming purposes. The immense extent of the lumber and allied industries in the State is referred to, and it is urged that if the thousands of men who now derive their support from these industries were thrown out of employment on account of the permanent disappearance of their raw material it would be nothing short of an economic revolution in the State. Finally, the commissioners say, it should not be forgotten that "a wise legislation should consider whether Wisconsin cannot in the future derive such revenues from its forests as will help to bear the expenses of government which will otherwise have to be met by taxing the people."

After this introduction, the subject is divided into three heads of discussion: Fire protection; the relative advantages of public and private ownership of forests; and the steps necessary and practicable to attain the object of reform.

"Without some effective system of fire protection there is no hope of placing the forest industries of the State upon a stable basis. It is clearly as much a duty of the public authorities to prevent forest fires as to prevent and extinguish fires in cities." The system of fire wardens inaugurated by the last legislature, although it has done some good, is not sufficient. Many local wardens either do not understand their duties or neglect them. There should be proper supervision. The commissioners recommend that the State pay one-half of the expense of the fire police.

The report discusses the question whether there is likelihood of private capital being invested in timber lands for permanent management, and arrives at a negative conclusion.

The opinion is expressed that Wisconsin lumber concerns could not compete with those of other States if they were to conduct their business on any different principle than that now prevailing of cutting at once all the merchantable timber on their holdings, though there are reasons why this seems questionable.

The management of timber lots on farms is considered and the report insists that it is the duty of the State to assist farmers, by proper instruction, to prevent the constant deterioration which these small forests now usually suffer.

The conclusion is reached that the State must either allow its lumber, wood, and allied industries to decay, or take the supply of the necessary raw material into its own hands.

This naturally leads to a consideration of the public lands still existing in Wisconsin. According to the report of the land office the whole amount of the State land remaining unsold on the 30th day of September, 1898, was 367,000 acres. This is nearly all forest-covered, and not well fitted for agriculture, and is widely scattered. The legal status of these lands is discussed, and attention called to the constant deterioration of the growing timber on them by reason of fires, windfalls and consequent insect damage. The report urges that the sale of these lands be stopped temporarily, and the merchantable timber thereon be cut and disposed of as soon as practicable. A number of objections which might be raised to the permanent retention of these lands by the State are discussed and shown to be ill taken. The lands owned by the United States Government in Wisconsin, which are somewhat larger in extent than the State lands, are of substantially the same character as the latter. The commissioners recommend that an effort be made by the State authorities to have these lands ceded to the State by the Federal Government.

The most difficult part of the forest problem is the disposition of the Pine lands from which the merchantable timber has been removed. Of these there are many hundred thousand acres in the

State. Practically all of them are capable of being restocked with pine at reasonable expense.

This can be done only by public authority which will not look to immediate profit. As long as they remain uncared for the fires prevent the natural reproduction. Without human intervention these immense tracts will for the most part become vast wildernesses, unfit for agriculture, yet yielding none of the valuable products of a forest.

Most of these lands are owned by private parties, although a considerable portion is owned by counties under tax titles. The idea that all of these lands will eventually be taken up by agricultural settlers is a mistake. Occasionally a settler may be found who makes a miserable living on even the poorest of these lands, but he must of necessity always remain poor, unambitious and ignorant. The simplest way to dispose of these lands and make them of use to the people would be for the State to purchase them. How this is to be done is yet to be determined. It is stated by the commissioners that several large owners of cut-over Pine lands have intimated their

willingness to cede large tracts to the State if the latter will take steps to restock them.

After outlining the manner in which the rational management of the State forests should proceed in the future, the report gives a general view of the commissioners' plan for a State forest department, as proposed in the bill which will be submitted to the Legislature together with the report. A State superintendent of forests, an assistant, and other subordinate officers are to be appointed. The sale of State lands shall be stopped, and the same shall be surveyed. All dead and down timber, and such other timber as the superintendent may deem expedient, shall be sold as soon as practicable. Also audit all accounts. The superintendent is to build roads and make necessary improvements on the lands under his care, but must not incur an expenditure to exceed \$110 without authority. The superintendent appoints the local fire-wardens, and has the supervision over them. The department is to establish model forests and experiment stations in different portions of the State.

The Lumber Industry.

Commenting on the proposition of the Forest Division to aid timberland owners in the formulation of plans for their most profitable management, the *Northwestern Lumberman* says:

"Probably the scheme will result in calling attention to the work of the department to a greater extent than formerly. It appeals directly to the pockets of forest owners, which is about as strong an address as can be made to the average American or the average man of any nationality for that matter. If the officers of the Forestry Division can, through the workings of their new plan, interest a considerable number of woodland owners to the extent of forcing on their minds that there is a better way to handle forests than to slaughter them, they will

have accomplished a good work. When a few shall have become interested, the influence will spread until an intelligent forestry system shall become prevalent throughout the country. But it is doubtful if the services of the department agents will be much required by the lumbermen who own lands that they intend to denude as rapidly as they can cut and sell the timber. Anything that shall hamper speed in this process will likely be turned down as an unwarrantable interference. Yet here and there is a timber owner, not a lumberman, who will listen to any proposition that promises to add to the value of his holdings."

This enterprising lumber trade journal will have to revise the judgment above expressed. Fourteen lumber camps are

now cutting timber under plans prepared by the Division, while plans have been made and accepted for over 100,000 acres in the Adirondack region alone.

It is estimated by Wisconsin lumbermen that this winter's cut will exceed former years by anywhere from 100,000,000 to 150,000,000 feet. The wages that will be paid this winter for chopping are placed at about \$215,000 per month, and from 2,000 to 3,000 more men will in all probability be employed this year in the woods about the head of the lakes than last year.

Lumbering in Northern Michigan and on the upper peninsula has been at its height, and thousands of men have been plying the axe with vigor. Skilled woodsmen have held out for \$24 to \$26 per month, and even when the operators decided to pay these prices it was hard to secure men enough to recruit the crews to the desired number. Two years ago wages in the woods ran from \$14 to \$18 per month.

There is a good demand for log scalers on the headwaters of the Mississippi, in northern Minnesota. This must either be due to an unusually large amount of logging going on in that district, or else scalers of experience have suddenly become very scarce. It has even been said that this scarcity may affect the log cut the coming winter.

The shipments of lumber from Bangor, Me., this year are reported to be about 35,000,000 feet less than the aggregate amount shipped last year. This is said to have been in a great measure due to the war. It is hoped that there

will be some demand for Maine lumber for shipment to Porto Rico and Cuba.

The Government has been buying some timber and lumber for use in Cuba. The creosoted lumber called for in the bids is to be used for a wharf at Triscornio, a village of 500 inhabitants on the shore of the harbor of Havana. The wharf will be between 300 and 400 feet in length, insuring thirty feet of water, sufficient for large steamers. The timber is subjected to its treatment of creosote to enable it to resist the ravages of the teredo worm.

Representative Bromwell, of Ohio, has introduced a bill in Congress to grant salvage for logs found adrift in navigable waters of the United States. It provides that the owners of such logs shall pay 25 cents each for logs less than 30 inches in diameter and 50 cents for logs over 30 inches. Bunches of 50 logs, in raft, are to cost the owner \$5 in salvage, and 10 cents for each log over that number is to be charged.

An enthusiastic writer on a Mobile newspaper says that "the forests of Alabama are inexhaustible." This is a very popular mistake and one that has been made by others in a better position to judge intelligently than are the editors of secular newspapers. If the writer in question had first known his neighboring State, Georgia, had been practically exhausted within a commercial period scarcely exceeding a quarter century, and that inroads upon forests are growing, not shrinking, he probably would not have made that sort of statement, especially as it is very clear that he thereby could hope for no good to come from it to his clientage.—*The Timberman.*



Technical Improvements.

The Bavarian state railroads have been experimenting with a process of hardening railroad ties by chemical treatment, the object being to produce a chemical union of the wood fiber and the preservative. It consists of a double baking of the wood, a treatment with oil of vitriol and sulphate of iron, after which the wood is given a bath of chloride of lime, milk of lime being added, at a temperature of 112 to 257 degrees Fahr., at a pressure of about forty pounds to the square inch. The theory is that the first baking destroys the germs of fermentation and induces the chemical union of the preservative with the fiber of the wood, the second baking hardening the wood and rendering it a non-absorbent of moisture. It is reported that hardening takes place to a remarkable degree, while the preservative effect compares favorably with the processes already in use.

The American Wood Fire-Proofing Company, of 11 Broadway, New York, is building works at Newark, N. J., and

presently will be prepared to fire-proof woods for naval, marine, and other structural uses. The cost of treatment, so the company claims, will be generally moderate, depending in particular upon the nature of the wood treated. The process is protected by letters patent and is said to be the only insoluble treatment which, with a second treatment, the albumen bath, seals the pores and makes the wood almost proof against the elements, thus greatly increasing its durability. The company will sell territorial rights or royalty privileges, in such latter cases superintending the building of necessary apparatus. Fire-proof wood made so artificially is not altogether a new thing, but the treatment employed by this company, on account of its insoluble and sealing processes, seems to have reached the limit of performance in the premises. The strength of the wood is not appreciably affected by this process, but the treatment affords a foundation for more effective polish than is attainable without it.

Forest Administration.

U. S. Indian Agent Wisdom, of Muscogee, I. T., who has supervision of the agency for the five civilized tribes, recently issued the following instructions relative to the cutting of timber in the Indian Territory:

Until permanent allotments have been made and patents issued therefrom to the individual Indians, no one is authorized to buy or sell timber off any place in the Cherokee Nation until final disposition of the land or claim in said nation is made.

On December 10 the Committee on Indian Affairs in Congress decided to appropriate \$45,000 to continue the examination and estimates of the timber on the Chippewa reservation in Minnesota; \$10,000 to be immediately available, with the proviso that the work shall be finished within the current year.

Land Commissioner Hermann states that he has issued orders to Chief Seelye, of the Chippewa Pine Estimating Corps, to hurry work in order that the Pine may be put on the market at the earliest possible moment. The commissioner has formally instructed Superintendent Ross to resume dead and down timber operations in the ceded portions of the Chippewa reservation. The regulations of last year will govern in operations in the year to follow, with the following modifications to be applied to future contracts:

All dead and down timber is to be marked and none other than marked timber is to be cut; all green trees removed for road-cutting purposes are to be accounted for at green timber price, the amount to be placed in the Indian

fund in the Treasury. Boom sticks also to be accounted for in this way, and only small trees to be used for this purpose. Accounts of supply men are to be subject to inspection by Superintendent Ross and Indian agent to prevent overcharges.

The Commissioner of the General Land Office has issued instructions to the forest officials and rangers on the reserves in Colorado to co-operate with State officials in the enforcement of the game laws of that State.

The right of the Government to prosecute criminally persons grazing sheep in all forest reservations, except in Washington and Oregon, is sustained in a decision rendered by the Attorney General.

The forest reserve officials of Washington and Oregon met at Tacoma, Washington, on the 27th of December to discuss the question of sheep grazing in the reserves.

It was practically decided to allot the pasture district lying in the Mount Tacoma reserve in well-defined ranges, the boundaries being marked by streams and ridges. These ranges will be let at the rate of \$5 to every thousand sheep pastured each season, unless there is competition for the same tract between rival growers, when it will be given to the highest bidder. Grazing will be prohibited in the reserves until June 20 to allow the grass to get well started, and the higher altitudes will be reserved until a month later.

The settlement of this question is one of greatest difficulty, yet it is left nearly altogether to the discretion of the reserve superintendents, although their plans have to be ratified by the Government. It is believed that the reserves are already pastured to the fullest extent compatible with safety to the permanence of the grazing. The herds are increasing every year, and it has become necessary to formulate a plan for allotting the district

with definite boundaries for each range, and to prevent too early feeding on the grass in the spring.

Spoliation on the Public Domain.

As news items indicative of industrial activity, the two following press dispatches are self-explanatory:

ROCK SPRINGS, WYO., Nov. 23.—(Special.) The Oregon Short Line Company has completed negotiations with the Rock Springs Lumber Company for the delivery during the coming year of \$160,000 worth of railroad cross-ties for use on its line. The ties will be cut on the headwaters of Green River and floated to the railroad at the town of Green River, where the company has a big log boom. The lumber company has at the present time a large force of lumbermen employed in the mountains getting out ties for the contract.

ALAMOGORDO, N. M., Dec. 8.—Good authorities state that the Alamogordo Lumber Company has taken a contract to furnish a Mexican railroad with sixty miles of railroad ties.

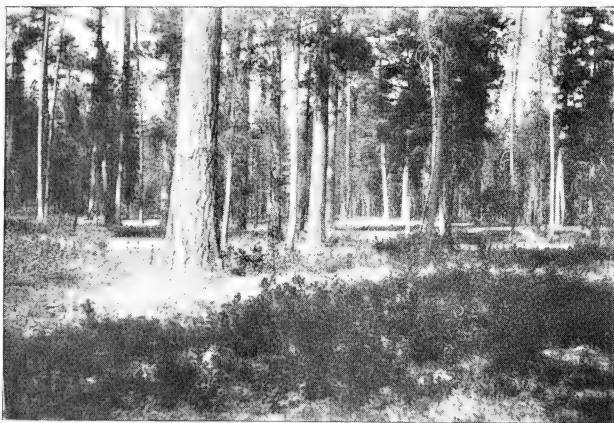
A question naturally arises in many minds, when reading such items, as to whether or not all these ties are to be cut from patented lands. Trespasses on the timber of the public domain have been of not infrequent occurrence in the past and they may occur again. The following from the *Denver Times* throws some light on the character of the transactions of the lumber company referred to in the first of the foregoing dispatches:

One of the most gigantic steals in the history of the timber traffic of this country is being unearthed at Wells, Uinta County, Wyoming, a new town of 150 miles north of the Utah line. The case is not only large of itself but its ramifications are far-reaching and involve parties high in power in the meshes of malfeasance in office. Binger Hermann, Commissioner of the General Land Office, is on the scent and after having been notified by prominent men of Wells of the state of affairs existing there, has ordered several inspectors to the scene. That is the first part of the cat-out-of-the-bag side of it. Despite the Commissioner's orders, to date none of his inspectors have appeared. No reflections are made on the integrity of Mr. Hermann, however. It is the fact that none of the men whom he had ordered to the scene have arrived that led to the upheaval. Briefly summarized, the methods have been as follows: The Rock Springs Lumber Company has located a large

number of tracts of timber land, paying for it with soldier scrip. Of this scrip they have a great quantity, bought for a song from soldiers who did not use it themselves. The scrip calls for small parcels of land, from 40 to 120 acres each, and reads "agricultural land"! The fact that it is diverted into other channels is considered sufficient cause for prosecution by the Government. Instead of taking the land in a bunch, it is alleged that the lumber company takes it in various sections, skipping here and there and using their own and the land lying between their tracts indiscriminately. This is very difficult to discover, as the lines are hard to run through the heavy timber and it would involve a great

ruthless manner. Another count which has been lodged against the company is that it has been buying elk meat at two cents per pound and that a number of hunters have been providing it for the wood-choppers in various camps belonging to the company. In view of the fact that this was done during the close season for big game, it is a most serious offense, and when taken with the rest of the allegations, it seems important that something should be done to thwart the schemers. The informants of *The Times* are reliable men and their reports indicate a most malodorous state of affairs.

Last fall the Assistant Commissioner



YELLOW PINE ON BITTER ROOT RESERVE, MONTANA.

amount of labor to locate the boundaries correctly. The company has from 150 to 200 men at work at all times and it does a general timber trade, dealing in ties, mining timbers and saw logs. The amount cut annually is immense and the loss sustained by the Government is enormous. In addition to the scrip deals, it is alleged that last winter the company cut much timber on Horse Creek without paying for it even in scrip. Two years ago they cut it around Wells, and the year before that their traffic was carried on along Jim Creek. They made no pretensions save an open steal on those occasions.

Mr. Wells, of the town which bears his name, has been threatened by the company on account of the bitter fight he has been making against the members of it. It is said that the country is being stripped of timber in a most

of the General Land Office, acting in the absence of the Commissioner, refused to sell to a contractor a large tract of timber on the west slope of the Medicine Bow range in Wyoming, holding that under the law timber cannot be sold from the public lands to non-residents of the State. In making this ruling the Assistant Commissioner was in the right, yet his decision might well have been based on a more sweeping provision of the law. In the Act of March 3, 1875, among other rights conferred on railroad companies, is the privilege of taking from the public lands

adjacent to the line of road such timber as may be necessary for the construction of the road. This provision of the statute was literally construed in a subsequent ruling of the Interior Department, thus permitting the use of timber from public lands by railroad companies, or their agents or contractors, for purposes of *construction only* and *not for repairs*. It would seem that the prohibition in this case should be based, not on the fact that the contracting tie-cutter was a non-resident of the State in which it was proposed to cut the timber, but rather on the fact that the railroad, for which the supplies were to be cut, was not constructing a new line in the meaning of the law, but proposed to use the supplies so obtained as repairs. Indeed, in the present instance, the contracting railroad, the Oregon Short Line, is not only not constructing a line of road adjacent to the land from which the timber is being cut, but it has no line, either in existence or projection, in the State of Wyoming!

Of the transactions of the lumber company reported as operating at Alamo-gordo, N. M., less is known, but it is

certain that there is no law that authorizes the cutting of timber to supply the needs of railways beyond the national boundary, and it is no less certain that New Mexico has no timber to spare for such purposes. Every day the necessity for a further extension of the forest reservation policy becomes more apparent. So long as an adequate supervision of the public timber lands is lacking, cupidity, dishonesty and law evasion will be manifest. It has indeed been well said that "No good reason can be given for the maintenance of the present reserves which does not also demand the withdrawal and protection of all similar lands held by the Government."

Government officers say many men throughout the mountains are illegally cutting railway ties on Government land. Recently a mountaineer called at one of the Denver offices to sell ties. When asked if they were broad or narrow gauge ties, he replied that they were not cut yet. Suspicious that everything was not straight, the official dismissed him.—*Denver Times*.

Arboriculture.

Tree Planting on the Farm.

I am glad to notice the interest manifested by so many in the matter of preserving our now almost depleted forests. Those of us who have grown old in Indiana have been familiar with a native forest that was truly beautiful for its grandeur and magnificence; and we have witnessed, too, its almost entire annihilation. In the early settlement of the country trees were regarded as the natural earnings of the farmer. Before the pioneer built his cabin he industriously cut away every tree within a stone's-throw of the site. Years afterward, discovering his mistake he planted the same kind of trees about his home that in an earlier day his hands had so ruthlessly destroyed. I am now living

on the farm upon which I was born. At first the trees were all cut down that were near the house. Many years ago I commenced allowing sprouts of native trees that voluntarily sprang up to grow, and transplanted others. I now live in a grove of native trees of second growth. Ten or a dozen kinds are represented; some of the trees are quite large. I have had to cut some down, one of which was over two feet in diameter, and made a good sawlog, which I sold to a timberman for several dollars. This is conclusive evidence to my mind that timber culture is not a mere dream of a theorist, but that it is practicable, and in my judgment it may be made profitable. I have also on my farm two or three Black Locust groves that are, and have been for

years, furnishing all the posts needed on a large farm. This is a convenience that can only be appreciated by those who have to have posts and who have not the money to buy iron posts with—that our friend Haslett recommended so highly. I have urged young farmers to plant Locust groves for shade, for wind-breaks, for beauty and for poles and posts; but not many of them will do it. In this fast age of steam and electricity people cannot wait for trees to grow. Yet how few there are who do not admire a grove of thrifty trees. In my opinion the State Board of Agriculture could not do a wiser thing than to devote a few acres of the fair grounds to tree culture, planting and preserving in it all of the various kinds of trees that grew originally in our forests. It would beautify the grounds and would be one of the attractions for visitors and an object lesson that would awaken and stimulate an interest in the subject of forestry.

—James N. Hill in *Indiana Farmer*.

For hedgerows and windbreaks on the dry plateau uplands of eastern Colo-

rado J. E. Payne, of Cheyenne County, finds the black locust the most acceptable tree, with the honey locust second choice. The Russian *Artemisia*, which was so well recommended, has not done very well. Out of 900 planted only four remain on account of winter-killing. The Russian mulberry is more promising and the ash is a slow but sure grower. The sand plum will do, and so may other varieties of the wild plum; but the most essential thing to observe in tree planting on the great plains without irrigation is to plow and subsoil or even dynamite the land, and if possible plow diagonal furrows in from higher ground so as to direct flood waters along the tree rows whenever it rains hard, and in this way get the benefit of the moisture.

The Newtown (Pa.) *Enterprise* says a Hickory tree, 100 feet in height, was cut down a short time ago, on the farm of David Slack, near Penn's Park, Buck County. Eighty feet from the stump it measured two feet in diameter. It will be cut up into firewood.

Sheep-Grazing in Forests.

The people of Madera County, California, have been circulating a petition to the Commissioner of the General Land Office praying for a rigid enforcement of the forest reservation rules in the Sierra Forest Reserve, and especially that sheep be hereafter excluded from its bounds. Among other things recited in the petition is the following, which illustrates the determined stand which the people of California have taken in regard to sheep grazing:

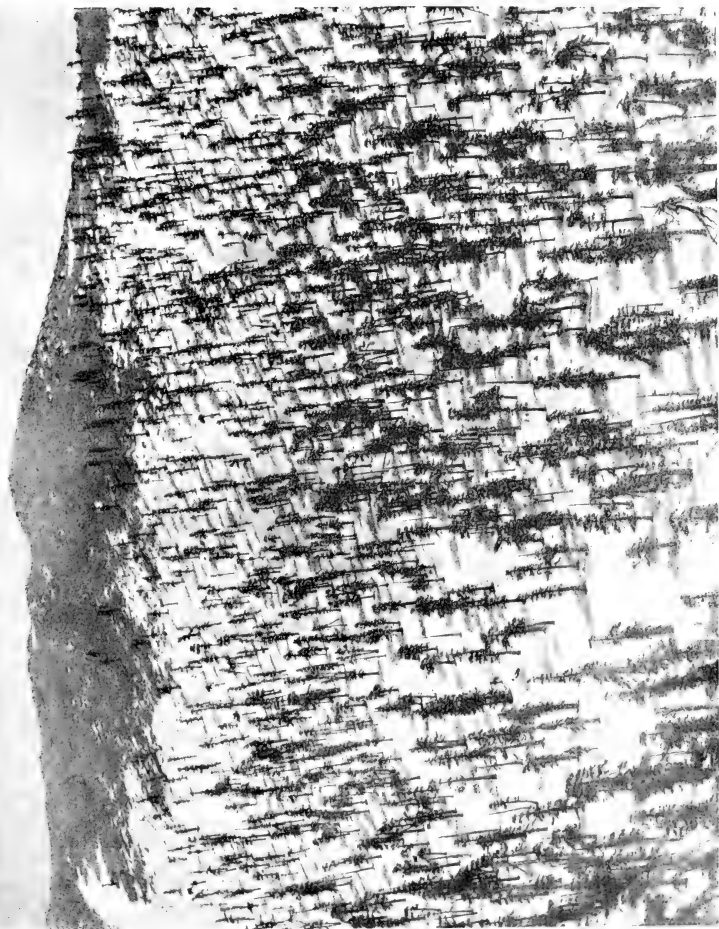
We memorialize you that sheep owners retard the settlement and permanent growth of wealth in the California valleys; that years ago they antagonized the irrigating canals and they opposed the conversion of grazing lands in to wheat ranches; that they once grazed their flocks over the site of Fresno city, now the center of the raisin industry, nestling amid matchless orchards and splendid vineyards, over land there and elsewhere, whose value as

grazing lands was \$1.25 per acre, but which is now worth from \$125 to \$300 per acre.

Therefore your petitioners pray that the Sierra forests be preserved as nature's guardians to protect our valleys, so that all lines of industry may be developed side by side.

And in the name of the common people of California, in the name of our genial valley awaiting the wealth of waters that nature has provided for but avarice denies—which valley once baptized with crystal fountains would smile to welcome sheep husbandry along with sister industries—and in the name of labor that looks longingly out across broad acres unemployed and is strong in hope and love to build the future homes of the "Golden State," we ask that the sheep be not allowed to range the Sierras and despoil the God-given heritage of forest and stream.

A county "wool growers' protective association" in Wyoming recently adopted resolutions in which the declaration was made that the regulation which excludes sheep from forest re-



NORTH SLOPE OF GREYBACK PEAK, SAN BERNARDINO RESERVE, ALTITUDE 11,700 FEET
—SHOWING STANDS OF LIMBER PINE, *Pinus Flexilis*.

serves is the result of "false representations made by the American Forestry Association." It would seem that, by that particular interest and in that locality at least, the American Forestry Association, in common with the coyotes and wolves of the wilderness and the foreign wool grower under the free trade regime, is regarded as a most deadly enemy of the flockmaster. The American Forestry Association, above all things, has always sought to develop the facts that should be the cause of, and the basis for public action. It has no interests of a private or selfish nature to conserve and has ever advocated what seemed to promise the greatest good to the greatest number. Just why any particular class or interest has a vested right to the use of any part of the national domain to the exclusion or injury of other interests or industries is not apparent. For nearly seventeen years the American Forestry Association has been working for the present and future welfare of the whole people, and the selfish motives of a single class interest will scarcely avail now to change its sense of duty to the more general interests involved. There are good reasons why the grazing of sheep on forest reserves seems inexpedient, and until careful investigation shall result in the development of facts to the contrary, the regulation which has aroused this opposition should be continued in effect.

A Better Understanding.

There has been within the past twelve months a very noticeable change in sentiment on the part of many people in the West toward the forest reserve policy of the Federal Government. Perhaps one of the strongest agencies contributing to this desirable result is the report of Mr. Frederick V. Coville, botanist of the Department of Agriculture, on the subject of "Forest Growth and Sheep Grazing in the Cascade Mountains of Oregon." Mr. Coville's fair and unbiased manner of presenting the facts developed by his careful and painstaking investigation, together with the re-

commendations submitted, appealed to reason rather than prejudice, and that with telling effect. The result is apparent in the many letters received from residents of Oregon, some of whom are sheep owners. They all unite in commending the report together with the accompanying recommendations. The Portland *Oregonian* published the report in full and added its editorial endorsement. The following, which is a more recent expression of the *Oregonian*, is indicative of the present state of public sentiment in Oregon:

"It may be said that there are now fewer violations of the National Park and forest laws of the United States than ever. Cleveland's reservation proclamation is not working the hardship that people thought it would, and all classes are glad that the Senate amendment to the Sundry Civil Bill, abolishing the reservations, did not prevail."

Among others who have expressed the most cordial approval of Mr. Coville's exposition of the matter are Hon. T. W. Davenport, ex-State surveyor, of Salem; Judge J. B. Waldo, of Macleay, who is known as "the father of the Cascade Reserve," and Hon. J. N. Williamson, of Prineville, who is a member of the Oregon legislature, a stockman and sheep owner. At a special meeting of the Stockmen's Union of southern Wasco County, Ore., the following resolution was adopted:

Resolved, "That this Union generally endorses the report of F. V. Coville on the Cascade Forest Reserve and pledges its best efforts to carry out the suggestions therein witnessed."

(Signed)

E. M. HALEY,

Sec'y Stockmen's Union.

Gradually it is beginning to dawn upon the popular mind that forestry and a forest reservation policy do not comprehend the setting aside of vast tracts and keeping them from ever becoming fields of human industry. It is well that such views are becoming dissipated, for forestry means use as against abuse of woodland reserves. The result of the publication of Mr. Coville's report is indeed most happy.

The Law and the Forests.

Judge Hallett yesterday instructed the jury in the United States Court to acquit H. S. Tomkins, the well-known hardware man, of unlawfully trespassing on public land in Custer County and despoiling the land of 250,000 feet of lumber. The defendant proved that the lumber was used in mines and not for railroad ties. He was accordingly acquitted.—*Rocky Mountain News* (Colo.).

During the present term of the United States District Court several convictions have been obtained of men charged with cutting timber on Government land and carrying it away. Albert and George Rutherford were fined \$990 each and given one day in the county jail for stealing timber in Boulder County. Frank Nice, a neighbor of the Rutherfords, was given a similar sentence yesterday by Judge Hallett. J. C. Dallon did not appear yesterday to answer a charge of cutting timber and judgment was entered against him.—*Denver Republican*.

Timber Land Frauds.

Eleven indictments returned by the recent United States grand jury, which were not made public when handed into court, turn out to be the result of a patient investigation into as big a scheme, if the grand jury allegations are true, to defraud the Government as has been called to the attention of the Land Office in recent years. Thousands of Government acres in Southern Colorado have been despoiled of valuable timber in a scheme which, it is alleged by the Federal authorities, is as smooth as has ever been concocted.

Deputy United States Marshal Crockery returned from Durango this morning after having placed under arrest Louis C. Jackaway and F. W. Stubbs, of the lumber firm of Jackaway & Stubbs; Louis C. Griffith, S. B. Jackaway, Edward Walker, Robert D. Sisson, E. L. France, bookkeeper; John W. Miller and William

Palmquist. Indictments for two others are in the deputy's possession, but as the men could not be found the warrants were not served.

The nine pleaded not guilty to the charge of cutting timber on Government land when arraigned yesterday before United States Commissioner Pengree at Durango, and were held in bonds of \$500 each. The preliminary hearing was set for the first Monday in April.

The company, it is alleged by the officials, was organized to operate in La Plata, Archuleta, Conejos and Montezuma Counties, where the settlements are few and far between and where forests of the choicest timber in the State stretch over the mountain ranges for miles upon miles. For ten years the business has been carried on but under such a clever cover, if the findings of the grand jury are true, that it was not until after months of tireless search that the matter was ready for presentation by the special agents.

Extensive sawmills are located fifty miles west of Durango and at various other points adjacent to the Rio Grande Southern Railway. Large lumber yards are maintained by the company in Silverton, Durango and Ouray. The business amounts to tens of thousands of dollars annually and the members of the company are very wealthy.

Stacked at the principal mill west of Durango are 4,000,000 feet of lumber ready for shipment. From fifteen to twenty men are employed by this mill as loggers and choppers.

The grand jury charges that the company induced men to settle on Government land, taking up homesteads of 160 acres each and then, when the first papers were filed, purchasing it from them, the purchase price being the pay for the labor expended. These homesteads were never proved, for final papers were never taken out. The company would cut all the timber, haul it to its mills, and the homesteader under another name would

take up other acres. It is said something like 10,000 acres have been stripped of timber in the ten years of the company's existence, the railroads buying the lumber. The Government

will demand a big round sum of the men arrested and in the meantime the special agents are investigating further into the matter.—*Denver (Colo.) Post.*

Forest Policy.

The much lamented denudation of the famous "Presidential Range" in the White Mountains seems to be in full progress, according to reports emanating from that section. A year or more ago it was reported that a deal had been closed whereby this famous tract passed into the hands of the Bartlett Lumber Company, of Boston, whose mills are at Bartlett, N. H. Forestry enthusiasts held up their hands in horror, and the press of the country printed column after column of editorial comment, pointing the finger of reproach at the authorities of the old Granite State for permitting a transaction which would probably result in the denudation of that world-famed range of mountains. We learn that not less than eight distinct logging crews have been sent into that section to operate during the winter, largely in the interest of the Bartlett Lumber Company. If the intention of the company is to strip the entire growth from this spot—much favored by tourists—their work will undoubtedly bring forward loud and prolonged protests from forestry interests, the general public and the press of the country.—*Lumberman's Review.*

Timber Cutting in Mississippi.

Under the caption of "A Birthright for a Mess of Pottage" *The Timberman* has the following to say of the waste of timber in Mississippi:

Down in Sunflower and Bolivar Counties, Mississippi, there is a practical exposition of an uneconomical proposition that is so wide in its scope and important in its influences as to merit the serious attention of all hardwood stumpage holding and tapping railroads and hardwood manufacturers. Both of these, as

well as entire communities outside, are in this connection such unnecessarily large sufferers that they should adopt strong measures of reform. We refer to the getting out of pipe staves and its effect on those mentioned.

In the case in point it amounts to a frittering away of the real and prospective assets of the railroads tapping the territory named. It reduces the possible amount of forest product tonnage to a minimum, indirectly damaging the community and occasioning a loss to the lumberman by depriving him of entrance into a field peculiarly intended by nature to be the scene of his operations.

Than the Yazoo bottoms in Mississippi there is, or rather was, probably no finer hardwood timbered section on earth. In that portion of it for miles on both sides of a line drawn from Moorhead, on the Southern Railway, to Duncan, on the Yazoo & Mississippi Valley branch of the Illinois Central, there may now be witnessed such operations as in this, as well as numberless like sections, are wiping wide expanses of territory from the map so far as lumbermen are concerned, and all this at little immediate profit and much future loss to those short-sighted entities—the railroads—who could, if they would, prevent it.

The story of this locality is that of hundreds of others. Several years ago Eastern parties who had been attracted there settled at Moorhead with the intention of developing the heavily timbered country lying north. In connection with this development a line of railroad has up to this time been constructed from Moorhead to Ruleville, a distance of twenty miles. This road has been recently purchased by the Illinois Central and will be extended from Ruleville to the Yazoo & Mississippi Valley Railroad, a further distance of about twenty-five miles. Absolutely the only natural resource of the country traversed is timber, and the most liberal estimate that can be made from the facts is that not to exceed 10 per cent of as much of this as would be available to the lumbermen will provide revenue for the railroads; and even this percentage will not yield returns at all to be compared with those from a like quantity of sawn lumber.

All of this, accompanied by the almost positive exclusion of lumbermen from the territory, is the net result of conditions practically created by the railroads, wherein the country

has been recklessly despoiled by the stave producer.

To begin with, the very land was turned over to these people by the railroads, who in the end are the chief sufferers. When the development spoken of was first projected, the stave people flocked in and secured possession of the land or trees for their purposes, always working far in advance of the actual location of transportation facilities. In their operations only trees of perfect growth and only about 20 per cent of the board measure contents of them are utilized.

Traveling ahead, they fell all the choice timber. Of this they utilize in the case of each tree a 13-foot cut only. This is riven into staves, and the remainder—about 80 per cent of the average perfect tree—is left a victim to the always hastening forces of worms and decay. These staves are piled in cribs and let remain, if needs be, for several years before hauling. They are being dried in the meantime and the freight on them is being largely absorbed by the neighboring air—this is the extent of the neighborhood benefit. The community or the State does not benefit even to the slight extent of the labor employed, which is imported by wholesale from the disappearing forests of Europe for the purpose.

Should necessity demand, these staves may in the end be hauled a dozen or fifteen miles for shipment at a comparatively low cost. This is not possible with logs, hence the lumberman can be and is anticipated in his operations; in fact, he cannot operate.

Before the fallen trunk left by the pipe-stave man can be reached—and they are the most valuable things left—they are rotten or worm-eaten. What is left is not sufficient to make an attempt at lumber producing either tempting or profitable. The counties of Sunflower and Bolivar, in Mississippi, are living evidences of this. Less than 10 per cent of their resources are disposed of in such a way as not only to prove unprofitable in themselves, but to render the remaining 90 and more per cent largely valueless. The country they include is covered with stave cribs, and when the time comes that the atmosphere will cease to absorb the freight, the railroads which held these lands and delivered them into the hands of the alien, in a more than double sense, will receive a paltry freight earning for the short haul necessary to reach the nearest exporting point only, and even the amount of this revenue is more than they deserve, since the rate which produces it is the same as they have fixed upon lumber. Verily, this is a waste of substance that should be inquired into and remedied.

Information Wanted.

The notable lack of reliable information as to the timber supply of the United States was clearly demonstrated during the discussions that preceded the adoption of schedule D in

the Dingley bill. While that bill was pending in the Senate a request was made on the Department of Agriculture for information covering this point, and in response the Division of Forestry furnished an estimate, which was prefaced by the statement that it was largely guesswork. The remaining supply of White Pine in Michigan, Wisconsin and Minnesota can be arrived at with some degree of certainty, but we have little accurate knowledge of the vast resources of the south and the Pacific coast.

It has been suggested that an attempt be made to collect this information in connection with the taking of the Twelfth Census, work on which will begin in 1900. Those who have had experience, however, claim that all such information can be more economically gathered through the appropriate bureau, and in this case the Department of Agriculture, having charge of the Forestry Division, would be the proper medium for the purpose. In fact, the bill providing for the taking of the Twelfth Census, which has already passed the Senate, was prepared with reference to excluding all such information because of the tendency to overload the enumerators, who ordinarily have had no practical experience in such work.

There is no reason, however, why this work of securing information as to the timber supply should not be taken up by Congress independent of the Twelfth Census and the work might just as well be begun next year as the year following. It is stated by a leading lumberman who is in close touch with the authorities at Washington that should it be demonstrated that there is a public need of such information, there would be no difficulty whatever in securing an appropriation from Congress for the Forestry Division to carry out any plan of operations that might be decided upon. That there is a demand for such information is clearly shown by the resolutions adopted at the conference of Northern and Southern mill men held at St. Louis recently. These mill men represented Wisconsin, Minnesota, Iowa, Illinois, Missouri, Arkansas, Indian Territory, Louisiana and Mississippi, and included in the number were several of the heaviest timber land holders in the country. In the preamble to this resolution, after reciting the need of statistics relating to the timber supply, the opinion is expressed that such statistics can be compiled only by the Government, through some special bureau abundantly equipped by ample appropriation and thus able to employ the expert knowledge required. The resolution therefore urged the establishment of a Bureau of Timber and Lumber Statistics as a part of the Division of Forestry, Department of Agriculture, to be supported by adequate annual appropriations, or that a special appropriation be made to cover the cost of the compilation of these statistics in connection with the Twelfth Census.—*Northwestern Lumberman*.

The following is the text of the resolutions above referred to :

Resolved, That we, the lumber manufacturers of Wisconsin, Minnesota, Iowa, Illinois, Missouri, Arkansas, Indian Territory, Texas, Louisiana and Mississippi, in convention assembled at St. Louis, Mo., on the 15th day of November, 1898, urge the establishment of a Bureau of Timber and Lumber Statistics as a part of the Division of Forestry, Department of Agriculture, to be supported by adequate annual appropriation, or that a special appropriation be made to cover the cost of the compilation of these statistics in connection with the Twelfth Census.

A forest fire in Wright County, Missouri (in the Ozark region), burned over a tract of land fifteen miles long and from two to six miles wide. A number of farm houses and other buildings were burned and a great deal of fencing was destroyed, the owners in several instances having to seek personal safety in hasty flight. The progress of the fire was finally checked by timely occurrence of rain.

Recent Publications.

"*The Timber Wealth of Pacific North America*" is the title of a very interesting and instructive contribution to the December *Engineering Magazine* by Frank Haines Lamb, of Leland Stanford University. Besides discussing transportation in its relation to the lumbering industry and the growth and development of that industry within thirty years, the writer enters into a brief description of the economic value of the commercial timbers of the Pacific Coast region, all of them being conifers. In concluding Mr. Lamb says :

The Pacific Coast forests are not "inexhaustible"—far from it—but, with proper use and care, they should be equal to the future needs of home and foreign consumption. The forests now standing are mature and are not bettered by not being cut. At least 90 per cent of the cut-over lands are of absolutely no value for agricultural purposes. They are adapted only to timber growing. Moreover, the native species, if protected from fire, are, as a rule, readily and quickly reproduced. Let land owners and loggers recognize these facts, and treat their cut-over lands as growers of another timber crop. Let a wise policy protect the forests and cut-over lands from fire and further the work of reforestation. The lumber industry is legitimate and necessary business, despite sentimentalists; moreover, if properly managed, its future has more in store for the Pacific Coast than all her gold mines have yielded.

Bulletin No. 46, Maine Agricultural Experiment Station, recently issued, treats of ornamental trees and plants for Maine. About twenty species of trees, mostly indigenous, are recommended as hardy. Strangely enough, though it is published in the "Pine Tree State," no conifers are mentioned.

Bulletin No. 55, New Hampshire Agricultural Station, gives detailed account of a careful observation of the feeding habits of the chipping sparrow, proving the value of this native bird as a destroyer of noxious insects. *Bulletin No. 56*, of the same station, gives results of analyses of the leaves of several species of Wild Cherry, showing that they contain poisonous principles which, when subjected to digestive ferment, result in the formation of prussic acid, thus causing the death of browsing animals.

The Park Commissioner's Report, Springfield, Massachusetts, a copy of which has been received, is a publication of eighty pages with a map. It is illustrated with half-tone engravings and contains catalogues of the flora and fauna of Forest Park, both indigenous and exotic.

The December number of *Forest Leaves* contains the addresses of the officers at the annual meeting of the Pennsylvania Forestry Association. Dr. J. T. Rothrock's dendrological contribution, illustrated as usual by two very handsome half-tones, is devoted to a description of the Honey Locust, which, it is claimed, is gradually extending its habitat eastward in Pennsylvania.

The Forester

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of forests and forest trees and to related subjects.



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THE AMERICAN FORESTRY ASSOCIATION.

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INCORPORATED JANUARY, 1897.

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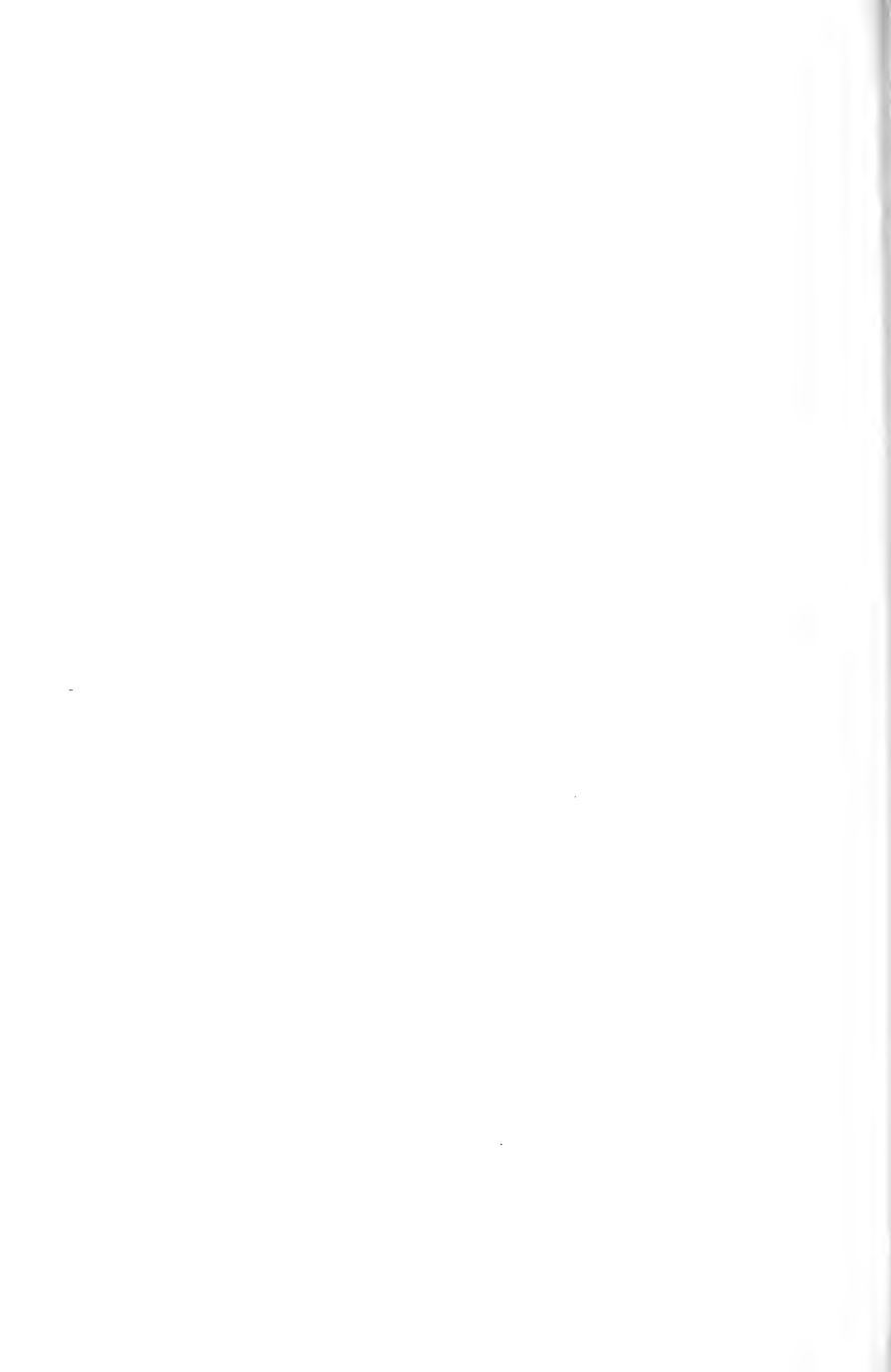
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RESERVOIR SITE AT HOUSTON, SOUTHERN CALIFORNIA. SCATTERED LOGS



The Forester.

VOL. V.

FEBRUARY, 1899

No. 2.

Why Persons Interested in Irrigation should be Members of the American Forestry Association.

It is generally believed throughout the West that the destruction of the forests and smaller growth upon the mountain sides has an influence upon the quantity of water available for irrigation. From every section of the arid West statements are received showing the disastrous consequences of burning forest cover. Individuals and communities appeal for something to be done. It is hopeless to expect that anything will be accomplished without united action and sustained effort possible only through a strong association.

It may be said that the protection of the forests is a matter for the General Government, but it must be borne in mind that this is a Government by the people and that no action by the Government can or will be taken unless urged by a large body of citizens. The country is so vast that the wishes of a few citizens cannot prevail in the general struggle unless large numbers join hands in a common cause. A sparsely settled country as that of the West must call to its aid the citizens of the more populous States of the East. The six million of people within the arid region can succeed when their interests are identical with those of the sixty million living outside.

In the matter of forest preservation the interests of East and West are identical, and in his attempt to retain the wooded growth around the headwaters of the streams the irrigator receives the full sympathy of foresters throughout the country. To make this sympathy effective

through the enactment and enforcement of proper laws each irrigator should join the Forestry Association, and thus add his name and contribution toward pushing forward the desired objects. By so doing his efforts—otherwise unavailable—become effective and the work of the association more practical.

The benefits of a strong national organization have already been shown in the legislation obtained after sixteen years of unremitting effort. The disappointments and failure year after year have not discouraged the members and they now have reason to rejoice at what has been done, although this falls far short of their anticipations. The laws passed by Congress for the protection of the forests are not those originally proposed and are recognized as imperfect; they should be modified from time to time as experience demonstrates the necessity and feasibility of so doing. Above all their enforcement must be a matter of keen solicitude. Public sentiment must stand behind the officers charged with the execution of the laws sustaining them in their duties and constantly demanding competence and fidelity. To do this it is necessary to have a strong organization—one which will not be dominated by factions or personal aims, but which with a widely diffused membership shall reflect the larger public wishes.

In the East, where the development of population and industries has shown the need of protecting the forests, the membership of the American Forestry

Association is large. The membership from the older States includes many men of recognized national standing. The Western members, therefore, have the advantage of a group of associates already strong and experienced.

While the irrigators need the aid of the American Forestry Association in bringing about the protection of the forests of the West, the Association on the other hand needs an increase of its membership throughout the arid regions. In order to speak with authority as to the demands of the West it must have a large Western membership and one which

will be truly representative of all the States and Territories. Every man interested in irrigation, or dependent directly or indirectly upon the conservation of the water supply, should become a member and should by his voice and pen unite in creating public sentiment and in sustaining public interest through the trials and vicissitudes which always surround needed reforms. A proper administration of the forests can result only through a strong and united demand and through an adaptation of laws and regulations to fit American conditions.

Letter from the Secretary of Agriculture.

MR. F. H. NEWELL,
Secretary, American Forestry Association, City.

MY DEAR SIR: I believe I have already acknowledged your letter of December 15, notifying me of my election to the presidency of the American Forestry Association for the ensuing year. If not, permit me to say now that my services are at the disposal of the Association, and I am anxious to do anything in my power to further its objects. Our Association has for its object the advancement of one of the greatest of the national industries. It is high time that intelligent action be had regarding our woods, including not only wise management of existing forests, the rehabilitation of denuded areas, the study of forest fires and the possibility of preventing their ravages, but also an inquiry into the effect of grazing on forest ranges, investigations into tree-planting, to ascertain what progress has been made and what trees give promise; and what is wise advice to give our people for future work. I may say generally that the rate at which we are using our woods admonishes us that it can be only a few years at most before the United States must go to the ends of the earth to keep up its supply for commercial purposes.

The Association should continue to bring to public attention, and especially

to the notice of lumbermen, the fact that the present methods of conducting the lumber business are not only wasteful and extravagant but opposed to the best public policy. It should endeavor to demonstrate, by practical examples, the fact that it is possible to remove merchantable timber without destruction to the forest and that better methods of lumbering are not only practicable but profitable; it should demonstrate that its objects are not in any wise to interfere with lumbering, but to assist and to render the business one of permanence instead of being a comparatively temporary occupation. The destruction of the forests at the headwaters of the streams is having a bad effect on the productive power of the country, resulting in high freshets in spring and dry streams in midsummer.

My observation of over forty years in a prairie country leads me to the conclusion that the velocity of our cold winds in winter and hot winds in summer is greatly retarded by timber belts and hedges. The farmer can graze longer in the fall when his stock pastures are protected by belts of woodland and hedges. He can graze earlier in the spring on account of the same protection, thus lengthening his grazing season materially; and it is well known that growing and fattening periods of animal life are

most cheaply carried through by means of grazing. The interspersing, throughout the country, of groves and hedges, furnishes protection for the birds that keep the insect enemies of the farmer in check. In the West, therefore, the Association should endeavor to co operate with the farmers and others dependent directly or indirectly for their subsistence upon agriculture by irrigation. It is generally believed that, through reckless and wanton destruction of forests, injury has come to the streams which furnish water to the arid or drought-stricken lands. Throughout a third, or possibly a half, of the United States, all land values rest upon the ability to obtain an artificial supply of water, and anything

which in the least affects the water supply comes to have vital importance. In arid and semiarid regions, therefore, the Forestry Association should at all times second the efforts of those who are seeking for the conservation of the water supply. It is evident that it is high time for intelligent men, from Maine to California, to give serious attention to the preservation of the forests we have and to increase the forest area throughout every State, particularly where lands have value for no other purpose.

Very truly yours,

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C.,

Jan. 27, 1899.

Object of Forest Reservations.*

Public forest reservations are established to protect and improve the forests for the purpose of securing a permanent supply of timber for the people and insuring conditions favorable to continuous water flow.

It is the intention to exclude from these reservations, as far as possible, lands that are more valuable for the mineral therein, or for agriculture, than for forest purposes; and where such lands are embraced within the boundaries of a reservation, they may be restored to settlement, location and entry.

The law provides that nothing it contains shall be construed as prohibiting the egress or ingress of actual settlers residing within the boundaries of such reservations, or from crossing the same to and from their property or homes; and such wagon roads and other improvements may be constructed thereon as may be necessary to reach their homes and to utilize their property under such rules and regulations as may be prescribed by the Secretary of the Interior. Nor shall anything herein prohibit any person from entering upon such forest

reservations for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof: Provided, That such persons comply with the rules and regulations covering such forest reservations.

The settlers residing within the exterior boundaries of such forest reservations, or in the vicinity thereof, may maintain schools and churches within such reservation, and for that purpose may occupy any part of the said forest reservation, not exceeding two acres for each schoolhouse and one acre for a church.

All waters on such reservations may be used for domestic, mining, milling or irrigation purposes, under the laws of the State wherein such forest reservations are situated, or under the laws of the United States and the rules and regulations established thereunder.

The right of way in and across forest reservations for irrigating canals, ditches, flumes and pipes, reservoirs, electric power purposes, and for pipe lines, will be subject to existing laws and regulations; and the applicant or applicants for such right will be required, if deemed advisable by the Commissioner of the

* Abstract from Regulations of the General Land Office.

General Land Office, to give bond in a satisfactory surety company to the Government of the United States, to be approved by him, such bond stipulating that the makers thereof will pay to the United States for any and all damage to the public lands, timber, natural curiosities or other public property on such reservation or upon the lands of the United States, by reason of such use and occupation of the reserve, regardless of the cause or circumstances under which such damage may occur.

For the purpose of preserving the living and growing timber and promoting the younger growth on forest reservations, the Secretary of the Interior, under such rules and regulations as he shall prescribe, may cause to be designated and appraised so much of the dead, matured or large growth of trees found upon such forest reservations as may be compatible with the utilization of the forests thereon, and may sell the same for not less than the appraised value in such quantity to each purchaser as he shall prescribe, to be used in the State or Territory in which such timber reservation may be situated, respectively, but not for export therefrom.

While sales of timber may be directed by the Department without previous request from private individuals, petitions from responsible persons for the sale of timber in particular localities will be considered. Such petitions must describe the land upon which the timber stands by legal subdivisions, if surveyed; if unsurveyed, as definitely as possible by natural landmarks; the character of the country, whether rough, steep or mountainous, agricultural or mineral, or valuable chiefly for its forest growth; and state whether or not the removal of the timber would result injuriously to the objects of forest reservation. Estimate the average diameter of each kind of timber, and estimate the number of trees of each kind per acre above the average diameter. State the number of trees of each kind above the average diameter it is desired to have offered for

sale, with an estimate of the number of feet, board measure, therein, and an estimate of the value of the timber as it stands. These petitions must be filed in the proper local land office, for transmission to the Commissioner of the General Land Office.

Before any sale is authorized, the timber will be examined and appraised, and other questions involved duly investigated, by an official designated for the purpose; and upon his report action will be based. When a sale is ordered, notice thereof will be given by publication by the Commissioner of the General Land Office, in accordance with the law above quoted; and if the timber to be sold stands in more than one county, published notice will be given in each of the counties, in addition to the required general publication.

The time and place of filing bids, and other information for a correct understanding of terms of each sale, will be given in the published notices. The act provides that the timber sold shall be used in the State or Territory in which the reservation is situated, and is not to be exported therefrom.

Every person who unlawfully cuts, or aids or is employed in unlawfully cutting, or wantonly destroys or procures to be wantonly destroyed, any timber standing upon the land of the United States which, in pursuance of law, may be reserved or purchased for military or other purposes, or upon any Indian reservation, or lands occupied by any tribe of Indians under authority of the United States, shall pay a fine of not more than five hundred dollars or be imprisoned not more than twelve months, or both, in the discretion of the court.

Any person who shall willfully or maliciously set on fire, or cause to be set on fire, any timber, underbrush or grass upon the public domain, or shall carelessly or negligently leave or suffer fire to burn unattended near any timber or other inflammable material, shall be deemed guilty of a misdemeanor, and, upon conviction thereof in any district court of the United States having juris-

diction of the same, shall be fined in a sum not more than one thousand dollars, or be imprisoned for a term of not more than two years, or both.

Any person who shall build a camp fire, or other fire, in or near any forest, timber or other inflammable material upon the public domain, shall, before breaking camp or leaving said fire, totally extinguish the same. Any person failing to do so shall be deemed guilty of a misdemeanor, and, upon conviction thereof in any district court of the United States having jurisdiction of the same, shall be fined in a sum not more than one thousand dollars, or be imprisoned for a term of not more than one year, or both.

In all cases arising under this act the fines collected shall be paid into the public-school fund of the county in which the lands where the offense was committed are situated.

The Secretary of the Interior may permit, under regulations to be prescribed by him, the use of timber and stone found upon such reservations, free of charge, by bona fide settlers, miners, residents and prospectors for minerals, for firewood, fencing, buildings, mining, prospecting and other domestic purposes, as may be needed by such persons for such purposes, such timber to be used within the State or Territory, respectively, where such reservations may be located.

This provision is limited to persons resident in forest reservations or within a reasonable distance thereof in the State or Territory where the forest reservation is located who have not a sufficient supply of timber or stone on their own claims or lands for the purposes enumerated, or for necessary use in developing the mineral or other natural resources of the lands owned or occupied by them: Provided, That where the stumpage value exceeds one hundred dollars, applications must be

made to and permission given by the Department.

The law provides that where a tract within a forest reservation is covered by an unperfected bona fide claim, or by a patent, the settler or owner may, if he so desires, relinquish the tract to the United States and select in lieu thereof a tract of vacant public land outside of the reservation, open to settlement, not exceeding in area the tract relinquished. No charge is to be made for placing the new entry of record.

The pasturing of live stock on the public lands in forest reservations will not be interfered with, so long as it appears that injury is not being done to the forest growth, and the rights of others are not thereby jeopardized. The pasturing of sheep is, however, prohibited in all forest reservations, except those in the States of Oregon and Washington, for the reason that sheep raising has been found injurious to the forest cover, and therefore of serious consequence in regions where the rainfall is limited.

The law provides that "any mineral lands in any forest reservation which have been or which may be shown to be such, and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry," notwithstanding the reservation. This makes mineral lands in the forest reserves subject to location and entry under the general mining laws in the usual manner.

Owners of valid mining locations, made and held in good faith under the mining laws of the United States and the regulations thereunder, are authorized and permitted to fell and remove from such mining claims any timber growing thereon, for actual mining purposes in connection with the particular claim from which the timber is felled or removed.



FLOOD SCENE IN THE VALLEY OF THE MISSISSIPPI RIVER.

What a waste of water!

Such is the natural and involuntary exclamation of the resident of an arid region as he views a scene like the above. And yet in the period of inundation the flood of the Mississippi River is augmented by the contribution of streams which have their sources in the arid

regions. Every drop of water which is permitted to run unused from the arid region represents wasted possibility. There are two means by which the water supply can be conserved, namely: forest preservation and reservoir construction. Wherever forest protection for the water supply is possible it will prove to be a

safe and economical means to this end. With the widest possible extension of protective forest area there would yet be a necessity for the construction of a great many storage reservoirs. On page 37 THE FORESTER presents a view of a large reservoir already constructed. The

frontispiece is a view of the site of a proposed reservoir. It will be noted that, although each is surrounded by a forest growth, in neither case is it of such a character as to prove effective in the conservation of water, hence the necessity of reservoir construction.

Grazing.

Mr. John Muir, the veteran California mountaineer, writes a private letter, dated at Martinez, Cal., January 10, 1899, to a friend in this city, from which THE FORESTER is permitted to make the following extract:

"I suppose you know that 200,000 sheep invaded the Sierra Forest Reservation this last season under a temporary concession made by the Secretary of the Interior, and did incalculable damage. The other California reservations—most of them—and also the National Parks were overrun, trampled and desolated almost as completely as the Sierra Reservation; and I have just been informed that certain land and sheep speculators have sent on agents to Washington to obtain leases of the entire Reservation for grazing purposes during the coming season. This scheme I trust you will oppose to the utmost of your power and opportunity. Not a single flock of sheep should be allowed on any of the dry mountain reservations."

This statement of Mr. Muir is corroborated by information contained in a letter from a Federal forest officer in California. He says:

"A land speculator is now in Washington for the purpose, among others, of obtaining the consent of the Department of the Interior to the granting of leases in this reservation for sheep-grazing purposes. He represents perhaps ten, and possibly twenty, sheep owners. Last season a special concession was made by the Secretary of the Interior to the sheep men, on account of the failure of feed in the San Joaquin Valley, and elsewhere. About 200,000 sheep were driven into the reservation. The injury

which these sheep wrought in this part of the public domain is patent to everyone who has traversed any considerable part of the reservation. If the same ratio of injury were maintained, in less than fifty years there would be no forests there worth protecting.

"If the object of making such reservations is to preserve the forests, and the water resources, then that purpose will be defeated by allowing sheep grazing as is desired by a very few men. Deforestation has already begun here. The prevailing climatic conditions are entirely different from those which exist in the reservations in more northern latitudes. There the rainfall is very great, the streams are strong and full in the summer season; the undergrowth is rank; and it may be that sheep grazing under such conditions would not result in any great damage to the forests. I can only speak with certainty of this reservation where I have made extended personal observations. The climate here is semi-tropical. The reservation is in what may be called the dry belt. Hardly more than five to seven inches of rainfall can be expected. The mountain streams flowing out of the reservations have been greatly diminished. The waters no longer flow in the summer season across these great arid plains. A part of this shrinkage of streams can be traced directly to sheep grazing. The sheep destroy the undergrowth, and their herders are the prolific source of the great number of fires which break out in the reservation. They change the spongy character of the ground; they produce aridity and desolation wherever they go. The pro-

cess of deforesting will go on as long as this sheep grazing prevails.

"The interests of a few in the sheep business are set over against the interests of the larger community which represents an investment of many millions of dollars. Water for irrigation has become to them a matter of vital necessity. All the property represented by more than 4,000 acres of citrus orchards, and more than 10,000 acres of raisin vineyards, in this county and the adjacent one, is menaced by this sheep-grazing proposition.

"The forests cannot be preserved in a proper condition while sheep are allowed to range the reservation. This is the case in brief. I omit many details, but submit the facts."

Another Federal forest official from the same State and writing about the same matter says:

"I want to call your attention to the fact that it is impossible to reforest this reserve as long as sheep are allowed to graze here. When the timber has been removed the ground will be seeded from the surrounding forest and, as the ground does not freeze, the young pines come up as soon as the snows melt. The sheep are especially fond of pine; they bite the tops off of these young seedlings, thus killing them. Unless, the Government can, in some way, keep the sheep off of this reservation it cannot be re-

forested. I know of several places, owned by private parties, that have been enclosed for the last twenty-five years, thus protecting them from sheep, and which have also been kept free from fires. The timber was cut from these lands before they were enclosed, yet they are now reforested with trees which measure from ten to twenty-four inches in circumference, while surrounding lands, where sheep have been allowed to run each year, have nothing but a little brush, even the grass being killed. This country produces a new forest growth very rapidly as the ground rarely freezes under the snow, and if protected from fire and sheep so that the natural mulching of pine needles and leaves is not destroyed by fire or tramping, it will prevent the soils from being washed off. Aside from the question of reforesting it would only be a few years until the sheep would destroy the water supply of the San Joaquin valley. I believe the Government could better afford to buy hay and grain, and feed the sheep at its own expense, than to allow them to destroy this forest, for in destroying that they are destroying the valley. In the best years in the past the valley has not had enough rain to produce a crop and its thousands of inhabitants depend on this forest for their water supply. I trust that we will have your support in protecting the forest from sheep."

Forest Administration.

Some of the supervisors and patrolmen in the employ of the Government on the forest reserves are being laid off owing to the fact that the appropriation has almost been expended. The total amount of the appropriation for last year was only \$75,000. The fires in this section cost \$15,000, or almost one-fourth of the entire appropriation. It was the intention of the department to have the patrolmen construct trails in the reserve during the winter months and this will yet be done so far as the funds will admit, but the majority of the supervisors

and patrolmen will have to be laid off until next April or May. It is to be regretted as there is a great need of trails through certain portions of the reservation.—*Azusa (Cal.) Pomo-Tropic.*

The case against George Witcher and others for cutting timber on Government land above Cripple Creek, was placed on trial in the United States Court yesterday. The defendants are accused of cutting 500,000 feet of timber belonging to Uncle Sam. The lumber has been seized by the Federal authorities. The

defense sets up the claim that the timber was cut for mining purposes and not to be shipped away.—*Denver (Colo.) News, January 11.*

Forest Supervisor Taggart has repeated the edict that hereafter no one will be allowed to take wood of any kind, either fallen or standing, from the San Jacinto reserve. Any violation on the part of any one will be considered as trespassing, and will be dealt with as such.—*Riverside (Cal.) Press.*

Acting on official information, Commissioner Binger Hermann of the General Land Office has directed a special agent at Juneau, Alaska, to make a complete investigation and prompt report with a view to stopping the denudation of the forest tracts. The action is based on notice sent the Department in regard to the cutting going on in many places; that Indians on Annette Island, who are aliens, having been transported there from British Columbia, are cutting valuable spruce and cedar on all the adjoining islands and have established a saw mill on Graniva island, near Kechcan, where they are manufacturing lumber and carrying on extensive traffic. In his instructions Commissioner Hermann states that neither the natives nor other residents of Alaska are allowed under the law to cut timber for market from the lands in Alaska belonging to the United States, until after first purchasing the timber from the Government through the Secretary of the Interior.

Some additional light is thrown by the following dispatch dated Cheyenne, Wyo., January 17, upon the doings of the Rock Springs Lumber Co., in the Green River valley in Wyoming, mention of which appeared in the last issue of THE FORESTER:

The surveillance of the United States Govern-

ment is becoming more strict than ever. The newest sensation in lumber depredations is laid to what is known as the Rock Springs Lumber Co., which has employed about 300 men cutting timber near the head of the Green River, in Fremont and Sweetwater counties. The matter is under investigation by United States Agent Abbott. The company claims to have complied with the law in every particular; saying that it has been cutting timber only on lands either acquired from the State of Wyoming which had selected the lands under Government grant, or bought with soldier scrip from the Government. They say that the charges of timber depredations were originated by a set of hunters and guides who have established lodges for the entertainment of foreign and Eastern hunters. The investigation will be pursued.

From the North Yakima *Times* it is learned that the supervisor of the Mount Rainier Reserve met the stock rangers of the contiguous region in the State of Washington, on January 16. Although he did not make any allotments he received applications for grazing permits. It was suggested that the cattle men and sheep men get together and agree upon some plan to harmonize their interests. The stockmen were warned against overcrowding the reserves with cattle and sheep, and that the ill-advised actions of the few in violating the rules would operate against all. It having been proposed to limit the number of stock to be grazed in the reserve hereafter to 325,000 head and to define the grazing season as continuing from June 15 to September 25 of each year, the stockmen appointed a committee consisting of five cattle men and five sheep men, to settle the matters under dispute. This committee drew up an agreement by the terms of which certain parts of the reserve are to be regarded only as cattle ranges and are not to be invaded by bands of sheep. The charge for pasturage of sheep is to be at the rate of \$5.00 per thousand, single bands not to exceed 2,500 in number. The fee for grazing cattle has not yet been determined upon.

Opposition to Reservation Policy.

The National Stock Growers' Convention met in Denver, Colo., January 26-27. It had been previously announced that the convention would be given an opportunity to put itself on record concerning the policy of excluding sheep from the forest reservations. Mr. John C. Mackay, of Utah, brought the subject up for discussion by introducing a resolution urging the Department of the Interior to abrogate the rules prohibiting the grazing of sheep on forest reserves. In support of his resolution Mr. Mackay said, in part:

My observation of twenty years in the mountains teaches me that the sheep do not damage any timber that is really valuable for mercantile purposes. Their eating of the grass in the timber is a safeguard against forest fires. If the executive orders prohibiting the sheep from ranging in the reserves is enforced the industry will be immeasurably injured. Western citizens have just cause for complaint. We should adopt such means as will bring about the desired change.

A substitute resolution was introduced by Mr. A. R. King, a delegate from Colorado. This substitute was, in effect, a negation of the original resolution and proposed to urge upon the Secretary of the Interior the wisdom and expediency of a strict enforcement of the rules excluding sheep from the reserves. In advocating its adoption Mr. King said:

The Government of the United States never attacked the interests of any citizen unjustly, nor did the American Forestry Association. For instance, when the Battlement Mesa of Colorado was reserved it was mainly to protect the water supply, upon the request of hundreds of citizens of the counties of Delta and Mesa on the western slope, except the owners of sheep. Those who wanted the protection were fruit growers and also stock raisers to more or less extent. The order of the Department and the law are the result of growth, development of the country and the observation of experts on the effect of herds on the water supply and timber on the public lands. The order did not emanate from the influence of the cattle man as against the sheep man. Sheep raising was pronounced injurious to the water supply and the timber by experts. Evidence showed that re-growth of timber follows forest fires, but never follows sheep grazing. Sheep destroy

all the young sprouts each year. The sprouts do not come back again until sheep are taken away.

Take the county of Delta, for instance, where people are engaged in diversified industries. The Government says the good of the many is superior to that of the few. We would as soon be the slave of the cattle king as of the sheep baron. (Applause.) We insist that no 15,000 sheep should be driven into our headwaters to pollute our supply first and then destroy it. The cows and steers do not eat out everything, but the sheep do eat out the willow leaves as high as they can reach, they take out the bunch grass and all they can find, and then tramp the soil so solidly that the water rushes off the surface quickly in the spring, whereas if the soil is left in its natural state snow water will percolate and eventually serve for irrigation purposes when water is needed.

The people of Utah think the same as we do. Take the Uintah reservation. People residing in that community took the position that the sheep destroyed the range and supported their allegations by proof before the Government excluded the sheep to preserve the agricultural interests that were watered by the country included in that reserve.

Mr. Smith, a delegate from Utah, replied to the arguments of Mr. King, declaring that the statements that sheep destroy the range and the water supply was a theory not substantiated by facts. He declared if the sheep had killed the range the sheep in Utah would not have increased as they have. Continuing, Mr. Smith said:

They are a benefit to the range. I can show you ranges in Utah where sheep have been pastured for years and it is better now than ever. Years ago where settlers located in Utah on streams and had no water, now they have plenty, hence the sheep could not have exercised a deteriorating influence upon it. They have been grazing upon the headwaters of those streams right along.

There was scarcely a sign of applause for Mr. Smith. It was evident the sheep men had little sympathy from the convention. A. J. Bothwell, delegate from New Mexico, briefly attacked the arguments of the sheep advocates, saying several witty things at their expense and creating rounds of laughter, adding in conclusion:

But we must look at the matter in a broad

sense, and recognize the fact that we must not discuss it from the standpoint of a cattle man or as a sheep man.

Mr. Barnes, of Arizona, in discussing the question said :

On some of the Arizona ranges where the sheep have been for twenty-five years the range is as good as ever. It seems the conditions are different in the various States. I would offer an amendment to the original resolution recommending that the order be changed so as to prohibit all animals from the forest reserves except under such regulations as the Secretary of Agriculture may prescribe for each.

Col. J. M. Dougherty, of Nebraska, moved the previous question, but withdrew it to allow Mr. Mackay, of Utah, to make an explanation. Mr. Mackay spoke with intense feeling as he said :

I am sorry to see you gentlemen admit by your action the theory that sheep are a curse to our country. I realize the way this convention feels. I say that to-day in Utah, where we irrigate more land in proportion to the total area than any other State, we have plenty of water. We do not need the timber reservations for protection, but we do need the grazing privileges. Our sheep industry goes down without them.

The previous question being again demanded it was ordered, showing an overwhelming vote in favor of the strict enforcement of existing regulations. The Barnes amendment was then adopted also. This placed the convention on record as favoring the prohibition of all grazing on the forest reserves except when the Secretary of the Interior may issue orders permitting such grazing as the diversified interests concerned may approve of.

A PRACTICAL VIEW.

The friends of the forest movement have so often been called "blind enthusiasts" and "misguided theorists," that it is a pleasure to be able to quote from authorities that cannot, even by inference, be accused of taking any other than a practical view of an economic question. The *American Lumberman*, from which the following is copied, certainly cannot be accused of sentimentalism :

The public, through the forestry advocates and the public prints, has become fairly settled

in the belief that forests covering the land about the headwaters of streams conserve the fountains and maintain a good stage and equable flow of water throughout the dry season.

This doctrine was the strong argument for passing the laws for the segregation of the national forest reserves in the mountain districts of the West. Not only has the National Government set apart such reserves but State governments have taken up the enterprise and legislatures are passing laws to preserve the moisture of the soil and thus maintain the streams. A notable example is in New York, which has provided for a State park in the Adirondacks. Pennsylvania, Wisconsin, Minnesota and other States have done something in behalf of forestry. The governor of Utah is also stirred up in behalf of the forests of that State. In his late message to the legislature he said that the increasing spoliation of the timber of the State was affecting seriously the source of the water supply for the valleys, and something should be done to arrest denudation. C. L. Sessions, of Bountiful, Utah, writes to the *Salt Lake Herald* as follows :

I notice in the governor's message that he says the increasing spoliation of our timber areas is seriously affecting the source of water supply for our valleys. I would like to ask what relation the timber in the mountains has to supply of water in the valleys, and how. If the governor is a close observer, or had asked a canon man, he never would have made such a remark. Every person acquainted with the source of supply knows that the water used for irrigation does not come from the timber sections but from the drifts or pockets where the wind piles the snow in great banks, or from slides which come down from the mountain sides and pack the snow in ravines. Timber hinders this, for it is a windbreak and prevents the snow from making drifts. It also stops the slides from piling the snow up in vast banks to draw from in late irrigation, which is the water we want. The snow that lies all over the ground and melts just moistens the ground where it lies and never gets into the creeks at all.

Mr. Sessions proceeds to ask the governor what the bona fide settlers are to do for timber if cutting is to be stopped, and calls for practical men to make laws for the protection of timber. He asks that business men, farmers and laboring men shall have their say in determining on a method to control the forests.

After commenting to the effect that

the snow drift theory may be a correct one in given instances, the *Lumberman* concludes:

But there may be climatic reasons for preserving the forests, and there may be economic reasons. Forestry advocates as a rule do not expect to deprive the people of necessary timber, but seek only to have the laws enacted so cutting can be carried on in a way that shall preserve and perpetuate the younger growth. What they aim at is to stop indiscriminate slaughter, without reference to a future supply, and by preserving carefully and maintaining the growth of young trees to keep forests on public lands practically intact. No wise economist can object to that. It seems to the *Lumberman* that the objectors to public forestry are mainly those who want to go on to Government or State domain and steal timber, thus avoiding the necessity of buying land and paying taxes thereon.

Philip Wilson, of Fort Collins, Colo., writing to a local paper in opposition to the forest reserve policy, which, fortunately and for good reasons, is very popular in that enterprising community

of irrigators, argues along the same line that Mr. Sessions does. Each argues from special instances to general conclusions; each seemingly forgets the office of the forest cover in preventing erosion on sloping surfaces and apparently neither believes that water can or does percolate through the soil. Both writers have failed to note, in recording their observations, that not all the snow drifts into dark canons and gorges, that indeed many drifts form on southern exposures where rapid melting is early and certain. Mr. Wilson even goes so far as to advocate the clearing of all the mountain forests in the interest of the irrigation agriculturist, finally concluding with the following language which would seem to substantiate the *Lumberman's* conjecture as to the real motive of opposition:

The Poudre valley is one of the best farming countries in the West. We need full swing at the timber for building and fencing. Why send to Texas for timber when it is here and plenty of it? I say, clear this Government domain of the fences so that the people can have free access to go where they want to and get timber where they can find it.

Lumber Industry.

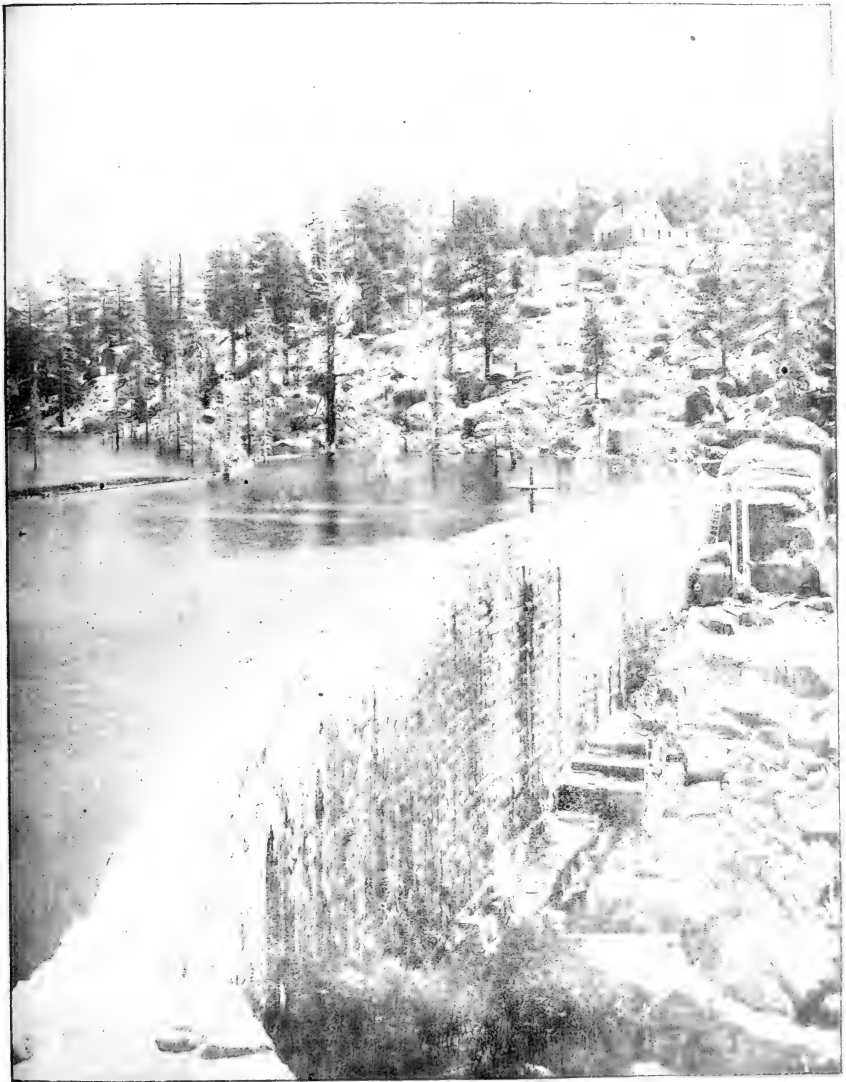
Log Salvage.

Under the caption of "A Dangerous Bill" the *American Lumberman* has the following to say in regard to pending legislation:

Mr. Bromwell, of Ohio, has introduced a bill in the House of Representatives which it will be well enough for the lumbermen who are engaged in floating logs in the streams of the United States to give some attention to. The bill was presented some little time ago, and has already been referred to the committee on interstate and foreign commerce. Under the operations of this law if a lumberman should chance to lose, as lumbermen are apt to do, some of his logs, by floods or other accidents, it would be entirely possible for any one picking up these logs to collect from 25 to 50 cents for each log. This would mean anywhere from \$3 50 upwards a thousand additional cost to the log owners. The condition on the Mississippi River will serve to illustrate. It is not an infrequent occurrence in the spring for logs to break away at Minneapolis and be carried into the river at points between St. Paul and Hastings. Before the machinery for gathering these logs into rafts again could be put into motion, every owner of

a little boat could gather such logs as he could reach and then collect by process of law the large fees provided for in this bill. It is the practice of the operators on the Chippewa River, and particularly of the manufacturers at points on the middle Mississippi River, to float their logs down in the open Chippewa River to the Mississippi, and then for a considerable distance in the Mississippi to the West Newton rafting works. Unless this law were supplemented by some other provision, all these logs would become subject to the pirating acts of any parties who could find a profit in gathering them and selling them under the terms of the law. In rafting logs to the down-river points, it not infrequently is the case that a raft is broken up and the logs set afloat. Here again the log owners might be subjected to the penalties prescribed in this bill.

The conditions on the Mississippi are probably not different from those on other streams where logs are floated. Log owners have found that they can gather their logs at a great deal less cost than named in this bill. Some vigorous protests should be sent to Washington against the passage of this bill, which it appears that Mr. Bromwell has introduced by request. At whose request has not transpired, but presumably parties in his own State or Kentucky.



BEAR VALLEY DAM, SOUTHERN CALIFORNIA. SCANT FOREST PROTECTION.

INTEREST IN UTAH.

In his message to the legislature, Governor Wells touched upon an important question when he referred to the protection of timber areas from the devastation which has been jeopardizing not only the timber supply, but the water supply of the State.

Traveling over the mountainous sections where once the Pine forests were almost impenetrable, one is confronted with evidences of Government neglect and the spoliation of the portable sawmill, great barren tracts of stump-covered ground, with piles of sawdust in the center, showing where indiscriminate milling was carried on before the outfit had been moved to another grove of virgin timber.

Something ought to be done, as the governor suggests, to obtain favorable consideration from the Federal Government, to whom alone the State must look for aid in this matter. For although the State land board is "authorized to set apart and reserve from sale such tracts of timber lands and the timber thereon as may, in the opinion of the board, be required to preserve the forests of the State, prevent a diminution of the flow of rivers and aid in the irrigation of arid lands," the governor calls attention to the fact that such provision applies only to the State lands which are needed for other purposes, and which the General Government obviously never intended to

The sparrow has found an unexpected champion in the Prime Minister of France. The farmers have recently been agitating in favor of the extermination of the little bird, and succeeded so far that a decree was submitted to Premier Meline for signature, giving orders for the destruction of the bird throughout the country by all available means. Before giving his sanction to the measure the Prime Minister determined to make an investigation, in the course of which he has received so much information in favor of the birds, especially from the Forest Department, that he has not only

have remain in their natural state as forest reservations.

Members of the legislature would do well to heed the governor's suggestion in reference to memorializing Congress on this matter.

If the Government does not come to the rescue of the States in the effort to stop the devastation which has already, in many sections, gone too far, the people will ultimately be compelled to resort to the expedient of planting forests like orchards, and bringing them up by hand. It were well to profit by the example of some of the older nations.

Nor is the destruction of forests compassed altogether by design or for profit. Carelessness contributes to the waste. Every year there are forest fires which destroy infinitely more of wealth and prospects than the timber represents

Last year the fires in Wyoming and Western Colorado caused an enormous loss. There should be measures and precautions adopted by the General Government and powers vested in the several States to prevent this double destruction which results from axe and fire.

There are interests to be consulted and rights to be regarded in the selection of tracts for reserves, but the necessity of some definite, decisive action while there is yet time to accomplish good, is imperative, it seems, in the interest of agriculture and for the benefit of future generations.—*Salt Lake City Herald*.

refused to sign the decree, but has announced that he is about to take steps to promote the increase of the species in consequence of its usefulness. It seems that the harm they do to the crops is more than counterbalanced by the benefits which they confer in destroying the caterpillars, worms and other insects that are so detrimental to trees. A Western exchange, which is evidently skeptical as to the alleged usefulness of the sparrow, suggests that now is a good time to get rid of the sparrows in this country, and pertinently inquires what M. Meline will give for them. But,

seriously, the European sparrow is of doubtful value to the forests of this country. Not only does the bulk of its food consist of grains, and matters other than insects, but its worst feature, as demonstrated by the investigation of Dr. C. Hart Merriam of the U. S. Department of Agriculture, is its antagonism toward the native insectivorous birds which apparently results in the decrease of the latter.

It is reported that mining revival in Leadville and vicinity has given an impetus to the mine timber business, and that industry has trebled in the last six months. Some timber cutters have contracts with Leadville mines to supply them with timbers for a year to come, and the coming year will witness an amount of activity in this line and a demand on the neighboring forests unprecedented in the history of that great Colorado mining district.

Recent Forestry Meetings.

California.

A meeting was held in the hall of the Chamber of Commerce in San Francisco, Cal., on January 21, for the discussion of matters pertaining to forest and water conservation. It was a representative gathering, the fifty-four delegates holding credentials from twenty-four different organizations, including boards of trade, chambers of commerce, horticultural societies, granges, farmers' clubs, the University of California, the Yosemite State Commission, the Miners Association and the Sierra Club. The meeting resulted in the organization of a society to be known as "The California Society for Conserving Waters and Protecting Forests." The following officers were elected: President, J. M. Gleaves; vice presidents, J. M. Walling, Wm. H. Mills and Abbot Kinney; secretary, E. H. Benjamin; treasurer, Ernst A. Denike. An executive board of seventeen members was also chosen. Resolutions were adopted requesting the governor to appoint a non-salaried commission to report on the subject at the time of the meeting of the next legislature, and petitioning the present legislature to create a school of forestry in connection with the State University.

Minnesota

The twenty-third annual meeting of The Minnesota State Forestry Association was held January 10, at Minneapolis. Though the attendance was not large, the session was rendered interesting by its spirit.

President Owen was prevented by sickness from attending, his place being taken by Capt. J. N. Cross. Capt. Cross called the attention of the society to the efforts being made by Col. J. S. Cooper, of Chicago, toward the establishment of a national park at the headwaters of the Mississippi, and urged its co operation with him. He also spoke of the growing interest in forestry evident throughout the country. The Cross Bill was then discussed. It was decided to reintroduce this bill, and a committee was appointed to look after it.

A paper from Professor Fernow was delayed and came too late to be read. "Utilizing Our Waste Lands for Forestry Purposes" was the title of an interesting and careful paper presented by Gen. C. C. Andrews. The suggestions which it contained were based upon an outline by Dr. C. A. Schenck. THE FORESTER hopes soon to present it in part. At the afternoon session, Profes-

sor Green's paper, "What About a Forestry School in Minnesota," led to a discussion which ended in the adoption of a resolution recommending to the Board of Regents of the University that a tract of original forest be obtained or set aside to illustrate the principles of forestry. Then followed "Native Evergreens of Minnesota," by Mr. D. A. Gaumnitz, of the School of Agriculture. In the debate which ensued spruce received most attention, and was held to be even more valuable than white pine. Papers by Mr. H. B. Ayres and Mr. C. L. Smith were read, but not discussed owing to business before the meeting.

The following officers were elected: President, Capt. J. N. Cross, Minneapolis; secretary, Geo. W. Strand, Taylor's Falls; treasurer, R. S. Mackintosh, St. Anthony's Park; and one vice-president for each Congressional district.

Among the resolutions adopted, one commended the work of Mr. Gifford Pinchot and the Division of Forestry, and another advocating legislation for an appropriation of \$35,000 for a building for Horticulture, Forestry, Botany and Physics at the School of Agriculture.

Nebraska

At the recent annual meeting of the Nebraska Horticultural Society, held at Lincoln, a committee was appointed to arrange for the organization of a park and forestry association. Nebraska is distinguished as the State in which was originated the custom of designating one day in each year to be known as Arbor Day and to be observed, especially by school children, as a tree-planting holiday. Although millions of trees have been planted, this is said to be the first effort at organization on the part of the planters. Much of the State lies within the semi arid region, yet even there it has been ascertained by experiment that there are certain hardy species of trees, especially conifers, which survive the rigors of a seemingly unfriendly climate. The committee appointed by

the Horticultural Society consists of C. S. Harrison, of York, chairman; ex-Gov. R. W. Furnas, of Brownsville; and E. F. Stephens, of Crete.

Utah.

The Utah Forestry Association held a meeting in the office of its president, Dr. John R. Park, in Salt Lake City, January 20. There was a fair number in attendance, and several new members were elected.

A communication from Dr. J. E. Talmage, president of the Microscopical Society, inviting a combination of the Microscopical Society, Mathematical and Historical Societies and the Forestry Association, for the purpose of forming a joint body under some such title as Utah Academy of Sciences. Opinions as to the advisability of such a step varied and on motion a committee was appointed to confer with Dr. Talmage on the subject and to report at the next meeting.

Another committee was appointed to confer with the committee on forestry of the State legislature for the purpose of obtaining such legislation on forestry matters as may be deemed beneficial to the State.

The creation of the office of a State fish, game and forestry commissioner was advocated, as well as the enactment of stringent laws against leaving camps without extinguishing camp fires. The advisability of following the example of Colorado, where United States forest wardens are, by consent of the General Government, appointed State fish and game wardens, was suggested.

Prof. W. G. Roylance reported that a majority of the people of Utah County desired the United States to create a forest reservation in the southeastern part of the county, at the same time allowing some timber cutting for domestic purposes and some grazing under proper directions. After some discussion the meeting adjourned subject to the call of the president.

Educational.

The New York State College of Forestry has a 30,000-acre demonstration area of Adirondack forest. The terms of sale are agreed on, and only a survey delays the formal turning over of the property. It contains some virgin forest, some from which the lumbermen have taken the choice timber, and some from which forest fires have taken all the timber. The college can, therefore, on the start, demonstrate all sides of forestry, from planting bare tracts to lumbering and getting the logs to market.

Of this institution, *Schweizerische Zeitschrift für Forstwesen*, published at Bern, Switzerland, says:

We must grant that the Americans not only are in earnest in their efforts to further their forestry, but are able to choose with keen vision and true comprehension the proper means for attaining the desired ends by the shortest road.

The *Indian Forester*, published at Mussoorie, India, in reviewing the prospectus of the College of Forestry, makes the following comments:

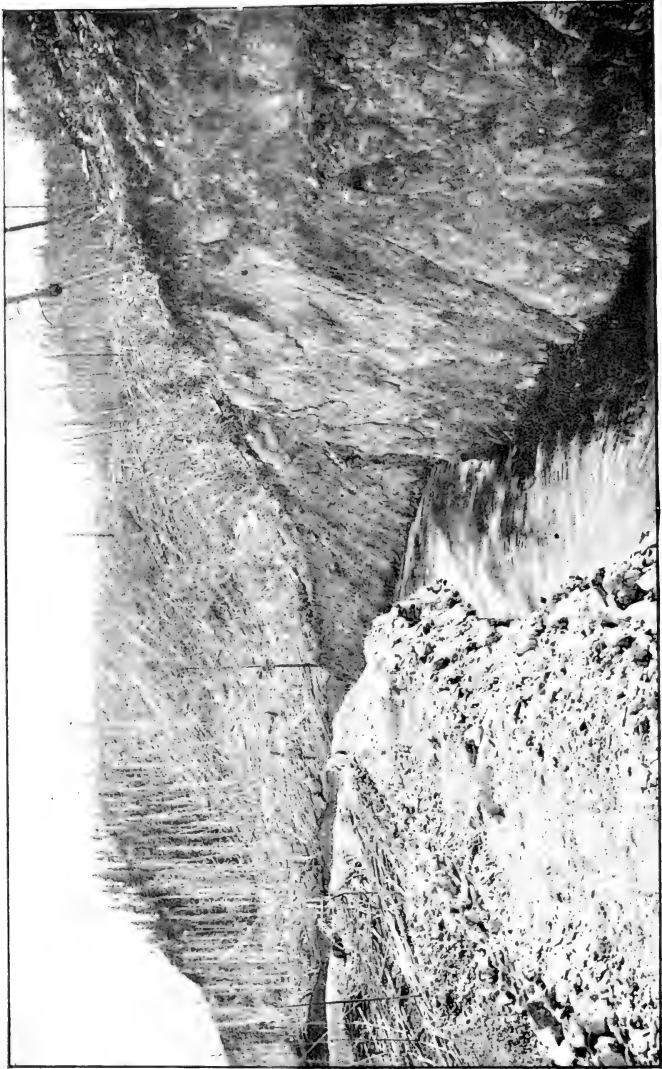
We may confess at once that after reading through the proposals for the latter, which may be termed "stiff all through," and the names of the President and thirty-two professors and instructors who will be engaged in the scholastic work, we reflected with no small amount of relief that our school and college days are over. In the college courses of instruction, we should be inclined to say that too many subjects in too many parts are proposed to be taught, when for instance we read that eight different courses of geology are proposed. In all, if we read aright, as at English universities, there are about fifteen hours fundamental and four hours supplementary or elective work per week; and that excursions and laboratory work only count one hour for every two and a half or three actually spent. Botany is taught in the first three years, forestry in the last two only; thus students who only take the three-years' course lose a large part of the latter. We note that an average of two hours per week is to be spent during each of the last seven terms on political economy; while the subject of pisciculture and venery is also taught. A thesis will be required from every student in his fourth year, and it is noted that there is an ample field for graduate and research work which will be encouraged. We see no mention of the teaching of accounts. A knowledge of these is certainly required in the work of a forest officer. In geology we note that one

week's practical work is to be done in the field; in addition we would say, regarding this and the origin and nature of soils, the geology of soils, the way in which they take their origin from certain formations of rock, and the kind of soil formed from the latter is, for a forest officer, far more important than knowing the names of fossils; similarly with the knowledge of how to read a geological map and the way in which strata lie. As regards forest protection, an account of fire conservancy as it will be taught and practiced, will be of interest to forest officers of this country. We wish the New York State College of Forestry every success, both in its teaching and its results, large and small.

The board of directors of the California State Board of Trade discussed, at a recent meeting, the preservation of the forests of the West. A committee was appointed, consisting of John P. Irish, Craigle Sharp and W. H. Mills, to confer with the board of regents of the University of California at the meeting of the latter on the 21st inst. The committee was instructed to urge the faculties of the universities of Berkeley and Stanford to create a chair of forestry in their respective institutions.

The annual report of State Engineer John E. Field, of Colorado, contains some valuable suggestions with regard to forest fires. It says in part:

Forest fires during the last year have been more than ever destructive and numerous, and I would urge that some law be passed to prevent, if possible, these conflagrations, even to the extent of prohibiting hunters and campers from invading the timber reserve or thickly wooded portions of our mountains when there has been a long spell of dry weather. I would then urge that some effective measure be adopted for fighting the fires when first discovered. The entire irrigation section is dependent on the preservation of our forests, which I believe can never be replaced no matter what the necessity and regardless of expense, for with the forests the soil alike disappears, is washed off by rains and rapidly melting snows, and we have in prospect bare rocky ranges without trees or soil. I would recommend, instead of building reservoirs to hold our flood waters, that the forests, those great natural reservoirs, be preserved to the end that our floods be not increased, and as a consequence, our summer flow decreased.



SKY LINE CANAL, COLORADO; PROTECTING FOREST KILLED BY FIRE.

THE FORESTER.

PUBLISHER'S ANNOUNCEMENT.

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FOREST ORGANIZATION.

Among the resolutions adopted by the Pomological Society of Southern California at its recent meeting at Covina are the following:

Resolved, That a plan of work in forestry and water preservation should be framed and worked to.

Resolved, That an efficient forest patrol force can only be formed by disciplined men of good physical capacity.

Resolved, That the plan formulated for forest work in the Sierra Madre at our Covina meeting be forwarded to the Secretary of the Interior, the Secretary of War and the Secretary of Agriculture.

The plan mentioned as having been formulated at the Covina meeting includes, in brief, a proposition to form a forest patrol by details from the regular Army to serve under forest officers. The proposition itself is not a new one, but, under new conditions, there seem to be reasons why it can no longer be regarded as being either practicable or expedient. At present the work of the Government pertaining to forestry is distributed among three agencies, the General Land Office and the Geological Survey, both in the Department of the Interior, and the Division of Forestry, in the Department of Agriculture. This distribution of powers and duties has not resulted in any direct conflict of authority. It has, however, served to demonstrate that, owing to lack of unity, many efforts, well directed though they have been, have necessarily involved the waste of more or less money, time

and energy. The question very naturally arises as to whether the measure advocated by the Pomological Society of Southern California might not tend to complicate the situation still further by the addition of the Army as a fourth agency? The American Forestry Association the Pennsylvania Forestry Association, and the National Board of Trade, in meetings held during the past few weeks, have adopted resolutions favoring the unification of the several governmental agencies for the investigation, survey and administration of public forests, prefacing the proposition by the statement that such a change would be in the interest of public economy and lead to a more efficient and satisfactory service. The National Irrigation Congress, at its meeting in Cheyenne last September, declared in favor of the creation of a Bureau of Public Forests in the Department of the Interior, a proposition which has since been endorsed in the resolutions adopted at the annual meeting of the Colorado State Board of Horticulture.

It is unnecessary at this time to discuss the wisdom and propriety of utilizing the Army in even a temporary plan for forest management. There may have been a time when such a course might well have been adopted as a measure of temporary expediency, but if so it would seem that such a time has passed. At present there are pending in Congress two bills for the increase of the regular military establishment. This certainly indicates that the entire army is occupied in the discharge of its proper functions and that it now has no men to spare for forest patrol purposes. Not only is the Army not available for service in any scheme of forest administration and management, but it is doubtful if the War Department desires to have its present duties and cares increased.

Certainly it cannot be said that "an efficient forest patrol" consisting of "disciplined men of good physical capacity" cannot be organized apart from the Army as readily as within its ranks.

On the contrary, there is every reason to believe that an organization created for the single purpose will, under all conditions, prove the most satisfactory. If, at any time, a part of the military force becomes available for service in aiding to patrol the forest reservations during the season when there is imminent danger from fire, there is no reason to doubt that such service would prove to be a valuable supplement to that of a regularly constituted corps of foresters. Army officers who take intelligent interest in matters pertaining to forest preservation have made the appropriate suggestion that such service might well be substituted for, or made part of, the summer practice marches. At the present time, however, the further agitation of any specific proposition for the utilization of military forces in this capacity, coupled, as it would be, by a further division of authority, would seem to be unwise. This is true not only for the reasons already given, but also because such a course leads to a common misconception as to the professional questions involved. For this reason efforts must be made to promote a wider understanding of the fact that forest administration, in its strict sense, and forest management, are each quite as necessary as forest protection. With such an understanding established, the creation of a proper organization for the control, management and care of the forest reservation system could not be long delayed.

In this connection it is well to call attention to the admirable suggestion of Hon. Abbot Kinney, Chairman of the Yosemite Park Commission, that students of forestry be recognized as the most desirable candidates for employment as forest rangers and that they be given preference as such. This plan is certainly to be commended. Its adoption would result in the elimination of partisan politics from a matter where its intrusion is a manifest incongruity, and would have a generally elevating and beneficial effect on the forest service by the addition of discipline and physical ability. At the start the forest student

who seeks employment as a ranger would prove to be much more efficient than the average political appointee not only on account of his superior intelligence but also because he would possess a certain degree of professional enthusiasm, or pride of service, and an ambition for advancement. With such incentives he would become distinguished for his aptitude, efficiency, and fidelity to duty much more than the man who accepts such employment only because of the wages offered. Mr. Kinney's suggestion is timely and it is to be hoped that it may become the subject of favorable consideration and action.

THE PROTECTION OF IRRIGATION WORKS.

In the matter of natural fertility, the soil of the arid and semi arid regions of the Western States has few superiors. Though the relative amount of organic matter is small, the elements of mineral fertility are abundant. This is due to the very fact of aridity. In the humid regions, where there is greater precipitation, the soils have been leached of their soluble salts by the washings and percolations of ages of rainfall, and now lack fertility because of the loss of these elements which have been swept to the sea. Added to a soil of the highest fertility, the arid regions possess a climate that is distinguished for its constant sunshine. With a rich soil and constant sunshine but one other condition is requisite for the attainment of the greatest possible returns for all agricultural and horticultural operations, and this is moisture. With this condition supplied, farming in the rainless regions presents one of the most inviting and promising fields for industry. That its possibilities have as yet been only touched is hinted at in the following paragraph from the Denver *Field and Farm*, whose editor, a long resident of the West, is the author of the well-known book, "Irrigation Farming":

If all the land under canal in Colorado were utilized, our State could support a population

ten times as great as now. The ditches already built cover four times the area on which crops are being cultivated and matured by the aid of the natural flow of the streams alone. The best that can be done with the three-fourths now left uncultivated is to water it once during the flood season, so increasing the pasturage or possibly raising one crop of alfalfa instead of the three or four crops which could be produced with an ample water supply. Many of the ditches already built have to remain idle and empty during more than half of the irrigation season, and the value of the greater part of the land under them is but little more than it would bring for pasturage alone. The period of greatest need in irrigation extends from the middle of June to the middle of July, while the demand during the last half of July is often as great as during the first half of June. There is no profit in planting crops which cannot be matured; hence the limit of the area which can be cultivated by the natural flow alone is not fixed by the flood discharge of May and June, but by the short supply of July.

Briefly stated, the future of irrigation development will largely depend upon the storage of flood waters that are now permitted to flow unused to the sea. How this end is to be achieved is a problem on the solution of which many minds are at work. That it will be solved, no one acquainted with the activity and ambition of the Western people doubts for a moment. That various measures will be adopted is probable. One of these is certain to be the rehabilitation, preservation and extension of forest protective areas. Even if the construction of a storage reservoir system would answer for all the purposes of water conservation (which it could not), the maintenance of protective forests would yet be an imperative necessity for the adequate protection and the most economical operation of irrigation works. The rapid confluence of storm waters is not the only evil that follows forest destruction in a mountainous region. Falling water washes loose particles of soil and gravel and small fragments of rock. The carrying power of flowing water increases as the sixth power of its velocity.* A torrent which has its source in the timber-stripped area of a steep mountain side often attains, after heavy rains, a power that not only moves sand

and gravel and small fragments, but transports boulders and other rock masses. These are deposited as the force of the current is checked, perhaps choking the bed of a stream and causing by its overflow the ruin of the lower lands on either side. As the slope of the receiving stream decreases the coarse gravel and fragments are deposited. The sand and silt are still carried in suspension, to settle finally on the bottom of some irrigation canal, so limiting its capacity by making it shallower, or to be deposited on the bed of a reservoir, the available storage capacity of which is thus decreased.

The cleaning of the sandy sediment from the bottom of canals is reckoned upon annually as an expensive but necessary item in the operation of many irrigation systems. In eastern Colorado the engineers on the Amity Canal reported that in one instance a small reservoir of two or three acres in extent was filled with a deposit of thirty feet of silt and sand in the single season of 1895. The construction of scouring sluices in canal systems and settling basins in connection with reservoirs may seem to reduce these difficulties to a minimum. Such expedients, however, are wasteful of either water or money, and results obtained are not always satisfactory. Even under the best conditions there will always be more or less erosion and movement of soil and detritus by flood waters; and a considerable deposit of the finer particles in the slower currents and still waters of irrigation works must always be taken into account. How to reduce these evils to the minimum is a question of the very greatest importance to the irrigator. Here then is one of the great offices of the protective mountain forests. To break the force of rapidly descending waters and hold a part of them in check to feed the springs and brooks after the season of flood is gone is indeed a useful function; but one scarcely less useful is that of binding of soil on slopes and, to a great extent, depriving the flood of its harmful power.

On page 42 THE FORESTER presents a

*LeConte's Geology, page 18.

view of a mountain-side irrigation canal in Larimer County, Colorado, showing how its former forest protection has been killed by fire. It is scarcely to be expected that, by natural means, a new growth will rapidly replace the protective forest thus destroyed.* In such a case there is a possibility that it may at times be necessary to remove gravel and other coarse materials from the bed of the canal as well as the usual deposit of fine sediment.

Storage reservoirs may supplement protective forests, but they cannot be substituted for them. Since no agency can take the place of forest preservation, this subject is one of deepest concern to intelligent irrigators. They realize that with the destruction of protective forests, great material loss must fall upon them.

In order that all conditions may be made the most favorable, that the maintenance and operation of irrigation works may be made successful with the least expenditure of labor and money, the forests must be restored and properly cared for. This must be done sooner or later, and the sooner it is done the less it will cost.

In a communication to the St. Paul *Pioneer Press* Mr. Otis Staples, a veteran lumberman calls attention to the enormous extravagance involved in the annual cutting down of young Spruces and Firs for use as "Christmas trees." The young growths used for this purpose for one Christmas in Minnesota would, according to his figures, if left standing, produce 37,500,000 feet of lumber in twenty-five years. It is to be inferred that Mr. Staples bases his figures upon the assumption that each of the small trees thus destroyed would, if left standing, grow to full maturity. Such an assumption would seem to be scarcely warranted by facts, for the mature forest, in the point of numbers, is but a fraction of its earlier composition, the surviving

trees having crowded out their weaker neighbors. It is well, however, to call attention to the abuses of which the Christmas-tree cutters are guilty. Their methods are generally indiscriminate and, in effect, are destructive. A young forest is benefited by judicious thinning, but the prevailing practice of these tree cutters is not based upon any thought of benefit except that of personal gain to the offender. This practice of making a clean cut of all young forest growth for this purpose, particularly near the larger cities in a mountain region, is a most reprehensible one, and should be made subject to regulation by law.

The "Report on Floods of the Mississippi River," by the Senate Committee on Commerce, which details the results of the investigations made pursuant to a resolution of the Senate, has been printed. Under the head of "Destruction of Forests" the report says:

Nothing in the evidence or other data obtained by your committee discloses the fact that the destruction of timber at or near the headwaters of these river systems tends to cause or promote the floods referred to. It was shown that where timber is cut down for purposes other than cultivation the underbrush remains and grows more luxuriant than ever, and such underbrush serves to retard rather than hasten the movement of water on the slopes and hillsides; and where timber is cut down for purposes of clearing and cultivation the plowed area becomes an enlarged absorbent of surface moisture. It is a generally accepted opinion that the destruction of timber tends rather to diminish than to increase the rainfall.

A very important phase of the flood question is passed over with a very brief mention. That the effects of forest destruction would seem to warrant a more extended discussion in such a report there can be no question, for it has been proven over and over again that the removal of forests in mountain regions is always followed by disastrous results in seasons of great flood. Of the fires that burn through the cut-over lands and of the soil erosion which follows in the wake of the fire on the steeper slopes, and the consequent destruction of its

* See article on "New Growth on Burned Areas" by Prof. C. S. Crandall in *THE FORESTER*, Vol. V, No. 1 (January, 1899).

forest-producing capability, no account seems to have been taken. The fact that a heavy growth of underbrush cannot grow on a hillside which has been denuded of its surface soil does not seem to have been taken into consideration. In regard to the "generally accepted opinion that the destruction of timber tends rather to diminish than to increase rainfall," there is some question. There is another opinion, also more or less generally accepted, that forest destruction tends to promote violent forms of precipitation and leads to the alternation of excessively dry and wet periods, thus producing the greatest extremes of variation in the flow of water in streams. Although such an opinion is perhaps well grounded it would be of doubtful wisdom to base any particular line of public policy upon any such popular assumption, in the absence of scientific data.

The great question of the use and abuse of water resources is demanding more attention on the part of the people of the United States each year, and it would be well, in the earlier discussions

upon this topic, to omit all mere guesswork from calculations. Such a course would in the end prove to be the most economical and facilitate the earliest and most complete development of national resources.

That the progress of forestry is often seriously hindered by the personal aspirations of politicians goes without saying. In the Oregon legislature a bill was introduced creating the office of commissioner of forestry, game and fish, and before it had time to pass either house there were three avowed candidates for the position. The Wisconsin plan of creating an unsalaried commission would probably result in the appointment of more competent though less ambitious men. Judging by results attained in some other states it would be better to have no legislation enacted upon this subject at all than to have it end in the selection of an official whose interest in forestry and whose qualifications for the work in hand were secondary to his desire for preferment to a salaried position.

Recent Publications.

The Physical Geography of Worcester Massachusetts, published by the Worcester Natural History Society, is an admirable little descriptive pamphlet which serves as a model for works of the kind. The author, is Mr. H. Perry.

Biennial Report of the State Forest, Game and Fish Commissioner of the State of Colorado. This report covers the years 1897 and 1898. Three pages are devoted to Forestry, and the remaining sixty-three pages to game and fish. The fact that Forestry makes no greater showing is not due to the preference of Commissioner Swan for the other interests, but to an uncomfortable condition of the Colorado law. The law so stands that there would seem to be a conflict of authority between Commissioner Swan and the State Land Board, which has rendered his power inoperative by going to both the "care of all woodlands and forests." Commissioner Swan urges legislation which shall elude this difficulty. It is to be hoped that his suggestions will be carried out. We should then have a report as interesting and pertinent throughout as Commissioner Swan has made this one concerning

game and fish, in which matters he has had a free hand.

Forestry in Minnesota, prepared by Prof. Samuel B. Green, and published by The Minnesota Forestry Association. This little volume is welcome. It is hard to see how a better elementary hand-book adapted both for general educational purposes and special local requirements could well be put together. The first 127 pages deal with "Elementary Forestry," and serve as a good introduction to the study in general. The second part deals with the trees of Minnesota in their relation to forests and planting. That Professor Green's book is necessarily local in certain of its aspects, is part of its very purpose. What is most needed is a number of such local forest manuals. It is by the aid of such writings as this that forestry will become widely applied on the part of individuals, and hence widely appreciated and encouraged by the country at large. Copies of this work will be sent to non-residents of Minnesota by the secretary of the Minnesota Forestry Association, Geo. W. Strand, Taylor's Falls, Minn., upon receipt of fifteen cents.

The Second Report of the American Park and Outdoor Association. This is an account of the meeting of the Association at Minneapolis, Minn., June 22, 23 and 24, 1898. "To promote the conservation of natural scenery, the acquirement and improvement of land for public parks and reservations, and the advancement of all outdoor art having to do with the designing and fitting of public grounds for public and private use," are the purposes for which it exists. A number of interesting papers deal with various aspects of the work, which has already been so successful.

The president of the Association is Mr. Charles M. Loring, of Minneapolis; the secretary is Mr. Warren H. Manning, whose address is 1146 Tremont Building, Boston, Mass.

The Wyoming State University has issued an instructive bulletin on the subject of "Cultivated Shade and Forest Trees of Wyoming," by Prof. B. C. Buffum.

In a recent contribution to the *Atlantic Monthly*, President Charles W. Elliott, of Harvard University, who is noted as an observing traveler, says:

Any one who has traveled through the comparatively treeless countries around the Mediterranean, such as Spain, Sicily, Greece, Northern Africa and large portions of Italy, must fervently pray that our own country may be preserved from so dismal a fate. It is not the loss of the forests only that is to be dreaded, but the loss of agricultural regions now fertile and populous, which may be desolated by the floods that rush down from bare hills and mountains, bringing with them vast quantities of sand and gravel to be spread over the lowlands. Traveling a few years ago through Tunisia, I came suddenly upon a fine Roman bridge of stone over a wide, bare, dry river bed. It stood some 30 feet above the bed of the river, and had once served the needs of a

It is estimated, the bulletin recites, that approximately one-sixth of the area of the State, or about ten million acres of land within its borders, is covered with timber. All of this is in the mountain regions. The bulletin gives in detail the results of experiments at the various stations in Wyoming in raising forest and shade trees. A summary of these results shows that the best trees for wind breaks, shelter belts and street planting in Wyoming are the Cottonwoods and Willows. The most rapid Cottonwood is the smooth-bark, or Ryd-burgh's. The next in value are the Broad Leaf, Black or Narrow Leaf Cottonwood and the Balm of Gilead. In the order of their hardiness the following trees have been tried at the State experiment stations: Cottonwood, Willow, Silver Spruce, Douglas Spruce, Hardy Apples, Silver Maple, Cedar, White Ash, Locust, Elm, Mountain Ash, Black Walnut and Catalpa.

prosperous population. Marveling at the height of the bridge above the ground, I asked the French station master if the river ever rose to the arches which carried the roadway of the bridge. His answer testified to the flooding capacity of the river and the strength of the bridge. He said, "I have been here four years, and three times I have seen the river running over the parapets of that bridge." That country was once one of the richest granaries of the Roman Empire. It now yields a scanty support for a sparse and semi-barbarous population. The whole region round about is treeless. The care of the National forests is a provision for future generations, for the permanence over vast areas of our country of the great industries of agriculture and mining upon which the prosperity of the country ultimately depends. A good forest administration would soon support itself; but it should be organized in the interests of the whole country, no matter what it cost.

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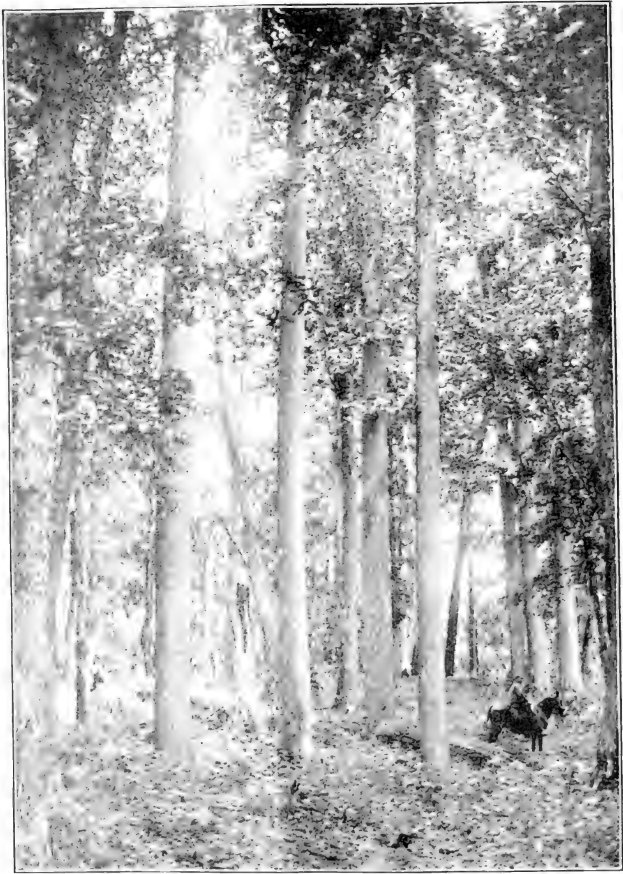
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FOREST SCENE IN WESTERN NORTH CAROLINA
ON LINE OF SOUTHERN RAILWAY.

The Forester.

VOL. V.

MARCH, 1899

No. 3

News Items.

The Minnesota Forestry Association is the oldest organization of its kind in the United States, having been organized and chartered in 1876.

The penalty for cutting timber on State lands in South Dakota has been heretofore a fine of at least \$1,000, but a bill has lately been introduced to reduce the fine to \$250 to \$500 or imprisonment of not less than six months.

Mr. Charles A. Keffer, for the past five years Assistant Chief of the Division of Forestry, has resigned to accept a position as the head of the department of horticulture and agriculture in the New Mexico Agricultural College, at Mesilla Park, N. M.

President McKinley formally disapproved of the act of the Choctaw Indian Council, in the Indian Territory, which prohibited the sale of timber on the Indian lands after January 1, 1899, and required saw-mills to cease operations on that date.

Mr. Geo. W. Strand, secretary of the Minnesota Forestry Association, is furnishing a series of press articles on forestry topics. They are sent out twice a month to the papers of Minnesota, and as nearly a hundred journals are publishing them regularly a large circulation is assured for the interesting and valuable matter contained.

Mr. John D. Benedict has resigned the superintendency of the New Mexico-Arizona Forest Reservation District to accept a position as Superintendent of Indian Schools in the Indian Territory. Mr. Benedict, who was appointed from Illinois, made a very creditable record as a faithful and diligent official during

the six months that he was a forest superintendent and it is to be regretted that a more tempting offer should take him to another field.

A bill was introduced into the Minnesota Legislature, by Representative Brusletten, of Goodhue County, to repeal the forest law of that State and abolish the fire warden system. The measure was defeated as it deserved to be. Since the enactment of the new forest laws in 1895 Minnesota has been free from the ravages of serious forest fires, though during that time the pine regions of neighboring States, where no provision for fire prevention has been made, have suffered severely.

Henry Weber, of Eau Pleine, Marathon County, Wis., stated lately that he had within a short time cut what he believed to be the biggest pine tree ever cut in that county. The tree was cut into eleven logs, most of which were twelve feet in length, which scaled a total of 6,780 feet. The butt log at the large end measured five feet five inches in diameter. There was no mill in the neighborhood that could saw the butt log, and Mr. Weber intended to split it with dynamite.

Great Britain is preparing to expend \$800,000 per year for a period of thirty years in the development of the agricultural region of upper Egypt by the construction of a series of gigantic irrigation works. The arable area of the Nile valley at present is about 10,500 square miles and it is proposed to augment this amount by the reclamation of at least 2,500 square miles of arid lands within six or eight years. Active work on the construction of the first great dam across the river has begun.

Not long since the representative of a Puget Sound lumber mill sold a small bill of timber consisting of four pieces 18 by 18 inches by 60 feet long, and four pieces 16 by 16, 55 feet long. The whole bill amounted to about one carload, but owing to their length the timbers had to be shipped in two cars, making double freight. The delivered price, therefore, was very high for this class of material—almost prohibitory it would seem—but there is where the Pacific coast producers have the advantage.

Dr. S. A. Knapp, of Louisiana, who recently returned from the Philippine Islands, reports that he saw a section of a mahogany tree that was purchased at Manila by U. S. Consul Williams to be sent to this country. It was between seven and eight feet in diameter and of most remarkable beauty. It is to be made into tops for center tables. Dr. Knapp visited China, Japan and the Philippines as special agent of the Department of Agriculture for the investigation of the rice-growing industry.

A White Oak tree was cut in Knox county, Indiana, in January that is supposed to have been one of the largest of the kind ever cut in that section. It measured eight feet four inches at the butt, fifty-three inches at the small end, scaled 7,867 feet, and made four twelve-foot logs. The tree was cut and rolled to White River and loaded on a barge, taken to Mt. Carmel, Ill., rolled to side track and loaded two logs to a car. A silver dollar would have covered the heart of any one of the logs. The tree was bought by John S. Dickson, timber buyer for A. B. Mickey & Sons, Princeton. The logs will cut quartered oak panels, 27 to 28 inches wide.

Until very recently Beech has been used for only a few purposes, such as plane stocks and tool handles. It is now recognized, however, that the wood is admirably adapted for furniture and interior finish. There is some diffi-

culty, it is true, in seasoning Beech in any thickness above one inch; but this may prove only a temporary limitation, and meantime it can be widely employed, especially when the stock is cut quite thin, making a satisfactory veneer. When quarter-sawed, the wood equals the Sycamore in the beauty of its grain. In the hardwood section of the middle South the tree attains a splendid size, with long clear bole, and there are many mixed forests in which it occurs in abundance.

Owners of timber lands in Pennsylvania are interested in a law that was enacted by the last Legislature which provides that the owners of land in that State having on it forest or timber trees of not less than fifty trees to the acre shall be entitled to receive annually from the commissioners of their respective counties during the period that the said trees are maintained in sound condition upon the land, a sum equal to eighty per centum of all the taxes annually assessed and paid upon said land, or so much of eighty per centum as shall not exceed the sum of forty-five cents per acre. No one property owner shall be entitled to receive said abatement on more than fifty acres, and proof must be made that each of said trees measures at least eight inches in diameter at a height of six feet above the surface of the ground, and that no portion of said land is absolutely cleared of said trees.

The following editorial paragraph appeared in a recent issue of the Philadelphia *Record*:

It is a pleasure to know that two misdemeanants found guilty of kindling forest fires are languishing in the Huntington County jail. The news ought to be spread abroad in the State as a deterrent to others who, out of willful malice or a mere spirit of deviltry, are guilty of this crime. The yearly destruction of growing timber in Pennsylvania by reason of spreading fires inflicts heavy loss upon owners of woodland property, and makes almost nugatory the effort of the State for forest preservation.

Why Lumbermen Should Be Members of the American Forestry Association.

The prevalence of forest fires during the past summer has called attention to the necessity of forest protection with unusual force. The destruction of forests by fire brings losses to many parts of the community, but to none more direct and severe damage than to the lumber interest; and the benefits that would accrue to lumbermen through the protection of forests against fire are correspondingly great. Such protection would mean the preservation of the raw material of the lumber trade on the stump, and in many cases the safety of the private property of the lumberman in the form of mill and machinery, dams, roads or slides, as well as in that of standing timber or logs in the woods. Protection of this kind costs the lumberman very heavily at times, although the State or Government should rightly bear the cost of an organization to guard against fire in the forest, just as cities maintain fire engines and apparatus and hire firemen at their own expense.

The continuation of the lumberman's business depends first of all on the success of the attempt to check forest fires. When the productive forests disappear the lumberman will go with them. In many parts of the country this result is nearer at hand than is often supposed, and in the case of individual millmen great hardships are very frequently imposed by the destruction of their tributary timber by fire.

Combined action on the part of all who are interested in the protection of forests and the perpetuation of the lumber trade is absolutely necessary before any successful attempt can be made to check this enormous evil. Forest fires throughout the United States are frequent to a degree little understood except by men familiar with the woods, and the magnitude of the task of checking them is correspondingly great. The American Forestry Association offers the means

of united action between the lumbermen of the East and West, the North and South, toward this most necessary end. Organization is absolutely essential in any attempt of this kind, and the established reputation of this Association, the strong names already on its rolls, and its history of honorable accomplishment, make it by far the best means for the purpose in hand.

But if we suppose forest fires to be checked throughout the country, the interests of the lumber trade will still be only partially protected. Destructive methods of lumbering are often not less harmful in their results to the lumber business itself than the severest fires. Lumbermen hitherto have given but little attention to ways of cutting and getting out their timber which would not destroy the productive value of forest land. In other words, cutting with a view to perpetuating the supply of lumber through the protection and reproduction of the forest has had little attention from lumbermen until now. Many of those who have considered it have not believed it was practical, but by far the greater number have scarcely considered it at all.

Conservative lumbering differs more widely from forest protection, as it is understood by those mistaken friends of the forest who are anxious to have all the trees die on the stump, than from the methods of lumbermen ordinarily used. It consists simply in taking such precautions in cutting and getting out the timber as will insure a valuable second-growth. In the Adirondack forests of New York, for example, such lumbering has recently been introduced on two large tracts covering together more than one hundred thousand acres, and during the past fall and early winter fifteen camps were cutting in this way. The reasons which led to the adoption of these methods were strictly business

ones. The removal of the old timber in a way to protect and promote the growth of the young trees adds very little to the cost of lumbering, while the increased value of the land after cutting much more than repays the additional expense.

The method used in the Adirondacks will naturally not apply to all the forest regions of the United States, but other methods of conservative lumbering can be used with advantage almost everywhere. The American Forestry Association works for the diffusion of a knowledge of these methods and for their adoption throughout the United States. In doing so, it seeks to perpetuate, not to destroy, the lumber business of the country, and it is already receiving the support of prominent lumbermen in different parts of the United States.

The Association understands thoroughly the premium set on the destruction of timber by heavy taxation on timber lands, cut and uncut, and is prepared to interest itself actively in bringing about a change. The possession of an appropriate and effective organ in THE FORESTER, with its extensive exchange

list and its circulation among men of influence, gives it peculiar advantages in any agitation of this kind.

Much misunderstanding has existed, and much still exists, on the part of lumbermen and others as to the law and the rules and regulations which govern the National Forest Reserves. It was believed at first that the intention of the Government in making these reserves was to withdraw them from use altogether, and to prohibit the settlement of agricultural lands within their boundaries. A better understanding has gradually come about, but the specific provisions of the law are not yet widely known.

Extracts from the law and the regulations issued under it, explaining in detail the ways in which the reserves may be made useful to the communities near which they lie, and the regulations to be observed in the use of their timber and other resources, appeared in the February issue of THE FORESTER. Applicants for membership in the American Forestry Association whose letters to that effect are received before April 15 will receive the February number until the edition is exhausted.

The Douglas Spruce of Northern Oregon.

BY HENRY S. GRAVES.

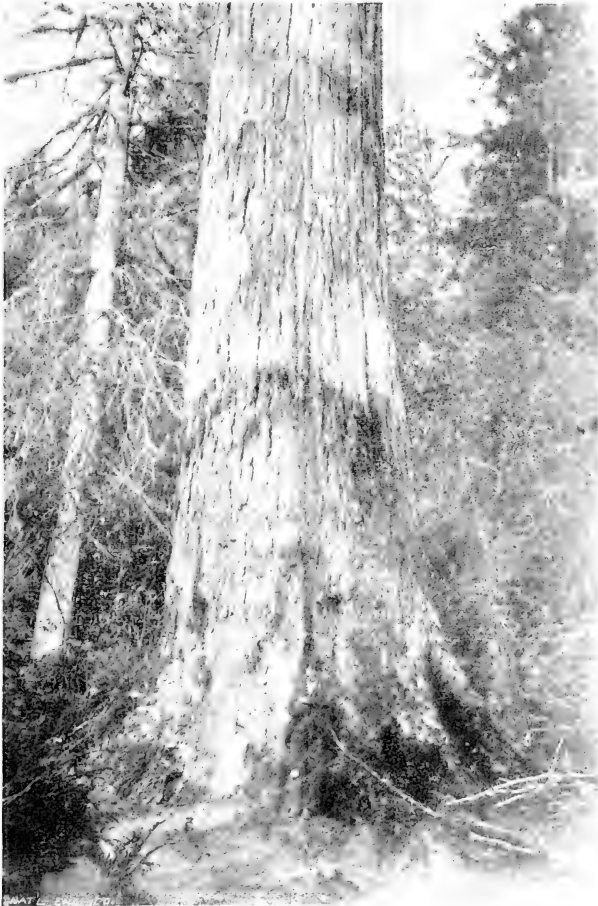
It is not improbable that the Douglas Spruce in Washington and Oregon grows more rapidly than any other coniferous tree. The long annual shoots of the young saplings and the wide rings on the stumps of trees which have grown in open situations are noticeable even to casual observers. There have been published from time to time measurements of the growth of the Douglas, but they have usually (with the exception of a few by Dr. Heinrich Mayr) been taken on old trees at haphazard in the forest, and may or may not represent the capability of the tree under average conditions. A complete knowledge of its growth can be obtained only through an

exhaustive study, such as is to be begun during the coming summer by the Division of Forestry. A few figures representing average conditions only and put in a usable form should, however, prove valuable until this investigation has been completed. The measurements of growth summarized below, together with the notes on the silvicultural character of the tree, were collected by the writer during the summer of 1896, in connection with a special report prepared for Mr. Gifford Pinchot.

OCCURRENCE.

Douglas Spruce is found from tide land to an altitude between 5,000 and 6,000

feet above sea level. A few scattering trees occur near the coast, but they dis-
tion at which the writer observed it on the eastern side of the Cascade Range



DOUGLAS SPRUCE, NEAR ASTORIA, OREGON; DIAMETER, THIRTEEN FEET;
ESTIMATED HEIGHT, THREE HUNDRED FEET.

like the tide land and only begin to reach their normal development above recent sea deposits. The lowest elevation at which the writer observed it on the eastern side of the Cascade Range was 2,800 feet. Along streams, however, it is probably found at a lower altitude. It reaches its best development

west of the summit of the Cascades below 2,500 feet, on river bottoms, in sheltered ravines, on rich benches and on moderate slopes. It attains the greatest height and produces the most valuable timber when growing in dense forests, on well-drained, loamy soil and in sheltered situations. It occurs, however, in abundance on rocky soil, steep slopes and exposed ridges, where it is apt to be comparatively short and scrubby. For its best development a considerable amount of moisture in the air is required, and on this account it prospers better on the western than the eastern slopes of the Cascades. A deep soil is not required on account of the shallow root system. This is well illustrated in the lower Santiam Valley, where Douglas Spruce is frequently found growing with great vigor, and producing tall, straight timber, on ground with an impermeable subsoil, in which the White Oak is short and stunted.

HABIT.

When growing in open situations, Douglas Spruce develops a large spreading crown, which gives the tree a broad, conical aspect. Such trees are comparatively short and grow rapidly in diameter. In dense stands, on the other hand, the trees are very tall, shed their lower branches early, and form long clear boles with narrow compact crowns. Douglas Spruce carries its diameter well up into the crown, and in case of very old trees, the stem then tapers within a few feet abruptly to a point, this portion being usually bent in the direction of the prevailing wind.

The largest tree measured by the writer was thirteen feet in diameter and had an estimated height of nearly 300 feet. One observer states that he measured a tree in Washington 335 feet high and fifteen feet in diameter. The oldest tree, whose age was determined during the present study, was about 400 years old, but specimens have been found with 700 annual rings on the stump.

The bark of young trees is light gray or white, and is smooth, thin, and covered with resin blisters. When twenty to thirty years old the bark becomes longitudinally cracked. In later life the

color varies from dark brown, almost black, to a whitish gray; and often on old trees it is reddish, or light brown tinged with yellow. At about fifty years of age the bark is six-tenths to nine-tenths of an inch thick, and on old trees three to six inches or even more.

Lumbermen distinguish between Red and Yellow Spruce, but botanically these are identical. They differ only in the character of the lumber they produce. The Yellow Spruce is old and mature, and is generally found in dense forest on good soil and in favorable situations. The trees have long, clear, full trunks, narrow crowns, and a fine-grained, yellowish wood. Often, however, the wood has a reddish tinge near the center. The bark is usually light brown, tinged with yellow, and is less coarse in texture than that of the Red Spruce. The latter has a comparatively large crown, deeply corrugated bark, and coarse-grained, reddish wood. The Douglas found on the eastern slope of the Cascades, or growing in open situations, is for the most part Red Spruce. The yellow variety is confined to the Pacific slope.

The wood of the Douglas is extremely durable. Trees have been known to lie on the ground forty years and be perfectly sound. Stems of trees which have been killed by fire stand many years before decaying. On one plot of even-aged trees eighty-three years old, near Permelia Lake old stubs of the original timber were still to be seen, though decaying and crumbling to pieces.

TOLERANCE.

The Douglas Spruce cannot live in very dense shade. This is shown by the great scarcity of young growth in the deep forest, where the proportion of old Firs which are constantly distributing seed, is large. Among the western conifers it stands between White Pine and Noble Fir in the scale of tolerance, the former bearing more shade and the latter less.

REPRODUCTION.

The youngest tree found bearing seed was only sixteen years old. It was growing, however, in excellent soil and in an open situation. In the forest the period at which the Douglas Spruce bears seed

begins much later. Observers testify that it bears fruit every year, but that in some years the production of seed is more abundant than in others and that frequently the cones are barren. It is certain, however, that seed is produced abundantly and at short intervals, and that the tree continues to bear late in life. Very old trees, such as the veterans on the slopes of the Coast Range, reproduce themselves sparsely. Trees bear more plentifully on rich than on meagre soil; in open places than in dense stands; and at low than at high elevations.

In the dense forest young seedlings are practically wanting, but where the stand is broken groups of small trees are abundant. A certain amount of light is, therefore, necessary for the germination of the seed. The second essential condition of germination is a good seed-bed. Young seedlings are found in largest numbers on ground which has been broken so that the mineral soil is exposed. A matting of leaves or a firm sod, on the other hand, seems unfavorable to the reproduction of the tree. When the upper layer of humus has been burned off the reproduction is excellent. This is the reason that fires are often followed by a magnificent growth of young Douglas Spruce. Near seed trees the second growth is usually very dense, but where a tract has been stripped by fire, and seed has to be borne from a considerable distance, the result is an irregular, rather ragged, growth of trees,

varying greatly in size and age. Under such conditions two and sometimes three generations of trees are necessary to seed the ground densely enough to establish a forest equal to the original growth.

GROWTH.

In order to determine the rate of growth, the following method was employed: Sample plots were measured off in second growth which had come up in regular even-aged stands. All trees on these plots were counted and their diameters measured at breast height. The average diameter was then determined, and a sample tree of this diameter and apparently of average height, was felled, and measurements were taken to determine its contents and rate of growth. This average tree was used as a basis for the computation of the total contents of all the trees on the sample plots and of the average growth in height and diameter.

The writer was fortunate in finding a number of even-aged groups of nearly pure second-growth Douglas in the Santiam and Willamette Valleys on what had been grass prairies before the country was settled. The repeated fires, probably set by the Indians, had prevented new growth from coming up; but when the fires were checked by the whites, the few scattered Douglas which had survived from a former forest seeded the ground rapidly to young timber.

There were measured, in all, nine sam-

TABLE No. 1.—Summary of Measurements of Nine Sample Trees.

Tree.	Diameter breast-height.	Diameter of stump.	Diameter inside bark.	Height of stump.	Age of stump.	Height of tree.	Age of sap.	Width of sap.	Volume.	Current annual growth.	Locality.
No.	Inches.	Inches.	Inches.	Feet.	Years.	Feet.	Years.	Inches.	Cub. feet.	Per cent of total vol.	
1	1.75	2.3	2.0	0.3	23	29.2	...	...	.....	....	Clackamas Ore.
2	3.0	3.5	3.0	0.5	22	38.2	...	...	1.11	....	Shelburne "
3	6.7	7.2	6.2	2.0	32	68.8	15	1.0	9.61	3.2	Clackamas "
4	7.1	7.9	6.5	1.3	41	73.5	27	1.7	10.3	4.0	Shelburne "
5	7.6	8.3	7.1	1.8	38	80.5	18	1.2	13.8	4.0	Shelburne "
6	8.2	9.4	8.2	1.8	37	77.5	17	1.3	16.4	4.2	Shelburne "
7	9.6	10.4	9.0	1.3	40	85.5	18	1.3	21.7	4.2	Shelburne "
8	8.4	9.6	7.8	1.0	50	91.1	21	0.8	10.1	2.6	Clackamas "
9	19.0	19.2	16.6	2.0	83	138.8	32	1.6	115.2	1.5	L. Permelia.... "

ple plots: four near Clackamas, four in the Santiam Valley near Shelburne, and one between Detroit and Permelia Lake. The measurements of the trees which were analyzed on the various plots are summarized in Table No. 1.

The annual growth of each tree in diameter and height was worked out separately from the stem analyses, and the average of all obtained by entering the values on cross-section paper and drawing normal curves through them. The rate of growth for each decade was then read directly from the curves. These values are given in Table No. 2.

TABLE No. 2.

Rate of Growth in Height and Diameter.
Average of Nine Trees.

Age.	Height.	Current annual growth.	Diameter.	Current annual growth.	No. of years required to grow one inch.
Years.	Feet.	Feet.	Inches.	Inches.	
10	10	1.0	1.9	.19	5
20	33	2.3	4.2	.23	4
30	57	2.4	6.6	.24	4
40	76	1.9	9.0	.24	4
50	92	1.6	11.4	.24	4
60	106	1.4	13.4	.20	5
70	120	1.4	15.0	.16	6
80	132	1.2	16.3	.13	8

From this table it will be seen that

the tree reaches its maximum rate of growth in height between its twentieth and thirtieth years, during which period it is shooting up two and four-tenths feet per annum. The mean annual growth in height for the first thirty years is one and nine tenths feet, or slightly less than the current annual growth. The rate of growth in diameter is very regular. It reaches its maximum at about the thirtieth year and continues at the rate of twenty-four one-hundredths of an inch per annum until the tree is about fifty years old, when it begins to decrease. It must be borne in mind that these figures of growth do not represent what an individual tree is capable of doing if given favorable conditions of light and growing space, but are the average for all trees both large and small, in a dense forest.

The chief purpose in taking the measurements of sample plots was to determine the number of trees per acre and the total contents at different ages. Table No. 3 gives a summary of the nine valuation surveys, and shows for each plot the number of trees, the average and maximum diameters, the average height, age and density, and the total contents in cubic feet and cords. No computation of board feet was made because, with the exception of a few specimens on Plot No. 9, the trees were not of a merchantable size.

TABLE No. 3.—Summary of Sample Plots, Showing Yield per Acre at Different Ages.

Plot.	Area.	Number of trees.	Number of trees under 1 inch.	Average diameter, breast high.	Maximum diameter, breast high.	Average age.	Average height.	Contents.	Density of the forest.	Number of trees per acre.	Contents, per	Cords, per acre.	Locality.
No.	Acres.			Inches.	Inches.	Years.	Feet.	Cu. ft.			Cu. ft.		
1	0.66	242	109	1.8	7	23	29.0	.....	1.0	4,033	.....	...	Clackamas. Ore.
2	0.25	701	125	2.9	10	22	38.0	1,037	1.0	2,804	4,346	...	Shelburne. "
3	0.25	168	....	6.7	16	32	69.0	1,613	1.0	672	6,451	72	Clackamas "
4	0.25	128	....	7.1	20	41	74.0	1,113	0.8	428	4,451	51	Shelburne. "
5	1.0	645	....	7.3	17	38	81.0	8,901	1.0	645	8,901	99	Shelburne. "
6	1.0	490	....	8.9	19	37	78.0	8,036	0.85	490	8,036	90	Shelburne. "
7	1.0	360	....	10.2	21	40	85.5	7,812	0.9	360	7,812	87	Shelburne. "
8	1.0	353	....	8.9	19	50	91.1	6,742	0.8	353	6,742	76	Clackamas "
9	1.0	150	....	19.9	40	83	139.0	17,280	0.7	150	17,280	190	L. Permelia "

These figures show that on a fully stocked plot, there are between 3,000 and 4,000 trees per acre at twenty years of age. As the trees grow older they re-

the age of eighty-three years with a density of only seven-tenths (a fully stocked area being rated as one). The most striking feature of the table is the



A GROWTH OF DOUGLAS SPRUCE ABOUT FIFTY YEARS OLD.

quire greater room for their development, and in consequence many are overtopped and die. While the number of trees per acre falls off with increase of age, there are still 150 trees on Plot No. 9 at

large yield in cubic feet and cords. An examination of the last column of figures will show that the mean annual increment is something over two cords per acre.

The Collection of Statistics.

Under date of December 26 Dr. C. A. Schenck, forester of the Biltmore Estate, wrote to the *Northwestern Lumberman* offering some suggestions as to methods of gathering timber statistics. Dr. Schenck holds that to be of permanent use such an investigation should include every tree species. As to the selection of a unit of measurement he would reject as inaccurate all commonly accepted rules for finding contents in board feet and use only the cubic foot. After suggesting that much will depend upon the extent to which the investigation is carried—how far up the bole of the tree, and the minimum size of small or young trees to be measured—and also as to what shall constitute a forest within the meaning of such an investigation, Dr. Schenck then takes up the cost of such an investigation as follows:

It will be interesting to find out what the stock-taking of the American forests will cost. The United States has an average width of about 3,000 miles and an average length of 1,250 miles. If the country was traversed on every meridian, and if for the width of four poles lying on that meridian the amount of standing timber, the area of brush land, of agricultural land, of waste land, of prairies, etc., was found out, very complete statistics could be obtained. There will be 60 strips, 50 miles apart one from another. Multiplying the result obtained on each strip by the ratio "distance between the strips divided by width of strip," the amount of timber land and the growing stock, the amount of brush land, of waste land, or agricultural land, etc., would appear at a glance. I do not think that the stock taking could be done by ordinary lumbermen. I have had several tracts in this neighborhood investigated relative to the amount of timber growing on them by highly-recommended lumbermen. The results given in by different lumbermen for the same tract vary by about 500 per cent. I am confident that inaccurate results would be obtained by the Government statistics as well, if they were taken with the help of average lumbermen. A thorough scientific way is the only one that will yield the desired result. A combination of agricultural statistics with the forest statistics will cheapen the entire work very considerably, while it will make it more interesting at the same time.

The head man of a "band of stock-takers" should be a botanist well acquainted with the

flora of the region in which he is working. In such places for which maps are not available a geologist and a surveyor should accompany him. Supposing that a band can thoroughly investigate the length of five miles a day, one of the strips above mentioned, being 1,250 miles long, could be done at an expense of about \$20,000. As there are 60 strips to be pursued, the total expense would amount to \$1,200,000.

I think the strip system is more advisable than estimating the standing timber by counties. In the latter case, the inaccessible parts of the country are necessarily over or underestimated, and there is little chance that a mistake made in the plus direction will be eliminated by another mistake made in the minus direction.

The strip system above recommended will compel the band of stock-takers to visit even more or less inaccessible places. The outcome will be maps showing at a glance for sts, brush land, abandoned fields, cultivated fields, grass lands, etc. Other maps will show the amount of cord wood standing per acre; again others, the amount of annual regrowth; finally, and that is for us the most important point, the amount of timber standing in the different States and counties given by species, average size and average quality will be shown by tables and illustrated by maps.

In commenting upon this proposition of Dr. Schenck's, Dr. B. E. Fernow, Director of the New York State College of Forestry, says:

One-quarter the expenditure proposed by Dr. Schenck will secure this information with sufficient detail for practical uses in measuring our forest resources.

Mr. Henry Gannett, who is in charge of the forest work of the U. S. Geological Survey, takes decided issue with Dr. Schenck as to the means that should be employed in the collection of lumber and timber statistics. In regard to this matter Mr. Gannett writes as follows:

"The 'stock-taking' is at present in progress; for the past two years the U. S. Geological Survey has been actively engaged upon it, and an area of about 200,000 square miles, including some of the most heavily-timbered portions of the country, has been covered. Moreover, for nearly a score of years, the Geological Survey has been gathering data concerning wooded areas and placing them on its maps.

"The method employed is the simple

one of compiling all *definite* information regarding timbered area and stand, and supplementing this by examinations in the field. All lumber regions of importance have been cruised, some of them repeatedly, in the interest of lumber companies, land grant railroads, etc., and the amount, distribution, species and condition of the timber, as closely as they can be estimated by trained men, are matters of record in the possession of these companies. Abstracts of such records can commonly be obtained at trifling expense under the sole condition that they be not published in such form as to injure the company's business. From railroads, lumber companies, State land offices and other parties in Oregon and Washington, I have obtained cruisings of many thousands of square miles, under this condition only, and these cruisings, with the accompanying information regarding the forested areas, furnish the basis for a close estimate of the amount of timber in these States, outside of certain mountain regions in which no examinations have yet been made. This estimate is, of course, based on the present lumbering practice in the region, by which only about one-third of the tree comes out of the mill as sawed lumber.

"The wooded area, which is one of the most important factors in these data, has been mapped in greater or less detail over more than one-third the area of the country. The atlas sheets of the Geological Survey show it in much detail on 800,000 square miles scattered widely over our domain. Very little, however, has as yet been published. The Hayden survey mapped the wooded areas of about 100,000 square miles, the Powell survey two-thirds as much, and the Wheeler survey much more, all in the Rocky Mountain Region. All these data are available, and, so far as they extend, furnish one of the two essential items of information.

"As to the accuracy of the cruisers' estimates, I have compared many duplicate cruisings with one another, and many cruisings with the actual amount cut, and have reached a conclusion entirely

at variance with that of Dr. Schenck. When we reflect that millions of dollars' worth of timber land is bought and sold annually, on the basis of these cruisers' reports, we must accord to them some degree of reliability.

"But assuming that cruisers' reports are not sufficiently accurate, what shall be substituted for them? These men have been trained for years in the sole business of estimating amounts of standing timber, and are the only class of men so trained. If their services cannot be made available the only thing is to give up the idea of measuring our forests."

"Where the timber has not already been cruised, estimates are being made by agents in the employ of the U. S. Geological Survey, but owing to the expense involved such examinations are by no means as thorough and detailed as cruisings by private companies. They have been made of some 30,000 square miles, all of which is in the Western country in and adjacent to the forest reserves, and have cost on an average in the neighborhood of \$1.00 per square mile. The cost is not, however, uniformly distributed, the heavily timbered reserves of Washington costing much more than others in which the timber is light and of little present value or is almost wanting as in the chaparral reserves of Southern California. These examinations are made by traveling through the country by such routes as to afford near views of the entire region. All valleys are traversed and many mountains climbed, and estimates of the average stand are made all along the routes. Of course, the timber is classified by species and its condition as to age, soundness, etc., noted. Maps are used for delineating the extent of burns, logged areas and areas of merchantable timber, its different degrees of density, and the distribution of species.

"In the examination of the Bitterroot Reserve, an area of some 7,000 square miles, about 1,900 miles were traveled, on horseback and on foot, or about one linear mile to $3\frac{2}{3}$ square miles. Much of this area is, however, so high and

rocky that the timber is sparse and valuable, and therefore required little examination, so that most of the work was confined to the lower country which was, proportionally, more closely traversed.

"Dr. Schenck's plan of gridironing the country by routes of travel fifty miles apart is open to many objections. It would involve an enormous amount of unnecessary labor. We know perfectly well what regions are timbered and what not. Why traverse the vast extent of the plains and deserts, where every one knows perfectly well there are no trees? What sort of an idea of the extent and stand of timber in the country could be obtained by traversing it along arbitrary lines fifty miles apart? We have already more information than could be afforded by such a skeleton. As to defining the areas by such journeys, consider the condition of things in the Eastern States, which are naturally timbered and where to-day the timbered and cleared areas form little, irregular patches, a fraction of a square mile in extent, scattered over the face of the country. These can be delineated only by careful, detailed surveys, such as the Geological Survey is now making.

"There remains the question of the unit to be employed in stating the amount of timber. On some accounts, it might be well to use the cubic foot and give the entire contents of the tree, but to this there are two objections. One is that when we had completed our survey, we would know little about the merchantable contents of our forests. The other, that we would be obliged to throw away all the cruisions which have been made and which can be collected at such trifling expense, and to do the work over again.

"That it is desirable to obtain this information regarding our forests, goes without saying. It lies, or should lie, at the bottom of all forestry movements. Such data are fundamental, and to attempt to build up a forest system without them, as we are trying to do, is much like building a house without a foundation."

Timber Statistics.

It is gratifying to find that the great daily papers are beginning to pay some attention to the lack of reliable timber statistics of the United States. In a recent issue of the *Transcript*, of Boston, there is an interview, supplemented by editorial discussion, with Mr. Weston, of Weston & Bigelow, who insists that whereas now there are no reliable data as to the timber supply of the country it should be no difficult matter to arrange for a fairly accurate census, and urges that Congress should appropriate the money to cover the cost of the work. This is a subject which is of interest not merely to the lumber trade, but of importance to the Government as a basis for formulating some intelligent policy in forestry matters.

At a recent meeting of the American Economic Association, a report was made by a committee which included, among others, Hon. Carroll D. Wright, who is probably the best qualified statistician in the United States. This report called attention to the fact that the Twelfth Census, which is about to be provided for by act of Congress, may prove inadequate to the needs of a nation such as this.

The committee makes criticism not so much of the accuracy of the previous censuses as of the treatment of the data which were secured, and of a lack of continuity from census to census. The committee believes that there should be a permanent census bureau, or that there should be constituted special bureaus, possibly in connection with some of the departments of government, to compile information upon specific subjects. This work should, of course, be in the hands of specialists in these subjects.

This is in line with what the lumbermen of the United States recently have been urging. It has developed during all the agitation concerning the tariff that the official records of the United States are woefully inaccurate and deficient concerning the greatest manufacturing industry of the country—lumber.

Our information from Washington is to the effect that it is the purpose in the bill for the Twelfth Census to strip from it all provision for any information beyond that touching the population of the country. If other subjects shall be taken up, they will be provided for by special acts, which shall define the expenditure and the scope of the investigation to be made. At the meeting of Northern and Southern lumbermen held in St. Louis in November a vigorous set of resolutions was passed, calling upon the Government to provide for a comprehensive statistical survey of the timber resources of the country and a compilation of facts pertaining to wood products.

The resolutions of the American Economic Association are in line with these suggestions. If anything is to be done to impress upon Congress the need of some such bureau as those who have had the tariff matter in charge have found to be absolutely necessary, it should be done at once. It will be remembered that in the Eleventh Census Superintendent Porter was able to make a fairly

satisfactory bulletin covering the lumber industry in Michigan, Wisconsin and Minnesota. He failed, however, to compile anything at all comprehensive concerning the great lumber interests in other parts of the country. It seems to the *American Lumberman* that it is of particular importance to the developing lumber interests on the Pacific coast and in the South that some means should be provided for the compilation of a close estimate of the standing timber of every kind in these newer lumbering regions, and accurate data concerning the volume and cost of production, etc. This can be done only by a bureau of experts, with ample time and ample means at their command. Is it not due to the lumbermen of the United States that some such provision should be made? Will not some such compilation be of vast importance and value to the friends of forestry? The subject is of enough importance to demand energetic and persistent effort at the hands of lumbermen all over the country.—*American Lumberman*.

Forest Management.

To Reforest White Pine Lands.

An interesting report of Forest Warden Andrews, of Minnesota, calls attention to the effect brought about by the use of the lumber railroads in devastating the forests. "These roads," he says, "reaching far into the forest where no trees can be cut if they must be rafted by river to the points of consumption, are tapping timber lands that were a few years ago supposed to be beyond the reach of the most envious lumberman. They are increasing the cut of Pine in Minnesota by millions of feet yearly, and their ultimate results will be to denude the forests at the very points where forests are absolutely necessary, far up the water-courses and on the ridges and the heights of land."

According to his statement, lumber-

ing began some fifty years ago in Minnesota, and about fifty billion feet of Pine have been cut in that time, and he estimates there still remains some thirty billion more, and unless some methods are taken for rehabilitating these forests they will be gone in from twelve to eighteen years. About 20,000 men are employed in the State on this work and the cut represents an annual value of \$5,000,000 as it stands and about twice that when cut. All this will be lost to the State unless some measures are taken for the reforestation of these tracts. Minnesota is now the only State east of the Rockies left with a Pine forest, Michigan and Wisconsin being practically exhausted. He estimates that there are in Minnesota nearly 3,000,000 acres of waste land, from which the trees have been cut, and on which no taxes will

ever be paid. These lands are reverting to the State for non-payment of taxes as fast as the lumbermen can get rid of them. Active steps are being taken by members of the coming State Legislature and others interested toward the outlining of a plan by which the State shall gradually reforest these millions of acres, and hold the lands as public property to be lumbered as occasion may require and the State may direct. It is claimed that millions of dollars can be earned by this course, and that the lumbering industry in Minnesota can be continued indefinitely and almost uninterruptedly. These new lands, if forested at once, will be ready for the axe by the time the present forests are gone, if the young trees on the present timbered lands are preserved and not ruined by the cutting of those now only large enough to make a board.

"In Europe," he says, "forest lands earn an average yearly of from 27 cents to several dollars per acre, and that Minnesota's abandoned pineries have better soils than most of those of Europe. The State now holds some 800,000 acres of these waste lands and it is proposed to begin experiments and operations on these within a short time, as soon as legislation and appropriations can be secured." Mr. Andrews makes the very reasonable estimate of 90 cents an acre as a return from these lands, which would mean nearly \$3,000,000 a year in revenue to the State, and a far greater income to labor and capital, all of which is now sure to be utterly swept away in a few years, with present methods continued.—*Lumber Trade Journal*.

Wood-Pulp Industry:

The wood-pulp bacillus is the enemy of forests, and unless a halt is called in its ravages it may almost eat them off the face of the globe. So many things are now made from wood pulp that the demand for the substance, constantly increasing, becomes practically limitless, and however ample the sources of supply may now seem to be, they have a bound and tend to diminution, while the demand promises a constant increase. Printing paper alone eats an enormous hole in our na-

tional forests yearly, and the future extent of that requirement can only be conjectured. The huge procession of railway cars all over the country runs to some extent on paper wheels; carpenters are beginning to use boards of paper handsomely veined, requiring no planing, twice as durable as the wooden variety, and costing only half the money. The builder is introducing paper bricks showily enameled, which will not burn, and possess many advantages over those of burnt clay. The shipbuilder introduces masts and spars of the same substance, which is likewise used for telegraph and telephone poles and flagstaves. These are not fanciful experiments, but serious business procedures, justified by the superior utility of the articles so produced. The same quality is claimed for the paper horseshoe recently invented and now extensively used.

An enumeration of the purposes for which this surprising protoplasm has come to be employed would stretch into a catalogue, and new ones seem to be discovered every day. They give a sign of its waxing demand on our forest growths, at which the sylvan economist and conservator may look with apprehension, but just at present it is difficult to see in what way he can intervene for their protection. Humboldt says that wherever the civilized, earth-tilling, wood-consuming man appears in arboreal regions of the globe he provides the conditions for his own extinction by his destruction of forests. His dictum antedates the wood-pulp man, whose appearance certainly does not tend to invalidate it, and, useful as he is, it may in time become necessary to take in hand and impose some kind of restraint upon him.—*New York Tribune*.

The "sylvan economist and conservator," which, in common parlance, means the professional forester, does not "look with apprehension" at the work of wood-pulp industry nor does he regard it as an enemy of the forests. On the contrary he recognizes that the requirements of new conditions must be met by the adoption of new methods and that it is the office of his vocation to provide forest products to meet the necessities of modern civilization. With the sentimental side of the question he has nothing whatever to do. One thing can be said of the wood-pulp industry, and that is, that it wastes less of the product consumed than most of the timber-using industries. If greater demands for material are to be made upon the forest, its productive capacity should be so increased as to equal such demands. This can only be attained by more intelligent methods of

treatment. The wonderful growth of the wood-pulp industry only serves to emphasize the necessity of adopting definite systems of forest management. An enterprise which uses the forest products in the manufacture of needful commodities is a legitimate one, but those interests or industries which are wasteful or destructive in their treatment of the same, should, as a measure of public policy, be regulated or excluded.

A Field for Lumber Capital.

Southern timber owners in both Pine and hardwood do not seem to have fully realized the value of their property, and lands are much cheaper in relation to the value of the lumber than is the case in the North. Something of the same kind is the rule in the West, where until the past year there has been little advance in the price asked for logs or timber.

Compared with the vast resources of the South in Yellow Pine, the manufacture of lumber is only just starting. It has taken Northern enterprise and capital but a short time to get a foothold there, and the development will be more rapid in the future than in the past. As the Pine of the North is cut away, the manufacturers have turned their attention more and more to the manufacture of hardwood lumber, but as the field is more limited than was the White Pine field, the surplus capital has looked elsewhere for investment. Part of it has gone West, but much of it has gone South, and from Florida to Texas can be found men who were formerly leaders among the White Pine men of the North.

There are vast tracts of both Pine and hardwood timber in the South that have as yet been untouched by the axe of the woodsman, and of the latter especially there is a wealth of supply. This vast wealth is only just beginning to be appreciated by the lumbermen of the country. On these lands in the South are Cypress, Ash, Oak, Gum, Box, Swamp Maple and Pecan. Cypress is a fine wood for building purposes, and is capable of the finest finish. All of the others have their uses, many of them being especially and specifically appropriate for certain uses in building.

The various kinds of Oak are perhaps the most useful for general purposes of any of the hardwoods, and as an all-round material for build-

ing, furniture and other uses, is perhaps the most valuable of the woods of the South. Southern Oak has been a staple for a number of years, but the supply has not as yet been heavily drawn upon, compared with the amount there is yet standing. Its future is sure to be greater than its past. Southern hardwoods as well as Southern Pine offer a great field for the investment of capital that is being withdrawn from the manufacture of White Pine of the North.—*Mississippi Valley Lumberman.*

Commenting on the foregoing the *Lumber Trade Journal* says :

While large sums of money have been invested in Southern timber by Northern Lumbermen, yet the field there is practically untouched, as is evidenced by the low value of stumpage prevailing all over the South. There are fortunes awaiting holders of Southern timber which will equal if not surpass those provided in the past by the forests of the North. Owners of good timber, either Pine, Cypress or hardwoods, in the South, cannot afford to slaughter it for an unremunerative price. They would far better let it stand, assured that it will not only grow in increment but also in market value steadily and perhaps quite rapidly.

Governor John Lind, the new chief executive of Minnesota, expresses the opinion in his message to the Legislature that public opinion in that State had been educated up to the point of supporting a system of forest culture on a large scale. However, he favored increasing the extent of Itasca Park, as recommended by the game warden, and of prohibiting the sale by the State of public lands clearly within the forestry area. He thought the State might acquire title to large areas of denuded lands forfeited to the State by non-payment of taxes. He made the novel but meritorious suggestion that each country school district should have a plat of ground connected with it on which the children should be taught to plant and rear trees, and that horticulture and forestry should be made regular studies in our normal schools.

Forest Administration.

Excessive Timber Land Taxation.

In discussing the relation of taxation and forest destruction a lumber exchange says:

The Pine of Itasca County, Minnesota, is being cut as fast as possible simply to get it out of the way and converted into money before the tax collector can confiscate a large part of its value. Taxes are so high that timber which is not immediately cut becomes a sinkhole in which investments are lost, instead of a source of profit. If forest lands were taxed with more consideration, owners would have a natural inclination to hold them for an advance in value. As taxes are now assessed, they offset any increase in the value of the timber that results from a diminution of the Pine supply.

It is a very short-sighted policy which prompts officials in frontier counties to pile up debts for the timber owners to pay in the form of taxes. The effect is that lumbermen remove the timber as rapidly as the market will allow, and afterward let the taxes go by default. This leaves the country without any taxes with which to make improvements and meet its obligations. If county expenses were kept at a minimum and made proportionate to the actual development of the county, and were incurred only as needed, the rate of taxation would be comparatively low. Then the lumberman could afford to leave his timber standing, and in the long run the county would derive a far greater revenue from his property than under the present practice.

It can furthermore be said that the deplorable financial condition to which forested counties are brought by the method pursued of preying on the lumbermen is also accompanied by the rapid denudation of the lands. Magnificent forests, which might be held in reserve for years, are hurriedly cut off, and in a few years the lumber industry of the section is at an end. Any motive for preservation and continuance is negated by excessive taxation. It is also probable that if taxes could be entirely remitted, or made merely nominal, on cut-over lands, owners might be induced to make attempts to reforest them and hold the lands in reserve for perpetual timber growth—if not wholly as an individual enterprise, at least in conjunction with the State or National Government.

An effort should be made by the proper parties to secure the establishment of a forest reservation covering the headwaters of the Arkansas River, Lake, Pine, Four Mile, Seven Mile, the

Cottonwood and Chalk creeks. The South Platte Reserve reaches into Chaffee County one mile west of the dividing line between Park and Chaffee counties, extending south to a point about opposite the Annie C. C. mine, and with that exception Chaffee County is without the protection afforded by a forest reserve. It would seem that the Arkansas River is of sufficient importance with its great volume of water, reaching as it does through hundreds of miles of agricultural country, to demand the immediate establishment of such a reserve. No section of country has been or is being more steadily drawn on for all kinds of timber than Chaffee County, and without the placing of some such restriction as is afforded by the forest reserve regulations, it is a question of but a short time until the entire available supply of timber will be exhausted, and the inevitable result will be a diminished water supply, which will be disastrous to the agricultural interests, not alone of this county, but the entire farming section through which the Arkansas flows—*Buena Vista (Colo.) Herald.*

A special legislative commission raised last year by the General Assembly of New York to investigate the advisability of acquiring additions to the forest preserve in the Adirondacks has filed its report. The latter, a voluminous document, criticizes past extravagances upon the part of the forest department and charges too much politics in its conduct. The commission recommends the purchase of certain virgin timber lands for the exemplification of projected timber culture by the State and commends the German system of reforestation; also that the ownership be vested jointly in the State and Nation, and that the property be made a national health resort after the manner of Baden-Baden, Germany.

State Associations.

California.

Concerning the activity of the newly organized California Society for Conserving Waters and Protecting Forests, the San Francisco *Call* says:

A few days ago a special committee went to Sacramento to ascertain Governor Gage's sentiment toward the movement for the conservation of the waters and forests of the State. Their request for an audience was answered by the statement that they would be granted fifteen minutes. At the expiration of an hour and a quarter the committee arose, but the Governor asked them to remain and further elaborate their proposition.

The outcome of the conference was the announcement that the enterprise would have the hearty support of the Governor, and, furthermore, that he would send a special message to the Legislature advocating the passage of the measure proposed by the society.

The legislation which is thus called for provides for the appointment of a Commissioner of Irrigation, whose duty it shall be to co-operate with the United States Geological Survey in surveys and estimates of cost of reservoirs for storing flood waters for irrigation, mining and industrial purposes. It is stipulated that the commissioner shall receive no salary and that he is to hold office at the pleasure of the Governor. The measure, however, calls for the appropriation of \$10,000 to be expended by the Director of the U. S. Geological Survey with the understanding that the Geological Survey will expend from Federal appropriations an equal amount in connection with said work.

Another provision of the proposed law is that a commission be appointed for the purpose of devising means to preserve the forests of the State from destruction by fires and wanton depredation, and to report to the Governor the result of their labors. A striking feature of the desired act is the provision that until such commission shall have reported to the Governor upon the matters intrusted to their care no legislative action shall be taken toward the acceptance of the proposed donation by Congress of a million acres of arid lands.

Colorado.

The annual meeting of the Colorado Forestry Association was held in Denver on February 15. A full account of the proceedings of the meeting has not reached *THE FORESTER*, but from press reports it is enabled to present the following:

Mr. W. N. Byers, of Denver, was re-elected President of the association. The other officers chosen were: First Vice President, Henry Michelsen, of Denver; Secretary and Treasurer, D. W. Working, of Denver.

On motion of State Engineer John E. Field, resolutions were adopted endorsing the recommendations of the National Irrigation Congress in regard to the creation of a bureau of forestry in the Department of the Interior. The recommendations of the Irrigation Congress set forth the importance of irrigation interests in the West and the necessity of maintaining a supply of water throughout the entire season. They further call attention to the fact that the forest cover conserves the snowfall, forming a natural storage for water, and equalizing the flow of the streams, also lessening the load of silt in the streams. Recognizing these facts the resolutions commend the care of the forests to the Secretary of the Interior and urge the formation of a forestry bureau, an appropriation by Congress to be made sufficient for the support of the bureau and the efficient preservation of the National forests, whether included in forest reserves or not. The resolutions also contain a recommendation that legislation be provided looking to the prevention of forest fires. After endorsing the resolutions of the Irrigation Congress the Association then adopted resolutions bearing upon local conditions and needs and urging some State legislation in the interest of forest conservation and protection.

Nebraska.

Pursuant to a call a meeting was held at the Nebraska State University, Lincoln, Neb., on February 15, which resulted in the formal organization of a society which is to be known as the Nebraska Park and Forestry Association. The meeting was well attended, various parts of the State being represented. A constitution was adopted and the follow-

ing officers were elected: President, C. S. Harrison, of York; Vice President, E. F. Stephens, of Crete; Secretary, A. J. Brown, of Geneva; Treasurer, George A. Marshall, of Arlington; Directors, Hon. J. Sterling Morton, of Nebraska City, Dr. C. E. Bessey, of

the University of Nebraska, and Peter Youngers, Jr., of Geneva. A committee was appointed to prepare by-laws and to secure additional charter members. It is proposed to hold meetings in conjunction with those of the State Horticultural Society.

Educational.

Instruction in Forestry.

The University of Southern California, an institution of learning which is located at Los Angeles, has established a short course of instruction in forestry. It is to be known as the School of Forestry of the University of Southern California. The following outline of its purposes and methods is quoted from the Los Angeles *Herald*:

The aim of the school and its founders is to train foresters, who as members of the Government forest patrol, may render intelligent and efficient service in preserving the forests and extending their present area.

President George W. White of the university will be president of the school. Abbot Kinney, of Los Angeles, will lecture on the historical development of forestry and efforts in behalf of local forests. Harry Hawgood, of Los Angeles, will devote his attention to some peculiar phases of the general subject, water percolation and the retentive power of the earth for water; also the mechanical properties and values of woods. The game and fish interests involved will be cared for by T. S. Van Dyke, of this city, who is an authority on those subjects. A. H. Koebig, of San Bernardino, will impart his observation on forestry in foreign schools, and his technical knowledge of hydrography, the location of reservoir sites, etc. J. B. Lippincott, a member of the United States Geological Survey Service, will have charge of the geological and drainage questions; also the course and changing channels of streams and means of conserving their waters. T. P. Lukens, of Pasadena, will discuss methods for the preservation of our forests and for their restoration after being destroyed; also method of tree planting. Ornamental results in forestry work will be treated by A. Campbell Johnson, of Garvanza. Nursery work and the propagation of trees will be under the supervision of Harvey S. Styles, of Redlands. Prof. O. P. Phillips will lecture on the botanical and geological features of the soil. Prof. L. J. Stabler will discuss the questions of physics and chemistry that are involved. A competent lecturer in meteorology will be secured before the lectures begin.

The school will be a permanent regular department of the university, and each year will offer a course of lectures extending over a period of six months, two lectures being given each week. In connection with the theoretical work, practical field work will be given to students during the summer. Students who show a proper degree of efficiency may obtain positions as forest rangers in the Government patrol service.

The course for the present year will last for sixteen or eighteen weeks and will open in about two weeks. There will be no tuition charged, but an incidental fee of \$5 will be required of each student.

Lectures on Forest Topics.

Under the auspices of the art department of the Civic Club of Philadelphia, Miss Mira Lloyd Dock, a member of the American Forestry Association, has been giving the four following lectures in several cities of Western Pennsylvania:

- I. National reserves, general and special.
- II. State reserves, the Adirondacks, and Pennsylvania reserves, School of Forestry, Pennsylvania Forestry laws, a prediction and its fulfillment.
- III. Municipal reserves, Parks, parkways and playgrounds, "Park-making a National Art."
- IV. Local reserves, Within reach of every village, Relation to schools, roadsides and the State reserves, Massachusetts reserves for "The protection and preservation of beautiful and historic places."

With the prospectus of these lectures there goes an admirable little list of books, circulars and so forth, bearing on forestry subjects. Miss Dock's work has been of great service; for she could not have chosen a better way to further the interests of forestry. She tells her hearers just what they wish and need to know, and in this way wins their appreciation and interest.

THE FORESTER.

PUBLISHER'S ANNOUNCEMENT.

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New Members.

Since the last issue of THE FORESTER the following named persons have been elected to membership in the American Forestry Association:

Edward P. Brennan, 4018 Vincennes Avenue, Chicago, Ill.

Mrs. Frederick Bronson, Greenfield Hill, Conn.

Dr. Arthur P. Chadbourn, North Scituate, Mass.

Mrs. Danske Dandridge, 2143 N St. N. W., Washington, D. C.

Lewis C. Flanagan, North Weymouth, Mass.

Prof. W. B. Graves, Andover, Mass.

Charles Bulkley Hubble, Bank of Commerce Building, New York, N. Y.

C. S. Hulbert, City Treasurer, Minneapolis, Minn.

Bernard P. Mimmack, 1410 G St., Washington, D. C.

William G. Rockefeller, 292 Madison Avenue, New York, N. Y.

W. M. Shepardson, Middlebury, Conn.

Two new vice presidents have been elected by the Board of Directors: Prof. Charles C. Georgeson, of the U. S. Department of Agriculture, who is stationed at Sitka, Alaska, and Lieut. H. W. French, U. S. Army, who is stationed at Manila, P. I.

Opposition to Reservation.

The following is from the El Paso (Texas) Times, dated February 11:

A Santa Fe business man who was in El Paso the other day let out the secret that a big scheme is being hatched at Santa Fe and Albuquerque to prevent the development of the new territory being opened up by the El Paso & Northeastern Railroad.

It is said that the scheme originated in Albuquerque and that Mr. Benedict, Superintendent of Forestry for New Mexico and Arizona, has been interested in the scheme. The Santa Fe man who was in El Paso the other day stated that the Government would be asked to set aside as a forest preserve a strip of land extending from the Capitan Mountains, east of White Oaks, to the Texas line, over 100 miles in length and thirty miles wide.

It is intended that this forest preserve shall take in all of the Mescalero Indian reservation and all or that rich section of country through which the White Oaks road now runs and is being built. Mr. Hawkins, attorney for the road, was asked what he knew about the proposition and said:

"I have heard some rumors to the effect that a forest preserve would be asked for in the section of country you mention, but I hope they are merely idle rumors, for, if the Government should take that land and close it up as a forest preserve, it would simply be roping the people who are investing their money there, and more, it would be an outrage on the Territory of New Mexico. I think it would be best not to mention the matter, for I feel confident that if any such movement is on foot the Department at Washington can be relied upon to stand by the people of New Mexico."

It is understood that Mr. Benedict will be in El Paso in a few days to make a trip through the country which it is proposed to have set aside as a forestry preserve. And it is a well-known fact that of late years forest preserves have been a popular fad with the Land Department, and in nearly every instance where a few petitioners have asked for forest preserves the petitions have been granted. The officials at Washington seem to think that the agricultural and timber lands of the West are not needed by home-seekers and are only fit for forest or game preserves.

But if this latest forestry scheme is carried into execution it will cost El Paso millions of dollars by making useless one of the richest sections of New Mexico, which is now being developed and made tributary to El Paso, while it would not interfere with the development of the mineral lands of that section, it would tie up the timber and agricultural lands and close the fine cattle ranges. Those ranges would market in El Paso every year thousands of head of cattle and large quantities of wool, and the agricultural lands would furnish thou-

sands of prosperous farms that would market their product in this city and purchase their supplies here.

According to information, certain commercial points in northern New Mexico are dissatisfied because this wealthy section of the Territory has been made tributary to El Paso, and like the dog in the manger, they propose to try to keep from El Paso's lips that luxury which they cannot get to their own. But the people of this city will make a fight for their own and will call upon the solid Texas delegation in Congress to stand by El Paso.

There is now pending in Congress a bill providing for the opening of the Mescalero reservation to homesteaders, but the Forestry Union will fight that bill, and if it carries pressure will be brought to bear on the Land Department to recommend the setting aside of this vast territory as a forest preserve. The forest fanatics will not be satisfied with the Mescalero reservation, but as already stated, they want in their preserve a territory 100 x 30 miles in area, extending in length from the Capitan Mountain due south to the Texas line.

The foregoing is not reprinted in THE FORESTER because it is in itself worthy of special consideration. With sensational phraseology and appeals to local prejudice THE FORESTER has nothing whatever to do. This does, however, open for discussion a matter to which public attention should be drawn, so that it is pertinent to make some observations in this connection. During the past two years several petitions have been made and suggestions offered, having for their purpose the segregation of the timbered areas of the Sacramento mountain region in southern New Mexico as a permanent forest reserve. These petitions and suggestions have emanated from citizens of New Mexico who were prompted by motives of public interest. Each time the matter has been agitated it has raised a storm of protest on the part of certain citizens of the town of El Paso, Texas, who assert that such a course would prevent the industrial and commercial development of the region in question. It is safe to say that the people of New Mexico would be the last to throw any obstacles in the way of the development of any part of their own Territory. When New Mexico was annexed to the United States her people were promised statehood at an early day. For fifty years

this boon has been withheld. To-day her people, both the descendants of the original Spanish-American stock and the immigrants from the eastern States, are at one in their enthusiasm for the admission of New Mexico into the Union as a State. Under such circumstances it is highly improbable that even a small part of the citizens of the Territory would jeopardize their political interests merely to spite a rival commercial community.

The Sacramento mountains are of considerable altitude, that of Sierra Blanca being 11,982 feet, and as the rainfall is abundant, many of the slopes are covered with a heavy growth of fine timber. The streams issuing from these mountains are of some local importance, as they make possible the development of agriculture in the arid valleys below. The climate is mild, the productions are varied, and these valleys, when properly developed, will undoubtedly support a thriving population. With this desired end in view it certainly cannot be said that the establishment of a forest reserve, to include all the lands not suited for agriculture, would work injury to the interests of any one now concerned. On the contrary, such a course would insure the most equable distribution of the water supply throughout the growing season, and it would at the same time provide for the perpetuation of the forests in a productive state, with an assurance of an ample supply of timber for local needs for all coming time. For these reasons it would also be for the best interests of the city of El Paso itself if, as is claimed, this region is to become permanently tributary to that growing commercial center. It is true that El Paso might be the gainer temporarily if those splendid forests were to be stripped to meet a demand for export, but the profits thus achieved would not compensate for the reaction that would surely follow when the forests were exhausted and the highest agricultural development seriously, if not permanently impaired. The new railroad which has been built from El Paso into the Sacramento mountain country may

not pay as high a dividend during its earlier years if such a conservative policy is adopted, but in the long run its promoters would be justified in encouraging the very movement they now seek to oppose.

Much of the land in the Sacramento mountains is not fit for agriculture. It is destined by nature to produce forest crops and nothing else. If its forest cover were removed it would sooner or later become a barren waste, unproductive and incapable of holding in check the rapid descent of waters that might otherwise be utilized for irrigation. The retention of lands better suited for agriculture or mining has never been advocated even by the most ardent forestry enthusiast. Moreover, it is not proposed to withhold the products of the forests of any reserve from the use of the people for whose benefit all reserves are created. The regulations of the Department of the Interior make ample provisions for the use of timber from the reserves for domestic, agricultural, and mining purposes. The establishment of a reserve within the bounds of the region indicated would not interfere with the rights of any one, but in the end it would inure to the benefit of all.

New Forest Reservation.

By proclamation of President McKinley, dated January 30, the Trabuco Canon Forest Reserve in Southern California was enlarged by the addition of a contiguous area estimated to contain 50,000 acres. The total area is now 109,920 acres. It was enlarged as the result of the petition of the residents of adjoining valleys.

On February 10 two new reservations were created by executive proclamation—the Fish Lake Reserve in Utah and

the Gallatin Forest Reserves in Montana. The Utah Legislature had memorialized Congress to grant a part of the Fish Lake tract for use as a State park. As it is difficult to secure the passage of such a measure Representative King, of Utah, concluded that a forest reserve would answer practically as well. The lands embraced within the limits of this reserve are all of a mountainous character and surround the lake from which it takes its name. Its area is 67,480 acres. The Gallatin Forest Reserves include the even-numbered sections on a tract that is drained by the Gallatin River near Bozeman. These 640-acre reserves, whose aggregate area is 40,320 acres, were created at the request of Mr. S. M. Emery, Director of the Montana Agricultural Experiment Station, and others who were equally as interested. The odd-numbered sections in the tract are embraced within the limits of a railroad land grant, thus necessitating the creation of separate reserves of each of the even-numbered sections. Although technically the Federal Government will have no jurisdiction over these unreserved lands, yet it is plain that they will be benefited for they will at least be protected from the ravages of fire by the forest patrol,

Reference is made elsewhere in this issue of *THE FORESTER* to excessive taxation of pine lands in Minnesota. In a recent letter on this subject Mr. H. B. Ayers, of Carlton, Minn., states that in 1898 he paid \$3.94 in taxes on a tract of thirty six acres of pine land which is valued at \$3.00 per acre, virtually at a rate of 3.64 per cent per annum on the actual market value. On another tract of forty acres, also valued at \$3.00 per acre, the tax was \$6.58, amounting to a rate of 5.4 per cent.

Recent Publications.

The Adirondack Spruce, by Gifford Pinchot. (The Critic Company, New York City.) "The owners and operators of Spruce lands in the Eastern United States will find within the covers of this little book a collection of facts and figures which is intended first of all to be of practical use. The information it contains is the product of a prolonged investigation conducted throughout with that intention. If its results have any merit, therefore, it must be because they are capable of assisting American lumbermen to get better returns from their investments in Spruce lands through conservative lumbering and successive crops than they could by considering the productiveness of these lands as of merely temporary interest."

These words, with which the preface opens, will serve to indicate at once the author's aim and the reader's standard of criticism.

To begin with, a word must be said about the investigation which forms the pith of the text, about its subject-matter and the handling of it. Ne-Ha-Sa-Ne Park, on the western side of the Adirondacks, was the principal field of work. Dr. W. Seward Webb, its owner, contributed the funds needed for the work; while Mr. Pinchot undertook the task of supervision, and afterwards, that of throwing the material collected into the form of the present book. The measurements taken, which cover nearly 2,500 trees and over 1,000 acres, were made for the most part under the direction of Mr. Henry S. Graves.

To turn now to the book itself. Its convenient size and business-like appearance suggest what we afterwards find true of its contents. From first to last the writing is terse, clear and straight to the point. We are not drawn into the details through which the material had to pass on its way to completion; but are given the valuable results in an interesting, almost a pictorial, form. By means of a couple of simple devices we are made to see the forest before we are asked to follow the author in his statements and reasonings about it. The devices are these: First, the forest as a whole is classified under four types, distinguished according to soil and elevation, and further emphasized by the addition of figures showing the relative extent of each type: Swamp lands, 22 per cent; Spruce flats, 10 per cent; Hardwood lands, 42 per cent; and Spruce slopes, 26 per cent. Second, a table for each one of these types shows the average size and occurrence of Spruce, and associated trees, over its particular area. When once we have thus got a picture of the forest in our mind's eye, there is no difficulty in following the exposition from this point. The Spruce in its silvicultural character is treated next, and then come the species associated with the Spruce within each of the four types. From this presentation of the general forest con-

ditions the author now comes down to a preliminary practical question: What are the effects of cutting on subsequent growth? The answer is supplied in an important table (No. 7), which is based, like all the tables in the book, on unquestionable data, and offers a valuable working suggestion. Growth in the original forest, which is next considered, comes out in contrast.

The most valuable tables in the book are the Yield Tables. These "are prepared for the purpose of predicting future crops of timber after cutting to a given limit on lands yielding a known amount of Spruce." By the aid of tables of volume, or cubic contents, and the tables showing the rate of growth under a variety of conditions, it is possible, if we know how much Spruce has been cut on any given number of acres, and down to a given diameter limit, to tell how soon again a like crop can be cut from the same area. And by comparing the amount of a given crop and the limit to which it has been taken with the time required to replace a similar stand, or with the time required to replace a stand of some other diameter limit, we are able to determine what diameter limit it is most profitable to choose in each case, according as we wish to reap the full return at one general cutting or to defer part of the return for any preferred number of years. The working of these yield tables is pointedly illustrated by a number of problems which they are made to solve.

The second part of the book contains a working plan adapted to the conditions described in the first part. As a part of it there are here given the following nine general rules for cutting under conservative methods:

"1. Only trees marked by the forester must be cut, and each tree marked must be cut unless a reason satisfactory to the forester can be given for leaving it.

"2. No timber outside the line of a road shall be used for corduroys, culverts, or other road purposes, until all timber cut for the clearing of the road has been utilized; and when more timber is necessary, all available trees of other kinds within reach must be used before any Spruce is taken.

"3. All lumber roads must be marked out by the contractor with the co-operation and assistance of the forester.

"4. As a protection against fire all tops must be cut or lopped so that the thin branches will be brought in contact with the ground by the weight of the winter's snow.

"5. Extreme care must be taken to prevent fire. No fire must ever be lighted where it can get into a rotten log or into duff.

"6. Great care must be taken not to injure young growth in felling timber, or to bark valuable young trees in skidding.

"7. Felled trees must be cut into logs at

once, to release young growth crushed by their fall, unless a reason satisfactory to the forester can be given for some other course.

"8. Any young growth bent over by felled trees must be released and allowed to straighten without delay."

"9 Provision for carrying out these regulations should be made in all contracts with lumbermen, and fines should be imposed by the contracts for failure to comply with them."

The author adds: "The application of such general rules to specific cases is the province of the forester."

This working plan, which, as has been said, was drawn up to meet the conditions of Adirondack forest management, and more especially the conditions in Ne-Ha-Sa Ne Park, has been in operation for nearly a year, over the property of Mr. Webb and that of Mr. Wm. C. Whitney, an area of 106,000 acres. Mr. Patrick Moynihan, a very successful lumberman of well-known practical ability, has done the cutting under the working plan and is thoroughly convinced that it is a good thing. It is gratifying to know that other owners of Adirondack lands have expressed their intention to have similar plans prepared for their forests also by the Division of Forestry. Thus the book has done what it was intended to do.

It is a significant fact that many of the data put to use were collected on the property of the Santa Clara Lumber Company, near Santa Clara, Franklin County, N. Y. This, together with the approbation of the practical lumbermen who are doing the work it recommends and the spirit and scope of the book itself, renders it specially valuable as a sign of the growing friendliness between lumberman and forester, who at the last are dependent on each other.

A review of *The Adirondack Spruce*, however slight and cursory, must at least mention the illustrations with which the teachings of the text are so tellingly brought home. These add, besides, an air of completeness and verity.

Measuring the Forest Crop, by A. K. Mlodziansky. (Bulletin No. 20 of the Division of Forestry, prepared under the direction of B. E. Fernow.) A salient fact of this publication is that almost throughout it employs the cubic foot, a unit of measurement practically unused in this country. The board foot, the unit in general use in all parts of the United States, is mentioned in two connections, once on the first page, where it receives scant but contemptuous mention, and again in the discussion of the determination of the volume by sample trees and sample areas. The method of treatment adopted is perhaps more largely responsible for this result than any deliberate disregard of the American lumber unit, but the effect is the same.

It might be said in justification of this course

that the board foot is in itself misleading and uncertain as a standard, and that in consequence it is not important that it should receive any but the most casual reference. This reply would overlook the fundamental fact that the board foot is a vastly more practical unit than the cubic foot, for the reason that it tells a man not what absolute quantity of wood there is in his log, without reference to waste in manufacture, as the cubic foot does, but how much usable wood his log contains, with all due allowance made for necessary loss before the log can be converted into merchantable lumber. This, and not the absolute cubic contents, is the fact of importance. It is quite true that the variety of log-scales in use in different parts of this country tends to confusion, and that in other ways there is room for improvement, but when all is said the fact remains that the board foot is an immensely more practical and usable measure than the cubic foot. The different conditions of the lumber trade in the various parts of the United States, which determine in one place that a log is merchantable when it will square four inches, and in another not till it will square twelve, demand a unit which will express the merchantable value, not the utterly irrelevant solid contents of a tree or a forest. Even if that were not true it would be unwise in a publication of this kind to ignore the unit in general use in the country for which the book was written. To do so is to create a needless prejudice against the book and the Division from which it emanates. It is but fair to the latter to add that its course during the last few months indicates unmistakably that no such lack of practical application will be found in any of its future bulletins.

Considered strictly as a summary of European methods there is much to be said in praise of Bulletin No. 20. It covers fairly the best of them, and in some respects it is the most usable treatise of the kind in the English language. On the other hand the rigid manner of presenting these methods robs them of a large part of whatever elasticity they have in their original forms, and the direction for work in the field at times suggest that the author is quietly amusing himself at the expense of his reader, as when on page 26 he advises him to have his sample tree sawed up to ascertain its contents in lumber. Such a procedure would seem superfluous to the practical American mind when the same result can be reached with all the accuracy the method permits by simply consulting a little book which may be carried in the vest pocket.

Water Supply and Irrigation Papers, Nos. 17 and 18, published by the U. S. Geological Survey, have been received. They are both written by Carl Ewald Grunsky, who treats, in the first, of Irrigation near Bakersfield, Cal., and in the second, of Irrigation near Fresno, in

the same State. A third paper is to follow, which will complete the set of three, dealing with irrigation in San Joaquin Valley, of which Nos. 17 and 18 are the first and second. The papers give careful and graphic descriptions of the local methods of irrigation, and are specially well illustrated with maps and half-tones.

Glaciers of Mount Rainier, by Israel Cook Russell; with a paper on *The Rocks of Mount Rainier*, by George Otis Smith. This pamphlet is an extract from The Eighteenth Annual Report of the U. S. Geological Survey, Part II. These papers are chiefly of a theoretic nature but they contain much that is of general interest and many illustrations as well. Mount Rainier lies eleven miles west of the crest of the Cascade Mountains and forty-two miles southeast of the city of Tacoma and in the northern part of the great forest reserve which bears its name. The forests by which it is surrounded, especially those on the side toward Puget Sound, are among the most magnificent on the continent. The Pacific Forest Reserve, an area about thirty-five miles square, was originally made by proclamation of President Harrison in 1893. By proclamation of President Cleveland, dated February 22, 1897, this reserve

was enlarged to include more than 2,200,000 acres, since which time it has been known as the Mount Rainier Forest Reserve.

American Lumber, by B. E. Fernow, in *The Chatauquan* for February.

This is a popular article, which gives important facts about American lumber; the various species now used, the development of the lumber industry in the last fifty years—attributed chiefly to the railroads—the prospects of future development and supply, and the statistics which serve as a basis for calculations in dealing with the treatment of our forests and with the problem of permanent supply. It notes that though we possess in all not more than 500,000,000 acres of so-called forest land, yet millions of acres within this area are barren of merchantable timber, while if our present rate of consumption is to go on, we need 600,000,000 acres under full forest. It emphasizes our wastefulness in using wood where stone or iron would be better, and points out that lumbermen of intelligence all over the country are alive to the fact that the forester stands for their own better judgment. Dr. Fernow does not neglect to call attention once more to the great variety of useful species which renders our country unique.

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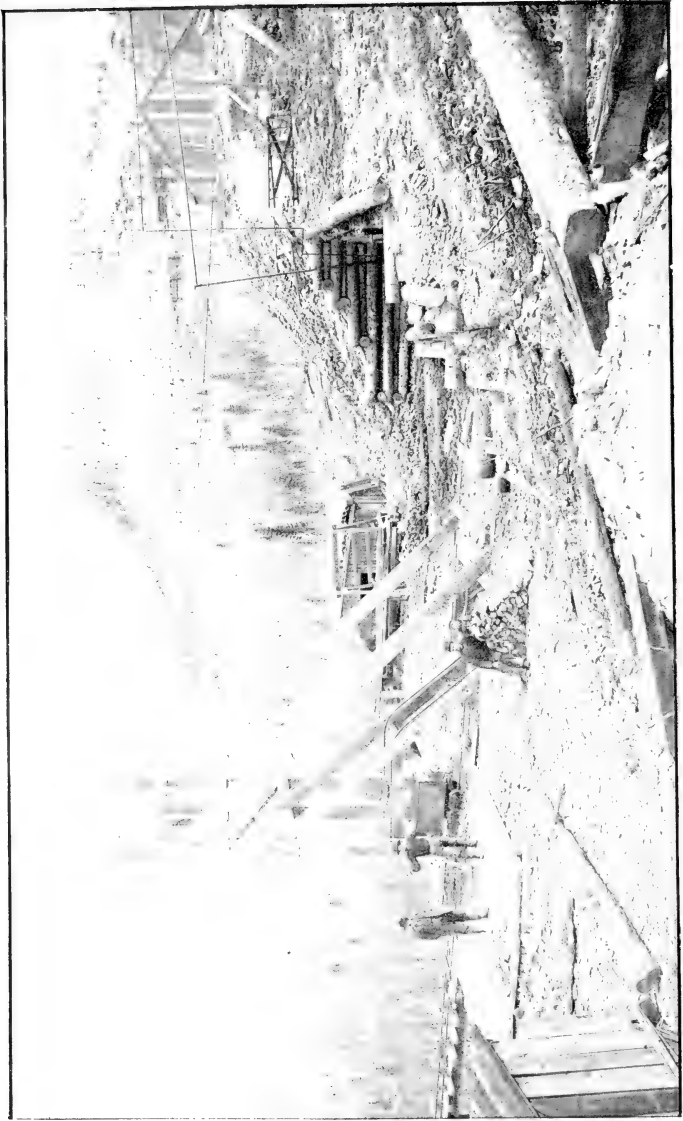
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USE OF TIMBER BY MINERS ; SCENE IN CRIPPLE CREEK DISTRICT, COLORADO.

The Forester.

VOL. V.

APRIL, 1899.

No. 4.

News Items.

Timber is being furnished from Oregon forests to be used in the construction of a Russian railroad in China.

A paper mill, to cost \$600,000, is to be erected at White Rapids, on the Menominee River, upper Michigan, this year.

Cedar logs have been exhumed in New Jersey which geologists affirm are fully 4,000 years old. They are in perfect condition.

There are now thirty-five forest reserves. The aggregate area within the boundaries of the land thus reserved is 45,913,794 acres.

The surveyor general of the Minneapolis district, Minnesota, estimated that the cut of logs on the upper Mississippi River would be, this season, not far from 600,000,000 feet.

THE FORESTER is under obligations to the *American Lumberman*, of Chicago, through whose kindness it is enabled to produce several of the illustrations which appear in this issue.

A walnut tree was cut down on the Woods farm in Wabash County, Indiana, says the *Indiana Farmer*, which was nine feet in circumference at the base and sixty feet to the first limb.

Mr. Elwood Mead, who for ten years past has been State Engineer of Wyoming, has resigned to accept a position as Irrigation Expert in charge of investigations in the Department of Agriculture.

W. J. Hoover, of Hoover & Slavin's lumber camps, near Glen Campbell, Pa.,

reports the cutting of a big Pine tree which was 51 inches in diameter, and which cut 10,000 feet. The butt log scaled 2,240 feet.

We wish to call attention to an error of proof reading in the March number of THE FORESTER, in which, on page 54, the names Red Fir and Yellow Fir should have been used instead of Red and Yellow Spruce.

The great pontoon bridge for the Chicago, Milwaukee & St. Paul Railway across the Mississippi River at Prairie du Chien, Wis., was launched lately. It absorbed in its construction 500,000 feet of Washington Fir.

The world's supply of timber bids fair to last for many years yet. It is stated that in the Province of Archangel, in Russia, there are forests belonging to the Government which cover 88,970,400 acres in which the ring of the woodman's axe has scarcely yet been heard.

The German Government has been purchasing Puget Sound Fir decking for its new war vessels. One ship recently took 1,200,000 feet of decking for Hamburg and other shipments were to follow. Heavy purchases have also been made for the same purpose by Philadelphia ship yards.

Labor has been in great demand in the lumber camps of Michigan, Wisconsin and Minnesota during the past winter. Common laborers have received as high as \$35.00 per month, while skilled woodsmen have commanded higher wages than they have been able to do for many years.

The North American Paper & Lumber Company has recently secured from the Nova Scotia Legislature the lease of a tract of nearly 1,000 square miles of land in Victoria and Inverness Counties, Cape Breton. The lands are leased for the purpose of converting the timber thereon into pulp and paper.

During the last month tree bounties to the total of \$19,563 68 were paid out to farmers in Minnesota who have planted trees under the act of the Legislature in that State giving bounties to those who thus plant. Bienville County has 1,761 acres of trees planted, the farmers receiving therefor a total of \$4,226.

General Andrews, the chief fire warden of Minnesota, is authority for the statement that while that State for the past twenty-five years has been paying the annual sum of \$20,000 in bounties on tree planting, the destruction of forest growth has far exceeded the renewals; at a rate which, he believes, will exhaust the White Pine supply of that State in fifteen to twenty years.

By the sale of Pine logs in the years past the Menominee Indians, in north-eastern Wisconsin, to the number of 1,300 men, women and children, have accumulated a fund of \$1,000,000, which is held for them, in the form of interest-bearing bonds, by the Government. This fund grows from year to year. The tribe expends about \$75,000 a year in logging operations, and annually clears from \$50,000 to \$100,000.

Prof. James Troop, of the Indiana Agricultural Experiment Station, has been appointed State Entomologist. Under the law recently enacted by the Legislature of that State he is required to inspect all nurseries in the State,

where trees or plants are grown for sale, at least once a year, and report upon the discovery of insect pests infesting nursery stock.

The biggest sticks of timber ever cut in Portland, Oregon, were cut at the mill of Inman, Paulsen & Co. recently. They were of Fir, and were three feet square, and a little more than forty-eight feet long. They contained 5,200 board feet, and weighed about 20,000 pounds each. The timbers were sawed without the aid of special machinery, and were handled easily by the ponderous apparatus at the mill.

One of the most persistent and active workers in the cause of forestry for several years past is Mr. John P. Brown, of Connersville, Ind., who has been elected president of the newly organized Indiana Forestry Association. It was due to Mr. Brown's tireless efforts that the Indiana Legislature passed the law for the encouragement of the care and preservation of forest lands in that State, mention of which is made elsewhere in this issue of THE FORESTER.

The snowfall in the mountains of Colorado during the past winter seems to have been unprecedented in quantity. Some of the lines of railway were not reopened for traffic until March 20, having been completely blockaded by snow for two months. Capt. Edward L. Berthoud, of Golden, Jefferson County, who is one of the most active members of the American Forestry Association in Colorado, reports the snowfall for the winter as follows: September, October and November, 27 $\frac{3}{4}$ inches; December, 15 $\frac{3}{4}$ inches; January, 10 $\frac{1}{2}$ inches; February, 12 inches; March, 7 $\frac{3}{4}$ inches; total 73 $\frac{1}{2}$ inches, and it is probable that it was much heavier in the higher ranges.

Why Miners Should Join the American Forestry Association.

BY THE DIRECTOR OF THE U. S. GEOLOGICAL SURVEY.

The interests of miners in the protection of timber is a vital one. In the *Popular Science Monthly* of February, 1898, I said:

"MINING INTERESTS.—The mining interests of the Western States should be the most urgent in the demand for care and protection of the forests under Government direction. Upon the abundance or scarcity of timber will depend the development of many mining enterprises, and through them the advance or retardation of the growth of the State in which they are situated. That scarcity of timber will limit mining is without question, unless the mines are sufficiently rich to pay the added cost that transportation from a distant source of supply will entail. This will apply particularly to the small mine owner, and to the miner with little capital who wishes to develop promising prospects.

"There is no doubt that the abundant timber supply of the Black Hills of South Dakota has given great impetus to the development of the mineral wealth of the region. It is equally true that if that timber supply is removed by being wasted, or is destroyed by forest fires, the future mining of the region will be limited to the working of a few rich mines which can afford to pay high prices. Scarcity of timber all over the West is not a remote contingency if the present waste and destruction are permitted to continue; it is already in sight. Indeed, it will not be long before the magnificent forests of the Pacific coast will be so greatly injured by fire and wasteful cutting that the mining communities will have to draw their best timber from Canada and Alaska.

"The opponents of the forest reserves have frequently stated that the reservation policy would cripple the mining industry. It is believed, however, that there would be much more truth in the

statement that the destruction of the forests would seriously injure and in many instances ruin the mining industry. This industry demands a permanent source of supply of timber, and it hardly needs to be said that, without some such policy as that of forest reservation, no such source of supply can be maintained. If mining men can be brought to understand that their industry will be protected by the proper administration of the reserves, the future of both the mining and the lumber interests of the West will be provided for."

There are great areas of Western forest lands no longer held by the Government, the protection of which from waste and destruction is as important to many mining regions as that of the forest reserves themselves. Such protection should not mean the withdrawal of any part of these lands from use, but the harvesting of their timber product without destroying their capacity to produce valuable trees. Many timber owners do not realize how quickly young trees too small to cut grow to merchantable size if protected, and how simple are the methods by which the forests can be kept from losing their productive power.

Among the objects of the American Forestry Association the prevention of forest fires and the introduction of simple and effective improvements in lumbering stand pre-eminent. It is particularly fitted for such work on account of its membership, which includes many prominent lumbermen and nearly all the practical foresters in the United States. Its membership includes men interested in forests and forestry from every point of view, and it unites for the common object all these different influences, which otherwise would be scattered and comparatively ineffective. Its efficiency in attaining its chief end, the preserva-

tion of the forests by use, is greatly increased by the publication of THE FORESTER, through which medium it reaches miners, irrigators, and lumber-

men, as well as those who have a less direct interest in forest protection.

CHARLES D. WALCOTT.

Government Forests and Their Preservation.

BY THE COMMISSIONER OF THE GENERAL LAND OFFICE.

There is so much theory and so much real poetry and romance in the bare mention of forests and forest life, and their association with untrammelled nature, that it becomes difficult to divert the mind to the more artificial phase and the practical details of forest preservation and management. It is, however, with this view I have to deal now. So important has this subject already become in its far-reaching result that it may be said to affect more or less every great industry of the nation. Agriculture, manufactures, and mining are perhaps at present more closely related to the fate of the forest than most other industries. Having disposed of the larger portion of its forest wealth to those whose selfish ends look only to the immediate present, the General Government at last has come to the rescue and through tardy legislation and limited appropriations has partially provided for the preservation of its remaining forests. In this wise policy it has in view a twofold purpose—the encouragement and protection of the timber growth and the conservation of the water supply. These are so interdependent that to remove either one, both are destroyed. The most formidable foes to forest life are the wasteful acts of man and the devastating fire. The object of the Government is to restrain and limit the one, and to prevent the other. It is not essential to the preservation of the forest that it be walled in and its products entirely withheld from use. The prime object of the reserve is that it shall the more largely contribute to a beneficial end. Experience in other nations has demonstrated that much of the matured timber should be judiciously culled from the forest, and

while this surplus is utilized the forest growth is greatly improved. Such cutting and removal, however, should only be permitted after the dead or matured tree has been selected and designated, and where so located that its removal shall not result injuriously to the forest cover and the tree life surrounding it. The purchaser, under our rules, is obliged to remove or destroy the branches and waste material of the fallen trees not essential for use, thereby preventing an accumulation of dry matter which is so conducive to fires. That reasonable compensation may be had to the Government, the timber is estimated and appraised and the price paid by the purchaser, and this forms a fund in partial aid of forest administration. So systematic and so businesslike and economical is the management of other countries in the disposal of the surplus timber from their forest domain that some nations actually count the annual wood yield as among their most profitable revenues. For instance: India collected in one year three millions of dollars net, while Prussia received an income from her forests of six millions of dollars net. The amount expended by the latter country in the management of her forest domain in one year amounted to the enormous sum of eight millions of dollars.

Not only as to the removal of timber, but in other respects is our Government liberal in allowing access to the forest reserves. Prospecting and mining, with the free use of timber for such purposes is allowed; while roadways, bridges, church buildings and school-houses may be constructed and timber used therefor. To the small user of timber, resident in

the reserve, permission is given to remove free of charge in any one year timber to the amount of one hundred dollars for individual use on his own claim, subject to the usual restrictions and supervision. To discourage the demand for reserve timber no export removal of the same is allowed from the State or Territory wherein cut. The precaution against

were, with few exceptions, excellently protected. The largest single reservation is in Oregon; it contains nearly four and one-half millions of acres, and extends from north to south over 234 miles. For a third of a century in the fall of the year it was rare that a clear view could be had in all that distance of the high mountain ranges, least of all of that



VIEW OF BURNED FOREST, PRIEST RIVER RESERVE.

fires, the methods adopted for extinguishing the same, the penalties for causing them, and the discipline which supervises the fire patrol are all so minute in detail as to forbid more than a reference to them. Though but one year has elapsed since the organization of an efficient forestry force, yet the most gratifying results are already the reward. Though numerous most destructive fires last year swept over the great forests not under reserve, yet those under reservation care

majestic, far-famed and ever sought for Mount Hood. Travelers from remote countries came to gaze upon its snow-capped summit and lofty height as it towers far above all the higher mountains of the range, but usually so dense was the volume of smoke as it ascended from the burning forests that no satisfactory observation could be had. Last year, however, so thoroughly had the forest rangers guarded the reserve that not a single day was Mount Hood or any of the

entire Cascade Range obscured from view by smoke. So noticeable was this relief that the leading newspaper of the Pacific Northwest commented editorially as follows:

"Usually from the first of July to the middle of September the air has been heavy with smoke and cinders and the destruction of timber great. As a result of the vigilance of the range patrol the valleys of the Umpqua and Rogue rivers are now free from smoke, no fires being in progress in that section. * * * The absence of the forest fires in the mountains of southern and southwestern Oregon as the result of this system for the first time in many years may be held to have proven its efficacy under a vigilant supervision."

Reports from superintendents of other reservations in other States all contain testimony as to the great exemption of fires from the forests within their charge.

The progress thus far made in reserving forest area can best be appreciated when it is known that at the present date there have been nearly forty-six millions of acres set apart and withdrawn from entry, or a quantity which would about equal thirty-one times the size of the State of Delaware. The reserves are situated in eleven States and Territories. The area embraces thirty-five distinct reserves, not including the Afognak Forest and Fish Culture Reserve in Alaska. To superintend, supervise and patrol this vast empire of forest land there will be employed during most of the present year nine superintendents, twenty-seven supervisors, and 275 rangers or fire patrolmen. The reserves are all mapped and each fire patrol district is designated, so that reference to the map will indicate the location of each supervisor and of all the rangers under him. Reports are promptly made at stated periods from which can be seen where each official has been at any particular day and the kind of service engaged in. Campers, tourists and hunters while in the reserves will be under the constant supervision of the rangers, who will visit the camps and inspect the fires and see to their extin-

guishment when the camp is abandoned, and who will make arrests of persons violating the regulations or permitting fires to extend into the forest, and in further aid of this purpose the Department of Justice has been requested to direct United States Marshals to deputize all forest rangers in order that they may have authority to make arrests within the reserves for offenses committed in violation of the forest regulations.

We can never fully comprehend the real value of the forest relative to conservation of the water supply until we are reminded of the vast domain of our country now remaining vacant and unappropriated, aggregating 546,549,655 acres, exclusive of Alaska and our recent Island possessions. Of this aggregate 332,176,000 acres require the aid of water to render them of utility for farming, and of these acres 69,000,000 are barren, irreclaimable waste. Under the best economic management sufficient water is available for the reclamation of only 71,000,000 acres for agricultural crops.

One thing yet remains to make the success of the Government complete as to its forest administration, and that is in a more earnest co-operation on the part of the States and land-grant corporations having lands within or near the reserves. A patrol of the even sections of the Government can never be adequate so long as the corporation owning the odd sections fails to exercise like vigilant care as to them. Where sheep grazing is permitted on the odd section it cannot be prevented on the even section except at an enormous cost to the Government. Fire originating through carelessness or design on the one section quickly communicates to that adjoining, whatever may be the efficiency of the patrol. The General Land Office is now in correspondence with State authorities, and with land-grant companies owning lands within or near the reserves, with a view to mutual co-operation for forestry protection, and I am glad to say that already many cordial assurances are received in response. A further suggestion still remains. There exist vast bodies of vacant

forest lands not yet reserved, which having no responsible patrol become the prey of the depredator and the fire fiend, and each year, until remedied, we shall continue to read in the dispatches of the magnificent forests and great wealth which go up in smoke and down in ashes with no sufficient power to control the devouring element. The same laws, rules and regulations which now govern the forest reserves, should be extended over all such unreserved forests, with

the same powers and safeguards for their protection and disposal. It is a solemn and imperative duty the citizens of our country owe to posterity to co-operate singly and collectively in the care of the great forest wealth of the nation, for in so doing they contribute not only to the industrial wealth, but alike to the happiness and health of the unborn millions who are to succeed us.

BINGER HERMANN.

Forest Administration.

Mining in Forest Reserves.

The laws for the regulation of mining in forest reserves make ample provision for the protection of the miner's interests and permit the exercise of every privilege that is consistent with public welfare. Among the provisions of the law are the following :

"It is not the purpose or intent of these provisions or of the act providing for such reservations to authorize the inclusion therein of lands more valuable for the mineral therein, or for agricultural purposes, than for forest purposes.

"The Secretary of the Interior may permit, under regulations to be prescribed by him, the use of timber and stone found upon such reservations, free of charge by bona fide settlers, miners, residents and prospectors for minerals, for firewood, fencing, buildings, mining, prospecting and other domestic purposes, as may be needed by such persons for such purposes.

"Nor shall anything herein prohibit any person entering upon such forest reservations for all proper and lawful purposes, including that of prospecting, locating and developing the mineral resources thereof, provided, that such persons comply with the rules and regulations covering such forest reservations.

"All water on such reservations may be used for domestic, mining, milling or irrigating purposes, under the laws of the States wherein such forest reservations are situated, or under the laws of the United States and the rules and regulations established thereunder.

"Upon the recommendation of the Secretary of the Interior, with the approval of the President, after sixty days' notice thereof, published in two papers of general circulation in the State or Territory wherein any forest reservation is situated, and near the said reservation, which after due examination by personal inspection of a competent person appointed for that pur-

pose by the Secretary of the Interior shall be found better adapted for mining or agricultural purposes than for forest usage, may be restored to the Public Domain. And any mineral lands in any forest reservation which shall have been or which may be shown to be such and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry, notwithstanding any provisions herein contained."

Under the authority vested in the Secretary of the Interior by the act to insure the objects for which forest reservations are created, rules and regulations were prescribed June 30, 1897, by the Commissioner (24 L. D., 189), among which the following are important :

"3. It is the intent to exclude from these reservations, as far as possible, lands that are more valuable for the mineral therein, or for agriculture, than for forest purposes; and where such lands are embraced within the boundaries of a reservation they may be restored to settlement, location and entry.

"19. The law provides that 'any mineral lands in any forest reservation which have been or which may be shown to be such and subject to entry under the existing mining laws of the United States and the rules and regulations applying thereto, shall continue to be subject to such location and entry, notwithstanding the reservation.' This makes mineral lands in the forest reserves subject to location and entry under the general mining laws in the usual manner.

"20. Owners of valid mining locations made and held in good faith under the mining laws of the United States and the regulations thereunder, are authorized and permitted to fell and remove from such mining claims any timber growing thereon, for actual mining purposes in connection with the particular claim from which the timber is felled or removed."

Special Agent Frank Gryglar, of the United States Land Department, is now in Alaska investigating timber depredations. It seems that while the squatter has a right to timber, he has no right to cut timber for sale. A number of yards in Skagway are well stocked with Fir wood, and it is said that some of these parties have already been proceeded against in the court. Some of these made application for settlement, some explained that they were cutting for others. The railroad company had a certain right-of-way, which had to be cleared, and they gave certain parties the timber on condition that they would clear it. This has been investigated already and permitted. Where the fire went through last summer the removal of the injured timber has been allowed. Outside of these two instances all who cut and sell timber will be prosecuted.

Mr. Gryglar has over 200 cases of lands in Alaska located for speculative and not for bona fide improvement. Such locators have been warned not to cut the timber.

The idea of the Government in this is the protection of the country, since stripping the hillsides near Skagway would allow the cold winters to sweep down on the town unhindered and would make snowslides more easy of occurrence.—*Seattle Post-Intelligencer*.

From present indications there will be no sheep in the San Bernardino Forest Reserve this summer, for the authorities are already making preparations to keep the bands out.

Deputy United States Marshal Pourade came in from the reserve Wednesday and found orders awaiting him from B. F. Allen, Forest Superintendent at Los Angeles, instructing him to be on the watch for sheep and not allow them to infringe on the reservation. Pourade says that he will enforce the law even if it is necessary to call out the troops to do so. Sheep are not restricted from passing along the roads but will not be allowed to graze on the reserve.

The sheepmen have received notice

from the officials to notify them when they desire to take their sheep through the mountains, and a patrol will be sent to accompany the bands and see that no harm is done. It is thought that the sheepmen will take kindly to the work of the officials and will not endeavor to break the law, but if such should not prove to be the case, they will be severely dealt with.—*San Bernardino (Cal.) Times-Index*.

A half million feet of Red and White Pine lumber were sold at noon yesterday by United States Marshal Bailey.

The sale was conducted in Park County, about eighteen miles west of Cripple Creek. This is the largest sale ever held in this State, of replevined lumber illegally cut from Government lands. The original value of this lumber when cut was from \$10 to \$15 per 1,000 feet.

United States District Attorney Whitford said yesterday that the Government would be glad if \$5 per thousand was realized by the sale. Both the men who cut this timber have paid fines for their offense.

The price obtained by Marshal Bailey will not be known until after his arrival in Denver to-day. Several Denver lumber dealers sent representatives to bid on the lumber.—*Denver Republican, February 10*.

The officeseeker has discovered that there is an office at the city hall to be filled, or will be as soon as the ordinance creating a city forester has become a law, and the mayor's office is besieged with applications for the place. The appointment will be made by the board of public works, but any recommendations in this line offered by the mayor will be considered. Yesterday he stated that he would recommend no one for the place who was not thoroughly posted in regard to the planting and care of trees and who was not young and active enough to get around and do the work.—*Kansas City Journal*.

The Government officials are having

trouble with the owners of saw-mills in the hills, who have been cutting down timber on public land.

John Norris was arrested by Deputy Marshal Crocker, twelve miles north of Florissant, El Paso County, charged with cutting the prohibited timber. He was taken before James B. Severy, United States Commissioner, Colorado Springs, and gave \$500 bonds.—*Denver (Colo.) Republican, March 2.*

Forest Superintendent W. H. Buntain, successor of J. D. Benedict, is actively at work in his new position at

the Federal Building. He was assistant postmaster at Momence, Ill., where his father was postmaster; but his health was not good because of the confining work, and he came West.—*Santa Fe News Mexican.*

The *Leader* learns that Superintendent E. B. Hyde, of the forest reserve, on Friday seized a lot of logs near Twenty-five Mile creek, belonging to Jerry Dunlee, on the charge that they were illegally cut on the reserve.—*Chelan (Wash.) Leader.*

Forest Policy.

The National Wholesale Lumber Dealers' Association held its annual meeting at Boston, Mass., during the first week in March. The meeting was concluded by the usual banquet, and among the speakers on that occasion was the Hon. John M. Woods, of Boston, a member of the Massachusetts Forestry Association, who was introduced to speak concerning a lumberman's interest in forestry. Mr. Woods said, in part:

"Gentlemen, I want to say to you here that you think perhaps in some parts of the country the lumber business is old. I want to say to you here that you are meeting here to-night on the anniversary of the first exportation of lumber from the United States—200 years ago from this part of the country the first cargo was sent abroad.

"As the chairman has said, I have one or two specialties. I will touch on only one of them now. The first is on the lumber business—the forestry of the United States, and something about the legislation that has taken place in this country. As you know, the Pilgrims landed in 1620, and in 1631—eleven years afterward—the first law that was ever made in this country was passed in regard to it. It was enacted by the Pilgrim colony that there should be no fires set on the Lord's day and that any one that set any fire, if it did any damage,

should pay ten shillings or be publicly whipped. In 1639 it was further enacted that no man should set a fire on the Lord's day, the last day of the week, and if he did, and it did any damage, he should be required to pay a fine of forty shillings, and if it were done by a minor his parents or guardians should pay. In 1697 the first effort was made to find out the value of woods in North America. The English Government sent a commission here. The chairman was Mr. Bridges, who was a ship builder in the English dock yard at Portsmouth. He came here under a royal commission, and the commission read that he was to ascertain the conveniences of the woods of North America for furnishing woods for the royal navy. In 1699 the first cargo was shipped abroad. The largest part of this cargo was cut on the Piscataquis River, a little river that runs up from Portsmouth, N. H., about forty miles from here.

"There was no further legislation to amount to anything during the colonial period, and there never has been since to amount to anything. In 1743 Governor Wentworth, of the territory of New Hampshire, was appointed commissioner of all his majesty's woods in North America. You can have some idea, gentlemen, of the size of his commission. The king instructed the commissioners

to mark a large number of trees for use for the royal navy and this was done, but this commissioner, like the commissioners of later days, was human. He was denounced as a fraud and a villain and complaint was made to the royal governor of Massachusetts, who was governor of the territory of New Hampshire, and a petition was sent to the king for his removal, but they had 'pulls' in those days as they do in these days and he managed to hold his place for many years.

"We have seen the woodworking business from this country depart. Gentlemen around this board who are or have been in the business any length of time know that Boston forty years ago was the center—and the circumference, I might say—of the furniture business of this country. It has now gone where the raw material is. We have an incorporated society, and our idea is this: The first thing—and we believe it is the proper thing to do in the first place—is to educate public opinion to realize the necessity of the preservation of what we have. There is a bill before the legislature now which asks for an appropriation of \$4,000 to make a forest survey of the State. The forests in this State practically amount to nothing. There are a few box boards in this State and something of that kind, but we believe that the time has come to agitate this question and to ask the State—not only this State, but other States and the National Government—to reserve forests as national domains. There are a quarter of a million of acres in this State which are valueless for taxation and we purpose to ask the Government to reserve those. It has been demonstrated that it is possible to make this a paying investment for the State, so that this land which is practically valueless shall make some return. I will give you one illustration: In Plymouth County, less than forty miles from here, is a small tract of Pine land, and I will say to you for the benefit of those who are not aware of the fact that Cape Cod is a sandy district, and sandy land is adapted for the growing of Pine. There are two tracts of land down there

owned by different owners, and one of these was sown forty years ago with Pine seed, while the other was allowed to run wild. The result is that now the one tract is assessed for \$150 an acre and the other for \$2.50. That demonstrates that it is practicable to do something along these lines. It does not need any argument to show that we can do it. The chairman has referred to the fact that Memphis is the great market for hardwood to-day. Indianapolis was the great center not many years ago. I lived there from 1869 to 1873 and I have heard it said that it was impossible to exhaust the hardwood of Indiana, but you and I know that forty per cent of the hardwood to-day is brought in there. It behooves us to lock the door before the horse is stolen. We have public-spirited men in this State and they have taken hold of it. The idea is to enlighten the public and to influence the legislature to take hold of this matter.

"Another thing I might touch on is that our water supply depends on the forests. This Commonwealth has spent more than \$50,000,000, or will have spent, when the water-works system is completed, to maintain her water supply, when if our forests had been saved and cared for at least one-half of that sum would have been saved. In New York State through her Forest Commission they are saving the Adirondacks largely for this reason.

"It is a practical question, gentlemen, and I commend it to you for careful study and to take home with you. As the honorable president has said, it is a serious question where they are going to get the supply for the future from unless something is done along these lines."

Mr. Woods was followed by Hon. Robert C. Lippincott, of Philadelphia, who spoke of the growing interest in the question of forest conservation in his own State, briefly outlining the legislation that has been enacted and commending Dr. Rothrock for the faithful and efficient service which he has rendered as Commissioner of Forestry. Mr. Lippincott closed with the assertion that the

forestry question is one that should be seriously considered by lumbermen; that when as a class they did take the matter up it would be well taken care of.

In the March number of *The Irrigation Age* there appeared a paper on "The Irrigation Problems and Possibilities of Northern Wyoming," by Capt. H. M. Chittenden, Corps of Engineers, U. S. A. The purpose of Captain Chittenden in

in the Bighorn Mountains under the patronage, I believe, of the Burlington Railroad. It may have been the surpassing beauty and sublimity of the scenery around Cloud Peak Lake, which I had seen but a week before, that caused this much-advertised spot to appear altogether tame in comparison. More probably, however, it was the desolate appearance of the surrounding country, which is almost divested of the noble forests that once covered it. Here indeed is an impressive example of the ruin that has spread over many fores' areas of the West. It alone is sufficient to convince any believer in the necessity of preserving our forests, that



LOGGING SCENE IN THE STATE OF WASHINGTON.

making a tour through Wyoming in the months of August and September, 1897, was to investigate the question of the construction of reservoirs in the arid regions through the agency of the General Government. As a close observer he does not fail to note the importance of forest preservation in the region included in his professional investigation. Of the effects of forest destruction he writes:

On our second day out from Sheridan we visited Dome Lake, a nascent summer resort

prompt and vigorous measures ought to be taken by the Government to save what remains and to restore what has been lost.

In this connection I may mention a matter which came to my attention about a week before. I made a short excursion from Buffalo, up the valley of Clear Creek to the old military reservation of Fort McKinney, where I had spent some time nine years before surveying its boundaries. I passed through the abandoned post, now the property of the State of Wyoming. The perfect state of preservation and the neat appearance of everything spoke highly for the care with which this piece of property is being preserved. But I imagine that the State is at a loss to know what to do

with it. It at once occurred that here was a central position from which to protect the forests of the entire Bighorn range. Let the post of Fort McKinney be reoccupied by United States troops, held there to do duty as foresters. If this is not considered a proper function for the regular troops, let a regiment be raised whose duty shall be confined to that of forest protection and let a portion of it garrison this post. There is no good reason that I can think of why the army should not afford the basis of an efficient police system for our national forests; there are many and excellent reasons why it should.

Captain Chittenden presents some very strong evidence in support of the assertion that the preservation of forest cover on mountain slopes is absolutely necessary in order that soil erosion may be reduced to the minimum—a fact that is almost always overlooked by those who oppose a conservative forest policy. In describing his journey through the mountains he says :

Teton Pass is incomparably the most difficult pass I have met with in the mountains. Its slopes are so steep that one would scarcely believe it possible for wagons to cross did he not see the evidence of their having done so. Unlike most passes, the two slopes of this one come together almost like the top of a roof, with no space on top; and it is but a mild exaggeration to say that a saddle horse on arriving at the top is laboriously digging its way up on one side with its hind feet and vigorously bracing with its fore feet to keep from sliding down on the other.

On the summit of this pass we were in dense clouds, from which the rain came down in perfect floods until we were drenched through and through. The road carried such torrents of water that it seemed unsafe to travel in, but the occasion afforded an excellent opportunity of seeing how forests protect mountain slopes from erosion by the elements. The heavy rain caused streams of water to pour down every gully or depression, but wherever this was in the forest areas the water came out clear, notwithstanding its heavy volume. Wherever we came upon open tracts destitute of vegetation the surface water was invariably laden with sediment.

A Reasonable Policy.

The following, in reference to forest reserves, has been furnished the *Journal-Miner* by a gentleman who has made a study of the proposition, and hence is conversant with the subject, and will be found of special interest at the present

time, inasmuch as it corrects some erroneously conceived opinions on the subject:

“There seems to be a general disposition upon the part of those interested in sheep grazing and other pursuits in the vicinity of forest reservations to confuse them with Indian and military reservations, upon which none are allowed to trespass, and which are set aside for specific uses of the Government.

“The forest reservations are of entirely different nature, and are set aside by the Government for what is considered the public good of the Territory. Scientific men, men of wide experience, who have been interested in this subject, have made thorough reports upon the arid condition of the Southwest and the necessity for the conservation of its meagre water supply. They came to their conclusion by years of careful observations, and in an unbiased manner, without interest, except the general welfare and prosperity of the country.

“Aside from this great question of water supply, there are other questions of equal importance to the people of Arizona, in whatever business they may be interested

“Remove the great pine forests, strip the territory of its magnificent belt of timber, and what have you left? A few rich men, who cut and sold the timber, upon one hand, and upon the other a vast territory denuded of its threefold value; the timber gone that should be used in the development of the Territory's great mineral wealth; the means for impounding water shipped to other States, and thousands of acres of worthless, barren, non-taxable, untillable land reverted to the Territory.

“Just where the reasoning man can find objection to the forest reservations, under the existing conditions, is difficult to say. The general rule governing forest reserves allows grazing privileges to all stock except sheep. In the San Francisco reservation even sheep are allowed to graze, and it is very probable that this ruling will be permitted so far as this reservation is concerned; the

reservation does not prevent the sale of timber to people of the Territory for all uses and purposes when there is need of same; it does not prevent bona fide entrymen from taking up land that is more valuable for agricultural purposes than for timber or mineral.

"A reservation does prevent fraudulent entries as homesteads on timber lands; it does prevent an indiscriminate slaughter of timber; it prevents the vast waste of timber by forest fires; it prevents a few people from deriving all the benefits from our forests to the detriment of the people in general.

"It is not the intention of the Interior Department or any of its representatives to put hardships upon the people of Arizona, but to preserve for her citizens those things which will, some time in the future, make her a proud sister among the sisterhood of States; it is their desire to people the Territory with men who come to make Arizona their home, and to protect them against those who come to glean, gather, and go."—*Arizona Journal-Miner*.

The following statement of the effect of forest removal on the water supply is extracted from Weekly Bulletin No. 28, Colorado Experiment Station. The bulletin was prepared by Prof. L. G. Carpenter and relates to the discharge of water by the Cache la Poudre River during the season of 1898:

"Since the early settlement the areas of forest have become much less from fires, denudation for mining, and railroad purposes. The amount used for domestic purposes is of small importance, except as careless and irresponsible cutting gives conditions favoring the spread of the devastating forest fires. From the standpoint of the water supply on which agriculture depends, the protection of the forests becomes of vital importance. The protecting influence of the forests on the snow cover is of the greatest importance. The letting in of the sun and wind melts and evaporates the snow without sensible formation of water, dries the springs and lessens the amount of

water available for use. It is safe to say that with the former forest cover, even with the small snowfall and little rainfall, the low stage of the river would not have fallen to thirty-four second-feet as it did this year, but would have been several times more, for the innumerable small springs would have continued their supply. If the forest cover continues to be removed, autumns of low water like the present will cease to be exceptional, but become the rule, the river will be lower than it has been this year, and may become as dry as some of the tributaries."

The Gila River Forest Reserve.

By proclamation of President McKinley, dated March 4, The Gila River Forest Reserve was formally segregated. It embraces a rough, mountainous region in the southwestern part of New Mexico, the Black Mesa Forest Reserve adjoining it on the west. It includes part of the Mogollon, Black, San Francisco and other ranges of mountains. The land is exceedingly rough, having no roads and but few trails through it. There are not many settlers within the bounds of the reserve. Those who are there are stockmen. They have a great many cattle, but not many sheep. Considerable areas of the forests within the reserve have been burned over. It is asserted that the Cliff Dwellers once inhabited the gorges and cañons within the bounds of the new reserve, and that remains of their dwellings are still in existence.

The Gila, San Francisco, Tulerosa, and Mimbres rivers and other streams have their sources in the mountains of this reservation. As several of these streams flow into Arizona, the people of that Territory have some interest in the preservation of the forests on their mountain water sheds. The rich alluvial valleys through which these streams run after emerging from the mountains, and the mild but arid climate, makes the conservation of water a matter of prime importance there.

The business men of this city have no

desire to see the sawmills shut down or the post and wood haulers deprived of their business through the establishment of a forest reserve, and would not advocate the establishment of such a reserve if they thought it would have that result. They, as well as the timbermen, are satisfied that the establishment of a forest reserve will not interfere in the least with these industries, and therefore they advocate it.—*Fort Collins (Colo.) Express.*

The Sheep Industry in Tulare County, California.

A writer in the *Pacific Rural Press* for March 4, 1899, states that in Tulare County, California, the value of taxable real estate and personal property is \$41,775,133; of sheep and lambs, \$299,712. The sheep owners therefore pay only about seven-tenths of 1 per cent of the county taxes. The writer of the article then says:

If it is true, as it appears upon the records, that this great sheep industry pays less than 1

per cent of our taxes; if it is true that our Government has placed it upon the protective tariff list; if it is true that our Government is to continue to furnish them pasturage free in future as it has in the past; if it is true that they are very largely responsible for the destruction of our forests, which means the destruction of our water supply; then I would suggest in all candor, and with due respect to the 99 per cent industry, that, as a financial proposition and as a proposition looking to the welfare of ourselves and our children, to the saving of our farms, our orchards, our vineyards, in short, all that we hold dear, that if we expect to continue to live here, we would better purchase this 1 per cent industry and ship it to another country, and thereby save our homes.

In a private letter, from which THE FORESTER is permitted to make an extract, President James Reid, of the Montana College of Agriculture, says:

I am glad that the President has seen fit to set apart the Gallatin Reserves, and sincerely hope that a much larger tract may be added, including all the headwaters of that river. There are many fertile valleys in the State of Montana and throughout the Rocky Mountain region, whose fertility can be made permanent only by making reserves at the headwaters of the streams that supply them.

Forest Management.

In a letter to the *Evanston Wyoming Press* Mr. W. F. Hill writes as follows of the wasteful way in which the timber is being stripped from the mountains in the vicinity of the town of Wells:

The Rock Springs Lumber Company now has a large force of men at work cutting timber on Townships 38 and 39 North, Ranges 109, 110 West, which land is not yet open to settlement. It is claimed that they have bought this land with soldier scrip, and it is claimed as agricultural land, and that removing the timber is necessary to put it in condition for settlement. Now every one in this country knows that such land is not, and never will be, of any account for agricultural purposes, the soil being shallow and situated on sidehills too steep to

admit of cultivation. The settlers of this section have asked repeatedly to have an investigation ordered from headquarters, but so far very little attention has been paid to our demands. However, there are too many people interested in the matter for it to be put aside for long. The amount of timber in this country is comparatively small and the future interests of a large and prosperous community demand that it be protected. This outfit pays no attention to either the rules of common sense or of the Interior Department in regard to the prevention of fires, and it is certain that if left alone they will cause great damage to what timber they do not cut, by fires which will unavoidably start among the refuse left by them. There is no law by which they can take this land without swearing that it is agricultural land and such a statement would be utterly false.

Forest Utilization.

Scarcity of Mine Timbers.

While the mining situation here continues to improve steadily, still there are many factors which are likely to retard operations for many weeks to come. There is no difficulty, particularly, in the actual mining of ore. If other conditions were favorable the tonnage of the camp would be up to the standard of 1,800 tons per day. But there are several almost insuperable difficulties in the way. In the first place, the roads are wretched. The ore teams have recently discarded their runners and are making the trips with wheels, but the snow is soft, and great ruts are cut down through the slush, into which the wagons sink up to the hubs. At one time yesterday afternoon at least a dozen teams were stuck on East Fifth Street, near Harrison Avenue, and it was all that four and six horses, aided by the picturesque vocabulary of the orehaulers, could do to raise the blockade. Even with a four-horse team it is necessary to move only about half a load. The chances are greatly in favor of the conditions getting rather worse than better, for

several weeks at least, unless another very cold snap should occur.

Then there is the timber famine. This is a cold, hard reality, as a visit to the saw mills very clearly proves. This camp in ordinary times can consume about five carloads of logs per day, but in February only three cars reached the city, and there is but little improvement in the situation. Logs have risen in price at least $33\frac{1}{3}$ per cent and it will be a month before there is any improvement. Mr. Winten Morrell, of Guller & Co., saw mill men, explains that last year the loggers were getting very low prices for their logs, and as a result many of them were compelled to turn their attention to other channels of business. They couldn't make a living at the prices they were then receiving. During the winter the local lumber dealers advanced the price slightly, and there was a decided stimulus in the log market. But the blockade came, tying up the sources of supply on the Blue River and the Frying Pan. Lately eight-inch logs have been bringing from 60 to 65 cents, while a year ago the same logs



LOGGING ON THE COLUMBIA RIVER.

brought 30 cents; seven-inch logs 30 to 35 cents, former price 20 cents; ten-inch logs 70 cents, former price 60 cents; twelve-inch logs 90 cents, formerly 65 cents. To these figures 15 cents is added by the saw mill men for framing, etc., this being their regular figure at all times. Of course the timber bill for the big mines, under these conditions, is increased from one-third to one-half, but probably the mine manager would not complain providing there were plenty of timbers. But even at these fancy prices only a stray carload now and then can be secured, and the shrewd logger naturally holds out for the highest prices. In fact the local saw mill men have had to bid very lively in order to secure what few timbers they have on hand, which accounts, partially, at least, for the high prices now prevailing.

The result of this timber famine is apparent. The big mines gobble up every stick of timber on the market. The small lessee is the one who particularly suffers. He is unable to prosecute his operations, particularly in catching up the iron stopes, and as a result a large amount of this work has had to be abandoned. In fact some of the lessees have found themselves in a rather serious predicament, and several of them have had to temporarily abandon work.—*Leadville (Colo.) Herald-Democrat.*

The frontispiece of THE FORESTER is a view of the entrance of a mine in the Cripple Creek (Colo.) district in its earlier stages of development, and illustrates some of the uses to which timber is put in the mining industry, while the hill in the background, once heavily timbered, shows that a mining community utilizes practically all of the timber at hand. The interior timbering of the mine is necessarily not shown, but in many formations it is most important and the quantity required for this purpose is large. On page 77 is presented a view of a forest in a reserve near one of the largest mining camps in the Northwest. It tells its own story—a story

that must appeal strongly to the mine owner. It is true that he may secure many good mine timbers from the charred trunks of the burned forest, but if he cares for the perpetuation of the great industry in which his interest lies he must feel a personal responsibility in hastening the adoption of a policy which will limit if not prevent the occurrence of forest fires in the mining regions.

The Diversion of Spruce.

Emphatically the pulp material is Spruce. No other wood, available in large quantities, has to so high a degree the requisites for this class of manufacture as has the leading element in the forests of New England. Its fiber is long and tenacious and the logs are both easily handled and worked; so that as the business of paper pulp manufacture develops greater and greater have been the inroads upon the Spruce supply for this purpose, and it is rapidly being diverted from its use as a lumber timber to the purposes of the pulp makers.

Ten years ago Spruce was the leading, or one of the leading, woods in use in New England and adjacent territory, and the condition of the Spruce market was of more interest to Eastern lumbermen than that of any other wood excepting White Pine, and perhaps exceeding that wood in its real significance. But Spruce lumber is rapidly becoming a thing of the past. Elsewhere in this issue of the *Lumberman* will be found a review of the changes which have taken place and are now in progress in the Spruce holdings and manufacture in New England. They come from the fact that, manufactured into paper, Spruce is many times more valuable than when made into lumber. The pulp business originated more than ten years ago, but even as recently as that the Spruce put into pulp consisted mainly of timber too small for profitable lumbering operations. The saw mills took the saw logs, and what was left on the lands, ranging perhaps from four to twelve inches in diameter, was taken to the pulp mills. But now

entire tracts are logged for pulp manufacture.

The article referred to has one forcible illustration of this change, in connection with the production of wood pulp on the Androscoggin River. In 1888 the consumption of Spruce timber on that stream in pulp manufacture was only 22,000,000 feet; in 1898 it was 195,000,000 feet. The same thing has been going on all over New England, though resisted in some sections, as on the Penobscot River. Spruce therefore is rapidly becoming a material not available for the lumber manufacturer, who is outbid for its possession by the pulp maker.

While New England is the home of the Spruce, the idea that it is confined to that section of the country is erroneous. There are large quantities of it in the Allegheny Mountains and no small amount in the upper peninsula of Michigan and in northern Wisconsin. There are a few million feet of Spruce lumber produced in Michigan, but the real use of the wood there as elsewhere is for pulp making. Two of the greatest centers of wood pulp manufacture in the country are now to be found in Wisconsin, the Spruce districts in that State being respectively on the Fox River, in the eastern part of the State, and on the Wisconsin River. The Spruce in that section ordinarily does not grow in solid bodies of any size, but is scattered in narrow belts through the other timber or is found mixed with other growths. But in the aggregate the output is considerable, and the traveler along the railroad lines which penetrate the upper peninsula sees at every station piles of pulp wood bolts brought in by the farmers and small jobbers, to be shipped to the pulp mills further south. Spruce has had its day as a lumber wood, but is even more valuable as standing timber available for the use of pulp making than it was when its only or chief use was the production of lumber.—*American Lumberman.*

Mine Props.

It is generally known that in all coal

mines the roof above the coal vein has to be propped up as the coal is dug out. This is done with wooden props made of round timber cut to proper lengths. In this country the coal mines are usually situated in wooded localities, and the cost of the mine props is a small matter; but in the United Kingdom and some States in Europe the trade in such timber is an important one. By the by, mine props in England are called "pit props" and "pit wood," and they come largely from the Scandinavian countries. While there is a limit to the amount of lumber timber in this country, the amount of small timber suitable for pit props may be truly said to be inexhaustible if used for no other purposes. We have had some inquiries as to the feasibility of shipping pit wood from the hardwood section of the Central South to British ports. The data as to prices, cost of freight, etc., available at present is not sufficient to permit any satisfactory answer; but it may be of interest to inquirers to know that English experts have some queer ideas as to the crushing strength of timber. The following extract is from *Timber* of March 4, 1899. We do not know just what is meant by "ordinary oak props":

"At a general meeting of the Federated Institution of Mining Engineers, held at Shelton, Stoke-upon-Trent, on the 22d ult., Prof. H. Louis read a paper, entitled 'Further Notes on Pit Props,' stating that of half a dozen ordinary oak props he had tested the best result was given by the straightest prop; yet this was only 1.11 tons per square inch, while the average of the six was only 0.92 ton per square inch. This figure compared very unfavorably with the result obtained from ordinary Baltic soft-wood props—viz, 1.571 tons—being only 60 per cent of that figure. The lowest figure obtained from soft wood—1.1 tons—was equal to the highest given by an oak prop. It was, therefore, impossible to doubt that the oak prop was far weaker than an ordinary Baltic prop."

Southern Lumberman.

Lumbering in the Northwest.

Graphic reproductions of forest scenes and lumbering operations are always interesting, even to the most casual observer. Especially is this true of the great forests of the Pacific Northwest, where the trees are of truly gigantic proportions, the growth upon the ground

a point in the southern part of the State of Washington. The latter represents a view of a waterway where the great logs are received to be floated to the sawmill. The two Oregon views show something of the methods by which great obstacles in the way of successful logging have been overcome by the ingenuity of re-



A TIMBER SLIDE IN OREGON.

very dense, and where lumbering methods are necessarily upon a scale commensurate with these conditions. In this issue THE FORESTER presents three lifelike illustrations of some of the methods in vogue in the lumber camps of that region. The above scene and one on page 87, are from Oregon, twenty miles below Portland, on the Columbia River, and another, on page 83, is from

sourceful lumbermen. Timber slides are constructed, upon which immense logs are quickly drawn up a steep hillside by means of steel wire cables, operated by machinery. Similar slides are used to conduct logs down hills or mountain sides to the mill, road or waterway. THE FORESTER will present other views of equal interest from time to time.

State Associations.

Southern California.

The meeting called by the Southern California Academy of Sciences was held yesterday forenoon in the assembly room of the Chamber of Commerce to organize a Forest and Water Society. There were about forty men present, representing several branches of the Fruit Growers' Exchange, and other organizations, as well as a number of persons engaged in water development and hydraulic engineering.

B. R. Baumgardt acted as temporary chairman, and Abbot Kinney was elected president and W. H. Knight secretary. The president read a paper on forestry, and a number of persons participated in a discussion of the work to be done.

It is the object of the society to promote the interests of forestry and irrigation by inducing the Federal Government to take greater interest in the subjects, though so far as could be ascertained, the society is not prepared to make any suggestions to the Government of specific irrigation development to be undertaken.

A committee of five, consisting of A. R. Sprague, T. P. Lukens, G. H. A. Goodwin, A. Campbell Johnston and B. R. Baumgardt, were appointed to draft resolutions and report a constitution and by-laws. They urged the Executive Committee to secure the membership in the society of all organizations and individuals interested in the work; endorsed the forest school conducted under the auspices of the University of Southern California; request the Secretary of the Interior to recognize forestry graduates on forestry patrol; and endorse the establishment of a botanical garden in one of the public parks of Los Angeles.

Vice presidents will be appointed for each county in Southern California. Three were named for the following counties: Los Angeles, W. G. Kerckhoff; Ventura, N. W. Blanchard, and San Bernardino, Col. Adolph Wood. The others will be appointed later.

Some idea of the scope of the work of

the society may be gathered from the committee work provided for in the Constitution. The Committee on Forestry shall devise plans for the conservation of our forests, and adjust conflicting interests; that on flood waters and reservoirs shall obtain data regarding suitable sites for storage reservoirs, and their cost of construction; that on the distribution of waters shall consider how the waters of this section can be best utilized for agricultural and industrial purposes; and that on legislation shall endeavor to secure such State or National legislation as may be approved by the association.

Much enthusiasm was manifest in the meeting. The president spoke of the annual destruction by fires that are denuding the mountains of their beautiful forests, which serve not only to increase precipitation, but act as natural storage reservoirs for holding the snows and rain-falls on the mountains. This work of conservation must be taken up at once, he declared, or the mountains will be bare in a few years, and we shall leave a heritage of shame to the next generation.

Olaf Ellison spoke of the work that had been accomplished in various parts of Europe, in France about the Bay of Biscay, in the Peninsula of Jutland, and in Sweden and Norway.

Capt. S. S. Mullins felt an eager, absorbing interest in this question. He had witnessed the vandal work of shepherds, who build four fires a day, one for each meal and one at night, if it is cool. They do not, like intelligent hunters, see that their fires are extinguished before leaving them, but leave that matter to chance and to the grossest neglect.

Col. Adolph Wood, of the Arrowhead Company, thought that shepherds should be forbidden to take their flocks into or over a Government reserve. He considered the subject one of vital, far-reaching interest.

A. W. Koebig, Dr. C. G. Baldwin, George H. Peck and others were among the speakers.—*Los Angeles Times*, Mar. 9.

Indiana.

The Indiana Forestry Association was formally organized at a meeting held in the rooms of the Commercial Club, at Indianapolis, on March 16.

The purpose of the new association is to awaken public interest in the care of forests and woodlands; to promote the afforestation of land which is at present unproductive and to encourage the planting of trees in public parks, private grounds and along streets and highways. A congratulatory letter was read from Dr. C. A. Schenck, of Biltmore, N. C. It is expected that the association will eventually have a membership of from 300 to 500. John P. Brown, of Connersville, was elected president; William H. Drapier, Amos W. Butler, John H. Holliday, Albert Lieber, of Indianapolis, and Alexander Johnson, of Fort Wayne, vice presidents; William Watson Woolen, secretary, and Lewis Hoover, treasurer; William Watson Woolen and John P. Brown and Alexander Johnson were chosen as a committee on forestry, while J. Clyde Power and John R. Pearson were named as a committee on parks.

The officers elected were constituted

an executive board, to have entire charge of the work of the association. It was agreed to hold monthly meetings on the second Saturday in each month. The annual meeting will be held on the Wednesday following the second Monday in January next.

The present membership comprises the following: John P. Brown, William Watson Woolen, James A. Mount, Dr. C. A. Schenck, Biltmore, N. C.; J. Clyde Power, John H. Holliday, Albert Lieber, Alexander Johnson, of Fort Wayne; A. W. Butler, William H. Drapier, Dr. J. W. Bates, Dr. G. V. Woolen, Prof. D. M. Geeting, Eugene J. Barney, of Dayton, O.; George H. Cooper, Montgomery Marsh, Prof. John S. Wright, James G. Kingsbury, Lewis Hoover and John R. Pearson.

The following honorary members were elected: J. Sterling Morton, of Nebraska; A. J. Brown, secretary of the Nebraska Forestry Association; Mr. Allen Chamberlain, secretary of the Massachusetts Forestry Association; Prof. Samuel Green, of the University of Minnesota; Prof. Ellen Hayes, of Wellesley College, and Prof. William Trelease, director of Shaw's Botanical Garden, St. Louis.

Recent Legislation.

Minnesota.

"An act to encourage the growing and preservation of forests, and to create forest boards and forest reserves" has passed the Minnesota House of Representatives and seems likely to pass the Senate also. This bill profits by previous forest law and contains most of the points which the history of the subject in this country has shown to be most important or most helpful. Some special points deserve mention here.

There is to be a State Forestry Board of nine members. The Chief Fire Warden and the Professor of Horticulture at the State University are to be ex-officio members; three other residents of the State are to be selected by the Board of

Regents of the University, each of them chosen for his knowledge of special conditions; and The Minnesota State Forestry Association, the Board of Managers of the Minnesota State Agricultural Society, the Minnesota Horticultural Society and the State Fish and Game Commission are each to appoint one of the remaining four. There will be a president, vice president and secretary, appointed by the Board, and an executive committee; the State treasurer is to be the treasurer of the Board. The Town Boards of Supervisors and the County Commissioners, respectively, are to be town and county forest boards, which are to have such authority only as is expressly conferred by legislature.

The forest preserves are to consist of tracts (1) set apart by the State for forestry purposes, (2) deeded, devised or granted to the State for these purposes by persons or granted by the United States Government, or (3) given or devised outright by persons.

The Board is empowered to accept certain classes of lands deeded by their owners, in which case the lands are to be permanently devoted to forestry purposes; to sell dead and down timber and mature timber; to deed tracts whenever the growth of towns, railroads or need of water-power may demand it; to cut and sell forests or trees or sell tracts with the right to cut and sell timber thereon; but the proceeds of such sales must be divided like the rest of the income from the forests. This income is to be divided, at least once in every five years, one-third going to reimburse the State for the expenses of forest management and for the non-payment of taxes on the tracts deeded, the State receiving one-half and the county and town each one-fourth of this third; two-thirds going to support the educational institutions or systems of the State.

As a source of revenue, or for their protection from the fire Board may lease (a) low meadow tracts and (b) other tracts for pasture, when this can be done without endangering the growth of trees.

If this bill passes, as it bids fair to do, the State of Minnesota will have joined the good movement for perpetual State ownership and protection of forest lands in which New York and Pennsylvania have already made such noteworthy progress.

Indiana Forest Tax Legislation.

The General Assembly of Indiana enacted a law during its late session which has for its object the encouragement of the preservation and proper management of timber lands in that State. It provides that upon any tract of land in the State of Indiana there may be selected by the owner, or owners, as a permanent forest reservation, a portion not

to exceed one-eighth of the total area of said tract, which shall be appraised for taxation at one dollar per acre. If the tract is original forest with not less than 170 trees on each acre its owner may avail himself of the benefits of this provision immediately by filing a description of the selected tract with the county auditor. If the land owner elects to plant a tract he must cultivate the same and have not less than 170 trees growing on it at the end of three years before he can have his reservation confirmed for the reduced assessment. In all cases dead trees must be replaced by new ones planted so that the minimum number on each acre shall not fall below 170; and it is further provided that no land owner who receives the benefits of this law shall permit cattle, horses, sheep, goats or hogs to pasture upon such reservation until the trees are four inches in diameter. Not more than one-fifth of the full number of trees on any such reservation shall be cut in any one year, except that dead trees may be removed and other trees planted in their places.

One section of the law enumerates the trees which shall be considered as forest trees within the meaning of its provisions. About twenty varieties of timber, including probably forty or more species of trees, are specified. It would not seem to include the Beech, Sycamore, Cottonwood, Black Cherry, Hackberry and Juniper, all of which are indigenous and each of some economic value, although the Kentucky Coffee, Osage Orange, Sassafras and Catalpa are given in the list that will be considered as forest trees within the meaning of the law.

It is made the duty of the county auditors to keep a record of all forest reservations. They are also to require owners or agents to subscribe under oath to the extent and description of the land reserved. It is made the duty of assessors to personally examine the various forest reservations when the real estate is appraised, and to note upon the return the conditions of the trees, in order that the intent of the law may be fully complied with.

A New National Park.

By an act of Congress approved March 2, 1899, a tract of land eighteen miles square, embracing in all 207,360 acres, and including Mount Rainier itself, was withdrawn from the Mount Rainier For-

est Reserve and dedicated to the purposes of a national park. It is to be known as the Mount Rainier National Park. The Mount Rainier Forest Reserve thus reduced contains 2,027,520 acres.

Educational.

The College of Forestry recently added to the curriculum of the University of Southern California, was formally opened in the college building at West Los Angeles yesterday morning. The exercises and lectures were held in the biological lecture room, and will continue to be given there for the present. After a few remarks by President George W. White the first lecture in the course was delivered by the Hon. Abbot Kinney. In an exhaustive discourse upon "The History of Forestry and Its Need in Southern California," Mr. Kinney set forth the original cause of a study of forestry in the dependence of primitive man upon the forest and its products for subsistence. The nations of Europe have made a science of forestry and it is conducted under governmental supervision.

To Southern California, with its treeless plains and scant rainfall, this subject is all-important, and this school will meet the want by turning out trained foresters, who will carry out this work under Government control. Their efforts will be directed to preserving and enlarging the present forest area on our watersheds.

At 1.20 p. m., Professor O. P. Phillips addressed the students upon "The Botany of Tree Growth." In brief he described the method of tree growth and

the absorption of moisture from the atmosphere by the leaves and the slow evaporation of the moisture from the soil through the trees.

Prof. Laird J. Stabler followed with a lecture on "Soil Physics." He described the meteorological instruments used in practical forestry and explained the effect of forests on the rainfall.—*Los Angeles Herald, March 4.*

Mr. Peter Barr, a prominent horticulturist and arborist, of London, Eng., who is visiting Ottawa at present, makes a suggestion that is well worth the attention of the Government. It is the establishment of a School of Forestry for instruction in the propagation and conserving of the forests. Much attention is being directed to this branch throughout the British Empire, especially in India, where it is a well-organized departmental work, the country being divided into districts under foresters and rangers. There is no School of Forestry in the British dominions in North America, and Mr. Barr thinks that the Imperial authorities would make a grant for the support of such an institution where thorough instruction could be imparted in the growth, care and preservation of timber, and that Ottawa is just the place for its location.—*Canada Lumberman.*

THE FORESTER.

PUBLISHER'S ANNOUNCEMENT.

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where all communications should be addressed.

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Make all checks, drafts, etc., payable to THE FORESTER.

New Members.

Since the last issue of THE FORESTER the following named persons have been elected to membership in the American Forestry Association:

Austin Corbin, 192 Broadway, New York, N. Y.

Sydney Arnold, Box 308, North Yakima, Wash.

Wm. J. Roberts, Pullman, Wash.
Joel Shoemaker, North Yakima, Wash.
Geo. H. Wallis, 333 Bay St., San Francisco, Cal.

Douglas T. Fowler, Berkeley, Cal.
Ezra F. Stephens, Crete, Neb.
Henry O'Sullivan, Indian Lorette, Prov. Quebec.

James Dun, Topeka, Kan.
Hon. Joseph M. Carey, Cheyenne, Wyo.
Hon. Henry C. Dillon, 321 Bullard Block, Los Angeles, Cal.

Arthur Gunn, Wenatchee, Wash.
Charles H. Baker, Seattle, Wash.
Peter Koch, Bozeman, Mont.
Henry E. Glazier, Stillwater, Okla.

W. N. Wiley, Holly, Colo.
Oscar R. Young, C. E. McCormick Building, Salt Lake City, Utah

Norval W. Wall, C. E., Colorado Springs, Colo.

F. A. Hutto, Stillwater, Okla.
Walstern R. Chester, 27 Doane St., Boston, Mass.

W. H. Howcott, 838 Common St., New Orleans, La.

E. L. Tebbets, Locke's Mills, Maine.
Fred Larkins, White Springs, Fla.
Geo. J. Krebs, Cairo, Ill.
Richard Thornton Fisher, 44 Brattle St., Cambridge, Mass.

G. Fred Schwarz, Department of Agriculture, Washington, D. C.

Nathan B. Prescott, 28 Boylston Terrace, Jamaica Plain, Mass.

C. H. Shinn, Berkeley, Cal.
Geo. S. Edwards, Commercial Bank, Santa

Barbara, Cal.
A. Edwards, Commercial Bank, Santa Barbara, Cal.

C. H. Frink, 725 State St., Santa Barbara, Cal.

E. P. Dunn, Arlington Hotel, Santa Barbara, Cal.

Clio L. Lloyd, *Morning Press*, Santa Barbara, Cal.

R. F. Winchester, M. D., Santa Barbara, Cal.

J. M. McNulty, M. D., Santa Barbara, Cal.
D. B. Harmony, " "

E. C. Tallant, " "
E. M. Pyle, " "

E. C. Roeder, " "
Jonn F. Diehl, " "

F. A. Canant, " "
T. R. Dawe, " "

Garrett S. Richards, " "
C. A. Storke, " "

Bennett Fithian, " "
A. W. Maulsly, " "

O. A. Stafford, Hope, Cal.
D. L. Wiggins, Ashland, Wis.

C. F. Latimer, Ashland, Wis.
Frederick Abbot, Milwaukee, Wis.

Mack Morris, Trenton, Tenn.

Life Member.

Mrs. Edward Whitney, Belmont, Mass.

TO THE EDITOR:

I note in your last issue the patriotic criticism which the reviewer of the Bulletin on "Measuring the Forest Crop" makes because the cubic foot measure has been employed, at the same time breaking a lance for the American lumber foot.

In this attempt the critic recommends and at the same time discredits the usual log rules, which, as is well known, are not really a measure but a complex agreement dependent in part on volume and on usage in conversion.

Will you please explain for the benefit of your readers how one can measure trees directly with the lumber foot, and how, for instance, a pulpman may know how much a given parcel of land or a lot of logs contains, if the report merely gives the amount of material according to the Doyle or Scribner rule.

Sincerely yours,

WM. B. HOWARD.

UTICA, N. Y., March 31, 1899.

In our criticism of Bulletin No. 20 of the Division of Forestry, "Measuring the Forest Crop," by A. K. Mlodziansky, in the March number of THE FORESTER, we did not state that directions for computing the contents of trees in cubic feet should have been entirely omitted, but

we criticised the lack of directions for measuring timber by American methods, namely, the board foot, standard, and cord. These measures will be used in this country for many years, both by lumbermen and foresters, and any treatise which subordinates them to a method used in some other country and almost never used in America is not complete and can have but little practical value.

The report of the Special Committee of the New York Legislature appointed to investigate as to what additional lands shall be acquired within the forest preserve in order to protect the watersheds and for the Agricultural Experiment Station has been printed under date of February 9. It is a document of sixteen pages, chiefly occupied with puffs of the regions visited by the Committee. Its

recommendations are supported by no arguments of consequence and apparently by little actual examination. The report as a whole is inconclusive and incomplete. It represents an exceedingly small return for the expenditure of the three thousand dollars appropriated for the Committee which made it.

The edition of THE FORESTER for November, 1898, having been exhausted, it has been found necessary to have a new one printed. Members of the Association and subscribers who may need copies of that issue (No. 11, Vol. IV,) to complete files for binding, will be supplied if they notify the publishers to that effect.

A limited number of complete copies of Vol. IV of THE FORESTER are offered for sale. Price \$1.00. Previous volumes are out of print.

Recent Publications.

The European and Japanese Chestnuts in the Eastern United States, Bulletin No. 42, Delaware Agricultural Experiment Station, by Prof. G. Harold Powell, treats of chestnut culture from a horticultural point of view. The history of the introduction of the cultivated varieties of the chestnut from France and Japan is briefly sketched and several pages are devoted to a discussion of the value of its fruit as food. Four pages are filled with the botanical consideration of the American, Asiatic and European types, their similarities and differences. Cultural suggestions include production of varieties from seedlings and hybrids; propagation, by budding and grafting; the treatment of the planted orchard and the grove of top-worked sprouts; subsequent care of trees; insect enemies and fungous diseases. The merits and advantages of the two introduced species are compared and the conclusion is drawn that the Japan Chestnut is the more desirable for the nut culturist, although the European species is accorded a higher value as a timber tree. A great development for this branch of horticulture in the Eastern States is predicted. A list of thirty-six desirable varieties, about equally divided between the two species, with brief descriptions of each, completes the pamphlet of thirty-five pages. It is well illustrated and well written, and serves excellently as an introduction to the subject under consideration.

Bulletin No. 40 of the Wyoming Experiment Station is entitled *The Trees of Wyoming and How to Know Them*. This bulletin of fifty pages was prepared by Prof. Aven Nelson, botanist of the Wyoming Station. It is a brief but comprehensive description of the native arborescent flora of Wyoming, and, with Prof. Buffum's bulletin on the shade and forest trees in artificial plantations, it makes a very complete exposition of the subject of trees and tree culture in that State. In consequence of the great altitude of the mountains of Wyoming and the arid conditions prevailing on the plains the forests are limited in area and it is but natural to presume the list of species included would not be large. Prof. Nelson has listed thirty-one species in this bulletin, although not all of these would be classed as timber trees. Of these eight are conifers, three Pines, two Spruces (*Picea*), the Douglas Spruce (*Pseudotsuga*), and two Junipers. The deciduous trees enumerated include five species of Poplar, two of Birch, one of Oak, three of Maple, and one of Ash and a number of species of lesser importance. The bulletin devotes some space to observations on the growing interest in trees and tree culture, forests and forestry and advocates an extension of the forest reservation system in Wyoming. It is well illustrated with half-tones and drawings of forest scenes, trees, twigs, foliage, flowers and fruits of the species described, and altogether it is a very interesting and instructive bulletin.

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A MONTHLY MAGAZINE

devoted to the care and use of
forests and forest trees and
to related subjects.



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The Forester.

VOL. V.

MAY, 1899

No. 5.

The Mount Rainier National Park.

Compiled partly from official data hitherto unpublished.

[Published by permission of the Director of the U. S. Geological Survey.]

The first suggestion for the establishment of a Rainier National Park came from two widely traveled foreigners. In 1883 they visited Mount Rainier, the one Prof. Karl Zittel, of Munich, a geologist familiar with all the aspects of Europe, and the other the Hon. James Bryce, a member of the English Alpine Club, and a traveler whose mountaineering conquests included Ararat. In a joint letter these gentlemen wrote:

"The scenery of Mount Rainier is of rare and varied beauty. The peak itself is as noble a mountain as we have ever seen in its lines and structure. The glaciers which descend from its snow fields present all the characteristic features of those in the Alps, and though less extensive than the ice streams of the Mount Blanc or Monta Rosa groups, are in their crevasses and serracs equally striking, and equally worthy of close study. We have seen nothing more beautiful in Switzerland or Tyrol, in Norway or in the Pyrenees, than the Carbon River glacier and the great Puyallup glaciers; indeed, the ice in the latter is unusually pure, and the crevasses unusually fine. The combination of ice scenery with woodland scenery of the grandest type, is to be found nowhere in the Old World, unless it be in the Himalayas, and, so far as we know, nowhere else on the American Continent. * * *

We may, perhaps, be permitted to express a hope that the suggestion will at no distant date be made to Congress that Mount Rainier should, like the Yosemite Valley and the geyser region of the Upper Yellowstone, be reserved by the Federal Government and treated as a National park."

The hope expressed by these foreigners found no response in legislative action until the winter of 1895. Then a memorial prepared by a committee representing the American Association for the Advancement of Science, the Geological Society of America, the Sierra Club of California, and the Appalachian Mountain Club, was presented to the Senate by Mr. Squire, the Senator from Washington. In 1897, the action of which

this memorial was a feature, led to a bill designed to establish a National Park, which passed both Houses of Congress, but failed of signature by the President. In the winter of 1899 this bill, with slight modifications, was again introduced, passed both Houses, and receiving the signature of the President, became a law on March 2.

The bill provides for a National Park eighteen miles square, designed to include the glacial system of Mount Rainier, its parks, and some part of the surrounding forests. The boundaries are laid off according to township and range lines of the Government Land Survey, beginning at a point three miles east of the northeast corner of T. 17 N., R. 6 E. of the Willamette meridian. The square, eighteen miles on a side, is broken on the eastern line to an unknown extent by the provision that: "In locating the said easterly boundary, wherever the summit of the Cascade Mountains is sharply and well defined, the said line shall follow the said summit where the said summit line bears west of the easterly line as herein determined."

It is provided that the National Park shall be under the exclusive control of the Secretary of the Interior, whose duty it shall be to make and publish such rules and regulations as he may deem necessary for the management of the same. The Secretary may, in his discretion, grant parcels of ground for the erection of buildings for the accommodation of visitors, and all the proceeds of the leases, and all other revenues that may be derived from any source connected with the Park, are to be expended, under his direction in the management of the same and for the construction of roads and bridle paths therein. Rights of way may be granted to railway or

tramway companies for access to the Park, fish and game are to be protected from wanton destruction, and police authority is given. Provision is made to compensate the Northern Pacific Railway Company for such part of its land grant as falls within the boundaries of the Park, it being authorized to select other non-mineral lands in lieu of those taken. The last section of the law extends the mineral land laws of the United States to the lands lying within the Forest Reservation and Park.

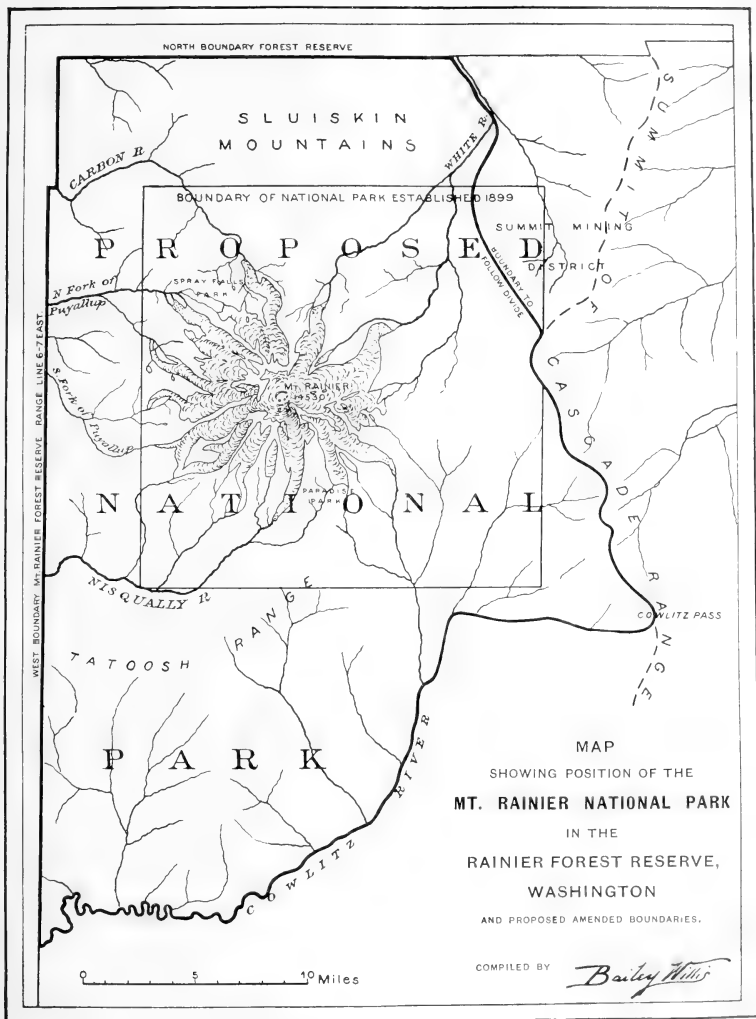
The occasion for creating the Rainier National Park cannot be more concisely stated than in the quotation from Professor Zittel and Mr. Bryce: "The combination of ice scenery with woodland scenery of the grandest type is to be found nowhere in the Old World, unless it be in the Himalayas, and, so far as we know, nowhere else on the American Continent." The district lies wholly on the western side of the Cascade Range, where the moist and equable climate promotes the growth of vegetation, and the heaviest forests of the United States clothe the slopes. These virgin forests of the Cascades are deep and dense. The tall, light-loving trees, tower to heights of 250 feet or more, on relatively slender shafts, which near the ground are 6 to 10 feet in diameter. Beneath their interlacing crowns grow trees more tolerant of shade, bearing branches to within a few feet of the ground. Shrubs crowd among the tree trunks, rising from rich ferneries, vines and matted mosses. The air is damp, the light sombre, the solitude becomes oppressive. But little animal life is seen, and few birds. The wind plays in the tree tops far overhead, but seldom stirs the branches of the smaller growth. The great tree trunks stand immovable. The more awful is it when a gale roars through the timber, when the huge columns sway in unison and groan with voices strangely human. The upper limit of the dense forest is about 4,000 feet above the sea, but trees of less vigorous growth cover the slopes and ridge up to 6,000 feet, and the limit of

tree growth in many places meets the snow line at 7,000 to 7,500 feet.

From the sea of the evergreen forest the gigantic snow peak, Mount Rainier, rises solitarily to an altitude of 14,530 feet. Its form is that of a many-sided pyramid, 5,000 feet in height, rising from a broad and deeply-carved base. The summit consists of three peaks, two of which are nearly a mile apart, and their broad expanse is deeply covered with a mantle of glistening snow. The sides of the pyramid are precipices, which descend into vast amphitheatres. Glaciers flowing from the *nevé* fields of the summit hang upon the cliffs, break in avalanches over their steepest facets, or descend in cascades of flashing ice pyramids to the broader platform. Gathering their spray, as it were, beneath the steep scarps, the ice rivers flow outward in all directions and descend far into the forest-clad valleys. Forest, glacier and precipices combine to form scenes of the wildest grandeur and the deepest sublimity.

Strangely environed in this rugged scenery lie alpine meadows of exquisite beauty. In July and August they bear a richly-tinted flora, comprising more than 400 species of flowers, and they are set with groves of exquisitely symmetrical Firs, whose dark foliage is a foil to the brilliant coloring of the flowers and the pearly aspects of the snow peak. These are the scenes which no student of nature can visit without interest, nor any one view without realizing an inspiring and uplifting influence.

At present there is but one easily accessible route to the Park. This is by stage from Tacoma southward to the Nisqually Valley and thence eastward to Longmire's Springs. The distance is about 60 miles and the roads are not yet adequately constructed. From Longmire's, Paradise Park, one of the mountain meadows on the southern slope, is reached by a mountain trail 7 miles in length. Beyond Paradise Park all excursions involve mountaineering of greater or less difficulty. A second route extends from Wilkeson, at the end



of the railroad north of Mount Rainier, southward across Carbon River to the northwestern spur of the mountain, and reaches a district spur known as Spray Falls

Park. The distance is about 30 miles over a well built bridle path, which is now, however, in poor repair. It was at one time easily possible to leave Wilke-

son in the morning and watch the sunset from a camp at an elevation of 7,000 feet on the northwestern side of the snow peak. The wanton destruction by fire of a bridge across Carbon River renders necessary a dangerous ford at that stream, and now makes this route unavailable for any except mountaineers.

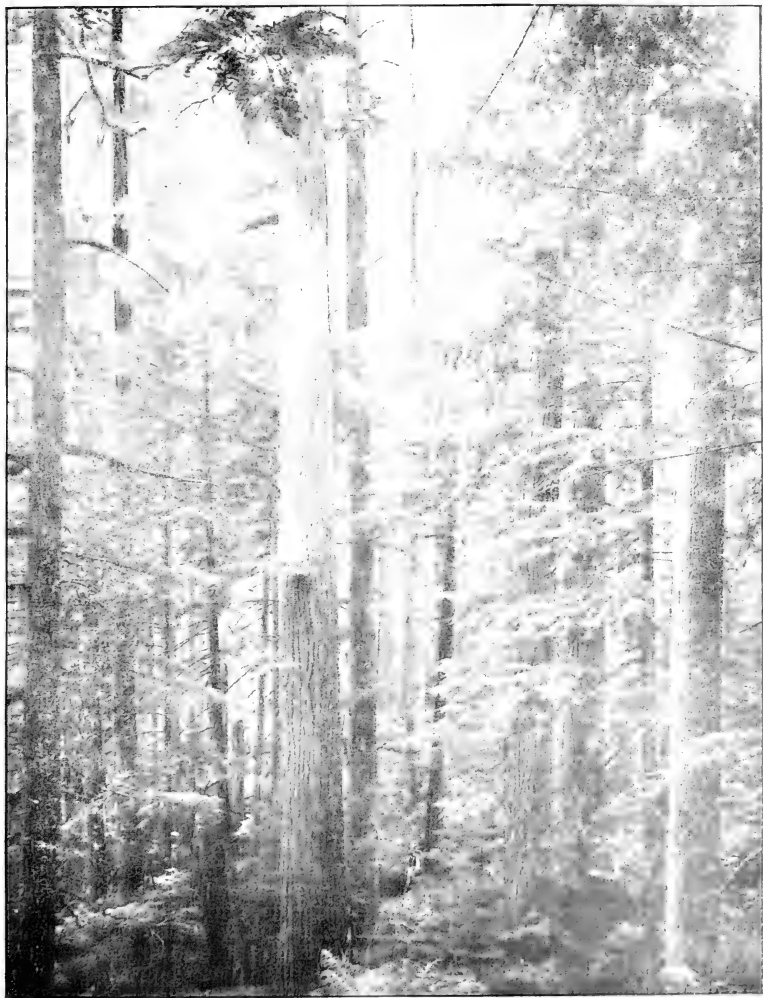
Other lines of access which may be opened up but are not now used are (1) from the southwest up the Cowlitz River, which rises in the glaciers on the southeastern slope of Mount Rainier, (2) from the east through the Cowlitz Pass in the Cascade Range, and (3) from the north along the summit of the Cascades. The Cowlitz Pass has repeatedly been examined as a possible route for railroad construction, and it is probable that the establishment of a National Park may lead to the construction of a railroad across the range at this point. In all legislation relating to the National Park, care should be taken not to close the Cowlitz Pass against traffic, as it affords an important line of communication between the Yakima and the lower Columbia Valleys.

Access to Mount Rainier from the north along the summit of the Cascade Range is at present practicable only with a pack train. There is a rough trail which may be followed by mountaineering mules, and which may serve to suggest a great driveway that shall be built to connect the Northern Pacific Railroad with the Cowlitz Pass and the National Park. Such a road will be about 50 miles in length, and will throughout much of the distance run at altitudes of 5,000 to 6,500 feet along the somewhat even crests of the range. For many miles the traveler along this road will have Mount Rainier in view beyond mountain slopes which sink from his feet into the vast expanse of the great forest. Abreast of Mount Rainier the road will be 12 miles distant from the summit, and the splendid snow peak will rise from the depths of canyons far below to a height of 8,000 feet above it. That it is practicable to lay out this road there is no doubt, and that it will be found profitable and will be built is more

than probable. It will challenge the world for its equal in variety and majesty of scenery.

Two central points for tourists are determined by the topography of the district. These are Paradise Park on the south and Spray Falls Park on the north. Both of them lie at elevations of 6,500 to 7,000 feet, between adjacent glaciers. Routes within the Park will be developed chiefly for communication between these two points and for the ascent of the mountain. At the present time to pass around Mount Rainier at a low altitude is an extremely arduous undertaking, and at higher altitudes across the glaciers a task requiring alpine experience. At the higher levels the construction and maintenance of trails will never be practicable, as four-fifths of the way is across the ice and through mazes of crevasses, but below the glaciers trails may be laid out to the east or to the west of Rainier, traversing the canyons and winding through the forests, where the traveler will be charmed with the harmony of tints in the vegetation, delighted with waterfalls, and transported with glimpses of the snowy summit far above them all.

The ascent of Mount Rainier can never become a popular pastime, as under the best conditions it demands unusual strength and steadiness of nerve, yet a considerable number of climbers have already ascended the peak, and with due care the ascent may be made from Paradise Park across Gibraltar Rock and the snow fields beyond without serious risk. Many who might be unequal to the task of ascending and descending the peak in the same day will avail themselves of the caverns within the crater of the mountain. There, protected by a roof of ice from the freezing blasts without, and warmed by the steam which issues from many vents in the old volcano, they may pass the night, dividing their dreams between Jack Frost and Pluto. All other ascents of Mount Rainier than that by Gibraltar involve great risk and should be undertaken only by experienced mountaineers familiar with work among crevasses. The climb has



FOREST ON SLOPE OF MOUNT RAINIER ; ELEVATION 2,000 FEET.

(The diameter of the large Fir at the lowest point seen is about 10 feet. The figure of a man may be seen to the right of it.)

been successfully made up the glacier on the western slope, and also from the northeast and east up the great ice mass that covers the eastern slope, but the conditions which made success possible in these instances are constantly changing with flow of the ice and variations of the seasons.

The boundaries to the Park as now established by law are not well considered for its future development. They are too limited. They fail to include districts whose scenic aspects are essential to the unity of the Park and whose features should not be left outside of its protection. This is most especially true of the western limit, and it is to some extent true of the northern and southern bounds.

According to the best information available, the western boundary of the established Park traverses the spurs of Mount Rainier at altitudes which range from 2,500 feet in the canyons to about 7,000 feet on the ridges. The extremities of several notable glaciers probably extend to or beyond the Park limit. The valley of the headwaters of the South Fork of the Puyallup has a northwest course in the three-mile strip which lies west of the National Park and within the boundary of the Rainier Forest Reserve. The most accessible route for communication around the mountain from the Nisqually Valley to Spray Falls Park should cross the low divide north of the Nisqually and traverse this valley of the South Puyallup. Such a route should be within the Park limits. The valley of the Puyallup is heavily timbered, and if preserved within the National Park may be protected from those operations of the lumbermen which it is part of the economic policy of the Forest Reserve to a certain extent to promote. It is not much to demand that the virgin forest within a strip 3 miles wide by 18 miles long should be preserved for all time to come.

North of Mount Rainier lies a group of jagged peaks rising to elevations of 7,000 to 8,000 feet, known as the Sluiskin Mountains. The boundary of the

established Park crosses these summits apparently through the highest peaks of the group. It may probably be desirable to extend the National Park northward approximately 6 miles to the northern boundary of the Forest Reserve. The northeast corner of the established Park probably includes some portion of the Summit mining district, which is separated from Rainier by a high spur of the Cascade Range. It may be necessary here to curtail the limits of the Park in such manner as to exclude the mining district.

It has already been stated that the Cowlitz Pass should be left open for railroad construction, but in order that the routes into the Park may have a rational development it is desirable that the Park boundary on the east should extend along the summit of the Cascade Range southeastward to the Cowlitz Pass, and that the southern limit should follow thence down the Cowlitz River probably to the western side of the Forest Reserve. This will include in the Park the Tatoosh Range, south of Mount Rainier. The rugged peaks of this range form part of the environment of the snow mountain, and are to some extent still densely forested. A broad area of burnt forest covers their northern portion and extends to the headwaters of the Cowlitz River. Under the practical management of the Forest Reserve this broad area will be reforested, but it is desirable to preserve that forest against future cutting, except as may be necessary to promote its proper growth, if the object of the National Park as a tourist resort is to be fully attained.

If these amendments to the boundaries should be carried out, the northern and western boundaries would remain straight lines artificially determined by U. S. land surveys; the eastern boundary would be defined by a spur and the crest of the Cascade Range, and the southern boundary by the Cowlitz River. The two last are natural features, always to be preferred, where practicable, to artificial lines extended across a mountainous country.

The bill which has been passed creating the National Park is without effect because it carries no appropriation. Before anything can be done toward the appointment of an administrative force, for the accomplishment of surveys necessary to intelligent plans, or for the protection of the district from careless campers, means must be provided and

modifications of the boundaries must be adopted.

The societies which have been active in presenting the matter to Congress and all who appreciate the inspiring influence of Nature in her most majestic aspects should energetically interest themselves in the further development of the Rainier National Park.

BAILEY WILLIS.

The Training of Professional Foresters in America.

A Symposium in Three Papers.

I. BY THE DIRECTOR OF THE NEW YORK STATE COLLEGE OF FORESTRY, ITHACA, N. Y.

There are many roads leading to Rome and there are many ways of getting an education or a preparation for a profession, and according to the make-up of the man is the one or the other best to travel.

I know a most competent scientific investigator, an excellent teacher and manager, who started life as a cowboy; yet, though undoubtedly his early experience of independent thinking and acting benefited him, we would hardly prescribe such a preparation for general use. The next man might remain a cowboy.

Even if we knew the ideal way to knowledge, practical limitations often forbid to follow it, and finally we find ourselves forced to take the main-traveled, broad road of uniformity, which our educational institutions, schools, colleges, and universities have built, with the prescribed or at least systematically-laid-out curricula, without regard to individual requirements or dispositions, except so far as the student is left to select his studies within a prescribed circle.

For a profession which, like forestry, has to deal with the direct application of knowledge to practical problems, the need of an opportunity to see such application in actuality and to have a hand in the practice early, is obvious, just as

in the engineering or medical profession or in fact almost any other profession. Yet we must not forget that all practice is based on theory; and the more thorough the theoretical knowledge, the more intelligent and more sure will be the practice.

The attempt to satisfy the popular but ignorant cry for so-called "practical instruction" usually leads to the production of superficial and incompetent practitioners, lacking a safe guide in thorough knowledge, although by no means lacking in self-assurance. I would, therefore, advise any student of forestry in this country, as well as in any other, to lay as broad a foundation of theoretical knowledge as he can afford; he will be more successful in the end with his practice.

As to the time and manner of acquiring practical insight, whether it should precede or follow the theoretical studies or be interspersed with the latter, opinions vary. Even the Germans, who have the reputation of being good educators, have not been able during the hundred years of forestry education to come to a final verdict.

Yet, if we may take the number of students as an indication of the preference of methods, we find that the University method which leaves much choice to the student in electing his studies and

seeking practical instruction where and when he can, seems to be in favor, for the College of Forestry at the University of Munich shows by far the largest attendance—namely, 140 students during the last term, more than double that of the best attended separate schools, excepting only its own preparatory school at Aschaffenburg, the total number of students inscribed at all the eight forestry schools being 587.

I should be inclined to advise American students, if they can find the opportunity, to begin their forestry education in some well-conducted lumber camps, in actual employment, either before or after the Freshman and Sophomore years of their college education, so as to learn the practical side of forest exploitation—forestry, largely, being merely an improvement on lumbermen's practice. Then after laying the foundation of theoretical knowledge in professional forestry at the Cornell State College of Forestry, or wherever else it may be attainable with as much practical demonstration in this country, a visit to European forest districts for inspection of object lessons, which are, as yet, not at hand in this country, would be advisable. Such a visit after the theoretical instruction will be more instructive and helpful than if timed otherwise.

As to qualifications, we must not overlook the fact that forestry, like all other professions, when once established, will soon call for specialization. We shall need not only captains, but lieutenants and privates, managers as well as instructors, investigators, etc. In the end, therefore, the qualifications required for this profession are no more nor less than for any other.

Yet before the profession is further established, I would not advise to enter it, any one who is not possessed with a spirit of enterprise and independent thinking, who has not the capacity for finding a way where none is marked out for him, and who has not a large amount of business sense or gumption. For finally the fully-equipped forester is a business manager, whose business it is to turn into profit the product of a forest

property sustained in continuous revenue-producing capacity. This under our economic conditions is not easy and requires judgment. Judgment, to be sure, is formed by experience, nevertheless there is a disposition of mind which ripens experience into judgment, sooner in some than in others. It is alertness of observation and capacity for combination which we call practical sense. The student, therefore, should be sure that he possesses this disposition, that he is interested in technical, as well as in practical things, such as the management of a property represents.

I may only add, that at the newly-established New York State College of Forestry, the aim is to run it on broad University principles, allowing students who have attained the proper degree of knowledge in their Freshman and Sophomore years in Natural Sciences, Mathematics and other supplemental branches, to elect their forestry studies in the Junior and Senior years as they desire, except those studying for a degree, who are expected to elect a complete prescribed course. As much practical demonstration as possible is given during the terms, and there is more opportunity for this than had been anticipated. The summer vacations are to be spent in practical work in the experiment forest or wherever else an opportunity may offer.

The beginning has been encouraging, for during the first two terms there have been in attendance in the five strictly forestry courses (excluding duplication of names in the different courses and also excluding students of the College in the Freshman and Sophomore years), thirty-six students, taking either one or several courses—namely, students of Civil Engineering, Architecture, Agriculture, Political Economy, besides those who propose to make forestry their profession. The experiment forest coming into the possession of the College only by the 1st of April, the work has not yet begun; but the students will be largely employed in making the necessary surveys and working plans.

B. E. FERNOW.

II. BY THE FORESTER OF THE BILTMORE ESTATE, BILTMORE, N. C.

All thinking people realize that the financial result of forestry consists in part of a positive gain obtained, and in part of economic losses avoided—losses threatening navigation, water supply, public health, etc. And all must agree that forestry on a large scale in the long run is not possible unless it be found to be remunerative one way or the other, unless it be established as a well paying business.

The American forester, in almost any position, must be a business man.

Abroad, things may differ where large forest areas are controlled by the commonwealth and municipalities, or consist of entailed property, institutions for which business considerations do not hold good, perhaps, altogether. In this country, at least 85 per cent of all woodland is owned by private individuals, who cannot possibly be compelled to manage their forests for the general welfare, when such management interferes with the owners' financial views.

The American forester, being employed for business purposes, must be well acquainted above all with the economic conditions of the various sections of the United States, and more especially with their lumber interests. The more time he spends traveling in the woods, in the lumber camps, in saw mills and wood-working establishments, the better for him. Knowledge thus acquired will be more valuable to him, the business forester, than a thorough acquaintance with chemistry, physics, zoology, mineralogy, geology and mathematics, with which forest students are packed full in Europe.

If the American forest student masters the principles of botany, surveying, political economy and private law, he will not know enough to pass as an expert, but enough to take a deep plunge into any question connected with forest botany, forest surveying and so on that may present itself; and if he finds the question too difficult for his own head, there are plenty of specialists to whom

he may appeal for help. It is impossible for one single individual to be a thorough botanist, zoologist, chemist, geologist, mineralogist, surveyor, economist and lawyer; besides, more important than the theoretical knowledge, however valuable it may be, is the practical knowledge for the forester as a business man. It is just as little feasible to study forestry from books or at a university alone, as it is possible for the physician to become a master in his branch unless he have large experience in clinic and hospital work. True, the physician must know something of chemistry, of botany, and of physics; but it would be preposterous for him to devote more time to the study of such branches than will be justified by the needs of the practice.

A young man who is anxious to take up forestry as a profession should, I think, adopt the following course of studies:

The first year should be given to the study of botany, surveying, political economy, law and, to a certain extent, mathematics, chemistry, physics and geology. The proper place to study is at a university, which offers concentrated courses suited to the needs of the forest student.

The second year should be devoted to the study of forestry under the guidance of a forester of some experience and in a range where forest administration is conducted on a comparatively large scale. If, as is the case at Biltmore, N. C., daily lectures on forestry are given at the same time, the young man will have a chance for the study of forestry as well as for a sort of apprenticeship, which we might compare to the hospital or clinic practice of a medical student. All operations in forestry (logging, road making, planting, and whatever there be) repeat themselves, as a general rule, in the course of a year. Thus a twelve-months study of forestry at a place like Biltmore seems sufficient.

The third year should be spent partly

in lumber camps and lumber mills; partly on a trip to Germany or France, where silvicultural principles may be studied, and nothing else. The economic conditions on the other side of the water are so different from those prevailing in this country that it is futile to try an adaptation of European forestry to American woods—silvicultural principles excepted.

We cannot import German forestry unless we import German conditions, conditions under which conservative forest management pays better than rapid lumbering. If our lawmakers were filled with the conviction that the commonwealth needs forests, and that it should pay for forest maintenance just as much as that maintenance is worth; if our Government would only provide and pay for a state of affairs making conservative lumbering of forests more remunerative to the owner than rapid forest destruction, we would get "European Forestry" at once.

The legislatures, the people, we ourselves are guilty of committing the crime of deforestation by carelessly allowing conditions to remain unchanged which make forest destruction more remunerative to the owner than forest conservation. Release the heavy burden of taxes on young forests not yielding immediate returns; save maturing forests from the short-sightedness of local tax assessors; protect young and old forests from fire and theft as well as any other property, and you will have forestry, because it will pay.

The change in American forest economy must come, and must come soon. Forest proprietors have anticipated it in sections where the conditions are less unfavorable, and have begun to apply conservative management to the forests which they control.

Still the forests of the United States do not offer illustrations exhibiting the effect of applied silviculture. Even those at Biltmore show only ten years' management. Thus it will be advisable for the forest student to visit countries where silviculture has been practiced for over a century. He simply follows the example of the American artist who studies those masters in the Old World which the New World does not yet offer.

In the course of three years a young man will be ready to fill a position in a forest undertaking. It will depend on the work to which he is put whether he has to enlarge upon his knowledge of botany or on his knowledge of law or political economy and so on, and so on. Neither the physician nor the forester can ever stop learning. It is impossible in this complicated world to be prepared for all emergencies. Any new situation necessitates new study.

Again and again, forestry is business, the forester a business man, and the primary training he needs in order to become a "master of his art," is a common sense and business training.

C. A. SCHENCK.

III. BY THE FORESTER OF THE DEPARTMENT OF AGRICULTURE.

The general objects of training in forestry are: first, to develop what may be called, after the French, the forester's eye—that is, the capacity to observe and understand the condition and needs of forest land; and, secondly, to give such a knowledge of methods and circumstances that the forester may be able to act intelligently, in accordance with the facts he has observed. To reach these ends the forest student must have some

knowledge of physical science, a good working acquaintance with the theory of forestry, and a considerable experience with the forest itself under a variety of conditions. The first step, in my judgment, should be a college or university training, wherever that is possible.

Forest work, on the rougher side, demands great bodily endurance and strong enthusiasm, but there are other divisions of the subject which make less stringent

physical demands. It may be said in general, however, that none but the completely sound in body should undertake the active work of a forester.

The more important auxiliary subjects, a knowledge of which should in most cases be obtained, at least in part, before the training in forestry itself is begun, are:

(1) Botany, emphasis to be laid chiefly on the structure and life of plants. Systematic botany need not be dwelt on at length. The knowledge essential to the determination of the species of trees is, naturally, of great importance. Cryptogamic botany should not be entirely neglected, although only a general view is required.

(2) Geology, with special emphasis on the origin and meaning of the surface features of the earth.

(3) Some Physics and Chemistry is essential, and a slight knowledge of Zoology and Entomology should not be omitted.

(4) Mathematics should include Geometry and Trigonometry, and, preferably, Mechanics also. A good working knowledge of Surveying should be acquired.

(5) Some knowledge of Law and business methods.

(6) German or French, preferably the former, and still better both together.

(7) A good course in Economics.

(8) History and Geography of the United States, with special reference to economic development and production.

A considerable part of these auxiliary subjects may be acquired during a college or university course. If, however, work in forestry begins after graduation and without previous training in auxiliary subjects, it should be commenced by several months of practical work in the woods. Indeed, it will be well, in all cases, for the forest student to begin practical work before plunging too deeply into his theoretical training. For this purpose the position of Student Assistant in the Division of Forestry, United States Department of Agriculture, offers a valuable opportunity

to a few well-qualified men to become acquainted with the true nature of forest work. Students are paid at the rate of \$300 per annum, and all field expenses are borne by the Division.

After such an experience in the field, when the forest student has achieved a correct conception of his future work, the auxiliary training should be begun, followed by a year or more in forestry at a forest school, with the vacations spent in the woods, and, finally, not less than a year abroad. To my mind, this final year is of very great value, because in this country it is not possible to gather an adequate conception of the response of forests to treatment through long periods, or of the application of remedies to defective forests and the results. Forest management in this country is still too young to offer the necessary examples.

It will be essential for the American student to acquire some considerable knowledge of lumbering and the forests in the United States before going abroad, where much that he sees will interest him only as to the principle involved and not as to its practical application.

Not less than three years should, in general, be devoted to the special preparation of a forester for his profession. At that time he may reasonably look for paying employment either from private owners of forest land, such as great companies or wealthy lumbermen, from States such as New York or Pennsylvania, or from the Government, either in the General Land Office, where the national forest reserves are administered, in the Geological Survey, where they are mapped and described, or in the Division of Forestry, to which the general progress of the science and art of forestry is assigned, together with all technical forest work, and in which the interests of the vast area of private forest lands are considered. At present the pay of foresters is on about the same plane as that of the instructors and professors in a university.

GIFFORD PINCHOT.

Timber Protection in Minnesota.

The bill to repeal the Fire Warden Law in Minnesota was defeated at the last session of the Legislature. The wisdom, and, in fact, necessity of affording efficient protection to these timber lands is shown by the following statements.

Commissioner Hermann, of the General Land Office, said :

“Instead of repealing the law it should be made more stringent, and every effort made to bring about co-operation with the Federal authorities. In many instances the public timber of the United States and of a State are so contiguous as to make protection of one protection of the other. This should be mutually in the matter of surveillance. The tendency of most States is to protect the timber interests, and recent legislation in New York is in the interest of forest preservation in the Adirondack region. I have noted, with interest, the relation of Minnesota to timber interests. The State lands of Minnesota aggregate a great deal, and an important part of their value comes from the timber contained on those lands. The forests of that State, I presume, in common with the forests of the General Government, are subjected to great depredations, and the greatest depredator of all is the fire fiend. The loss sustained in one of the last notable fires aggregated more than would compensate for fifty years' appropriations for the administration of forestry. This subject is of great importance to Minnesota, and I cannot understand a desire to relax from the most efficient efforts that can be made for the protection of her forest interests.

“The chief difficulty we have experienced is to secure active co-operation on the part of the States with the Federal authorities in aid of prevention and extinguishment of fires, as well as in the apprehension of depredators on forest lands. Efforts should be made by the Legislatures in all States to make their legislation in line with that of the Federal Government. I have urged that the forest rangers on the several reservations

should be better equipped to enforce the law. Our department has asked the Attorney General of the United States to have United States marshals deputize the rangers to make arrests for offenses committed in defiance of forest regulations. I have been in some correspondence with executive officers in different States asking that co-operation may be had on the part of forest wardens of such States with Government officials, which would inure to the benefit of the Federal and State interests. I would be glad also if the Federal forestry officers could have authority to act as game wardens, so that while protecting timber interests they could also aid in protecting game on the reservations without additional cost to the State

“The State laws of Minnesota for the protection of timber interests are equal, if not superior to, those of any State, and the annual reports of the State officials contain much interesting and valuable information, and it is to be hoped that the State authorities will strengthen rather than detract from the efficiency of their laws for forest preservation. This forestry question is becoming more important every year, and statistics show that if losses by fires are not speedily checked our great timber interests will soon be things of the past. State and Federal authorities in this country may with profit study the results and experiences of Prussia and other European countries in promoting their export trade in timber by wise national laws for forestry preservation and development.”

Gifford Pinchot, Forester of the Department of Agriculture, who is familiar with Minnesota's law to prevent forest fires, regards it as one of the best in force. He said :

“If the bill under consideration is intended to do away with the office of chief fire warden and suspend the work which has been conducted by Gen. Andrews I disapprove of it heartily. Whatever the actual accomplishment of Gen. Andrews during his tenure of this office (and in my judgment the good he has done is

very great), the mere fact that there is a law on the statute books intended to guard against the damage from forest fires is in itself of great value. Protection against fire can never be fully successful until it is based on an active and healthy public sentiment.

"Such sentiment, as I understand it, the present law has done very much to promote. That it is capable of improvement I have no doubt, but to repeal it instead of improving it would be a backward step, especially in view of the enormous loss of life and property

caused by so recent a conflagration as the great Hinckley fire.

"The Minnesota law is one of the best and most progressive in force in any of the States, and it would be a national misfortune if it should be repealed. Public sentiment throughout the country has made such important strides in the last three or four years in the direction of a keener and more effective interest in forest protection that any retrograde step is all the more to be regretted."

Tree Planting in Kansas.

Kansas has been settled for a long time, but its timber-covered area is not increasing very rapidly. To readers of the papers it must seem that there are more persons writing about the desirability of increasing the timbered area than there are persons planting trees and tree seed. There are so few planting, because every one wishes to reap the results of his labor at once. They cannot afford to wait a few years. If this Spring and every Spring, land owners would all plant an acre to trees, Kansas would improve in beauty, climatic conditions and prosperity, to such an extent that a Kansan returning to his State fifteen or twenty years hence would scarcely recognize it. Another reason, aside from selfishness and impatience, why so little planting is done, is inexperience. Very few know how easy it is to raise a large supply of forest trees, such as Box Elder, Soft Maple, Ash, Walnut, Pecan, Oak, Catalpa, Honey Locust, and many others. It will take but an earnest trial, properly made, to convince most farmers that they can raise trees as well as corn.

To start a forest plantation by buying the trees is rather expensive; but to start one by raising the trees costs only a little more than the work. Seeds of many kinds may be obtained from trees that grow naturally along the streams. Of other kinds the seed may be purchased of seed supply houses. Addresses of such firms will be furnished by the

Horticultural Department of the Kansas State Agricultural College; or the Department, if requested at the proper season, will often be able to gather and ship seeds of some kinds such as are mentioned above, excepting Pecans, for the cost of the labor.

For Box Elders and Soft Maples the seeds should be gathered in July or as soon as ripe, and planted immediately in loose, moist soil, covered very lightly, not more than one-half inch deep. Four feet apart is a good distance for the rows. They will come up at once; if too thick, they can be thinned, but more and better trees will be obtained by re-setting in similar rows, placing the trees a foot apart. In three or four years, with careful cultivation, they will be ready for the plantation.

Most seeds should be gathered in the fall and stored in moist sand till spring. If they are surrounded by a hard shell, as Walnut and Honey Locust seeds, it is essential that they be placed where they will stay moist and be exposed to the freezing and thawing of winter. Plant in spring as soon as the ground will work well, letting the size of the seed govern the depth of covering. Walnuts, Butternuts, and Pecans should be covered two or three inches deep. If the ground is not needed for other purposes, these can be planted where they are to remain; but most trees should be grown in nursery rows for a few years.

With the work and attention one

gives to a potato crop he can in a few years raise trees in vast numbers and of sufficient size for a plantation of many acres. Let every land owner help to cover a proper portion of Kansas with

useful trees, largely for his own good and for the good of those who are to follow.

C. P. HARTLEY,
Kansas Agricultural College.

“False Mahogany” of South America.*

Here, in a growing country, clothed as God seldom has clothed any land with all that makes a forest grand and glorious, stand remarkable trees from which no man's axe has ever taken a chip, and scattered throughout the land are varieties more beautiful than Mahogany.

All things considered, probably the greatest aggregate value in any one variety of tree growing in tropical America, based upon abundance, availability and adaptability, will be found in the “Campano Espabi” or “False Mahogany.” The great round magnificent trees grow absolutely clear of surface defects, from which, all conditions being equal, the Indians and Negroes of the entire coast from Honduras down prefer to make the large and beautiful canoes which enter so largely into the lives and methods of these people.

A trunk starting from the root like an upright section of an iron water main, averaged not far from seven feet in diameter, and forty to fifty feet to the first limb, above which there was nothing of value. A tree with a fifteen-foot stump was estimated to contain 65,000 feet of

strictly surface clear. Near by was a completed canoe 43 x 9 x 4½ feet hewn from a tree 13 feet at stump, running 58 feet to the first limb; and neither on stump, canoe nor trunk was there a defect of any kind.

No wood can work more kindly under axe than this, and none can be less affected by time, wind, water, or any of the elements of decay. Your knife will tell you it is as susceptible to finish as walnut; and being free from sap, pitch or gum, you can readily see how it would receive paint. It shrinks so little that a great canoe—broken, abandoned, and so long forgotten as to have good sized trees growing around and over it—stands exposed to the sun and wind, the rain and dews of a tropical climate, and has not opened a single check. I think time will show that in this lies the greatest source of wealth of Colombia's forest resources—but there are others.

*An American explorer, A. H. Winchester, of West Virginia, has written from Cartagena, United States of Colombia, to the *American Lumberman*, an interesting description of that country, from which these excerpts are taken.

At the commencement (March 24) of the Minnesota School of Agriculture, three young women and thirty young men were graduated. This school is taxed to its utmost to care for all those who are knocking for admission within its doors. “Packed like sardines in a box” fully describes the situation there.—*Minnesota Horticulturist*.

It is stated as a conservative estimate of the usefulness of forest reservations

that the forests under the control of the State of New York will be more valuable as a source of income and wealth than all the iron and minerals which the State has produced.—*American Lumberman*.

An association has been formed in Chicago of the retail lumber dealers of Cook County, forty-two of the leading firms being represented in the membership.

The Forthcoming Year-Book.

Review of Two Papers by Gifford Pinchot Relating to Forestry.

(From the advance sheets, by courtesy of
THE SECRETARY OF AGRICULTURE.)

Work of the Division of Forestry for the Farmer.

"No part of the work of the Division of Forestry is without a distinct influence for good upon the farmer: For example, its study of forest fires, recently begun, has the closest relation to the farmers of Minnesota and Wisconsin, while, in all mountainous regions, the protection of the forest from fire is of vital interest to agriculture. So with the supply of lumber, to maintain which is the object of the studies by the Division of methods of lumbering, also recently undertaken with a view to improving their effect on the future of the forest without sacrificing the profit of the lumberman.

"Practical assistance given to the owners of forest lands has the same general object in view. A knowledge of the yearly rate of growth, in cords or board feet, of commercially valuable trees per acre of forest is of great value to every man who owns a wood lot; and this knowledge the Division is engaged in providing, with particular attention to the trees which, like the Loblolly, or Old Field Pine, are sure to increase in importance as time goes on.

"But however close the relation of the others, two branches of the work of the Division are related to the welfare of the farmer in a special manner. The two are concerned with the introduction of suitable trees for planting in the treeless portions of the West, and with the better handling of the wood lots on farms in the regions where trees now grow. * * *

"Of the 623,000,000 acres of farms in the United States, according to the

Census of 1890, more than 200,000,000 are under wood. This enormous total, broken up into wood lots over a very large part of the United States, exerts a most powerful influence on the welfare of the farmer to whom it belongs. Yet, as a rule, the treatment which farmers' wood lots receive is calculated to destroy rather than increase their productive capacity and value. The object of the undertaking described in the pages following is to devise, and assist the farmer in applying, better methods by which the forest on his wood lot will be improved without appreciably increasing the cost of harvesting the forest crop, or simply to apply such methods where they already exist. * * *

"To benefit the owner and the forest at the same time is the real problem. In other words, the cost of harvesting the timber crop from a wood lot in the usual way differs but little, if at all, from the cost of harvesting it, so that its productive value will be improved and increased. Thus, the difference to the farmer in expenditure will be very small, while the difference in result, both to the individual and, from the enormous area of all wood lots taken together, to the nation at large, will be very great."

The pamphlet concludes with a complete working plan for a wood lot at Oakland, N. J., as set forth in detail by Henry S. Graves, superintendent of working plans. This is illustrated by two drawings and numerous tables summarizing the work done. The methods of cutting recommended, the details of the cutting plan, and the rules which should be observed to secure the best results from cutting, are given in condensed form.

Notes on Some Forest Problems.

The public standing of forestry has made notable progress in the last few years. Still the forester and the lumberman are often not fully agreed. Yet "the forester, without the special knowledge of the lumberman, can never do effective work in preserving the forests by using them nor succeed in a money way; while without the methods of the forester the lumberman will speedily exhaust his supplies of timber and disappear with the forests he has destroyed."

Forestry in the treeless West deals with the supply of water as well as wood, and consists largely in tree-planting. "At first blush such work might seem to fall outside the province of the forester, on the ground that it has to do with trees and not with forests. But when it is remembered that protection and wood supply are the two objects of the work, and how important a public service may be rendered by the introduction of better trees and better ways of planting them, it appears at once that this also is one of the tasks of true forestry."

After referring to the deplorable dispersion of the Government's forest work among three agencies, heavy taxes on timber land are characterized as "a premium on forest destruction, a premium that is doing more than any other single factor to hinder the spread of conservative lumbering among the owners of large bodies of timber land," for the reason that these owners cannot afford to hold their lands for a second crop.

Another powerful factor in preventing lumbermen from adopting improved methods lies in their inability to answer this question: "How can the lumberman get out his logs without destroying the capital value of his land?"

Here the Division of Forestry steps in with the offer of practical assistance on the ground, under the conditions set forth in its Circular 21, the fundamental idea of which is "to provide successful examples of conservative lumbering, and by giving them wide publicity to ac-

quaint fresh owners with better ways of handling their timber lands." Applications for such assistance had, at the time the paper in question was prepared, reached more than 1,000,000 acres. At present, we are informed, they surpass 1,500,000.

"The question of forest grazing has aroused more opposition to the forest reserves than any other single issue. At present the advocates of forest protection are successful at many points, though not everywhere. A careful and trustworthy study by Mr. Frederick V. Coville of the effect of sheep grazing, leads to the conclusion that "to regulate pasturage, if it is rightly done, is better than to prohibit it altogether," although "many forest regions should be entirely protected against sheep."

Forest fires are enormously harmful even when, as in the majority of cases, they do not kill the older trees. Light surface fires are often the direct cause of unsoundness and disease. Great fires, while they may destroy the forest temporarily over great areas, are very seldom able to prevent its return in the end. "The devastating fires which have swept over this country for centuries have not succeeded in leaving it barren of trees."

A Bold Stroke for Irrigation.

The Pacific Improvement Company, which is only a convenient name for one of the departments of the Southern Pacific Company, is about to inaugurate a novel and extensive irrigating scheme near Santa Barbara in connection with its seaside Hope Rancho of 2,000 acres, a few miles westward of the city. A 3,000-foot tunnel is to be driven into the neighboring mountain range to draw off storage water at an elevation of 1,100 feet, and with the force generated by piping this water down two miles and a half larger volumes piped from lower levels are to be raised by suction to a height of fifty feet and allowed to pour into Felton Lake, which is on Hope Rancho, and has a storage capacity of 380,000,000 gallons, an area of about

sixty acres and an elevation at its bottom of 138 feet above the level of the ocean.

The plan contemplates the irrigation not only of the Hope Rancho, but of 3,000 acres of rich lowlands in the Goleta Valley, owned by many different persons. It is believed that this district, when properly watered, will produce great crops of superior early vegetables for the Eastern markets, which are already eager buyers of early California celery, peas, carrots and similar vegetables adapted to long-distance shipment. The land, naturally rich for ordinary farming, will, when parceled into small holdings for Chinese or Italian truck gardeners, be worth ten times its present value as a source of revenue to its owners.

The company, by buying 2,000 acres of rugged mountain, has executed a bold stroke, setting completely at defiance all the claims of riparian owners along the creek, the source of which is to be practically undermined by the mountain tunnel. Supreme Court decisions and the testimony of experts are quoted to show that the company has the law on its side. One

of the best known cases is that of Sheffield vs. Gould, in Santa Barbara, in which Gould was upheld in having bored a tunnel into the mountain on his own property and secured by natural percolation water that formerly flowed into a little creek running through the Montecito Valley eastward of Santa Barbara.

Work will be started on the tunnel immediately, and will be prosecuted with vigor. The water system will be completed within a year, so that everything will be in readiness for any further developments incident to the inauguration in May, 1900, of the coast railroad route which runs through Hope Rancho.

It will cost \$25,000 to bore the tunnel, which is expected to yield a constant flow of twenty miner's inches of water, a technical expression better understood, perhaps, by the explanation that twelve inches of water is equivalent to a continuous flow of a stream one foot wide and one inch deep.

State Mineralogist A. S. Cooper, of this city, and City Engineer J. K. Harrington, of Santa Barbara, both recognized authorities on mountain water tunnels, have been perfecting the plans.—*Journal, N. Y.*

Colorado Advice.

It is to be regretted that the legislatures of Colorado have not given more earnest attention to the preservation of the forests of this State. There is no one thing of so much importance. If the time comes when the snows of the mountains are no longer protected by the shade of the trees, the prosperity of the valleys will vanish. The injury may not come to this generation, but will be visited on those that come after us.—*Denver Republican.*

Among the many interests of this Western country some of the more important are our forests. To hold the snows, increase the moisture and abate the winds, our forests should have especial care. The Government is giving them more attention, and minimizing the constant waste and almost willful destruction that have been going on. These forests are a most important factor in the comfort and growth of the West.—*Western Progress, Denver, Col.*

Colorado Experience.

The ice gorges in the North Platte this season are unprecedented. That at the Cheyenne & Northern bridge, a mile south of Orrin Junction, is on a level with the track. Superintendent Rasbock has sent out a force of men with dynamite to blast it away. The bridge built over the Platte last season by the Platte Valley Sheep Company, of which Governor Richards is president, has already been partially wrecked by gorged ice, and its total destruction is said to be inevitable. Higher up the river, at Fairbanks, the county commissioners have had men at work for a week fighting the formation of a gorge, and they are now there personally superintending the work. This latter bridge is of vital importance, as it connects the iron mines at Hartville with the Cheyenne & Northern Railroad at Badger, over which the teams are hauling ore.—*Western Progress, Denver, Col.*

Recent Legislation.

New York.

The New York State Senate, by a vote of 33 to 4, passed Senator Ellsworth's bill appropriating \$300,000 for the continuation of the Adirondack land purchases by the Forest Preservation Board. The Special Committee which considered the bill advised the immediate purchase of additional lands, both for the protection of the water shed of the Hudson, and for the establishment and maintenance of a large tract upon which forest culture may be successfully instituted.

The number of acres of land purchased by the State is the subject of a statement by Superintendent Verplanck Colvin of the State Adirondack Survey. The total acreage of land included within the Forest Preserve to which the State has title is 1,058,444.53. In addition to this, 20,169.75 acres have been contracted for and will be added thereto as soon as it is found that the present owners can give clear title to the land.

Minnesota.

The Legislature has passed the bill entitled, "An act to encourage the growing and preservation of forests and to create forest boards and forest reserves," a review of which was published in the April FORESTER. The bill was approved and became a law April 13.

The Minnesota Senate Committee on Logs and Lumber, after three meetings with the lumbermen and the Surveyor-General of Minnesota, has decided that the fee for surveying logs shall not be reduced from five cents to four cents a thousand, on the ground that it would impair the efficiency of the service.

In the Minnesota House of Representatives, the San Jose scale bill, shorn of its bond and license features, was reported by the forestry committee providing for State inspection to eradicate the insect wherever found, and fixing fines for violations of the law. The bill was killed.

Missouri.

In a recent message to the Missouri Legislature, Governor Stephens says there are about half a million acres of Government land in the State not yet taken up, and that there are 5,000,000 acres of vacant land susceptible of cultivation. The timber supply, of the finest quality of hard woods, will be inexhaustible, it is said, if judiciously handled.

Wisconsin.

The Wisconsin Legislature has under consideration a bill to exempt from all taxation cut-over lands which have been replanted with Pine according to certain provisions.

Arkansas.

An important act of the Senate of the Arkansas Legislature was the passage of the Buckner game bill. The act declares all fish and game, except fish in private ponds, to be the property of the State of Arkansas, and the catching and hunting of the same to be a privilege. It is unlawful for any person to export game or fish from the State unless he personally accompanies it. The fine for violation is from \$25 to \$100. It is unlawful for any agent of freight, express or steamboat companies to receive fish or game consigned to points outside the State. An important provision of the bill is a section which would subject to a \$25 fine a woman wearing a stuffed bird on her hat.

Canada.

Canadian lumbermen from Georgian Bay, Rat Portage and British Columbia who petitioned the Dominion government to impose a duty of \$2 a thousand on American lumber, 25 cents on shingles, and 30 cents on laths, all of which are now on the free list, got merely a hearing at Ottawa. They said that a Canadian duty equal to the Dingley duty would be preferable to reciprocity with the United States. Manitoba, which is a free trade

province, will oppose, because of its advantage in low freights on Minnesota lumber. After the arguments of the delegation had been presented, Premier Laurier intimated that before coming to a decision in the matter officially, the government would afford a hearing to the interests representing the opposite side of the case.

Legislation Pending.

MINNESOTA.—The "Staples Bill," H. R. 529, prohibiting the removal of either timber or mineral from the State lands before the taxes have been paid.

State Auditor Dunn, in a statement, says: "It has been a common practice with corporations and individuals owning thousands of acres of timber lands in the northern part of this State to allow the taxes to accumulate for years, and then go before the county authorities and make a settlement which involves heavy loss to the counties. In many cases the taxes are not paid at all. It requires five years for the State to acquire a perfect title under tax foreclosure proceedings, and in that time the land has been rendered worthless by stripping it of timber."

The auditor also calls attention to a statement of a member of the State board of equalization, before that body last fall, when it was proposed to increase the assessment upon the iron properties in St. Louis County. The member in question advised the board that it would do well to leave the assessment of St. Louis County real estate as it was returned by the county board, for if any increase was made, the owners of producing mining lands would refuse to pay their taxes, and before the property thus delinquent could be brought into the absolute possession of the State all ore would be removed from it, and the State and county would receive no taxes whatever.

Under the law as it now stands, Auditor Dunn says that many owners of Pine lands bulldoze the officers of the smaller counties into accepting whatever taxes they see fit to pay. They tell the officers plainly that if they do not accept the amounts offered they will cut all the

timber from the lands and pay nothing. Not all lumbermen do this, but the auditor says he has personal knowledge of the fact that many of them do.

Many large tracts are owned by non-residents, who have no interest whatever in the State save for the Pine they hold on these lands, and they are willing to resort to any subterfuge to avoid the payment of the taxes.

A Scarcity of Timber and Its Hindrance.

The art of carpentry, as understood in this country, can hardly be said to exist in Persia, the greatest efforts in this department being there confined to the construction of flat roofs of inconsiderable span; and this might be expected from the circumstance of timber being there exceedingly scarce.

For farming roofs a sort of Poplar is generally employed, but for other purposes Oak, Chestnut, Plane, and other kinds of hardwood are used. Hard timber, as sold in bazaars, is all of small scantling, as it has to be brought from the forests on the backs of mules or camels.

In accordance with the invariable custom of all Eastern artisans, the carpenter sits upon the ground while at work. Instead of a bench, a strong stake is driven down before him, leaving about ten inches above ground, and upon this he rests his work and keeps it steady with his feet. The facility with which the work is executed in this position has always been a matter of surprise to European workmen. In the royal arsenals English tools are used, and a better system of working has been introduced under the superintendence of British officers, but in the native workshops the workmen are still to be seen squatting on the ground; and, being used to this position from infancy, and their tools being formed to work with more efficiency when used in this way, any alteration is scarcely to be expected. Their principal tools are the frame saw, adze, planes, hammers, nails, and a few smaller tools.

—*Southern Lumberman.*

Water Supply and Forestry.

If there is one question above another that comes nearer to the people of Southern California, it is that of an abundant water supply—how to get it and how to retain it; in other words, the preservation of forests and water, as the one naturally insures and secures the other. As it is, the rain which falls on our mountains, which have been so much denuded of vegetation, rushes in torrents down the bleak slopes, and is resistlessly carried through the canyons out into the great ocean deep, instead of being arrested by tree and root, branch and blade, and conveyed into the recesses of the earth—nature's great reservoir for the natural storage of a vast supply sufficient to meet all the demands of man.

The thinking, prudent people have become thoroughly awakened to the necessity for taking active measures to remedy the trouble and as far as possible prevent its recurrence. Organizations are being formed, memorials presented to the legislative authorities, State and national, and measures suggested both scientific and practical whereby to further prevent the great forest destruction which has been going on all these years, causing the headwaters of our rivers and streams to be laid bare, so that the water, instead of seeping into the ground and being deposited in the mountain fastnesses of mother earth, is carried off in torrents, causing, in many cases, great flood and waste. It is a question of action by the individual, and by the Government. The individual who owns or controls large land areas should give earnest and immediate attention to this important question.

The Government has wisely created a number of forest reserves, and the policy is being continued in the setting apart of others as their needs are understood and the public necessities require. It is not only the preservation of large trees which is looked after, but also the smaller

growth which in their sphere perform an important function in the economy of nature through every twig and fiber of which the rain and moisture percolates the soil. The question is one of protection and promotion—protecting the existing growth from further destruction by fire or otherwise, and also the promotion of its growth. In this way can the great watersheds be preserved and effectually made to serve the great purpose which nature intended them to do. The primary object of Forest Reserves is stated to be that of saving and improving the forest for the purpose of securing for the people a permanent supply of timber and also insuring conditions favorable to continuous water flow.

Every public-spirited citizen who appreciates and values these conditions is gratified that the Pine Mountain and Zaca Lake Forest Reserve was established, the only regret being that it had not been done long before. What is left in the public domain of the Santa Ynez Mountains—and which is now chiefly valuable for forest-reserve purposes—should have been included, as they are situated right on our borders, in fact at our very doors; so close, indeed, and so important as to seriously influence our continued and permanent water supply, together with the prevention of destructive fires which periodically sweep over them, and not infrequently menace property, and also to guarantee the better care and preservation of the remaining vestige of growth upon them.

It is a question of public concern, a matter extremely vital to our present and future welfare, and it is exceedingly gratifying therefore to know that the proper measures are being taken to have them brought under the supervision of the forest reserve control, so as to secure and perpetuate these important safeguards against the possibility of annihilating our forest and water supply. —*Editorial, Santa Barbara (Cal.), Press.*

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SPECIAL ANNOUNCEMENT.

A change in the editorship of THE FORESTER having taken place during the past month, the incoming editor desires to call the attention of exchanges to this fact, with the request that they note the address of THE FORESTER as given above, and see that their publications are forwarded promptly.

EDITORIAL NOTE.

The unfortunate confusion arising from the great number of popular names for various species of trees is no better exemplified than in the case of the great lumber tree of the Northwest, variously known as Red Fir, Douglas Spruce, Yellow Fir, Oregon Pine, Washington Pine, Red Pine, Puget Sound Pine, etc. Our attention has recently been called to the use of several different names in various issues of THE FORESTER, and the necessity has become apparent that there should be but one name for each tree. Most botanists prefer the name Douglas Spruce on account of its greater resemblance to Spruce than Fir. The name Red Fir is used, however, far more extensively than any other, both in the woods and in commerce, and on that account it has been definitely accepted by THE FORESTER and will be used in all future references to the tree.

The log cut in Maine this season is estimated to aggregate 400,000,000 feet.

The State Board of Education of North Carolina has sold a tract of 80,000 acres of timber lands at \$1 per acre.

The Baltic timber charter controversy between the shippers and the shipowners in Great Britain has been settled by a compromise.

An interesting proof of the power of wood to stand the ravages of time is found in the uncovering, near the banks of the Nile, of several Egyptian boats, made of cedar probably in use 4,500 years ago.

There is still an immense amount of virgin timber in West Virginia, but the present rapid extension of railroads in that State will doubtless bring every valley and mountain cove within the reach of transportation in a few years.

The lumber exports from Norway and Sweden form a large proportion of the annual export trade of those countries. In one year Norway placed over \$16,000,000 worth of manufactured lumber in the markets of the world, while Sweden exceeded these figures by \$30,000,000 in sawn and hewn lumber alone.

In view of the efforts toward reforesting mountain sides in the West, a successful experiment by the Marquis of Athol, in Scotland, is interesting. The grandfather of the present Duke planted hundreds of thousands of Larches on the barren hillsides of his estate, and saw them covered in his lifetime by an enormous forest, which began to pay dividends on the investment thirty years after the planting.

Kansas City is taking up the subject of tree-planting in the most practical way. At a recent meeting of the City Council, ordinances were introduced authorizing the planting of trees on eleven different streets, for distances aggregating about three miles. Four of

the ordinances were passed immediately, and a number of others referred. The newly-appointed city forester, L. F. Timming, is urging immediate action, his plan being to finish all planting before May 1.

A curiosity exists near the Red Bluff Primitive Baptist Church in Ware County, Ga. It is a mammoth Mulberry tree and the heart has long since rotted. Out of the heart of the Mulberry grows a Cherry and a Peach tree, both of which are eight inches in diameter. They grow at a point 10 feet above the ground. All three of the trees are alive and bear fruit every year.

The large number of applications for positions as forest rangers at the Cascade forest reserve, Oregon, coming from men of every walk of life, some of them old men and invalids, has led to the announcement that the reserve is not primarily a sanitarium, and that only those will be appointed who have some knowledge of woodcraft, and who are vigilant, vigorous and fearless in dealing with violators of the forest laws.

At a public meeting in Pasadena, Cal., to arouse interest in the cultivation and protection of the mountain forests of that State, Abbott Kinney, in the course of an address, said that it had cost the Government \$12,000 to fight fires in the neighborhood of Pasadena last year. He advocated the establishment of a well-organized patrol, working on the block system, by which fires might be immediately located and checked. This "ounce of prevention," he said, would cost less than half the amount of last year's losses.

The most noted grove of Walnut trees in the United States, containing fifty-one Black Walnut trees, all of them of enormous size, was sold at Cassopolis, Mich., for \$10,000 cash. There was strong competition from all parts of this country and abroad. The purchasers were German and English parties. The logs will be cut and squared for shipment.

It is estimated that one of the trees will produce \$1,200 worth of choice lumber. It was over one hundred feet of good logging size, its largest diameter was seven feet, circumference 21.99 feet, and it would require five men hand in hand to encircle it.

Forest Fires.

Heavy forest fires raged during the first week of April on three sides of Eastport, L. I., resulting in the destruction of much valuable timber. Two other fires devastated a large area near Quogue and Riverhead. At the latter place the smoke in the village was said to be "uncomfortably thick," which fact, together with the destruction of hundreds of rabbits and foxes in the brush, resulted in energetic efforts to stop the flames. The Pines Hotel at East Hampton was saved by the sturdy fight of volunteers.

Several thousand acres of woodland in Plymouth woods near Wenham, Mass., were burned in the first large forest fire of the season in that State recently. Some very heavy Pine was burned, but most of that consumed was small Oak and Pitch Pine.

Timber Prospects in Cuba.

A trio of Pennsylvanians who went to Cuba to investigate the timber prospects of the island, reached the conclusion that "to invest in timber lands alone would not be a paying investment, but to cultivate lands by raising coffee and tobacco, 'there's millions in it.'" They traveled 300 miles on horseback, cutting their way through forests with machetes, and inspecting 10,000 acres of timber lands, of the following woods: Mahogany, cedro, majagua (a strong, flexible, and plentiful wood, used for furniture, trapeze bars, etc.); jique (a hardwood for finishing work, and making mallets); coguarau, like steel; fustete, or logwood; coguani, similar to coguarau; igaya, for shafts and wagon tongues; almiqui, like rosewood; sabicu, a logwood; roble, used for axe handles; and

almendro, a very springy dyewood. The mahogany was found to be very disappointing, and the uses and value of the innumerable other woods still problematical.

Utilization of Water Power.

A company has been organized in Clear Creek County, Colorado, for the purpose of developing and utilizing the water power in Clear Creek Cañon. The sum of \$800,000 has been raised, all of which will be expended in the construction of the plant, erecting lines for the transmission of power and for the purchase of the necessary real estate and water rights. The contract has been let for the construction of the central plant which is to develop 2,000 horse power. Its location has been so selected that wire can be run to every part of the adjacent mining district at a minimum cost. While at all ordinary stages Clear Creek will furnish enough water to operate the system, the company does not propose to run any chances of loss on account of low water, so it will construct a reservoir above Empire that will have a superficial area of 250 acres. Besides its effect on the local mining industry by supplying a cheaper and more convenient form of motive power this enterprise will benefit the ranchers below the mouth of the cañon, as the storage of water during the spring floods and its use later in the season by the power plant will make it available for irrigation at a time of the year when there is a scarcity of water for that purpose.

Snowslide or Landslide Next?

At 3 o'clock last Saturday afternoon there occurred in this town an accident which was the cause of wonder to hundreds of people who visited the spot from that time until dark.

Gus Wold and H. T. Foy were getting wood on the hillside northwest of town, near the top of the hill, when a dead Pine tree which they had just cut down, started down the slope with fearful ve-

locity, and a few seconds later they heard it go crashing through the houses 2,000 feet below. It ran along within a few feet of B. Flaig's house, and thirty feet below it struck the roof of Iver Olson's kitchen, going through it just like a bullet and passing out above and a little to the left of the front door. Twenty-five feet below this it struck the wall of Mr. Nickerson's dining-room, passed through that and through the floor of the front room and through the basement, which is used as a woodshed. The next house in line was the one occupied by Mr. and Mrs. William Presley, seventy feet below Nickerson's. It entered the back shed above the kitchen door, through to the floor, finally plowing up the floor half way across the front room and stopping when it had penetrated the frozen ground beneath.

The log was fifty-nine feet long and two and one-half feet in diameter at the butt, yet the holes which it made through the different buildings were but very little larger than the diameter of the log. It passed within two feet of a sash door in the Olson building without breaking the glass. But the most remarkable and fortunate feature of the novel accident is that no one was killed or even injured. The effect of such a projectile striking a human being is almost too dreadful to contemplate. Four children were playing in the Olson home when the log passed just over their heads, covering them with snow and broken shingles and scaring them half to death. Mrs. Presley had just left the bedroom, and the moment the log struck, she had just moved to the fore part of the front room—the only safe place in the building. Mrs. Nickerson was at home also, but out of the path of the destructive log.

The men who were the unwilling cause of the disaster were almost beside themselves until they rushed down the hill and learned that no one was injured, when they immediately set to work to saw up the log and repair the damages to the buildings.—*Wardner (Idaho) News.*

Recent Publications.

Biennial Report of the Yosemite Valley and Mariposa Big Tree Grove Commission.—This pamphlet shows the careful attention to the details of the work imposed upon this Commission. Despite the small appropriations for needed improvements and the meagre allowance for traveling expenses necessarily incurred by the members of the Commission, a most commendable showing is made. The Commissioners urge the establishment of free roads and an increase in the protective patrol force on the part of the General Government.

The U. S. Department of Agriculture has just issued Farmers' Bulletin No. 92, under the title of "Experiment Station Work, IX." The subjects included treat of Sugar Beets on Alkali Soils; Planting and Replanting Corn; Improvement of Sorghum; Improved Culture of Potatoes; Second-Crop Potatoes for Seed; Cold v. Warm Water for Plants; Forcing Head Lettuce; The Date Palm in the United States; The Codling Moth; Jerusalem Artichokes for Pigs; Feeding Calves; Pasteurization in Butter Making; Gassy and Tainted Curds, and Pure Cultures in Cheese Making.

Experiment Station Record, Vol. X., No. 8, just issued by the Department of Agriculture, contains a description of the Agricultural Experiment Station in Alaska; the Proceedings of the Twelfth Annual Convention of the Association of American Agricultural Colleges and Experiment Stations; a review of recent work in agricultural science, and other valuable information covering a wide field of usefulness.

Bulletin No. 152 of the New York Agricultural Experiment Station (Geneva) is very timely. It tells how to meet at every stage a pest which was very much in evidence in orchards last year. The bulletin gives a full account, illustrated, of the life-history of the apple-tree tent-caterpillar, with concise directions for recognizing and fighting it when in the egg, as larva, or in the cocoon. Notes are also given upon spraying experiments against the spring canker-worm; and two new insecticides are recommended as both better and cheaper than Paris green. Orchard owners will be furnished free copies of the bulletin upon making request to the Experiment Station.

The report of the Director of the New York Agricultural Experiment Station (Geneva) has been issued as Bulletin No. 153. It will be found of much interest, as it shows what one State institution is doing and trying to do for agriculture. The extension of the buildings, and the different lines of investigation under way during the year are summarized and the most important results noted. Well executed half-tone plates add much to the appearance of the pamphlet. Bulletin sent free upon request.

A review of the experiments made in Long Island in 1898 to determine the amount of fertilizer, per acre, which could be used profitably in potato growing, has been published in Bulletin No. 154 of the New York Agricultural Experiment Station (Geneva), while the sugar-beet industry of the State is reviewed in Bulletin 155. Any of the bulletins of this Station will be sent free upon request.

NOTE.

The edition of THE FORESTER for November, 1898, having been exhausted, it has been found necessary to have a new one printed. Members of the Association and subscribers who may need copies of that issue (No. 11, Vol. IV.) to complete files for binding, will be supplied if they notify the publishers to that effect.

A limited number of complete copies of Vol. IV of THE FORESTER are offered for sale. Price \$1.00. Previous volumes are out of print.

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INCORPORATED JANUARY, 1897.

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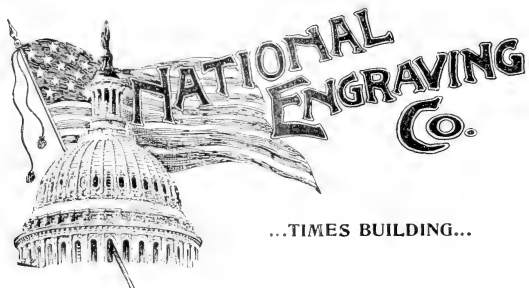
The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

Owners of timber and woodlands are particularly invited to join the Association, as well as are all persons who are in sympathy with the objects herein set forth.

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A MONTHLY MAGAZINE

devoted to the care and use of
forests and forest trees and
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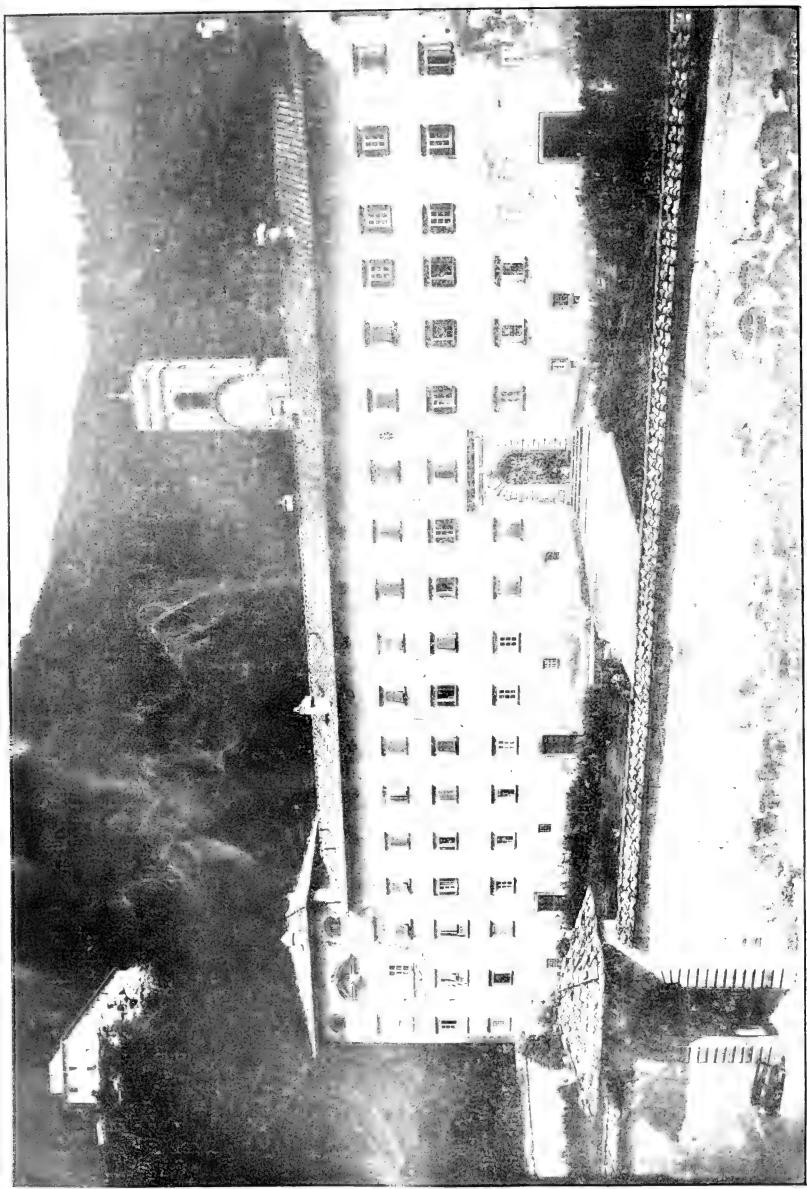
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VALLOMBROSA—THE ROYAL ITALIAN FORESTRY INSTITUTE.
[Showing Forests of Silver Fir in the background.]

The Forester.

VOL. V.

JUNE, 1899.

No. 6.

The World-famed Forest of Vallombrosa.

[Seat of the Royal Italian Forestry Institute.]

With Illustrations from Photographs forwarded from Europe especially for
The Forester.

BY THE FOUNDER OF "THE FORESTER."

One of the most attractive places in Europe is Vallombrosa. Every traveler in Italy should not fail to visit it. No matter what his profession he will find something of interest. All admire the beautiful views and the forests and enjoy the fresh, dust-free mountain air and pure spring water, far above the bells and yells and smells of Italian cities.

The word Vallombrosa itself means "shady valley." "Thick as autumnal leaves that strow the brooks in Vallombrosa, where the Etrurian shades high overarched embower," says Milton, who visited this lovely spot before he lost his sight.

Such a place in Italy, where the forests have been recklessly wasted, where almost every tree is lopped and pollarded and where the mountains are bare, the streams dry at times, at others rushing, raging torrents, is certainly refreshing.

Vallombrosa was formerly one of the richest and most famous of the monasteries of Europe, and is now of special interest to foresters because the only forestry school in Italy is located here. It may be easily visited from Florence. At S. Ellero, a short distance up the Arno, on the main line to Rome, the traveler must change cars. High on the mountain top in the distance Vallombrosa is partly visible, as a mass of dark

green foliage surrounded by bare mountain sides. The little train, consisting of one car and a small locomotive, ascends by means of a cog-wheel working in a toothed middle rail. The engine was built in Philadelphia and the car in Belgium, although the latter was finished in American pine.

The train passes through many well-kept olive groves and vineyards, the scenery being very beautiful. The fruit trees were in full bloom (April 5) and the olives were a rich, silvery color. Women dressed in bright-colored costumes were working in the soil, the men were lopping the trees, to which the vines are tied with willow withes. Others were ploughing the rich, brown earth with teams of large, pure white oxen.

Trees in Italy are planted for vine proprs. The clippings they yield serve for fuel and the leaves are used for fodder. The twigs take the place of twine. Italian agriculture is partly arboriculture. Almost every field yields grapes, nuts, figs, olives, wood, fodder and grain.

We passed through a coppice of chestnut and oak with large mother trees on the steep mountain side. The ground was carpeted with broom, gorse and many other wild flowers, among which we could hear the busy honey bees humming. The woods were filled with song

birds, something unusual for Italy, where formerly birds of every kind were captured for the pot in a wholesale fashion, by means of ingenious nets. A few sheep were visible, rambling amongst the herbage. Here and there choppers were cutting the young chestnut trees for vine props, stripping off the bark, dipping the ends in tar, and binding up the fagots.

In season, many peasants are occupied in picking the wild strawberries and raspberries and gathering mushrooms. A large income is yielded by the chestnuts, from the flour of which the bread of the peasants is made.

In the course of an hour the train reaches Saltino, the terminus. Below one, stretching for miles, is the well-tilled valley of the Arno; all about one the bare mountain tops of the Apennines; and plainly in the distance the famous city of Florence, with its extensive gardens and treasures of art.

About half a mile from the station of Saltino, the beautiful silver fir forests of Vallombrosa begin. The trees are large, with tall, straight boles and dense, dark green canopy. The air is fragrant with the orange perfume exhaled by the leaves in the sunshine. One could easily imagine himself in the midst of the Black Forest at Herrenwies or St Blasien.

The trees are in lines, betraying the fact that they had been planted. In truth the whole of the forests of Vallombrosa were planted by the patient and industrious Benedictine monks, who were arduous agriculturists and foresters during the Dark Ages. It is to them in fact that civilization owes much, and it was often with much injustice that their properties were confiscated and their treasures of art and science injured or destroyed. Some beautiful stems, fit for the masts of ships, were piled by the wayside. They seemed almost out of place in a land where twigs and fuel are often sold by weight, and where a decent fire is the greatest of all luxuries.

Soon one reaches an open meadow, surrounded on all but one of its sides by the amphitheater of green, forest-clad

hills. It was here, in about the year 1015, that San Giovanni Gualberto founded the famous monastery of Vallombrosa, under peculiar circumstances too lengthy to describe in this connection.

Above the Silver Fir on the mountain side a fine forest of old Beech is visible. The Silver Fir being more hardy is usually above the Beech. In order of hardiness there comes first the Spruce, then the Silver Fir, then the Red Beech, and then the Chestnut. The monks, no doubt, had some special purpose in placing the Beech above the Fir. They raised many pigs which fed upon the mast.

In front of the thick-walled monastery is the Albergo della Foresta, which is large and comfortable. Near by there is an old sawmill and ponds built by the monks for the collection of ice. The water here is excellent, coming from a famous spring which was long supposed to have great curative properties. Several students dressed in uniform were working in the nurseries. They are called to their work by bugle blasts.

We presented our cards and were most cordially received by the director, Comm. F. Piccioli, and his accomplished daughter, both of whom speak German and French. Director Piccioli was sent by his government to France to study the reforestation of mountains, and his report, entitled "Sui Rimboschimenti Eseguiti in Francia," appeared in 1887.

We were shown the museum, the library, the dormitory, the queer old kitchen and the refectory, with many portraits on the walls, including one of Gualberto, the founder of the monastery. The institution has eight professors and about 35 students. These students are of two classes—those who expect government work and those who do not. The Italian Government possesses only about 50,000 hectares of forest, so that the number of foresters needed is not large and their pay is small. The students have four months vacation in winter. From the prospectus the regulations seem rather strict. The course covers

four years and seems quite like the work of a German forest academy.

Italy could not have a better object lesson. She has had it many years and it seems to have little effect. Were all her mountains forested as at Vallombrosa

planted these forests and instituted an excellent system of agriculture, and that much blame is due the Italian Government for not following this excellent example by planting the denuded mountain tops—the birthplace of destructive tor-



ANOTHER VIEW OF VALLOMBROSA.

she would be rich instead of poor. If she had them it is doubtful, though, whether they would be properly managed.

One leaves this beautiful region with regret and with the thought that much credit is due to the old monks who

rents, and certainly the places above all others which should be owned and regulated by the State.

JOHN GIFFORD, D. C.

Florence, April 16, 1899.

The New Lake Tahoe Forest Reserve, California.

President McKinley issued a proclamation on April 13, establishing the Lake Tahoe Forest Reserve, in California, upon the recommendation of the Secretary of the Interior, after a very thorough examination of the subject had been made by that Department, during a period of two years. The area of the reserve is estimated at 136,335 acres.

On November 16, 1896, the Department of the Interior referred to the General Land Office the petition of residents of Carson City, Nev., to have certain lands in El Dorado County, California, in the immediate vicinity of Lake Tahoe, reserved for further disposal and set apart as a public park. Among the signers to this and other similar petitions were the Governor of Nevada, the Chief Justice of the Nevada Supreme Court, the State Treasurer, the Attorney General and other State officers, the University of California (including the Lick Observatory), the Leland Stanford, Junior, University, the Sierra Club, United States Senators Stephen M. White and George C. Perkins, and many other citizens of California.

As the result of a special examination of these lands and their suitability for a forest reserve, the agent of the Department made a favorable report in December, 1897, which is, in part, as follows:

"The land embraced within the boundaries of this proposed reservation is all rough and mountainous with but little, if any, agricultural land. There are no public traveled roads and but few trails in this territory.

"The elevation at Lake Tahoe is 6,200 feet above sea level, and all of the land in the proposed reservation is at a still higher elevation, and consequently is free from snow only in the lower portion for about four months in the year. Included in the territory are mountains which are never free from snow.

"The scenic features of the proposed territory are of the finest possible description and will attract tourists from

all parts of the world. The highest mountains between Lassen's Butte, on the north, and the Yosemite Reservation on the south, a distance of several hundred miles, are included within this proposed reservation, as will appear from a map of the Sierra Valley.

"Fine forests of Pine and Fir are scattered throughout the proposed reservation, and constitute one of the most interesting features of the landscape. The general elevation is too great for dense forests of Pine, or Pine of as large growth as may be found in the Sierras at a lower plane, but the forests are interesting and exceedingly valuable in preventing the rapid melting of the snows.

"What people there are in this district are only Summer inhabitants, that is to say, they drive their flocks to this region the latter part of June, pasture them in the meadows and on the mountain sides, and then return in October to the valleys below. I did not find any one except those connected with the fine hotels about Lake Tahoe, who remain in this region during the Winter. Snow not unusually falls in this region to an aggregate depth of twenty feet. The land is of no possible value except for grazing purposes in the narrow valleys during three or four months in the year.

"Scattered through this region are many lakes. Some of them have been stocked with fish and have become a place of considerable resort for mountain tourists. If this plan of making a forest reservation is carried out, it will be the most convenient of access of any reservation in California, and will be much more visited than any other, and a great National Park established, easily accessible to all the people, and one which will be visited much more than any other.

"The region is so attractive that already many hotels and watering places have been established and seem to receive a large patronage. Benefit will result to all the people of the country by

the establishment of such a National Park for their use, and as time passes these benefits will be appreciated more and more."

On February 10, 1899, after a further examination and reconsideration of the proposed boundaries, in response to the requests of various petitioners, a revised

plan, comprising seven townships, was recommended as satisfactory to all the interests involved. There are a few claims of record within the limits of the reservation, but their acreage forms so small a part of the total area that their existence presents no difficulties to the administration of the reserve.

Fishermen for the Forests.

Why Anglers Should Become Members of the American Forestry Association.

Although it has to do only with their pleasure, yet anglers, more than most men, are interested in the preservation of the water supply. Fish must swim. Without water there can be no fish, and the angler who appreciates the conditions governing the water supply is one of the strongest advocates of forest preservation. There are a thousand reasons why he wishes to have forests about the brooks and lakes that he fishes.

As we become better acquainted with the result of fish culture, the economic aspect of fish and fishing has come to be regarded as more and more important, and this is a consideration which should appeal strongly to the average man; but after all it is not with such results that the angler chiefly concerns himself. He loves his art less for the fish that it yields him than for the recreation it affords, for the opportunity to employ his skill, and for the absolute rest which he derives from an occupation so different from that of most of his life. Yet, if there were no hope of catching fish, he would not care to be an angler, and so he greatly desires to have the fish supply preserved and increased. Without an abundant supply of pure water of the proper temperature, this cannot be done and that water cannot be had without the forests.

The forest and its floor have been aptly enough compared to a great

sponge, which the melting snows and the Spring rains fill full of water, and which holds this water, giving it out by innumerable springs and rills through the dry months, to make glad the thirsty earth. This is above all things the function of the forest: to gather water, to hold it, and to send it out again little by little, so that it may do the most good possible. On the forests depend the water supply, the food supply and the shelter for the fish. They regulate, too, the temperature and purity of the water, and are the home of much of the food which supports the fish. In view of all this it is not strange that anglers as a rule are earnest advocates of forest preservation.

These are some of the reasons that they give for the faith that is in them.

Well-wooded districts are subject to more rain than treeless regions; and the forests are vast reservoirs of humidity, lessening the dryness of the surrounding atmosphere, assisting the flow of spring and stream, preventing freshets at the end of the Winter, and in Summer feeding spring and lake giving forth the clear and cold water in which fish delight and thrive. On the other hand we know that when the forests are destroyed the volume of the waterflow is diminished and the fish is injured in many ways. The disastrous freshets, which are likely to occur, follow the melting snows or the Spring rains, sweep

down mud, sand and debris, covering the spawning ground and the eggs which are on them, suffocating them and the young fish, or perhaps even floating eggs and fry out of the stream, and, when the water recedes, leaving them high and dry on the bank to perish. Besides this, freshets wash away and cover up food and the sources of food supply, so that the stream cannot support so great a number of fish. Trees and shrubs keep the water cool by their shade and furnish a resting place and cover for food for the fish, so that it will nearly always be found that shaded brooks or those running in part through woodland offer to the angler better results than those which flow through open meadows or plains.

In ponds and small lakes, in which the water supply has been diminished, the shallow water freezing nearly to the bottom gives less freedom to the fish, diminishes the air space for each, and is likely to cause wholesale destruction. Such diminished water supply, of course, means a lessened area to the lake or pond, which again means a less number of fish. In like manner the reduced shore line of the pond of lessened area gives less feeding ground for the fish, and so less food.

It is in the game fish that the angler is especially interested, and it is for their protection that he chiefly cares. They live in fresh-water streams, and push their way as fast as possible toward the heads of those streams, into the depths of the woods or high up on the mountain side, striving always to reach those sources where the water, cooled and purified by the influence of the forest,

is at its best. To preserve the best sort of fish, therefore, we must preserve the forests, and each angler should do his part to strengthen the public sentiment in favor of this work. If the past few years have seen an extraordinary growth of this sentiment, it is hoped that those to follow will see one still greater.

So far as the water and its inhabitants are concerned, the forest acts as a great governor or regulator. As it cools the summer stream, so it warms the same stream in winter; as it prevents bank-bursting freshets which may cause incalculable harm, so in time of drought it supplies from its secret sources an equable, unfailing flow which gives life to the fish and to all things that live in the water and along the river's bank. And since the forests regulate the water supply and its temperature and purify it, it may fairly be said that those who care for the forests care also for the fish in the stream, and that when they preserve the forests they preserve also the game fish.

The summer traveler who journeys along the sun-baked, treeless slopes of the southern Rocky Mountains or the Sierras comes now and then upon a dry watercourse in which, if he follows it up and down, he will sometimes see a pool standing in which trout are moving sluggishly here and there waiting for the passage of the week's drought which shall destroy them. Further to the north, in the same chain of mountains, where man or man's fire has not swept away all the timber, this is not seen. There the streams are ever-flowing and the fish are active and full of life.

Geo. Bird Grinnell.

The Relation of Forest Preservation to the Public Welfare.

(Being an address delivered on Arbor Day at the Montana State University at Missoula.)

BY THE SUPERINTENDENT OF THE UNITED STATES FOREST RESERVES IN MONTANA.

The celebration of Arbor Day seems a most fitting occasion to consider briefly the great question of our forests and to note how we, as a nation, are guarding a most priceless heritage.

When the Puritans of New England and the chevaliers of Virginia blazed pathways in the primeval forests, made clearings, and laid waste vast areas of mighty Oaks, sturdy Elms, and giant Hickories, it was deemed by them essential and proper for the onward march of civilization and necessary for the productiveness of the country. Conditions have very materially changed since then, and as we stand at the dawn of the Twentieth Century, we begin to realize what the loss of our mighty forests means. We begin to estimate their value not alone in dollars and cents, but as affecting our water supply and as an adjunct to human as well as animal and vegetable life, and we are now crying aloud and long: "Oh! Woodman spare that Tree."

I believe it is right and proper that the subject of our forests should be brought to the attention of our teachers and of our schools, and that in the school-room should be laid the foundation for the rational treatment of the same. The public generally, in years past, has given but scanty attention to this great subject, but if the youth of our land could but be brought to understand the momentous interests at stake the public would gradually be led to realize the importance of the question.

The forest area of the United States (exclusive of Alaska and our recent acquisitions) is estimated in round numbers at 500,000,000 acres. Seven-tenths of this is found on the Atlantic coast, one-tenth on the Pacific, one-tenth in the Rocky Mountains, and the balance scattered over the middle Western States.

On the Pacific coast hard woods are rare, the principal growth being coniferous and of extraordinary development. Here we find the gigantic Red woods, the soft Sugar Pine, the hard Bull Pine, as well as Spruces, Firs, Cedars, Hemlocks and Larch. In the Rocky Mountains we have no hard woods of any great commercial value, the growth being mainly Spruces, Firs, Pines and Cedars. In the Southern States we find the Cypress and a great growth of hardwoods with some conifers and some small quantities of Spruce, Fir and Hemlocks. In the north Atlantic States we find hardwood with conifers intermixed, and the same along the lakes, in Michigan, Wisconsin and Minnesota.

In 1896 it was estimated that there was then standing throughout the United States 2,300,000,000,000 feet, board measure, of timber. In the census of 1890 the value of forest products was estimated at \$1,044,000,000. The value exceeds ten times the value of our gold and silver output, and three times the annual product of all our mineral and coal mines put together. It is three times the value of our wheat crop, and with all the toil and risk which our agricultural crops involve they can barely quadruple the value of the product yielded by nature for the mere harvesting.

The total annual cut is estimated at 40,000,000,000 feet, board measure, and to this let us add the amount consumed for fuel, fence material, the waste in the woods and at the mills, and the loss by fires, and we find that the total annual consumption of wood in the United States is easily 25,000,000,000 cubic feet, and this consumption, it is said, increases in greater proportion than the population.

In considering this vast consumption of wood it is interesting for Montanians

to know that Butte City alone consumes 300 carloads of cordwood a day. The loss by fires varies from year to year, but it is enormous, especially in the West. It is estimated there is an annual loss of \$25,000,000—and this is exceeded in some years. From careful statistics and records we know that the annual growth of wood per acre and year does not average more than fifty-five cubic feet, though, under favorable conditions, it may rise to double that amount with some species. If we consider the production of such sizes as are used in this country our timber, at the age of 125 years, would be found to have grown not more than thirty-five cubic feet per acre per year.

Our present forest acreage, therefore, even if well stocked and well managed, could not produce our annual consumption. We are consuming much more than the area produces, probable double this amount, and every year the disproportion increases. It takes 100 years to produce a good-sized saw log. Most of the timber we are now cutting is over 200 years old. It is said that at the present rate of denudation going on in Minnesota that in forty years there will not be a stick of timber left, and at the present rate of cutting in Maine in eight years its once grand forests of Pine will be no more. In the light of these facts and figures, taken largely from governmental statistics and believed to be accurate and reliable, should we not, as a people, pause and consider the situation that stares us in the face?

Having considered, so far, only the commercial or money interests as attached to our forest production, let us now consider other features of this subject. Science has demonstrated that "forests temper the extremes of climate, equalize the rainfall, equalize the flow of streams, and so preserve fertility and increase comfort." The humus in the forest cover is nature's reservoir, the forest cover affords a natural watershed. The melted snows of winter and the spring rains find lodgment there, gradually and naturally the many springs in

our mountains are fed, and in turn are the creeks and larger streams. A certain amount of humidity is disseminated, essential to vegetable, animal and even human life, and all nature, animate and inanimate, feels the life-giving qualities, the refreshing influences given or exerted by the forests under the mighty hand of Omnipotence.

Denude our forests and what are the results? The humus becomes hard and packed, being exposed to the hot rays of the sun in summer and to winter's cold blasts, the forest cover disappears, the melting snow and the heavy rainfall, not being able to percolate gradually and naturally through the hard packed soil, rushes off down the mountain side, swelling all the creeks and larger streams and creating floods that cause immense damage. Later, their source of supply having become exhausted, the springs cease to flow, the creeks dry up, the streams are but empty channels through the parched land, and drought appears, vegetable and animal life droop and wither, and a baneful condition of affairs prevails. The preservation of our forests is essential, therefore, to other interests than those of the woodsman.

The National Government proposes to save what yet remains of our grand forests. To this end the executive proclamation of February 22, 1897, thirteen forest reservations, with an aggregate area of 21,379,840 acres, were established, and the President is empowered to increase the number whenever, in his judgment, it appears wise and necessary. The management of these reservations is placed in the hands of the Commissioner of the General Land Office, Department of the Interior, Washington, D. C. In Montana there are four forest reservations at present with an aggregate area of 5,043,680 acres, over one-fourth of all yet established in the United States. Each reserve has one superintendent and a number of rangers. These latter daily patrol a certain prescribed territory in the reserve to which they are assigned, and are ever vigilant against

fires, an evil that does more than any other one thing to destroy our forests. It is also their duty to prevent timber depredations, infringement against the land laws of the country and to enforce the State laws in protection of game and fish within the limits of the respective reserves.

This is a subject which should be dear to the heart of every true American; it

is a subject so large, of such immeasurable possibilities, of so vast importance, that a far abler pen than mine is needed to adequately set forth its value. Other nations receive great profit from their forests, why should not we? And then think of the future, think of posterity. My friends, it will, and it has a right, to hold us, in this enlightened age, responsible. J. BLATCHFORD COLLINS.

What Shall We Do For The Forest?

A Symposium in Four Papers.

I. AN OBJECT LESSON OF FOREST DESTRUCTION.

There is an "object lesson" of forest destruction on the regimen of water-flow in the streams and ravines of Jefferson County, Colorado, and its mountain neighbors, the mining counties of Gilpin and Clear Creek, since their settlement forty years ago. My observations began in May, 1860, and have been more or less continuous since that period, excepting from May, 1862, to August, 1866, at which latter date I returned from army life.

In 1860 the creek valleys and the mountains of these three counties were filled with Pines and Firs, and the creek bottoms were fringed with Alders and Willows. Clear brooks, never dry in mid-summer, were to be found in every bushy ravine. Vasque Fork of the South Platte (now called Clear Creek) flowed clear. Snows and rains never swelled it disastrously, even in June, and its affluents rarely appeared discolored by mud, which in the main stream itself was but very slightly discolored. Beautiful trout abounded in all the larger creeks, and well it deserved the name of Clear Creek.

In 1860-61-62 the unceasing rush to the gold mines of these three counties began the wholesale destruction of their forest for fuel and mine timbering and for the erection of thousands of cabins

and stamp mills, mining timbers especially requiring the best trees. This wholesale consumption of our forest was still further hastened by destructive fires caused by criminal carelessness and indifference.

As these elements of use continued unabated as years rolled on, in 1875-76 all the trees surrounding the mining camps and those in the most accessible slopes disappeared until the denudation forced the mills, mines and saw-mills to draw their supplies from the denser forests of central ranges, while the sparsely-timbered foot-hills occupied by farms, and the necessities of the prairie farmers for fuel and fencing completed the denudation of all the accessible trees of the foot-hills.

Following this condition in the seventies, Clear Creek and its affluents, Ralston, Beaver, North Fork Clear Creek and Soda Creek, began to show the force of denudation of forest growth. The winter snows melted more rapidly on the bare mountain slopes, and their drainage increased in rapidity, followed, as the result, with total cessation of flow or remarkable and early diminution of their former abundant supply. The smaller gulches which, in the Spring, when sheltered by Willows and timber growth, gave

out a very appreciable amount of water were totally dry or, when recipients of rains and cloud-bursts, emptied the gathered water-fall into Clear Creek in two or three hours, hurling down and carrying into the parent stream all the rich vegetable mould of their narrow valleys which had been stored there, during past ages, from the decomposition of vegetable matter. So that to-day, where twenty-five years ago there stood a vigorous growth of trees and under-shrubs, we see the alluvial soil washed to bed-rock, in some cases twenty feet or more deep, while everywhere the original wagon roads, opened in the low grounds of the gulches and creeks, have been moved at great expense to the more rocky mountain slopes, away from the violence of sudden floods.

Nor is this all. The denudation of tree growth in all our mountains, on the summits of the foot-hills, as well as in the valleys, has furrowed with ravines and covered with sand and loose rock acres of good soil, and on Bear Creek utterly spoiled meadow and cultivated land, every rain in June, July and August adding yearly to this calamity.

Another element of injury seems to act with increasing yearly fury. Bare mountain slopes and fields, heated by the torrid rays of the June and July sun, seem to create, by the force of ascending currents of heated air, disastrous hail-storms, accompanied by violent thunder-storms, which wreak their fury on the crops and fruit-trees and gardens of the prairie farms near the foot-hills. Forty years

ago this condition was almost unknown, or else was trifling in effect.

In 1898 hail fell in Jefferson County, east of Gulden, with terrific violence in a swath nearly three miles wide and of indefinite length. To the eastward apple, plum and pear trees, stripped of all their leaves, fruit and flowers, raspberry, blackberry and strawberry beds were annihilated almost completely, while growing wheat, oat and corn fields were beaten down and their yield much lessened from the weakness of their aftergrowth. The hail, rain and thunder storm of July 24, 1894, will long be remembered in Jefferson County for its violence, destruction and loss of life. The accompanying heavy rain on the foot-hills hurled down vast accumulations of boulders, gravel and soil into the valleys of Beaver, Bear and Clear Creeks, and swelled the streams in some places to twenty feet or more in depth. Boulders weighing two tons or more were floated down one and one-half miles into Clear Creek, the flood waters leaving beds of shingle and soil and gravel mixed where cultivated fields stood, while on Bear Creek twenty-two lives were lost in the flood. Hail stood in piles from one to one and one-half feet in depth. The storm came from the northwest. It was a veritable object lesson.

I have gauged the water-flow of Clear Creek repeatedly since September 20, 1860, and give the following figures, showing difference of flow up to September 15, 1880, at the same location of gauging:

Sept. 20, 1860, width of stream, 53 ft. ; veloc. per sec., 3.60 ; area, 101.

Sept. 19, 1879, width of stream, 32 ft. ; veloc. per sec., 2.38 ; area, 46.15.

Sept. 15, 1880, width of stream, 34 ft. ; veloc. per sec., 2.23 ; area, 38.22.

Greatest flow gauged at same point—
June 10, 1872, width of stream, 62.65 ;
velocity per second, 4.27 ; area, 280.23.

Least flow gauged at same point—
March 22, 1880, width of stream, 31 feet ;
velocity, 2.04 ; area, 25.72.

E. L. BERTHOUD.

II. THE NEED OF FOREST LEGISLATION IN COLORADO.

The experience of the past year has emphasized the need of strict legislation for the protection of what forest lands are still in existence in Colorado. During the latter part of last October and during the whole of November forest fires raged in our mountains. I traveled over a great part of the State and can hardly express my indignation at the wanton waste of timber. Good work is being done in other States to preserve forest lands, but the problem confronting us here cannot be solved in such a way. For us it is necessary both to save and to replant.

I am sure a practical solution of the difficulty would be made if forest conservators were aware of the opportunities still open here. There are some ways in which much could be achieved. For example, our State Land Board is in the habit of selling stumpage—ten cents a tree or so—and then the saw-mill man and tie-cutter practically take what they want and then pay the State as much or

as little as they please, burning Government and State forests to cover their tracks.

We might do something if some such plan could be put into operation here as has been done in Asheville, N. C. It seems impossible to convict despoilers or those committing arson on Government lands. Private ownership appears to be the only solution.

I rode through the forest of white pines between Durango and Pogosa Springs. It is forty miles wide and practically untouched. I rode through another piece of woodland, some eight or ten miles square, north of Creede. In Routt County there is much fine timber that could be saved. But the eastern slope of the mountains has been cut and burnt into a desolation, and during the last autumn more timber has been burnt in Colorado than has been legitimately used during the last forty years.

HENRY MICHELSEN,
Denver, Col.

III. THE ADVISABILITY OF FOREST CULTURE.

There is no subject of so much public importance, locally considered, as forest tree culture. We say locally considered, meaning to apply the remark to Southern California. Here, it is safe to say, the planting of forest trees is more needed than in almost any other portion of the United States. Fertile as this country is, strip it entirely of trees and it would become a desert. If the rain-makers would give their attention to planting trees they would accomplish something worth while.

There is no better way to conserve that dampness which insures fertility than by planting and protecting forest trees, and there is no such sure way of converting a country into a desert as by

destroying the forests. When Western New York was clad with primeval forests it was penetrated everywhere by "mill stream." Since the original woods have been mostly cleared away these mill streams have been nearly all dried up and the mills that once ran by water-power, and with plenty of it, are now either shut down or are running with steam.

Other countries recognize the necessity of preserving their forests. In Germany the laws are very strict on that subject. Every man is obliged to recognize the advantage to the public at large in preserving the forest trees on his own land. But our own legislators have not had time to consider subjects of such great and lasting importance as forest tree culture. —*Editorial, Santa Monica, Cal., Outlook.*

IV. THE INCREASING INTEREST IN FOREST PRESERVATION.

It is encouraging to note that an increasing interest is being taken by the people of this section on the subject of forest preservation. This is an important subject, in any part of the country. Already, in the East, apprehension is expressed at the rapidity with which the great forests of the Northwest and North are being denuded, not only for lumber, but in the ever-increasing demand for wood pulp in the manufacture of paper. It is now suggested that the Government should permit wood and wood pulp to come in free from Canada, so that there may be less inducement to cut down the American forests in such wholesale manner.

If the question of forest preservation is such an important one in other parts of the country, which enjoy a regular rainfall throughout the year, how much more so is it here, in Southern California, where our farmers have to depend so largely upon irrigation for crops. The supply of water for irrigation depends mainly on the condition of the wood growing on the mountains. Where it has been swept bare by fire, the rain, when it comes, runs off in torrents, cutting up the mountain sides, and often causing floods in the valley below, whereas, when the slopes of the moun-

tains are well covered with trees and underbrush, the rain soaks in slowly, and most of it reaches the valley in shape to be of service to the horticulturists. Damage equal to that done by fire is often worked by bands of sheep, which eat off every vestige of a green thing and tear the thin soil from the rocks with their hoofs.

While we are making provision for the protection of our forest reservations, we should not lose sight of the necessity of doing something to replant the stretches of forests that have been destroyed by fire during the past few years. It is a noteworthy fact that there is no river in Southern California which has been so much denuded in its upper stretches as the San Gabriel, where the damage done to agricultural lands in that valley increases steadily as the forests on the mountains are destroyed.

When it is considered that, in addition to the material advantage derived from the mountain forests, they have also an æsthetic side, and that this section obtains many millions of dollars every year from tourists, we certainly ought not to hesitate over the moderate expense of replanting these bare and uninviting mountain slopes.—*Editorial, Los Angeles, Cal., Times.*

The Propagation of Forest Trees.

Energetic Work of the State Sylvaton Society in North Dakota.

Public interest in the propagation of forest trees in North Dakota is being greatly stimulated by the energetic efforts of the State Sylvaton Society, and its originator, W. W. Barrett, State Superintendent of Irrigation and Forestry in that State. During the past month Mr. Barrett has sent out personally over one and one-half million of Box Elder and White Ash seeds to the county superintendents of schools for distribution in all the schools in the State, to be planted by the scholars, not only in the school

grounds, but at their homes, on the farms, and in the city and village lots.

"As the twig is bent, the tree is inclined"; as trained in youth so fixed in manhood years. According to the *Bismarck Tribune*, Mr. Barrett and his brothers became interested in the raising of trees in Maine, where they operated a nursery on the old homestead farm. They are now practical foresters in their respective States—Maine, California, North Dakota and Minnesota.

Ten years ago when running his farm

with three plodding oxen, near Church's Ferry, N. D., Mr. Barrett became convinced that the great need of the West was a large increase of trees and forests for producing the most favorable climatic and crop conditions, and the furnishing of fuel, building and fence material. Advocating tree culture as a prime factor in diversified farming, the present Forest Commissioner mapped out his present system of tree culture and the artificial use of water, when needed in cultural pursuits, devoting two years, at his own expense, to bring to consummation the creation of the Department of Irrigation, Forestry and Fish.

In order to interest the young in the subject of forestry, he originated in 1892 the Sylvaton System, which received the highest award at the World's Columbian Fair of 1893. The system has been fully organized; the aims and objects of the members of the State and local Sylvaton societies are set forth in twenty-five tenets. One of the leading ideas is to enlarge the school grounds, fence the same and convert the premises into attractive Sylvaton parks.

During the past two years the State Sylvaton Society, at the private expense of the State Superintendent, has fur-

nished forest seeds and seedlings to numerous schools. The pupils have planted the stock in the school yards and also near their homes in the country and in the villages and cities. Many trees have thus been started and made good and substantial growths under the tender and watchful care of the young boys and girls of those schools. This year the original plan has been enlarged and forest seeds have been sent out in behalf of the society to every pupil in North Dakota. The seeds selected were the best to be found in the State; all were stripped from the stems and put up in packages convenient for handling, and were then duly shipped for distribution, with circulars and directions for planting.

The repeal of the State law providing a bounty for tree culture has made the plans of the society all the more beneficent. In addition to the school distribution there has been furnished an additional lot of 500,000 seeds to be used in starting the Sylvaton Home, School and Church Nurseries, making a total of two millions of seeds. If this practical work is continued from year to year, under a proper tillage of the trees, North Dakota bids fair to become the tree home land of the great Northwest.

The Lumberman's View of The Forest.

A Symposium in Two Papers.

I. DESTRUCTION.

With lumbermen accustomed to life in the green pine-woods, the desolation of the cut and burned-over lands is felt most keenly. Passing through charred stumps and bleaching stubs, he feels as one moving through a cemetery where, at every step, he is reminded of lost friends. These sad reminiscences are useful. They start conceptions of what might have been; of a better way.

Several lumbermen, in talking about the matter, have in substance said: "If we could get timber-lands in a compact body, then we could perhaps do some-

thing in forestry; but, as we are now, limited to alternate sections, our lands are isolated; our border lines are greatly extended. Irresponsible and careless parties have free access to our property. We cannot protect ourselves.

There are as many tramps in the woods as elsewhere. They come to our camps, perhaps ask for work, get board over night, perhaps several days, then leave as unexpectedly as they came. In summer they stop in our vacant camps and often set fire to them. They are utterly careless of property and sometimes de-

light in destroying it. After lighting their pipes, they drop the burning matches into the grass. They camp along the trails and roads and leave their fires unextinguished. They have been known to start fires just for the wanton satisfaction of seeing them burn.

Sometimes the settler in the remote woods is quite as much of a nuisance. Often they are people who like no restraint and who have come to the woods to avoid living under the immediate restraint of the law. They range about, hunting, fishing, stealing timber, building fires for their lunches and camps against trees or in black muck or rotten trunks that hold the fire. Usually the first summer they burn over a lot of the adjoining land to allow grass to spring up and make pasture for their cattle, regardless of the timber they kill or the extent of country over which the fire spreads. When very dry, so a thorough "burn" can be made, they put fire in the slashings they have been making during the year and simply let it go.

If a lumberman could acquire timber

in a compact body—a township or more—he could do something to protect himself. He could clear strips of land around the borders, cultivate vegetables, hay or grain, and thus have a good fire-break. He could demand an explanation for the presence of any one found upon the land.

With timber and stump land thus protected against fire, he could establish a permanent business, put in a substantial mill, build up a town, and, by cutting the land in rotation, he could keep the woods green and productive instead of desolating them as he does now.

The lumberman is ashamed of the result of the present custom, but it is not in his power to improve the present state of affairs. The manner in which a large part of the public domain has been disposed of makes forest preservation seem impossible. A more thorough system could hardly be devised, in my opinion, for the introduction of fire-brands into the forest than the application of the Homestead law and the land grants of alternate sections to pine-timber lands.

HORACE B. AYRES.

II. CONSERVATION.

The subject of Forestry was made the leading topic of discussion at the annual meeting of the Paper and Pulp Association in New York in March, 1898. As a result, the mill owners were brought to realize that they were pursuing a very short-sighted policy in stripping their woodlands. Their attention was called to the fact that the Spruce of the Eastern States was rapidly disappearing, and that while only a small part of the capital of a paper mill was invested in woodlands, the enormously valuable water powers and plants would be useless without the raw material.

From this meeting dated the first action on the part of the paper mills of this country looking toward the adoption of scientific management for their timber lands.

When the various mills were combined in the International Paper Company, Mr. A. N. Burbank was placed at

the head of the woodlands department. He instructed the writer of this article (as forester for the company) to examine, first of all, the woodlands of New Hampshire, to report on the stand of Spruce, rate of growth, and the best method of lumbering to insure a supply of wood for the future. Some 100,000 acres owned by the company, in the vicinity of the White Mountains, were first explored.

The stand of Spruce was determined by valuation and surveys, the strip method being used, and all trees down to 5 inches callipered. Then the rate of growth was determined and a preliminary working plan made for the whole tract.

This limited the cutting of Spruce to 12 inches, "breast high," or 14 inches on the stump, which was found to be the same thing and much easier for the choppers to understand. The writer

realizes perfectly that cutting in all cases to 14 inches is by no means the best policy, but it is far better than stripping the land, and was adopted only as a temporary measure until men could be trained to mark the timber which should be cut. This working plan was submitted to Mr. Burbank, who thought favorably of it, and ordered that in all new contracts the cutting of Spruce should be limited to 14 inches.

At the same time Mr. Burbank, after consulting with Mr. Gifford Pinchot, Chief of the Division of Forestry, made application to the division for detailed working plans for over 300,000 acres of timber land. Thus two very important points were gained.

The first detailed working plan is being completed for a very fine tract of about 24,000 acres. A forest ranger will be employed to mark all the trees which are to be cut, superintend the work of the contractor, see that the cutting is carefully done, that all the conditions of the contract are fulfilled, and in the dry season to guard against fire.

The mature and dying Spruce will be cut first wherever possible, and the Fir in all cases to 5 inches, which is the smallest size the mills can well handle. The object in cutting the Fir to 5 inches is to remove the seed trees as soon as possible, and thus guard against its wonderful power of regeneration, as in many cases it would crowd out the Spruce.

Fir alone will not make good pulp, and gives satisfactory results only when united with Spruce, 15 per cent of Fir being the usual allowance.

In New Hampshire, the Spruce growing well up on the sides of the mountains must be clean cut, for any timber which is left blows down and is a dead loss. But in Maine, New York and Vermont this will not always be a necessity, as the mountains are not so steep, and the Spruce secures a firmer hold on the soil. A few mills use a small per cent of Hemlock in mixture with Spruce, but generally it is never cut. No other wood is used for pulp to any extent, so the supply of Spruce must be depended upon.

The hardwoods, with the exception of in a few localities, have no value at present. The Spruce, in a mixed growth of hardwood, is always of a superior quality, has a fairly favorable seed bed and is protected from heavy winds. If the stand of hardwood is not too dense it is allowed to remain, but if it is suppressing the Spruce and preventing regeneration the stumpage is sold.

In land where a heavy stand of Spruce has been clean cut, White Birch is now coming up. This has a ready sale in many sections for bobbin and peg wood, and may be utilized in future years by the paper mills.

The waste of good pulp wood through present methods of lumbering is enormous. Lumbermen have been accustomed for many years to get out saw logs alone, and are very slow to change their system of cutting and learn that a paper mill can use a great deal of wood which a sawmill would not accept. So they continue to top the logs at 7 or 8 inches, thereby losing an average of 18 feet, B. M., per tree, which they could have saved by running the top up to 5 inches. They also chop the stumps about 2 feet above where they could be sawed, thus wasting 20 feet, B. M., per tree.

To guard against this waste our contracts will specify that the timber shall be run up to 5 inches in the tops, and the stumps sawed as close to the ground as possible.

The aim of the company is to have woodlands tributary to each mill with a sufficient stand of Spruce to furnish its annual supply of logs or pulp wood for all time, cutting to 10, 12 or 14 inches, as the case may be, and on a fixed rotation. The International Paper Company owns or controls at present about 1,000,000 acres of Spruce land, which will be operated eventually under this system, thus setting a good example to other owners of Spruce land, by adopting forestry methods in the management of their own woodlands.

E. M. GRIFFITH,

Forester for the International Paper Company.

Recent Legislation.

New York.

A bill was introduced in the Assembly at Albany, authorizing Governor Roosevelt to appoint a state commission to confer with a like commission from the State of New Jersey as to means of preserving the Palisades of the Hudson. Incalculable damage has been done in the destruction of historic landmarks, and besides the voluminous protests on this score by historical societies and individuals, there have been additional remonstrances from adjacent land-owners. The face of the Palisades has been blasted away in a number of places by gigantic charges of dynamite, for the purpose of securing stone blocks for street paving purposes. After years of remonstrances, the matter has reached the attention of the State law-makers.

Governor Roosevelt has named the following as members of the commission to represent the State of New York: Enoch C. Bell, of Nyack; Waldo G. Morse, of Yonkers; and James R. Croes, of Yonkers.

New Jersey.

Governor Voorhees has appointed the following commission to make an examination into the facts and report a plan of procedure for the perpetuation of the Palisades: Franklin W. Hopkins, of Alpine; William A. Linn, of Hackensack; S. Wood McClave, of Edgewater; Elizabeth B. Vermily, of Englewood, and Cecilia Gaines, of Jersey City. This commission will work in conjunction with the New York commission appointed by Governor Roosevelt.

California.

The bills creating a Commission of Forestry and a Commissioner of Irrigation in California, having failed of Governor Gage's approval after passing the Legislature, have been carried into effect, notwithstanding, by the prompt action of the California Water and Forest Society, which initiated and secured the

favorable legislative action on the subject.

Though official sanction has been withheld, it is proposed to carry out the full intent of the measures under the voluntary supervision of this society. The first subject to be considered has been the raising of funds to insure successful efforts. With financial support assured, the working of the plan is expected to demonstrate the necessity for these officials in the State.

The Commission of Forestry appointed by the society consists of Prof. E. W. Hilgard, of the University of California; Prof. Dudley, of Stanford University; Abbot Kinney, of Los Angeles; Warren Olney, Sr., of San Francisco; and Geo. Fowle, of Placer County. The Commissioner of Irrigation is Prof. Geo. Davidson.

The legislation which failed officially, but will thus become operative in fact, provided for the appointment of the officials named to serve without pay; that the Commissioner of Irrigation should co-operate with the United States Geological Survey in preparing surveys, estimates, etc., for sites for storage reservoirs for impounding waters for mining, agricultural and industrial uses; that reports be made on the feasibility, etc., of such reservoirs and irrigating systems and that the Commission of Forestry should devise a means of protecting the forests of the State from destruction by fire or wanton depredations, and recommend means for preserving the forests and of storing and distributing the flood waters of the State.

It is realized that the commissioners can do little more in two years than acquire information, in a field that requires a vast amount of investigation, and formulate recommendations for further progress. This the California Water and Forest Society proposes to do.

In behalf of Governor Gage it is said that he gave his hearty support to both of the two measures introduced, but that

neither of them reached him officially until after final adjournment had been made, without having an appropriation attached.

Massachusetts.

The bill providing for the codification and amendment of the laws relating to the preservation of trees was taken up by the Massachusetts Legislature on an amendment proposed to strike out the provision requiring towns to elect tree wardens. The amendment was rejected, the mover being the only one to vote in its favor. The final vote in favor of the bill was unanimous, 104 votes being cast.

The Metropolitan Park Commission bill was signed by Governor Wolcott on May 27. The bill provides an appropriation of \$500,000 for additional roadways and boulevards.

The forest survey measure has failed in Massachusetts.

Minnesota.

A review of the work accomplished in Minnesota shows that a distinct and gratifying advance was made by the legislature, in the section just closed, in legislation looking to forest preservation. An appropriation of \$20,000 was made to extend the area of Itasca State Park over the contiguous timber lands. To round out this forest park, at the summit sources of the Mississippi, it is necessary to acquire about 8,000 acres, and if the appropriation, half of which is to be expended this year and half next, does not go far enough, the attorney-general is authorized to secure an option for a term of two years on other desirable lands.

The Cross forestry act was passed. It creates a forestry board, consisting of the chief fire warden, the professor of horticulture at the State agricultural college, three persons to be named by the regents of the State university, and four to be recommended by the forestry association, the State agricultural society, the horticultural society and the State game and fish commission. Forestry reserves are created to consist of such State lands as

may be set apart for the purpose or which may be deeded by private owners or granted by the United States Government. The care and management of these reserves is vested in the forestry board.

It is hardly necessary to restate other provisions of the bill relating to the disposition of the income from these lands, or to the comprehensive duties imposed upon the board of reforestation denuded lands, foresting waste lands, preventing the destruction of forests by fire, administering forests on forestry principles, the conservation of forests about the headwaters of rivers, etc., because all these provisions are practically rendered nugatory for the present by the failure of the legislature to make any appropriation to carry them out. An appropriation of \$1,000 annually is made for the actual expenses of the forestry board. As the St. Paul *Pioneer Press* says, not much can be done with so small a sum, but it is doubtless considered the thin edge of a wedge which is to be hammered home in future sessions of the legislature.

Wisconsin.

The Wisconsin legislature, after considering the advisability of taking effective measures to protect the forest interests of the State, finally defeated, on May 2, the bill providing for a commissioner of forestry at a salary of \$2,500 a year, and a number of deputy commissioners. The sum of \$15,000 was estimated for their total salaries and expenses.

Michigan.

A bill was brought before the State Senate providing for the creation of a permanent forestry commission, which is to consist of three members, one to be chosen the Michigan State Agricultural Society, to serve six years; the second to be chosen by the Michigan State Horticultural Society, to serve four years, and the third to be chosen by the Michigan Academy of Science, to serve two years; the appointments to date from July 1, 1899, and at the expiration of their

several terms the successors of the members so chosen are to be selected in like manner, the term of office to be six years. The commission is to elect one of its members president, another member secretary, maintain an office and records in the Capitol at Lansing, and serve without compensation, but entitled to traveling and other expenses while on business relating to the work of the commission. The secretary may be paid such amount as the commission may determine, not to exceed \$300 a year. The bill included five sections in amplification of the objects intended, making its scope very comprehensive. By amendment the Governor was given the power of appointing the commission. The bill was put under

the head of unfinished business, with good likelihood of final passage. Its main object is to get the movement well started now, to provide recommendations for future legislatures to act upon. 318

The bill has been passed by the House and Senate, and has gone to the Governor.

Colorado.

The Colorado legislature has passed the Beaman game bill, which had been under consideration for some time. Governor Thomas promptly attached his signature, and reappointed Game Commissioner T. H. Johnson, whom the new law deposed. The bill is very lengthy and comprehensive.



A LUMBER SCENE IN SAN MATEO CO., CAL.

This spot is one of the most picturesque in California. The mill is kept scrupulously clean in order to avoid any fire possibilities. Fifty men are employed during the active season of seven months in the year. The lumber from the mill is hauled on cars for a distance of two miles and then carried to the summit of the mountain by a cable road 3,600 feet long, climbing an elevation of 1,200 feet. At the summit of the ridge the manufactured lumber is stored, says *Wood and Iron*, and teamed from there to any designated point.

The frequency of forest fires in Pennsylvania has led to the employment of detectives to ferret out the malefactors. Three arrests were made in Franklin County, and similar efforts are in progress in Lebanon County.

Forest fires raged in various parts of Mexico during May, destroying growing crops and valuable timber. Many of the fires were of incendiary origin.

THE FORESTER.

A MONTHLY MAGAZINE

Devoted to Arboriculture and Forestry, the Care and Use of Forests and Forest Trees, and Related Subjects.

ANNOUNCEMENT.

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Make all checks, drafts, etc., payable to THE FORESTER.

SPECIAL ANNOUNCEMENT.

The special summer meeting of the American Forestry Association will be held at Los Angeles, Cal., July 19 and 20. A large number of prominent members of the Association have signified their intention of being present, and it is believed that the meeting will be one of the most interesting and enthusiastic of recent years. A number of papers on live topics will be read, further announcement of which will be made early next month. The leading papers read will be published in the August number of THE FORESTER.

The attention of all readers of THE FORESTER who are desirous of possessing a complete library on the subject of forestry is called to the several notices inserted in the advertising pages of the present issue.

THE increasing public interest in the subject of Forestry is evidenced frequently in letters to THE FORESTER, approving of the work of this Association and its magazine. In a recent letter, one of the best-posted forest experts in the West says: "I am proud of the good work done by the American Forestry Association. We are now beginning to see the practical results of an intelligent agitation of the forestry problem. The National Gov-

ernment and a number of States have taken advanced steps in behalf of forestry. But there is need of still greater work in the economic reform, both West and East."

Life Member.

Roswell Pettibone Flower, former Governor of New York State, and a life member of the American Forestry Association, died suddenly at the Eastport Country Club, Long Island, N. Y., on the evening of May 12. The cause of his death was acute indigestion, which induced heart failure.

Mr. Flower was born in Theresa, Jefferson County, N. Y., on August 7, 1835, the fourth of seven sons of Nathan Flower, a manufacturer.

Spending his early days on a farm, and in his father's wool-carding establishment, he was successively a store clerk, school teacher, deputy postmaster, and jeweler, until 1869. Ten years later on the death of his brother-in-law, Henry Keep, President of the New York Central Railroad, the latter's personal estate came under Mr. Flower's management and brought him into the financial circles of the metropolis.

Mr. Flower was prominent in the Democratic party, representing the Watertown District in the Forty-seventh, Forty-eighth and Forty-ninth Congress. In 1891 he was elected Governor of New York. He refused to consider a renomination, and became a special partner in the firm of Flower & Co. in Wall Street. He became interested in great financial undertakings, in which he made himself a powerful factor.

In 1859 Mr. Flower married Sarah M. Woodruff, who survives him, with one daughter, Emma Gertrude, the wife of John B. Taylor.

The funeral was held May 15 from his New York City home at 597 Fifth Avenue. Services were held at St. Thomas Episcopal Church, of which Mr. Flower had been a warden for many years, and interment was made the next day at Watertown, N. Y.

A Steady Advance.

During the past month seventy annual members and two life members have been elected to membership in the American Forestry Association. These latest advocates of forest conservation represent twenty-five different States, giving very conclusive and gratifying evidence of the spread of interest in the subject of forestry in America.

Life Members.

Emily L. Osgood, 57 Bay State Road, Boston, Mass.
Charles Lathrop Pack, Cleveland, Ohio.

Annual Members.

- J. H. Barber, Paso Robles, Cal.
F. R. Barrett, Box 616, Portland, Maine.
Dr. Cheves Beville, Winfield, Ark.
Charles E. Bigelow, 1800 Santa Barbara St., Santa Barbara, Cal.
H. P. Bowditch, Jamaica Plain, Mass.
W. J. Brennan, Calispell, Mont.
L. C. Bridget, Little Shasta, Cal.
Frank W. Brooks, 28 Inman St., Cambridge, Mass.
W. H. Buntain, Santa Fe, N. M.
Turner Buswell, Solon, Maine.
J. I. Campbell, Houston, Tex.
J. M. Coburn, Adobe Walls, Tex.
Miss Helen Collamore, 317 Commonwealth Avenue, Boston, Mass.
C. A. Colmore, Santa Monica, Cal.
Uriel N. Crocker, 247 Commonwealth Avenue, Boston, Mass.
Rufus H. Darby, Hickory Hill, Fairfax County, Va.
J. W. Davis, Porterville, Cal.
Henry M. Dunlap, Savoy, Ill.
Morton J. Elrod, University of Montana, Missoula, Mont.
William Engel, Bangor, Me.
Charles Fitzenreiter, Lake Charles, La.
David B. Flint, 360 Commonwealth Avenue, Boston, Mass.
Alfred Gaskill, 4309 Springfield Avenue, Philadelphia, Pa.
Benj. S. C. Gifford, Fall River, Mass.
L. A. Goodman, Westport, Mo.
C. A. Goodyear, Tomah, Wis.
A. A. Grant, Albuquerque, N. M.
Gilbert H. Grosvenor, Amherst, Mass.
Andrew S. Hallidie, 1032 Washington St., San Francisco, Cal.
William Herring, Tucson, Ariz.
Robert P. Hill, U. S. Geological Survey, Washington, D. C.
Lee G. Howell, "Grasmere," Kouts, Ind.
Miss Marian C. Jackson, 88 Marlborough St., Boston, Mass.
Thomas W. Jones, Great Falls, Mont.
John L. Kaul, Hollins, Clay Co., Ala.
John H. Kirby, Houston, Tex.
Prof. Charles R. Lanman (Harvard University), 9 Farrar St., Cambridge, Mass.
William E. Leffingwell, Glen Springs, Watkins, N. Y.
A. Liliencrantz, 359 Telegraph Ave., Oakland, Cal.
Seth Marshall, San Bernardino, Cal.
Albert Matthews, 145 Beacon Street, Boston, Mass.
George H. Maxwell, 801 Claus Spreckles Building, San Francisco, Cal.
Elizabeth Meagher (Mrs. T. F. Meagher), Southfield, Orange Co., New York.
Heloise Meyer, Hamilton, Mass.
Morrison-Reeves Library, Richmond, Ind.
William H. Niles, Cambridge, Mass.
Warren Olney, 101 Sansome St., San Francisco, Cal.
J. E. Payne, Cheyenne Wells, Colo.
Pasadena and Mt. Lowe Railway Company, J. S. Torrane, General Manager, Echo Mountain, Cal.
James W. Pinchot, 2 Gramercy Park, New York City.
Mrs. James W. Pinchot, 2 Gramercy Park, New York City.
Amos R. Eno Pinchot, 2 Gramercy Park, New York City.
Charles A. Platt, 107 East 27th Street, New York City.
Prof. R. H. Price, College Station, Tex.
Louis E. K. Robson, 242 Madison St., Malden, Mass.
B. Schlesinger, Brookline, Mass.
P. M. Shelley, Cliff, N. M.
Daniel Smieley, Mohonk Lake, N. Y.
Hugh N. Starnes, University of Georgia, Athens, Ga.
John Keim Stauffer, Reading, Pa.
Walter Sutton, 2514 Sacramento Street, San Francisco, Cal.
William W. Thomas, 184 1 2 Middle St., Portland, Me.
Edward R. Warren, Walnut Place, Brookline, Mass.
J. B. Weber, Bitter Root Forest Reserve, Hamilton, Mont.

Annual Members—Continued.

Wendell M. Weston, Room 811, 53 State St.,
Boston, Mass.

J. M. Wilson, Secretary State Board of Ir-
rigation, Lincoln, Neb.

C. M. Winslow, Brandon, Vt.

Jos. Worcester, 1030 Valley St., San Fran-
cisco, Cal.

A. Wormser, Wormser City, Sweetgrass Co.,
Mont.

P. K. Yonge, Pensacola, Florida.

CHIPS AND CLIPS.

"Pitch Pine continues in capital de-
mand" in London.

The agitation in the West for reforest-
ing denuded slopes and waste lands is a
hopeful sign for forest conservation.

Large quantities of Mahogany are
being brought from the tropics to Balti-
more, Md., for finishing.

Mahogany is said to have been brought
to England by Sir Walter Raleigh in
1595, but not to have come into general
use till 1720.

President McKinley has issued the
necessary instructions to secure the ad-
mission of common Pine lumber into
Cuba free of duty.

Ten carloads of Black Walnut logs
were sold recently in Kentucky for ex-
port abroad, principally to London, Glas-
gow and Hamburg.

A new railroad being constructed from
Hattiesburg to Jackson, Miss., will open
for development a very resourceful sec-
tion. The line runs for miles through
the virgin Pine forests.

The United States has about 450,000,-
000 acres of forest, but this is being
rapidly depleted by the axe and by de-
structive fires. The Government is now
investigating means to prevent or control
the latter.

Two thousand acres of timber lands,
covered with Fir and Cedar, in Skagit
County, Washington, have been sold to
Michigan capitalists for \$36,000. It is
said that the timber will not be cut for

marketing, but simply held as an invest-
ment.

The area and cost of the park lands in
Des Moines, Iowa, is computed as fol-
lows: West Des Moines, 340 acres at
an average cost of \$330 an acre; East
Des Moines, 112.55 acres at an average
of \$364 an acre.

Eighty-three thousand acres of Pine
timber lands, near Pine Bluff, Ark., have
been sold for lumbering purposes at an
aggregate price of over half a million
dollars. This is said to be the largest
business deal of the kind in the history
of this section.

It is encouraging to note that the New
York State College of Forestry has suc-
ceeded in planting with valuable tree
growths the first fifty acres of burned
lands. The college expects to plant every
year at least 500 acres. This is the first
encouraging step toward reclaiming the
losses caused by forest fires.

The "Christmas Tree"—Evergreen—
has been adopted by the school children
of Montana, by a popular vote, as the
State tree. Much enthusiasm was dis-
played in the consideration of the sub-
ject, and the selection was made with
practical unanimity.

An evidence of the fact that all the big
timber of the country does not come from
the Pacific Coast is found in a recent
letter to the editor of *THE FORESTER*.
The writer tells of his firm cutting four
pieces of timber twenty-two by twenty-
four inches and sixty feet long, out of
White Pine. This timber was rafted
from Michigan the full length of the tree

and cut as wanted, at Cleveland, Ohio, for track scales.

The forest area of all the British possessions in America is estimated at about 800,000,000 acres. The settler has cut his way into the fringe of the vast woodland, but his depredations are nothing as compared with the terrific scourge of fire which has rampaged through it at different times.

The historic White Pine forests of Pennsylvania are so near extinction that, according to a careful estimate, the total standing timber of this kind in the entire State is barely 400 million feet. The larger part of this timber is in five tracts, the residue being in small and scattered lots.

Black Walnut has become so valuable in Indiana that those who are cutting timber of that kind there are exercising great care and economy in the work. Each tree is cut off at the root, in order to save every bit of timber in the stump. Lumber which was considered almost worthless a few years ago is now being worked into costly veneers.

Los Angeles, Cal., gets its great electric power and electric lights from electricity generated by mountain streams, eighty-five miles west of that city. About 40 or 50 per cent of the power generated by the water wheel is carried the eighty-five miles in the form of electrical energy. This is a very high per cent to be obtained from so long a line.

In quoting the sale of the Black Walnut grove at Cassopolis, Mich., from the *MAY FORESTER*, the *Conservative* says: "For forty years we have been actively exhorting people to plant Walnuts in Nebraska, and besides practicing what we preach, we have several hundred fine Black Walnut trees to show in demonstration of our theories. On a farm near Dunbar we have nearly two hundred trees, which will average five feet in circumference and are worth nearly as much

as a whole quarter section of ordinary unimproved Otoe County land. Plant Walnuts."

All the White Oak timber on a tract of 50,000 acres, in Washington County, Mississippi, about 140 miles south of Memphis, Tenn., has been sold to a firm in Vienna, Austria. There is much valuable timber of other kinds on the tract, and the sale includes the White Oak only. The money consideration is estimated at \$25,000 at the least, and possibly more than double this amount.

An unfortunate circumstance which retards the advancement of irrigation plans in the West is the inconstant interest of a large part of the general public. There has been found to be tumultuous interest in the plan, as in 1873, after lack of water has caused inconvenience and suffering. Last year there was a sudden interest in the water resources of the State. The result this year is said to depend largely upon whether there will be "a good year" or not.

A White Oak tree which was recently cut down in Knox County, Ind., is said to have been one of the largest of the kind ever cut in that section. It measured eight feet four inches at the butt, fifty-three inches at the small end, scaled 7,867 feet and made four twelve foot logs. After being cut the tree was rolled to White River, where it was loaded on a barge. It was then taken to Mount Carmel, Ill., rolled to side track and loaded two logs to a car. The heart of each of the logs was the size of a silver dollar.

Six hundred million feet of standing timber on the coast between Norfolk, Va., and Charleston, S. C., has been acquired by a new corporation, chartered under the laws of Virginia, with the title of the "Atlantic Coast Lumber Company." It is legally authorized to do almost anything in the timber and mineral line, and is permitted by its charter to acquire one million acres of land. It is said that it will practically control the lumber trade

of the coast from Charleston to Boston. Most of the incorporators are Eastern capitalists. The minimum capital, one million dollars, may be increased to twenty millions.

The increasing need of forest conservation is emphasized by a recent dispatch from Memphis, Tenn., to a leading trade journal, saying: "The only trouble is the shortage of timber, which continues, and is likely to become an aggravated evil, instead of diminishing." The woodman's axe is a powerful educator, but the trouble lies in the fact that the knowledge is usually acquired when it is too late to take advantage of it.

In Nebraska the evergreen trees, especially exotic conifers, like the Siberian, Japanese and Chinese Arborvitæ, have been very generally injured, and in many cases killed, by the severity of the past Winter. White Pines, Scotch Pines, and other varieties, which went into the Winter with their roots very dry, have suffered in some counties where old and mature trees, as well as young trees, have been killed. The question is now being asked there why the past Winter caused this great loss, when the trees had escaped it in all the previous severe seasons.

Forest Fires.

Destructive forest fires were reported as raging about Canaan and Averill, Vt., during the middle of May. A wide territory was burned over and thousands of cords of wood were destroyed. The loss amounts to some thousands of dollars. A large crowd of men were engaged for several days in fighting the fires both day and night.

A disastrous timber fire occurred on April 18 between Pestletown and Waterford, N. Y. A thousand acres of trees were burned through a brush-pile fire started on a farm.

One of the largest forest fires ever experienced in that section started near

Bohemia Village, N. Y., during the middle of April. After burning all day, the flames swept toward the village at night, endangering many houses on the outskirts of the place. By great vigilance and energetic work the flames were kept back, women and children joining the men in fighting the fire.

During the latter part of May a big forest fire was reported near Port Republic, N. J. It had its origin in a small fire kindled to consume a mass of rubbish, but finally spread beyond control and burned over a large area. Fortunately the fire burned away from the village and did no damage to houses there.

Educational.

The Franklin Forestry Society was organized on Arbor Day, April 22, at Chambersburg, Pa., to create a more general interest in the subject of forestry in that immediate neighborhood. The officers for the current year are: President, Alvin B. Kuhn; Secretary, W. G. Bowers; Treasurer, E. H. Keefer. Much interest has been manifested in the work already undertaken.

The subject of tree-planting will be prominently considered at the Summer meeting of the Missouri State Horticultural Society, at Peirce City, Mo., June 6, 7 and 8. The meeting will be held under the direction of the South West Fruit Growers' Co-operative Union, and special arrangements have been made for accommodating visitors from a distance. Among the papers to be read are: "Deciduous Trees for Street and Lawn," J. M. Irvine, St. Joseph, Mo.; "Ornamental Planting" (with stereopticon views), Prof. J. C. Whitten, Columbia, Mo.; "The Business of Planting Orchards," J. E. Thompson, Windsor, Mo.

The Michigan Hemlock Association has been formed at Saginaw, Mich., to better the conditions of that trade, and secure uniformity of grading, etc.

Recent Publications.

A primer of forestry, soon to be published by the Division of Forestry of the Department of Agriculture, will consist of two small cloth-bound volumes profusely illustrated. Part I, entitled "The Forest," may be expected to appear during the month of June. It will treat of the units which compose the forest, of its character as an organic whole, and of its enemies. Part II will be entitled "Practical Forestry," and will deal with the practice of forestry, with work in the woods, with the relations of the forests to the water and the streams, and will conclude with a brief description of forestry at home and abroad. The intention in preparing these two little volumes has been to make so simple a statement of the essential facts in forestry that it could be used in the schools while at the same time retaining enough of general interest to warrant its circulation among all classes of readers. A more detailed review of Part I will appear in the next number of *THE FORESTER*.

The Maine Agricultural Experiment Station has sent out two bulletins—No. 51, "Feeding Stuff Inspection," and No. 52, "Spraying of Plants." The first-named contains the analyses of the samples of feeding stuffs collected by the station inspectors during the past winter. Bulletin 52 tells why spraying is necessary; when, how and what to spray and where the necessary apparatus can be obtained. Bulletins will be sent to all who apply to the Agricultural Experiment Station, Orono, Me. In writing, please mention *THE FORESTER*.

The Maine Agricultural Experiment Station, at Orono, will shortly make an investigation into the kinds of weeds contained in agricultural seeds sold in that State. Samples of seeds sent in before June 15 will be examined free of charge and a report returned.

The Kentucky Agricultural Experiment Station, Lexington, has just issued Bulletin No. 80, treating of "Some Pests Likely to be Disseminated from Nurseries," and "The Nursery Inspection Law." There has also been issued Bulletin No. 81, describing a method of avoiding lettuce-rot, and a review of potato scab experiments.

The New Hampshire College Agricultural Experiment Station, at Durham, has issued Bulletin 64 on "The Forest Tent Caterpillar." This is a very interesting and valuable treatise, by Clarence M. Weed, showing the life-history, habits, description of the life stages, food plants, abundance, and injuries of these destructive creatures. Their various names, natural enemies among birds, insects, and spiders, and the remedial measures suggested, complete the bulletin. Many illustrations are included.

The Experiment Station of the Utah Agricultural College, at Logan, has issued Bulletin No. 59, on "Utah Sugar Beets in 1898." The subject is reviewed in detail, with an introduction by Director Luther Foster, including sugar factory conditions in Utah, sources for market, relation of the water supply, localities interested and conditions suitable for the industry. Bulletin mailed free on request.

The same station has also issued a folder on "Spraying," containing the most important facts regarding the chief injurious insects and fungous diseases of the fruits of Utah, with directions for their treatment, compiled from the latest results obtained in this and other stations in combatting them. This bulletin is published especially for use in the field by those who spray, and will be sent upon request.

AMERICAN FORESTRY ASSOCIATION.

THE AMERICAN FORESTRY ASSOCIATION.

ORGANIZED APRIL, 1882.

INCORPORATED JANUARY, 1897.

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The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

Owners of timber and woodlands are particularly invited to join the Association, as well as are all persons who are in sympathy with the objects herein set forth.

THE INCREASING INTEREST

in the history of American forests and the efforts that have been made for their conservation, development, and use, has led THE FORESTER to secure, for the benefit of its readers, a number of complete sets of the

“Proceedings of the American Forestry Congress” and
“Proceedings of the American Forestry Association”

covering a period from December, 1888, to December, 1897. These issues include many valuable papers on forestry as read at the various annual meetings throughout the country during the years named, including the sessions in

WASHINGTON, QUEBEC, ATLANTA, GA., BROOKLYN, N. Y.,
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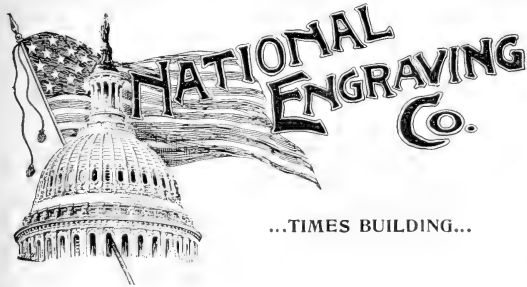
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A MONTHLY MAGAZINE

devoted to the care and use of
forests and forest trees and
to related subjects.

LOS ANGELES NUMBER

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Announcement of Summer Meetings.

Los Angeles, Cal.. July 19-20.

The arrangements for this meeting are in the hands of Mr. Abbot Kinney, of Los Angeles, to whom inquiries may be addressed.

It is expected that the President of the Association, Hon. James Wilson, Secretary of Agriculture, will preside at one or more sessions, and that papers will be read by Mr. F. H. Newell, Hydrographer of the Geological Survey, Mr. Gifford Pinchot, Forester of the Agricultural Department, and others. Detailed announcements of the place and the hours of sessions will be published in the local papers.

This meeting of the Association promises to be of peculiar importance. The deep and increasing interest in forest matters which now pervades Southern California, the nearness of the San Gabriel, San Bernardino, and other forest reserves, to which excursions are being planned, the opportunity to inspect the results of the forest policy of the Government in a region of very special interest in this direction, and the representative attendance which this meeting will undoubtedly attract—all these facts combine to assure one of the best conventions ever held. In view of the pressing importance of the question of sheep grazing on forest lands, nowhere better illustrated than in the neighborhood of Los Angeles, and of the intimate relation of forestry and irrigation, a full attendance of Western members is especially desired.

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Selected papers will be printed in *THE FORESTER*, the official organ of the American Forestry Association.



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NOTE.

The edition of THE FORESTER for November, 1898, having been exhausted, it has been found necessary to have a new one printed. Members of the Association and subscribers who may need copies of that issue (No. 11, Vol. IV,) to complete files for binding, will be supplied if they notify the publishers to that effect.

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NATURAL REFORESTATION IN NEVADA COUNTY, CALIFORNIA.

The Forester.

VOL. V.

JULY, 1899

No. 7.

Natural Reforestation in the Southwest.

The Gradual Restoration of Tree-Growths on Denuded Lands.

BY THE SPECIAL AGENT OF THE DIVISION OF FORESTRY,
DEPARTMENT OF AGRICULTURE.*

The importance of tree and shrub growth in the mountain and foot-hill regions of western America, adjacent to irrigated regions, is evident. The forest reservations of the arid regions were set apart by the National Government for the purpose, primarily, of affording protection to the farmer. Mountain forests and chaparral, in acting as conservators of moisture, need no better argument in confirmation of their value than the present activity in Southern California regarding forest management and reforestation.

Recognizing the importance of forest cover to irrigable lands, every public-spirited citizen in that section has become interested in forestry. A flourishing association has been built up in the five southern counties, and a subordinate forest and water society has also been established in each county. Knowing well that the life of the country depends upon the perennial flow of mountain streams, every board of trade, educational association and city council, and many private corporations as well, have formulated petitions aimed at procuring the most effective service possible. Some measures of this sort are neces-

sary, in order that the welfare of that section of country may not be seriously affected by inadequate protection, either to the forests or the lesser growth covering the mountains. For the valleys depend upon the mountains for a constant supply of water.

The financial loss entailed by a prolonged scarcity of water has had a great influence in arousing public opinion. The people of Southern California justly consider the fine forest reserves of that region as communal property; for these reserves with their growth of Pine, deciduous trees, chaparral, and grass give an additional value to the agricultural lands.

The farmer depends as greatly upon forest conservation as he does upon the team which turns the furrow. Naked mountains induce destructive floods, deluging the valleys with sand, mud, gravel and boulders. Then there are alternating periods, more or less prolonged, when the streams are dry or greatly reduced in volume of flow. The modifying influence is the forest, chaparral and grass covering of the mountains.

It is a matter of general public knowledge that the mountains are natural reservoirs, but only so long as they are covered with vegetable growth, with forests as the basis of this growth. It

[*The writer of this article, who is the Department's expert in tree-planting, has just returned from a trip, of nearly three months duration, through this section of country. ED.]

is also known that the value of the natural reservoir is in almost direct ratio to the density of growth. In no other portion of the United States has the dependence of the tillable lands on the water supply of the mountains been brought to public notice with such emphasis.

A destructive forest fire in any of the mountain ranges may greatly lessen the crop over the entire area depending for its water supply upon the streams originating in the burned district. Not only will the immediate effect be noticeable, but the destructive results will follow for years, until the burned districts become covered with vegetable growth sufficient to lessen the surface flow and surface washing. The new growth will cause a large percentage of the rainfall to pass into the soil, to be available later in a more constant stream flow.

The topography of Southern California and Arizona is such that at best much of the rainfall flows off in immediate floods. Even during the most favorable seasons the streams vary greatly in their volume of flow. The mountain covering must be cared for and extended: burned areas, and regions otherwise denuded, must be protected from sheep, and in some places even from horses and cattle. This is necessary in order that growth may spring up as quickly as possible, to take the place of that destroyed. Wherever the new growth is slow in starting from lack of seed, the seeds of the common chaparral of the neighborhood should be sown, and occasionally artificial reforestation should be undertaken.

All expenditure of time and money in improving the forest cover by reforestation is of little value unless provision is made for a reasonable degree of security against forest fires. Equal provision must be made at least in the mountains of Southern California and Arizona for the restriction of sheep grazing, which should be absolutely prohibited in the forest reserves of this district.

As a specific instance in illustration of

the destructive effects of grazing the forest reserves in Central Arizona may be cited. Many of the streams which flow into the Salt River have their sources in these reservations. Whenever sheep have been driven there in large numbers, the farmers of the Salt River Valley have suffered material injury from the canals and laterals filling with sand and silt.

Not only do sheep crop to the ground and kill much of the smaller plant life, but their sharp hoofs so cut up the soil that much of it washes from the rocks, causing injury to agricultural interests. All of the southern mountains are scantily supplied with soil. There is no sod to bind to the rocks what little soil there is. A scattered growth of mixed vegetation constitutes the cover of a great part of the mountain region. After a destructive fire or excessive sheep grazing, all of these localities become practically barren, and incapable of supporting, for a long period, more than a very limited amount of vegetation. When the scanty covering of vegetable mold and soil is swept into the valleys by the first rains, a half century must elapse, under normal conditions, before rocks have disintegrated to form a new soil, to be held in place by the slow growth of future vegetation.

Some of the burned mountain districts of Southern California have been so ruined that little of the original soil remains in place. In these mountains the rainfall flows as it does from the roofs of houses. Recent investigations have shown that, in some localities, fully ninety per cent of the precipitation flows off as surface water.

Having in mind the great value of forest cover to those who dwell in arid regions, the question of the best method of reforesting denuded areas is of first importance. Artificial reforestation is expensive, and in but few places is it practicable. This is particularly true of mountain sides previously swept by fire, as well as in instances where original vegetation has been badly injured by

grazing. On the other hand areas which were once wooded will again become wooded if protected from fire and stock and left to Nature.

A destructive fire will undo all that a quarter of a century has accomplished in the way of natural reforestation; while close cropping by cattle and sheep, for a long series of years, may prove almost equally destructive.

After carefully studying the open groves of California the opinion is forced upon one that they are the direct result of man's activity. In a recent journey over the California Sierras, north of Lake Tahoe,* I was impressed, in passing over the hydraulic gold regions, by the natural reforestation taking place where, less than fifty years ago, the natural surface was so torn and changed by hydraulic mining that the land was practically denuded of its timber. Bush and tree alike were torn from the hills; chaparral and manzanita were uprooted. Finally valleys and mountain sides, for miles in extent, were as barren as the open desert.

Soil sufficient to support vegetation has been brought by wind and flood to the hydraulic pits, and to the open gashes in the mountain sides, which were originally cut down to bed rock. Half-grown pines and other trees, intermixed with chaparral and bush, already hide the desolation wrought a half century ago.

One of the finest examples of reforestation that this country affords is on General Bidwell's ranch at Chico, California. Forty or more years ago, when General Bidwell acquired this ranch,

much of it was covered with isolated specimens of large wide-spreading Live Oaks, the individual specimens averaging more than four feet in diameter. These trees, growing from five to ten rods apart, formed an open grove, nowhere making what might properly be termed a forest.

Forty acres of this area was fenced and protected from fire and stock. As a result there grew up a dense growth of young Oaks of the same species. During the past forty years this growth has produced one of the most uniform and thickly wooded Oak forests in America. The trees, tall and straight, grew close together, and are from one to two and one-half feet in diameter. They stand in marked contrast to the heavily branched old trees nearby.

The frontispiece in this issue of THE FORESTER, reproduced from a photograph by G. B. Dornin, of San Francisco, has attracted attention because of its splendid illustration of the process of natural reforestation in the high Sierras. As this region was a forest originally it will revert to its former condition if protected from fire and excessive grazing, and left to natural conditions.

Under such circumstances, in a few more generations, this entire section of country will show but little effect of the early gold miner, at least so far as forest cover is concerned. But the process is a very slow one. Successful reforestation in the West and Southwest, when the chief desideratum is forest cover, will depend almost entirely upon affording adequate protection upon the lines indicated.

*See JUNE FORESTER.

J. W. TOUMEV.

The Redwood Forest of California.

BY THE GEOGRAPHER OF THE UNITED STATES GEOLOGICAL SURVEY.

As one who makes a pilgrimage to the old English abbeys, the traveler through the great Redwood forests of the Pacific Coast seems to stand transfixed by the silent grandeur of the place. He finds himself in one of Nature's cathedrals, with a high, o'erarching roof of foliage, supported by great tree columns, while the dim twilight of the scene suggests

with its shadowy recesses and a stillness which suggests the possibility of dryads confronting one at any moment, will appreciate in greater measure the almost supernatural conditions existing in the home of these tree-giants.

The densest forest on earth is, in all probability, the Redwood forest, of the Pacific Slope, as measured by the amount



COURTESY OF

REDWOOD FOREST, SHOWING DENSITY OF GROWTH.

NATL. GEOGRAPHIC MAG.

the stained glass windows of the pretentious edifices built by man—remarkable in their conception and execution, yet less wonderful than the marvelous forest temple of the lordly Redwood.

In a Redwood forest the sun never shines—it is always twilight. Those who are acquainted with the beautiful deep-green of the Pine forest, as found in various parts of the East and South,

per acre of merchantable timber—that is, of timber suitable for the saw-mill. As I said in an article in the *National Geographic Magazine*, it is not merely the size of the trees which accounts for this, —although even in this State of large things they are exceptionally large—but it is the number of trees on each acre.

The closeness of stand of Redwood trees is as remarkable as its habitat is

peculiar. It is found only in a narrow strip, closely hugging the Pacific Coast, and extending southward from the southern part of Oregon through Northern California nearly to the Bay of San Francisco. It is practically extinct in regions further south, where it doubtless existed not many centuries ago, and there are not more than about 1,000 acres of these trees in Oregon. So it will be seen the present habitat is limited.

The densest forests are found in Humboldt County, where the Redwood strip, which includes the westernmost of the coast ranges, averages ten to twelve miles in width. The greatest breadth is in Mendocino County, where it extends for twenty miles. Its entire habitat is a region of heavy rainfall in the Winter, and of fogs which sweep in from the Pacific at all seasons of the year. It is a very moist, temperate region. Both of these conditions seem to be essential to the growth of the species.

Redwood is so called because of its

color, which, when freshly cut, is a bright, though not deep, red, changing to a brown-red when thoroughly seasoned. The wood is soft, with a rather coarse, straight grain. It is easy to work, quite as much so as our Eastern White Pine. It contains practically no resin, but a large amount of water, which makes the green wood so exceedingly heavy that often the lower log of a tree will sink in water.

Botanically, the Redwood (*Sequoia sempervirens*) is a brother of the big trees (*Sequoia gigantea*) of the Sierra Nevada, the two species being the sole living representatives of the genus *Sequoia*. It is a cousin of the Cedars, which it resembles in many respects, in habit and appearance, in bark and foliage. It is an immense tree, larger than the Fir of Washington, but not as large as the Big Tree of the Sierra. It often attains a height exceeding three hundred feet and a butt diameter of fifteen feet. It rarely branches low, but almost invariably



COURTESY OF

REDWOOD LOGS LOADED FOR SHIPMENT.

NATL. GEOGRAPHIC MAG.

shows a straight, fluted trunk, perfectly symmetrical, rising with a slight taper for two hundred feet to the lower branches. The bark is covered with thin flakes of epidermis, lying parallel to the stem. The foliage is dull green in color, fine and drooping. It is a most beautiful tree, both in form and color.

There is one cause of destruction from which this tree is entirely exempt—that is, fire. Containing no pitch, but on the other hand, a large amount of water, it will not burn when green. No fire can run in a redwood forest. We shall, beyond reasonable question, have the use of our supply of redwood; shall not have the pain of seeing it go up in smoke. It is the only one of our coniferous lumber trees which is thus exempt.

The best lumber and the heaviest growth is everywhere in the valleys and on the flats. On the hillsides the trees are smaller and not so close. Nowhere is there any young growth.

When the timber has been cut there is no sign of reproduction from seed. In many localities sprouts are growing from stumps in the cut areas, but even this form of reproduction is limited. Indeed, everything appears to indicate that for some reason, probably a progressive drying of the climate, the present environment is not favorable to the growth of redwood, and that with the clearing away of the present forests the end of the species as a source of lumber will be at hand. HENRY GANNETT.

The Trend of Thought.

A Hopeful Sign.

The agitation for the protection of our forests is bearing fruit in almost every direction. The State of Massachusetts continues to set an excellent example for the rest of the country by reserving large tracts of land, which possess great natural beauty, for the enjoyment of future generations. Greylock, the noble mountain in the northwestern corner of the commonwealth, was threatened with the loss of its charms a few years ago by the reckless assaults of lumbermen, who saw in the extensive forests along its slopes only so much wood. Happily, there were public-spirited citizens who recognized the shame which it would be to their generation if these mountain-sides should be swept bare, and a movement was organized which, with the co-operation of the Legislature, ended in the permanent acquisition for the community of a great tract of land.

Greylock being secure, Wachusett, a fine mountain near the center of the State, next invited attention, and the State will soon come into possession of 10,000 acres

of land there, covering not only the summit, but also its approaches on every side. The readiness of a democracy thus to spend large sums of public money in the interest of beauty and taste is one of the most hopeful things in the development of our institutions.—Editorial, *Newport, R. I., News*.

Moderation in All Things.

“Timber is like wheat or any other crop. If we wish to harvest it again and again on the same land we must grow it there. The timber limits are practically fixed by the immutable laws of climate, and particularly of rainfall, and our forest resources therefore are not inexhaustible. With our enormous population and vast demand for lumber it is easy enough to denude thousands of square miles and to destroy the supply of the most desirable woods faster than unaided nature can replace them. But if we treat our forests half as well as we treat the other forms of vegetable and animal life that enrich us, they are just as inexhaustible as the cattle on our plains or the fishes in our lakes and rivers.”—*N. Y. Sun*.

The Restoration of Mountain Covering.

A comment on the trees available, their characteristics, growth and habitat.

BY THE VICE-PRESIDENT OF THE FOREST AND WATER ASSOCIATION
OF LOS ANGELES COUNTY, CAL.

The mountains, undisturbed by the work of the woodman, or the scourge of forest fires, or the depredations of domestic animals, benefit mankind not only by furnishing a natural water supply at all times of the year, but by increasing that supply under certain conditions, which, when taken away, result in droughts and a general wasting away of the most productive soil.

Few people now fail to appreciate this great value of the mountains to our prosperity. But there are not so many who are convinced that the forest covering must be preserved. Where fire has burned off the natural covering, the denuded area should be replanted at once without waiting for the slow processes of Nature.

In many cases the fire has been so severe that the roots of every tree and bush have been killed and the seeds consumed. The soil which has been so many years in accumulating has also been consumed, or, if it does remain, is in danger of being washed away by storm water. An occasional desert wind will scatter a few seeds where they will take root, and the birds will also give some help. But while we are waiting for the mountains to be reclothed by Nature's process alone, the rains will go wasting to the sea, and all interests in Southern California suffer to an alarming extent because of the destruction of the trees and brush by fire.

This is more particularly true of the San Gabriel range, owing to its greater area being so precipitous. Thus it is of the utmost importance to the people dependent upon water from this source to protect the growth, and, where it has been destroyed, to replant as soon as possible. It would hardly seem possible to get any plant or tree to grow on the steep, soilless slopes of our mountains, especially facing the South, where the heat is intense during all the Summer months.

But Nature has provided the possible means; it is for us to learn how to use such means to advantage.

The Tuberculata Pine is but little known because it is so seldom found. It is the most dignified evergreen we have, and it is extremely selfish, for it holds its cones of seeds as long as it lives, never voluntarily giving them up; and when the seeds are liberated, they, unless helped, are not planted far from home, owing to their not having a wing as most conifers. They thrive from 1,500 to 4,500 feet elevation at this latitude. A fine lot of them can be seen growing on the south slope of the San Bernardino Mountains, along the City Creek stage road, and here, too, can be seen the power of these trees, which is greater than any other evergreen known, to resist fire.

The foliage is light green. At the age of seven or eight years the tree begins to bear cones, not on the branches, but on the main axis, and as they never fall off or open while the trees live, a grove of any considerable size will produce a great many seeds. As many as 100 cones are often seen on a tree apparently 35 years old and each mature cone has 125 seeds. As the tree grows older the cones grow out from the older limbs as well as from the main axis.

This Pine is a long-lived tree and, barring fire and man, has little to fear. Even long droughts do not prevent their reaching the age of 300 years, and many reaching the height of 75 feet. John Muir says the tree is admirably adapted to the fire-swept regions, where alone it is found. After a grove has been destroyed, the ground is at once sown lavishly with all the seeds ripened during its whole life, and a young grove immediately springs up. The seeds seem to be held in store for just such a calamity as this.

Oftentimes these trees are referred to

as the fireproof evergreen. Of course there is no conifer that is strictly fireproof, but this tree resists fire to a greater extent than any other known. In my careful observation I find that where groves have been sown thickly, so as to occupy all the ground, they have resisted fires that have apparently come with great force. Where trees have been destroyed by fire, it has been where they grew sparsely and where there has been an abundance of chaparral and other similar inflammable growth.

By planting the seed carefully, systematically, and a uniform distance apart, nearly all this danger from fire is removed, for in ten or fifteen years the entire surface of the mountain is shaded so that nothing else will try to grow, and the rains will no longer go madly rushing to the sea, but will be returned to us bountifully during the summer months, through the various subterranean and surface channels.

The higher altitudes, where the growth has been burned, must also be restored, and Nature again offers abundant seed of the tree which is best adapted and which will bring the best results. This is the big tree of California, the "Sequoia Gigantea." The Yellow and Sugar Pines will also do well, in the higher altitudes, as we see them in the San Bernardino mountains, but none will so quickly and effectively cover our higher mountains as the Sequoia.

In reply to the question, "What are its relations to climate, soil and the associated trees?" John Muir, in his celebrated work on the "Mountains of California," says of the Sequoia:

"All the phenomena bearing on these questions also throw light upon the peculiar distribution of the species, and sustain the conclusion already arrived at on the question of extension. In the Northern groups there are few young trees or saplings growing up around the failing old ones to perpetuate the race, and inasmuch as these aged Sequoias, so nearly childless, are the only ones commonly known, the species, to most observers, seems doomed to speedy extinction, as

being nothing more than an expiring remnant, vanquished in the so called struggle for life by Pines and Firs that have driven it into its past strongholds in moist glens, where climate is exceptionally favorable.

"But the language of the majestic continuous forests of the South creates a very different impression. No tree of all the forest is more enduringly established in accordance with climate and soil. It grows heartily everywhere in moraines, rocky ledges, along water-courses, and in the deep, moist, alluvial meadows, with a multitude of seedlings and saplings crowding up around the aged, seemingly abundantly able to maintain the forest in prime vigor. For many old storm-stricken trees, there is one or more in all the glory of prime; and, for each of these, many young trees and crowds of exuberant saplings. So that if the trees of any section of the main Sequoia forest were ranged together according to age, a very promising curve would be presented, all the way up from last year's seedlings to giants, and with the young and middle-aged portion of the curve many times longer than the old portion. Even as far north as the Fresno, I counted 536 saplings and seedlings growing promisingly upon a piece of rough avalanche soil not exceeding two acres in area. This soil bed is about seven years old and has been seeded almost simultaneously to Pines, Firs, Ibocedrus and Sequoia, presenting a simple and instructive illustration of the struggle for life among the rival species; and it was interesting to note that the conditions thus far affecting them have enabled the young Sequoias to gain marked advantage.

"In every instance like the above I have observed that the seedling Sequoia is capable of growing on both dryer and wetter soil than its rivals, but requires more sunshine than they; the latter fact being clearly shown, wherever a Sugar Pine or a Fir is growing in close contact with a Sequoia of about equal age and size, and equally exposed to the sun; the branches of the latter in such cases are always

less leafy. Toward the south, however, where the Sequoia becomes more exuberant and numerous, the rival trees become less so; and where they mix with Sequoia they mostly grow up beneath

Sugar Pines which lay crumbling beneath them, an instance of conditions which have enabled Sequoia to crowd out the Pines.

"I also noted eighty-six vigorous sap-



COURTESY OF

A TYPICAL FOREST SCENE.

NATL. GEOGRAPHIC MAG.

them, like slender grasses among stalks of Indian corn. Upon a bed of sandy flood-soil, I counted ninety-four Sequoia, from one to twelve feet high, on a patch of ground once occupied by four large

lings upon a piece of fresh ground prepared for their reception by fire. Thus fire also furnishes bare virgin ground, one of the conditions essential for its growth from the seed. Fresh ground is,

however, furnished in sufficient quantities for the constant renewal of the forests without fire, viz., by the fall of old trees. The soil is thus returned and mellowed, and many trees are planted for every one that falls. Landslides and floods also give rise to bare virgin ground, and a tree now and then owes its existence to a burrowing wolf or squirrel. But the most regular supply of fresh soil is furnished by the fall of aged trees.

..The climatic changes in progress in the Sierra, bearing on the tenure of the tree life, are entirely misapprehended, especially as to the time and the means employed by nature in effecting them. It is constantly asserted in a vague way that the Sierra was vastly wetter than now, and that the increasing drought will of itself extinguish Sequoia, leaving its ground to other trees supposed to be capable of flourishing in a dryer climate. But that Sequoia can and does grow on as dry ground as any of its present rivals, is manifest in a thousand places. 'Why then,' it will be asked, 'are Sequoias always found in greatest abundance in well watered places where streams are exceptionally abundant?' Simply because a growth of Sequoias creates these streams.

"The thirsty mountaineer knows well that in every Sequoia grove he will find running water, but it is a mistake to suppose that the water is the cause of the grove being there: on the contrary the grove is the cause of the water being there. Drain off the water and the trees will remain, but cut off the trees and the water will vanish. Never was cause more completely mistaken for effect than in the case of these related phenomena of Sequoia woods and perennial streams, and I confess that at first I shared the blunder.

"When attention is called to the method of Sequoia's stream-making, it will be apprehended at once. The roots of this immense tree fill the ground, forming a thick sponge that absorbs and holds back the rains and melting snows, allowing them only to ooze and flow gently. Every fallen leaf and rootlet, as

well as long clasping roots and prostrate trunk, may be regarded as a dam, hoarding the bounty of storm clouds, and dispensing it as blessings all through the Summer, instead of allowing it to go headlong in short-lived floods. Evaporation is also checked by the dense foliage to a greater extent than by any other Sierra tree, and the air is entangled in masses and broad sheets that are thickly saturated; while thirsty winds are not allowed to go sponging and licking along the ground."

There are many reasons to justify the assertion that the tree would flourish in our mountains of Southern California, from 4,000 to 9,000 feet elevation. What a thing of beauty our mountains would be if thus planted, and that in a comparatively few years, and the problem of a water supply for our homes and farms would be solved for all time. The work, of course, should be done by the Federal Government, through all the semi-arid regions, but communities that are suffering for water should move in the work, and the Government will soon take it up. A system of scientific forest culture, such as is now being developed by the Government, will doubtless secure as excellent results for America as other countries have attained in Europe.

The Silver Firs, Abies, Concolor and A. Magnifica, the most beautiful native conifer, will grow and thrive in the higher elevations, but not in poor soil, or on steep, hot slopes. An occasional group of these beautiful, fern-like trees would add much to the attractiveness of the forests, and no other tree grows so compact, or so long shelters the snow from melting.

The Ponderosa or Silver Pine is found more generally both as to altitude and latitude, below the great Redwood belt of Northern California. The Ponderosa forms at least two-thirds of all the coniferous forests, and reaching as they do, away over the high plateaus of Arizona. It is useful for lumber, but is not so useful as some others, as a covering for our mountains, mainly because of its lack of density of foliage.

The Sugar Pine, the king of all the Pines, does not take kindly to our Southern mountains, while through the middle and northern Sierras, it is a close rival of the Sequoia in size and perfection of shaft, far outstretching its relative, the Ponderosa. With us it takes second place to the Ponderosa. A few favored spots should be planted with them to perpetuate the species. No conifer presents a more striking picture in fruitage than the Sugar Pine. Its cones are two years in maturing, and are borne in large

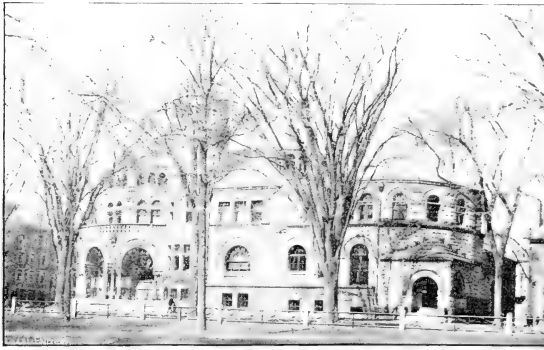
clusters on the ends of the branches, and when mature are from 10 to 20 inches in length. As Winter approaches, the cones open and set free vast numbers of edible winged seeds, which furnish good food for the bears, squirrels and birds. Not one seed in many thousand finds shelter in the soil, where it can grow, but, with a little help from man, many would find covering and become forest monarchs.

T. P. LUKENS,
Pasadena, Cal.

The Profession of Forestry.

Being an address delivered before the students of Yale University.
(Copyright, 1899, by the Yale Alumni Weekly.)

BY THE FORESTER OF THE DEPARTMENT OF AGRICULTURE.



THE OSBORN HALL ELMS.

Even the massive architecture fails to dwarf the trees.

The subject matter of the profession of Forestry is equally distinct from street tree-planting on the one side and landscape architecture on the other. It has to do with wooded regions, with the productiveness of forests, chiefly through conservative lumbering, and, in the treeless parts of the United States, with planting for economic reasons. Except for a comparatively small area of desert

land in the West, the whole land surface of the United States is included in the possible field of work for the forester. How extensive this field is will appear from the fact that the woodland in farms alone, in 1890, comprised more than 200,000,000 acres, or more than four times the area of the National forest reserves.

The first question asked by a man

who has in mind forestry as his profession, usually concerns the chance of finding work when his preparatory study is ended. The sources of demand for trained foresters at the moment are comparatively few, but they are increasing with remarkable rapidity. The great lumbering concerns, such as the International Paper Company, which controls more than 100,000,000 acres of Spruce land, are rapidly getting to see that it is worth their while to employ trained foresters. One Yale man is employed by the company just mentioned; another college graduate, not a Yale man, has charge for a company of certain phases of its lumbering in Maine; and a recently organized company in the Adirondacks will do its lumbering conservatively under the direction of the Division of Forestry. The demand from this source may be expected to increase very greatly within the next ten years, as the great holders of timber land come to realize more generally that conservative lumbering pays better than the destructive methods now employed.

In a similar way mining companies will eventually find it to their interest

to employ foresters. The owners of game parks have already taken steps in this direction. Private owners of large areas such as Biltmore Forest in North Carolina, the property of George W. Vanderbilt, Ne-Ha-Sa-Ne Park, in the Adirondacks, owned by W. Seward Webb, a Yale man, and the contiguous land held by the Hon. Wm. C. Whitney, another Yale man, are already under the management of trained men. The need of foresters to care for the forest interests of the several States is already making itself felt. States such as New York, with its million and a quarter acres of forest land; North Carolina, with its Geological Survey thoroughly interested in forest study; New Jersey and Maryland, of which the same is true; Maine, New Hampshire and several others, with their Forest Commissions; Minnesota, with its Fire Warden law, and other States are rapidly creating a demand for foresters, and would be doing so still more rapidly if men were available to do the work. Finally, the National Government already employs a considerable number of men, and in the comparatively near future will very largely extend the



“NEATH THE ELM’S”

Trees within the Campus, overshadowing “The Old Brick Row.”

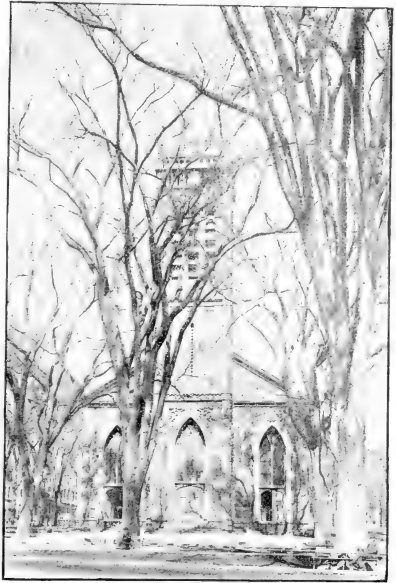
work which requires them. The General Land Office, to which is intrusted the administration of the National forest reserves, has this year an appropriation of \$175,000 for the care and protection of forty-five million acres of forest reserves. At present it employs no trained men at all, but in view of the vital importance of forest preservation, especially in the West, and of the great and growing public interest in its extension, this system of political appointment cannot be expected to last.

The Division of Forestry, which is charged with the general progress of forestry and the interests of private forest lands, in the subdivision of the Government's forest work, is at this moment unable to find suitable trained men, enough to supply its needs. It would be easily possible, it is true, to secure Germans or other foreigners, but a considerable experience has convinced me that, except in rare cases, such as that of the present forester to the Biltmore Estate, the attempt to use foreign-born men trained abroad is not likely to succeed.

COMPENSATION.

The second question asked by the prospective forester very often relates to the rate of pay. I cannot answer this question any more accurately than by saying that trained foresters now receive about the same rate of pay as instructors and professors at Yale. Those in the employ of the Division of Forestry receive from \$1,000 to \$2,500 a year. Scientific work under the Government is always underpaid, and it is most probable that those foresters who enter the service of lumber companies or other commercial organizations will fare better. It is even possible that a few men may develop such skill that they will be called in consultation over difficult problems. Such work will naturally pay well.

As with teaching, so with forestry; by no means all the compensation comes in the form of dollars. While the life of the forester in the field is often rough, many times exceedingly hard, and always



MAGNIFICENT ELMS ON THE PUBLIC GREEN,
NEW HAVEN.

without most of the comforts of life, it is to those of us who have been following it the most delightful of occupations. Briefly stated, it deals, on the scientific side, with the life-history of forests and forest trees, with their behavior in health and disease, their reaction under treatment, and their adaptation to and effect upon their surroundings. On the economic side, it has chiefly to do with reconciling the perpetuation of the forest with the production of timber. Measurements of the stand of timber per acre, and of the rate of growth of single trees and whole forests by counting rings, and subsequent calculations, often form a considerable part of a forester's work. There is often a great deal of office work. It is by no means the easy existence it has often been supposed to be by the many men who have taken up forestry, and then have dropped it. But it has

a charm which lies perhaps first of all in the fact that in the United States it is almost an untried field.

ORIGINAL WORK DEMANDED.

Unless forestry as a profession has qualities to recommend it other than those I have already mentioned, it would scarcely be worthy of consideration before many other lines of work. It has, however, two peculiarities in which it stands somewhat by itself. In the first place, because the field is practically untouched, a forester finds himself compelled to do original work at every turn. The pleasure of investigation of this is very real, and to those of us who are practicing forestry it is one of its two great attractions. The second lies in the fact that, because forestry is almost unknown in the United States, in no profession is it easier for a man to make his life count. I need not dwell further on the vastness of the interests it touches nor the great utility of forestry to the nation, but I should like to emphasize this statement—in few other professions can a man lead so useful a life.

WHAT THE PROFESSION DEMANDS.

These are the things which forestry offers. Now as to what it demands. In the first place success in forestry, as in any other profession, must come largely from the possession of what we know so well as "Yale spirit," the habit of accomplishment and the willingness to do the work first and count the cost afterward. It is interesting to note here that a majority of the young Americans who have fitted themselves for technical forest work are Yale men. Whatever the connection or the special fitness may be which brings Yale men into this line of effort and achievement, I should like to see the recruits from Yale come in fast enough to maintain something like the old proportion.

After the "Yale spirit" comes soundness of body and hardiness, for foresters must often expect the roughest kind of life in the woods. The helpmeet of hardiness is a contented spirit. There

is no more pernicious character than a grumbler in camp, and nothing will help so much to get field work done as the willingness to bear privation cheerfully.

A man who takes up forestry will often find the field work exceedingly or even unexpectedly hard, for it combines severe mental work with severe bodily labor, under conditions which make each one peculiarly trying. Work in the woods differs profoundly from camp life as it is usually understood. Foresters get a certain amount of hunting and fishing, and every forester will do his work better for a wholesome love of the rod and gun, but the line between work and play is still sharply drawn.

I have been speaking of the fundamental qualities which are more or less necessary to success in any vigorous outdoor life. There are several additional capacities with which the forester should be well endowed. The first of these is the power of observation. It is often difficult to say *a priori* whether a man has it or not. In many cases it makes itself known as a love of hunting or fishing, or a general pleasure in all outdoors. To the forester it is one of the most essential qualities in his mental equipment. Finally, perseverance, initiative and self-reliance are peculiarly necessary, because the forester is so often withdrawn from the inspection of his superiors and altogether dependent on his own steadfastness and devotion to keep him up to the high standard he should set himself for his work. In a new field of effort this is especially likely to be true. It is one of the distinguishing characteristics of the profession of forestry.

PREPARATION.

The preparation for forestry as a profession should, as a rule, begin with a college or university course, and should be continued after graduation in most cases for three years.

The first step in the preparation for forestry as a profession is for the possible forester to discover whether his con-

ception of forestry is a right one. To do so he must get into the field. The Division of Forestry has made provision to meet this requirement by establishing the grade of Student Assistant, with pay at the rate of \$300 a year. Men who take this position are required to

specific advantage this grade offers in enabling a man to take part in actual forest work under a trained forester, and so discover what the profession really means, it has a special usefulness in enabling men who cannot afford fuller preparation to support themselves while



A VISTA OF ELMS.

With Welch Hall and Lawrence Hall on the Yale Campus.

assist in the work of the Division with the same steadiness and devotion to duty as in all its other members, and they are employed so far as possible in work of peculiar value to them and at the same time of use in the general progress. All their expenses are defrayed while in the field. In addition to the

getting their education. It does not replace a forest school with advantage, nor is it the intention that it should. No future forester who can possibly afford to take a course, either at Cornell, under Dr. Fernow, or at Biltmore, under Dr. Schenck, should fail to do so.

The number of positions as Student

Assistant is decidedly limited. Parties will be in the field during the coming summer in the Adirondacks, in the State of Washington, and possibly also in Maine. No one will be received as Student Assistant who has not definitely made up his mind to take up forestry as a profession, although of course no pledge to that effect is required.

In my judgment the best course for the future forester to pursue, so far as his systematic training is concerned, is first, one year at a university, filling up the blanks in the auxiliary subjects necessary, as mentioned in the symposium published in the May issue of THE FORESTER; second, a year at a forest school, preferably where practical work in the woods goes hand in hand with theoretical instruction; and third, a year abroad. The latter is of the greatest value, because in this country forestry is too young to show the effect of silvi-

cultural treatment on the various kinds of forests; although much that is learned abroad must be unlearned later. This experience in a region where forestry is of old date is, in my judgment, a most essential portion of a forester's education. It goes without saying that vacations, as far as possible, should be spent in the woods.

Forestry on its executive side is closer to lumbering than any other calling, and a good knowledge of the lumberman's methods is an essential part of a forester's education. But it must not be forgotten that it offers a field for pure research of the widest and most attractive character for those who are inclined and can afford to occupy it. It is so broad a subject that as yet we do not quite know what its development and its subdivisions are going to be.

GIFFORD PINCHOT.

Appointments of Student Assistants.

Names of those selected for field work during the present summer under the direction of the Department of Agriculture.

The opportunity offered by the Division of Forestry of the Department of Agriculture, for field instruction during the present summer, met with an immediate response from a large number of young men, many of them college undergraduates, who were desirous of becoming student-assistants. The great excess of applications made a careful examination and selection necessary, with the result that the following young men have been chosen to work under the direction of these officials:

With Gifford Pinchot, Forester of the Department of Agriculture, working in the State of Washington: Stuart Hotchkiss, Richard Thornton Fisher, E. J. S. Moore, E. Koch, J. Frazier-Curtis, William M. Maule, Thomas C. Carson,

Kinsley Twining, Jr., William B. Hodge, Jr., Henry James, 2d., William James, Jr., Frank A. Spragg, E. T. Allen, and William F. Wight.

With Henry S. Graves, Assistant Forester of the Department, working in the Adirondacks: Smith Riley, Henry Grinnell, Fred Nash, Oscar S. Pulman, Jr., Edward T. Grandlienard, M. De Turk High, John Victor Doniphan, Jr., Charles Jones, Edwin Colby Lewis, and William P. Haines.

With W. W. Ashe, Forest Expert of the Division of Forestry, in North Carolina: A. E. Ames, A. E. Cohoon, J. A. Caldwell, Jr., and H. McC. Curran.

In the office of the Division of Forestry at Washington: Treadwell Cleveland, Jr.

Conservation and Restoration.

The Proposed Leech Lake Forest Reserve, Minnesota.

With the idea of providing the State of Minnesota with a public park reserve, larger, more easily accessible, and almost as beautiful as the Yellowstone National Park, a plan is being formulated, for intended legislative action, regarding the Leech Lake country in Minnesota.

The balsamic forests of that region are said to have healing powers not found elsewhere, on account of which the locality has been suggested as the site for a large sanitarium for wounded and disabled soldiers, for whose support the Government spends a large sum annually, in various States.

The suggestion is made that these invalids, besides being greatly benefited in health, could act as guards in the proposed forest reservation, making the plan not only feasible, but extremely practicable from a financial view-point.

The plan was originally suggested by Colonel John S. Cooper, of Chicago, who has been enthusiastically advocating the movement until its success now seems more than a mere possibility.

Lumbermen and Charcoal Makers— Next?

The growth of popular interest in forest conservation has been very marked during the past year, but even the most enthusiastic advocates were hardly prepared to hear that lumbermen and charcoal makers—the destroyers of the forests—are now taking steps to administer their forests as permanent investments.

A Minnesota lumberman, E. L. Reed, of Anako, has determined to apply forest principles to a tract of one thousand acres of Pine lands in Mille Lacs County, according to a recent article in the *Minneapolis Journal*. Other owners of forest tracts in the same State have also determined to adopt conservative methods, and are taking advantage of the offer

made some time ago by the Division of Forestry of the Department of Agriculture. This plan provides, as heretofore announced, for examining forest and woodlands, and outlining a scheme of scientific administration with a view to the preservation of the forest as a whole, while yielding an annual revenue.

The preliminary examination of these tracts has already been made under the direction of Horace B. Ayres, special agent of the Division of Forestry.

Even more significant are the applications which have come from charcoal makers in the upper peninsula of Michigan, who desire to begin a system of economical management of woodlands from which they procure wood for the charcoal kilns. After years of burning without thought of preserving the source of supply, they have become alarmed, and want to make the remaining lands furnish annual crops.

The Enthusiasm of Conviction.

Former Mayor T. P. Lukens, of Pasadena, Cal., an evergreen seed-grower of twenty-five years experience, intends to spend the greater part of the Summer in the mountains at Pine Lake, where he has built a log cabin, and will devote his time to forest investigation. He will collect seeds of the *Pinus tuberculata*, take them out by fire, and plant them in the Fall in the burned districts above Pasadena. In the absence of Government aid, Mr. Lukens intends to give a personal object lesson in support of his views.

A Significant Showing.

The applications from private land-owners to the Division of Forestry of the Department of Agriculture for a scientific administration of their woodlands, under the recent offer of the Department, represent a total of one and one-half million acres.

Recent Legislation.

New York.

A victory for those in favor of forest conservation was gained in New York State in the early part of June, when the Court of Appeals, in session at Albany, affirmed the decision of the lower courts declaring unconstitutional a forest law in dispute. This law was passed by the Legislature of 1894, making Moose River and its tributaries public highways for the floating of logs and timber. W. S. de Camp, a large landowner, brought the suit against Lemon and Edward Thompson, lumbermen, who had cut 19,000,000 feet of lumber. As the decision prevents taking this out, except at considerably increased expense, it is believed the landowners' victory will be a permanent one.

In the new rules adopted by the New York State Civil Service Commission, and approved by Governor Roosevelt, the offices of fire inspectors of the Forest Preserve Board are transferred to the "competitive class," by which applicants are made subject to examination under the classification of "skilled laborers."

Governor Roosevelt has signed a bill authorizing the expenditure of \$30,000 for Beaver Park, Albany.

Massachusetts.

A plan has been proposed to enlarge and improve the grounds around the Massachusetts State House so as to form a park. The Governor, President of the Senate, and Speaker of the House are the committee on a proposal to defray the expense by issuing \$2,000,000 of four per cent forty year bonds.

The Massachusetts Legislature has appropriated \$200,000 this year to be used in fighting the gypsy moth, which is very injurious to Elm and other trees.

The Massachusetts House has voted to appropriate \$600,000 for the purchase by the State of Nantasket Beach and its conversion into a public reservation.

Pennsylvania.

A bill authorizing the purchase of timbered lands for State forest reservations whenever there are available funds in the treasury for that purpose, has passed the Legislature and has been approved by Governor Stone. Under the safeguards provided there is no necessity for delay awaiting special legislation for each instance of a new purchase. The advantage of this provision cannot well be overestimated, as it will enable the State Forest Commission to establish reserves without the hindrance of the customary official red tape.

Michigan.

The Governor of Michigan has approved Senate Bill No. 101, providing for a permanent commission on forestry, a review of which was published in the JUNE FORESTER. The commission appointed by him consists of Hon. Arthur Hill, of Saginaw; Hon. Charles W. Garfield, of Grand Rapids, and Hon. William French, of Alpena, Commissioner of the State Land Office, ex-officio.

The bill which was introduced into the Michigan Legislature to create the office of Fire Warden, failed of enactment. It was planned to model the law on the lines of that enacted in Massachusetts in 1894. Though encountering a setback in this defeat, the friends of the proposed measure hope to arouse sufficient public sentiment to pass the bill at the next session of the legislature.

The main provisions are that the Governor shall appoint a State Fire Marshal, who shall hold office for a period of two years, and shall maintain an office at Lansing, and whomay be removed for cause at any time. This marshal or warden shall appoint two deputies, one of whom shall reside in the upper peninsula. The fire chief of Detroit is also constituted a deputy, as is the fire marshal or chief in every city or village in the State. Supervisors of townships shall also be deputies.

Minnesota.

Under the new forest reserve law, providing for a State Board of Forestry, the Minnesota State Forestry Association has chosen Judson N. Cross as its representative on the board.

Colorado.

At a recent meeting of the State Board of Agriculture, resolutions were adopted directing the preparation and circulation of bulletin leaflets containing plans and suggestions for the ornamentation of grounds by tree-planting, etc. Though intended primarily for the improvement of school-house grounds and country homes, it is certain that the effect of such bulletins will be far-reaching in other directions as well.

Washington.

The reorganization of the forest reserve service in Washington provides for one State Superintendent instead of two as before; four Supervisors instead of three, and a large force of rangers to guard against forest fires during the dry season.

The State Superintendent's salary has been reduced from \$2,000 to \$1,000 per annum. The Supervisors are placed in charge of the different squads of rangers and are paid \$5 a day salary, \$1.50 a day subsistence, Sundays included, and all traveling expenses. The Supervisor's salary thus amounts to about \$2,000 per annum. From 60 to 75 rangers will be employed, half of them having gone on duty June 1, and the remaining ones on July 1. Their salary will be \$60 a month, out of which they must supply their own outfit and subsistence.

Representative D. B. Sheller has been appointed Superintendent. E. B. Hyde, of Spokane, one of the former Superintendents, is one of the new Supervisors. He has charge of that part of the Washington reserve lying east of the Cascade Mountains, together with the strip of the Priest River reserve which extends into Washington, and has headquarters at Spokane. Supervisor Matheson has charge of Mt. Rainier Reserve, with

headquarters at North Yakima. Supervisor Ham is in charge of the Olympics, with headquarters at Tacoma. Supervisor Hulbert has charge of the western part of the Washington Reserve, and is stationed at Everett.

Canada.

After official inquiry into the subject, the Canadian Government has decided not to issue permits to cut timber on Dominion lands along the eastern slope of the Rocky Mountains and the foothill country adjacent thereto south of Bow River, and to preserve the timber as far as possible from being destroyed, with a view of securing a permanent supply of water for irrigation purposes.

Nova Scotia.

At the recent session of the Nova Scotia Legislature E. McDonald, M. P. for Pictou, introduced in the House of Assembly a bill designed to protect workmen employed by lumbermen. The bill was passed there but was defeated in the Legislative Council. It is known as the "Woodmen's Lien Act," making wages a first lien upon the forest product to the exclusion of all other claims except those of the Dominion Government, and will be reintroduced at the next session of the Legislature.

A movement was recently made to consolidate all the Cypress lumber mills of Louisiana and Mississippi into a "trust," but it fell through, says *Bradstreet's*, simply because all the mills have orders ahead for almost the entire output, considerable trade coming from Cuba and Porto Rico.

Wooden pavements are common in Paris, made of blocks 4.7 by 5.9 inches, of Landes Pine, with some of the principal thoroughfares laid with American Pitch Pine. The latter is said to have been employed with marked success. It is estimated that up to 1897 over three million dollars had been expended by that city for wooden pavements.—*American Lumberman*.

Reign of the Fire King.

Forest Fires in Washington.

While cruising in the vicinity of the headwaters of the Lewis and Sispus Rivers, between Mt. Adams and Mt. St. Helen, last August, I saw the destruction by fire of a great quantity of very valuable timber. At that time fifty sections of heavily-timbered country were totally devastated by fire within forty-eight hours. I would estimate the timber thus destroyed to be from 40,000 to 50,000 feet per acre. The loss approximated 1,280,000,000 feet of first-class Fir timber, which, when worked up into lumber, would amount to not less than ten millions of dollars in value. A fire entailing such losses would be considered a great disaster in any part of the country. This is but one instance among many—in fact, there are miles and miles of that country that have been thus destroyed.

There are evidently several causes for these fires. First, the Indians purposely set fires where the brush is so thick as to interfere with hunting; secondly, the sheep men cause these conflagrations to make better pasturage on the sheep ranges; and, thirdly, prospectors and travelers through the country are often careless of their camp-fires.

Something, indeed, must be done at once if the forests of the higher lands of the Cascade range are to be saved from the destroying brand. It is necessary not only to have a stringent law, but it must be strictly enforced. If nothing is done to save this great wealth of forest at once, it will soon be too late. Under the existing inactivity on the part of the Government and State to preserve these forests, the end of the next ten years will see the bulk of the timber on the highlands destroyed. This, of course, endangers the lower lands also, and will soon be the cause of inroads on the timber of the valleys.

R. F. Cox,
Chenoweth, Wash.

Forest Fires in Oregon.

Much of the loss occasioned by the disastrous forest fires of recent years in Washington and Oregon is undoubtedly due to the indifference and carelessness of settlers.

In my personal experience one man, J. B. McDonald, admitted on the witness stand that, after having cleared off an old burn of about two acres, he had set fire to the debris, and that at dark he had put it in shape so as not to spread to the adjoining forest, but that about 10 o'clock that night, noticing a bright light, he went up to the clearing and discovered that the fire had crept into the timber; that before it was extinguished ten millions of first-class Fir was destroyed.

The man said that his two acres, when cleared for the plow, were not worth ten dollars. The difference between the two amounts represents the premium on his carelessness and the cost of the experience to the State.

It is perfectly awful to go through the forests of Oregon and Washington and see the waste caused by needless fires. The statements of "boomers" regarding the immense forests in these States are gross exaggerations. The lands originally covered by forests have been so burned over that I do not believe 40 per cent of the timber remains—perhaps not 30 per cent.

J. B. MONTGOMERY,
Portland, Oregon.

Swift Punishment of an Incendiary.

Lowville, N. Y.—Henry Kennedy, of Watson, was arrested by Sheriff Geo. Denslow and brought before Justice J. C. Bardo for examination. The charge is setting forest fires in the town of Watson. He entered a plea of guilty. He was fined \$25 or twenty-five days in jail, and not having the necessary funds was committed to jail.

THE FORESTER.

A MONTHLY MAGAZINE

Devoted to Arboriculture and Forestry, the Care and Use of Forests and Forest Trees, and Related Subjects.

ANNOUNCEMENT.

THE FORESTER is the Official Organ of

The American Forestry Association,

Hon. JAMES WILSON, Sec'y of Agriculture,
President.

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Make all checks, drafts, etc., payable to THE FORESTER.

SPECIAL ANNOUNCEMENT.

Attention is called to the arrangements for meetings of the American Forestry Association, as given in the pink slips enclosed in each copy of this issue.

An unexpected demand having exhausted the supply of complete files of THE FORESTER, Vols. I, II, and III, the management will deem it a great favor to them, and more especially to those who have applied for the early volumes, if subscribers who have extra single copies or files, which they are willing to donate or sell to the Association, for the spread of forest information and interest, will kindly write to this office, stating volume, number, and how many copies they will forward, in order to fill out incomplete files now in stock.

The laudable efforts of many public-spirited men in the West, who have been energetic in arousing public sentiment for the care and preservation of the forests, have lately been decried by a newspaper writer who holds other views. While not denying the perfect right of every individual to hold whatever views appeal to him, THE FORESTER feels an interest in presenting to its readers this month several able comments on the conservation and restoration of forests.

The August FORESTER will contain a full account of the Los Angeles meeting of the American Forestry Association, with a number of the leading papers read at its sessions. This will be an important issue.

It is gratifying to the editor of THE FORESTER to be in receipt of commendatory articles from various parts of the country, in reference to THE FORESTER and its contributors of the last few months. The aim of the management will be to present facts with such official authorization as will make all its articles recognized as worthy of unquestioned acceptance.

It is encouraging, therefore, in an age of sharp criticism, to find that the opinions expressed in THE FORESTER meet with the hearty approval of those who are in a position to know the facts. In prefacing a review of Mr. Bailey Willis' article on "Mount Rainier" from the May FORESTER, the Seattle (Wash.) *Post-Intelligencer* says:

"Mr. Bailey Willis has written for the May number of THE FORESTER an article describing Mount Rainier National Park, and suggesting various modifications in the boundaries, which might profitably be given wider circulation. The descriptive portion of the article is the sort of material which the Information Bureau recently formed in this city might find advantageous to distribute. The adventures of mountain-climbing frequently form the most seductive inducements possible to be put before tourists; and Rainier, with its peculiar combination of ice and forestry, would commend itself to an unusually large range of explorers and exploiters. A pamphlet, well compiled and handsomely illustrated, containing the interesting data of Mr. Willis' article, could but find a large range of interested readers."

Mr. Willis, through his connection with the United States Geological Survey, has become known as an authority on matters pertaining to the physiography and glacial phenomena of the Northwest. He first visited Mt. Rainier in 1881 when he explored a large part of Washington and Oregon, especially the Cascade Range, during a period of three years, becoming thoroughly familiar with the entire region and repeatedly ascending the famous mountain at its most difficult points. He has visited there three times since, and in 1896, with Prof. Russell and several associates, reached the summit of Mt. Rainier up the northern slope—this being the only authenticated trip ever made by this route

A Further Increase.

Since the announcement, in the June FORESTER, of the large increase in the membership of the American Forestry Association during a single month—May—further applications have come in with hardly any diminution in the ratio of increase, notwithstanding the advent of torrid weather and the vacation season. But for the fact that the July FORESTER appears in advance of the usual date of publication—on account of the conventions of the National Educational Association and of the American Forestry Association at Los Angeles—it is more than likely that the marked increase announced last month would have been duplicated in the present issue.

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CHIPS AND CLIPS.

"Dead green" is the description given of much lumber being shipped lately.

The price of Hemlock in New York is said to have reached the best figure in its history.

"There are no soft spots in the Pine trade," is the way a lumber contemporary describes the situation.

The season's lumber drive in Maine, by the Kennebec Log Company, is reported as one hundred million feet.

A lumber firm has bought an entire township in Maine, and will manufacture a hardwood tape for improved pegging machinery.

The raft-towing from the Georgian Bay District to Michigan will aggregate less than seventy-five million feet this year, according to a recent estimate.

A considerable trade is said to have been developed in cedar posts for manufacture into paving blocks, creating a scarcity in that grade of article.

A Russian firm has been making extended inquiries regarding firms in a position to supply railway sleepers and wood blocks suitable for paving purposes.

The heaviest sale of hardwood timber in the history of Emmet County, Mich., was recently made, consisting of 36,000 acres, the total consideration being placed at \$52,000.

Export orders of Cypress ties are being figured on at New Orleans in lots of 250,000 for Cuban purchasers. Under the recent ruling, these ties will be admitted free of duty.

A lumberman's marine insurance company has been incorporated with a capital of \$50,000 at Norfolk, Va., in consequence of disagreements with the general insurance companies.

The timber on 30,000 acres of hardwoods at Algoma, W. Va., is about to be cut at the rate of 35,000 feet per day. It is estimated that five years will be spent in finishing the tract.

One and one-half million feet of lumber has already been delivered in Philadelphia for the buildings of the Commercial Museums' Exposition of American products and manufactures.

The timber on a tract of virgin forest in Mississippi, 23,000 acres in extent, heretofore reserved for United States naval purposes, was offered for sale at the highest bid filed by the middle of June.

A special commissioner, recently sent to San Francisco by the Philadelphia Exposition of American Manufactures and Products, has secured the promise of a California exhibit, including nuts and raisins.

A large tract of Pine, situated on the north shore of Lake Superior, has been purchased, it is announced, to be rafted to

Ashland, Wis. The timber will amount to about two hundred and fifty million feet and is the first large amount of Minnesota timber to be brought to the Ashland mills to be sawed.

The Ontario Department of Forestry has received inquiries from Great Britain regarding the quality of Birch timber to be found in Canada. There is said to be a good demand in Great Britain for Canadian Birch for furniture manufacture.

A consolidation of all the interests of a number of West Virginia timber producers, including U. S. Senator Stephen B. Elkins and all the mills on the W. Va. Central & Pittsburg Railroad, has been rumored for some time, but lacks confirmation.

An American company, composed largely of Pennsylvania capitalists, has invested in extensive timberlands, underlaid with minerals, in Honduras, Central America. About 40,000 acres of land have already been purchased for development.

Three Scotch lumbermen, from Crieff and Montrose in the Land of the Thistle, have been touring Michigan to acquire general information touching their business. Besides having interests in England and Scotland, they are factors in the lumber trade of Sweden.

A short time ago there was recorded at Davis, W. Va., the largest trainload of logs ever brought into that place. The cargo was West Virginia Spruce and consisted of thirty-seven trucks, loaded and unloaded and hauled a distance of twenty miles—all within twelve hours.

A valuable tract of land in Mississippi, well timbered, has been sold to New York lumbermen for immediate development. The purchase includes Yazoo Delta lands, of rich alluvial bottoms, which are regarded very highly, and will be good farming tracts, it is said, when the timber is cut.

A. W. Belding, for four years forest ranger of the Biscotasing district of Ontario, under the Canadian Government, died suddenly several weeks ago. He was an expert lumberman previous to his official service.

The passing of the axe-man from the Michigan and Wisconsin fields to the South, is becoming something like an exodus. Among other recently announced purchases by Northern lumbermen is a tract of 160,000 acres of Pine timber lands in Calcasieu Parish, Louisiana.

One of the leading forest experts in Scotland, M. Malcolm Dunn, died recently. He wrote frequently upon forestry, horticultural, and literary topics affecting Scotland. For many years he had been in charge of the grounds of Dalkeith Palace, one of the Scotch estates of the Duke of Buccleuch.

Four hundred million feet of standing Pine in Lake County, Minn., have been sold to former U. S. Senator Vilas and Col. J. H. Knight, of Wisconsin, for one million dollars. The sale is one of great importance to the prosperity of the towns bordering on Lake Superior, and Northern Wisconsin in general.

The aggressive and successful prosecution of a pulp and paper company for pollution of the Potomac River, has led to the formation of a board of trade by residents of Piedmont and Iuka, W. Va., and Western Port, Md., near by, to prevent opposition to lumbering enterprises which may be induced to locate there.

The consolidation of the interests of five Michigan lumbermen, and the capitalization of a company at \$550,000, is announced, for the purpose of buying and selling lands and timber, principally in the Parishes of Calcasieu, Vernon, and Rapides, Louisiana. The present holdings amount to 143,000 acres, for which an aggregate amount of \$900,000 was paid.

The successful propagation and growth of forest trees is admirably exemplified in the Farlington Tree Plantation, in Crawford County, Kansas. After nearly two decades of experimentation on two tracts of land, specially set apart for the purpose, there is ample evidence of what can be accomplished when scientific methods are employed.

The planting was completed hardly more than a dozen years ago and since then the only attention given to either of the tracts has been to keep out the fire and to cut out the small inferior trees.

Forest Fires.

Marquette, Mich.—Forest fires were burning north of Bessemer, the entire range being under a dense cloud of smoke.

Bangor, Me.—A fierce fire has raged in the woods along the line of the Mount Desert Branch R. R. near the Green Point road.

North Eastham, Mass.—The forest fire in this section swept a territory of 1,600 acres, causing a loss of between \$12,000 and \$15,000.

Brewer, Me.—A forest fire started on the Bar Harbor Railroad, at the top of Brewer grade, and burned fiercely; but spreading into a dead woodland district little damage was done.

Santa Fe, N. M.—Forest fires have recently done great damage in the Jemez and Via Mountains, destroying thousands of dollars' worth of timber. The fires can be seen for many miles.

Kanab, Utah.—Three immense forest fires swept Buckskin mountains, in northern Arizona and southern Utah. Over 100 square miles of timber on the Grand Canon forest reserve were destroyed.

Lewiston, Me.—A crew of twenty-one men were sent by Street Commissioner Murphy to the farms on the Noname

road, to extinguish the forest fires there. They worked from noon to midnight before beating back the flames.

Clinton, Mass.—A forest fire burned in the woodlands along the Boylston Road, the territory affected covering many acres, with "miles of flame." There were no houses in the vicinity and no efforts were made to check the fire.

Port Republic, N. J.—The fire mentioned in the June FORESTER, was the worst forest fire in this section in eight years. The flames at one time extended fifteen miles in width, and, with an unfavorable wind, would have threatened Atlantic City.

Rockland, Me.—A terrible forest fire raged at Razorville, sweeping everything before it and damaging land and timber greatly. A stiff northwest breeze sprang up, driving away the fire fighters. No buildings had been destroyed, at last accounts.

Buzzard's Bay, Mass.—A fire which started in the Plymouth woods, near Bournedale, swept toward Plymouth, being aided by a heavy wind. A large force of men went out to fight the flames, and saved the immense cranberry bogs by flooding.

Pueblo, Colo.—A large forest fire burned through a part of the Hardscrabble region, the best watered and best timbered portion of the Greenhorn range. The locality of the fire was several miles north of Hardscrabble canon, and west of Wetmore.

Hill City, S. D.—It is stated on the authority of H. G. Hamaker, Forest Supervisor for the Black Hills forest reserve, that fire in four different sections of the Southern Hills had destroyed large areas of valuable timber. In every instance the fire was started by a ranchman who was burning off old grass and brush on cleared lands.

Sparrow Bush, N. Y.—The recent forest fire on Hawk's Nest Mountain killed some thousands of fine young trees on the bluff west of Butler's Lock. A trip through the burned strip showed extensive loss. Several mountain farmhouses and barns narrowly escaped destruction. As the Port Jervis, N. Y., *Gazette* says: "The starting of such fires is a crime that ought to be punished."

Iron Mountain, Mich.—Northwest of this place a woodchopper left his camp-fire burning, and the wind, blowing a gale, fanned it into a conflagration. The flames spread both to the west and south. Another fire started near the compressor works on the Menominee River, south of this town, and burned standing Pine and cut hard wood. Many farmers had narrow escapes from being burned out.

St. John's, N. F.—The village of Bay of Islands, a settlement on the West coast of Newfoundland, forming part of what is called the French Shore, was destroyed by forest fires the middle of June. Sixty-nine houses were burned and fifty-seven families are homeless.

The French and British warships on the coast afforded assistance to the destitute people until relief could be secured from the nearest towns.

Rangeley, Me.—At "The Chain of Ponds" where there are large tracts of merchantable timber, a forest fire burned the supply-station of a large mill company and swept through 1,000 acres of merchantable timber, some weeks ago. The lives of two hundred lumbermen were endangered. There was a northwest gale blowing, causing the fire to spread with great rapidity, with no possible means of checking it. The station-keeper, William Mahoney, and his wife, escaped in safety.

At Mooselookmeguntic another fire occurred. Two log booms burst and entailed a loss of \$1,500. Five million feet of logs were included in the booms.

Recent Publications.

A Primer of Forestry, Part I.—Gifford Pinchot.

A simple book on forestry in the United States has long been needed—a book that could be readily used in schools and yet one thorough enough to serve as a basis for advanced work later on. Mr. Pinchot's forthcoming volume is the first part of a book written for this very purpose, and for this reason merits a welcome from all who have sought in vain for such a help to elementary study.

This account of the life of trees and forests is written in a light and very interesting way, yet contrives to tell all the facts and explain all the laws of forest growth which are not too abstract and difficult for the aim in view. It consists of four chapters. The first chapter tells of the habits of a tree; how it lives, and gains food, and breathes. The second chapter shows how numbers of trees live when they are grouped together in a forest. When this happens the trees are no longer able to follow their separate inclinations, but commence at once to fight with one another for the required amount of sunlight and growing space. There begins that competition between one tree and another, and between one kind of tree and another kind, which lends so much interest to the history of the forest.

Yet in spite of the struggle that is going on for survival, the trees are, oddly enough, bound together in mutual helpfulness, in this way resembling not a little the members of a human community; so that the sharpness of the rivalry is softened, and the tree that wins, claims our true admiration.

Chapter three is of special interest. It is devoted to the story of a forest crop through all its long and gradual growth from the seedling to the mature tree. At first the young trees start on nearly an equal footing; but before long they crowd up against one another, and their branches interfere, so that the sunlight is shut out from the leaves, and the least advantage of faster growth quickly gives some trees the means of overtopping the rest, leaving the latter to starve and die while they stretch up to gather strength and bulk for the next stage in the struggle.

This fight is repeated until the trees have reached their full height, when, being unable

to develop a larger crown of leaves above them, they resort to growing sideways, so that their branches again interfere with those of their neighbors. All this while the trees are growing in three ways—in height, thickness and volume—and it is shown how there comes a time when the trees can be cut or harvested with more profit than at any other time.

The final chapter deals with the enemies of the forest. Fire comes first in importance. The author describes how fires arise and how they are best prevented or extinguished. Next in order comes sheep grazing, which, besides being a frequent cause of destructive fires, is a menace to the forest in many other ways, such as the tearing of the soil on hillsides, the trampling or devouring of seedlings, and the like. Then there are insects without number, cattle, horses, swine, snow and wind—a whole army against which the forest battles more or less strenuously all its life.

But if Nature were left to herself, as was the case before the intrusion of man into the depths of the virgin forests, a very great part of all this damage now being done to the forest would never happen. Man has been the worst enemy of the woods. Independently of the fires which his interest occasion, there is lumbering which, as now conducted, despoils the forest, and benumbs or destroys its growing power for long periods.

"The Forest" is rendered doubly attractive to the general reader, and doubly useful for the end which it is written to serve, by its plentiful illustrations. There are forty-three full-page illustrations and eighty-seven more in the text. They consist almost entirely of photographs taken in the forest. The greater number were secured expressly for the book, while all elucidate various points of the exposition. The photographs of the different phases of forest life are remarkable for the clearness with which they show the contrasting stages of growth, distinct forest types, the effects of fire, grazing and wind, and the characteristics of many species of trees. In addition there are a number of photographs showing the parts of a tree, such as cones, roots, bark, and, particularly, the wood itself.

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ORGANIZED APRIL, 1882.

INCORPORATED JANUARY, 1897.

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The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

Owners of timber and woodlands are particularly invited to join the Association, as well as are all persons who are in sympathy with the objects herein set forth.

THE INCREASING INTEREST

in the history of American forests and the efforts that have been made for their conservation, development, and use, has led THE FORESTER to secure, for the benefit of its readers, a number of complete sets of the

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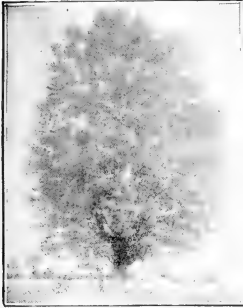
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THE STATE AND FORESTRY

VOL. V.

AUGUST, 1899.

No. 8.

Columbus, Ohio, August 22-23.

This meeting is proposed in response to the invitation of the American Association for the Advancement of Science, which meets at Columbus August 22-26. The local arrangements are in charge of Prof. William Lazenby, of the Ohio State University, Columbus.

The sessions will be held on August 22 and 23 at Room 1, Horticultural Hall.

Persons wishing to attend have the advantage of all favors as to railroad rates, excursions, etc., arranged for by the American Association for the Advancement of Science.

Full information will be furnished by the Secretary, Dr. L. O. Howard, of Washington, D. C.

Missoula, Montana, September 25-27.

The close relations between forestry and irrigation make it especially suitable that this Association should accept the invitation to hold a meeting in connection with the National Irrigation Congress, which convenes at Missoula, Montana, on September 25.

The immense forest reserves in and surrounding the Yellowstone National Park lend an additional attraction to this meeting.

A committee of arrangements will shortly be appointed, announcement of which will be made in THE FORESTER. Until further notice, information can be obtained from Mr. I. D. V. Donnell, Chairman Executive Committee, National Irrigation Congress, Billings, Montana.

Papers.

Members are earnestly and cordially invited to submit papers on forest topics, to be read at one or another of these meetings. Those which cannot be presented by the writer in person may be sent to the gentleman in charge of the arrangements, as named above. Selected papers will be published in THE FORESTER.

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THE STATE AND FORESTRY

Vol. V.

AUGUST, 1899.

No. 8.

American Forest
The Forester

A MONTHLY MAGAZINE

devoted to the care and use of
forests and forest trees and
to related subjects.

SUMMER MEETING NUMBER

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NATURE'S STORAGE RESERVOIRS

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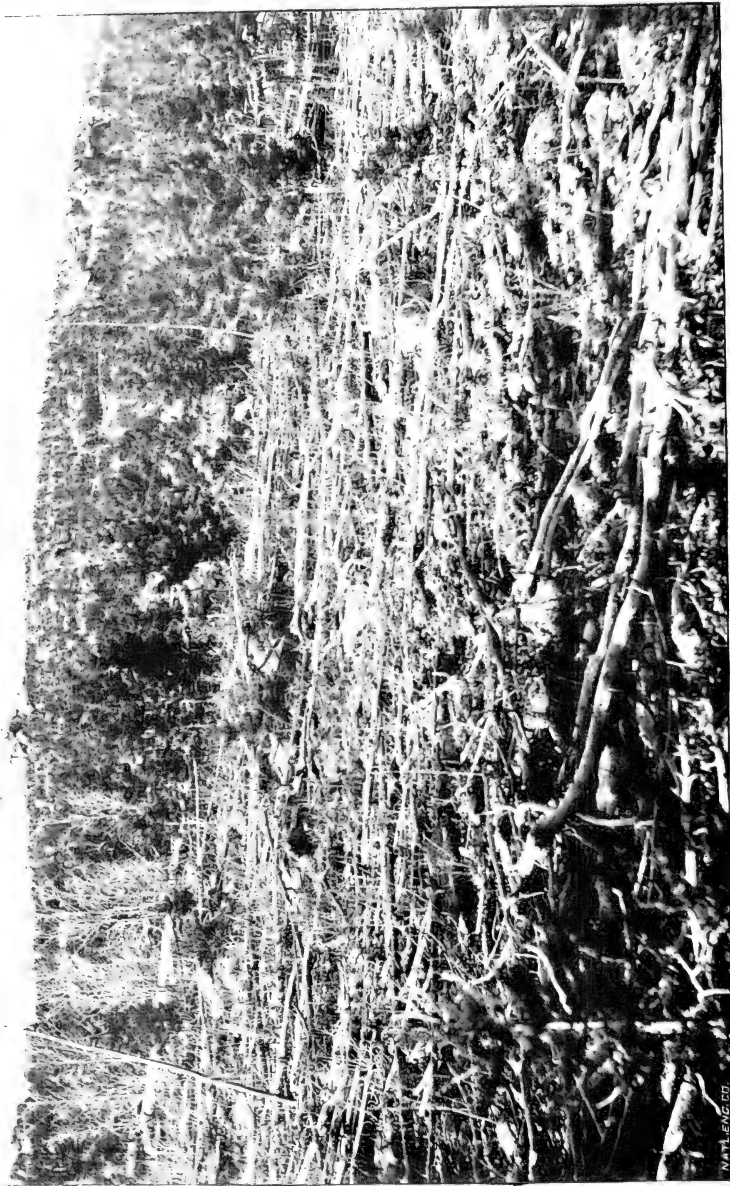
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The Forester.

VOL. V.

AUGUST, 1899.

No. 8.

The American Forestry Association.

A Notable Summer Meeting at Los Angeles.

FROM THE OFFICIAL NOTES OF THE SECRETARY OF THE ASSOCIATION.

The American Forestry Association held a special Summer Meeting at Los Angeles, Cal., on July 19 and 20. The arrangements were made by Mr. Abbot Kinney, Vice President for California, and were admirable in every respect. Prior to the date of the meeting the newspapers of Los Angeles and other towns in the State made frequent mention of the coming convention, both in their news and editorial columns, emphasizing strongly the importance of the subject and the value of an expert discussion of it.

The sessions were held in Assembly Hall, 330 South Broadway. At 8 o'clock on Wednesday evening, July 19, the convention was called to order by Mr. Kinney, in the absence of the President of the Association. The hall was comfortably filled and the audience manifested deep interest in the proceedings.

Among those present at this and other sessions were:

Abbot Kinney, Vice President for California and President of the Forest and Water Society of Southern California; Gifford Pinchot, Forester of the U. S. Department of Agriculture; F. H. Newell, Hydrographer U. S. Geological Survey; William G. Kerckhoff, Vice-Pres. Forest and Water Society of Southern California; W. H. Knight, Secretary Forest and Water Society of Southern California; Hon. W. S. Melick, former member of the State Legislature; J. B. Lippincott, U. S. Geological Survey; H. Hawgood, Consulting Engineer; S. M. Woodbridge, Ph. D.: Prof. W. R. Dudley, of Stanford University; James D. Schuyler, Consulting Engineer; F. H. Olmsted, City Engineer; Fred Eaton, mayor of Los Angeles; T. S. Van Dyke; Elwood Mead, Irrigation Expert, U. S. Department of Agriculture; George H. Maxwell, Chairman National Irrigation Association; A. J. McLatchie, University of Arizona; T. P. Lukens, Pasadena; C. M. Heintz, Editor *Rural Californian*; Lucius A. Booth, Oakland; C. L. Cory, Berkeley; N. W. Blanchard, Santa Paula; James Boyd, Riverside; J. A. Lippincott, Philadelphia; C. G. Baldwin, Claremont; Prof. L. J. Stabler, University of Southern California; Capt. G. G. Mullins,

U. S. A. (retired); Mary B. Moody, New Haven; Edgar W. Camp, Esq., Los Angeles; J. W. Mills, Pomona; E. F. C. Klokke, Los Angeles; Charles E. Richards, Los Angeles; A. Campbell Johnson, Los Angeles; Ad. Petsch, Los Angeles; William F. Burbank, Los Angeles; C. E. Rhone, Los Angeles; Wallace W. Everett, Editor *Wood and Iron*, San Francisco; Prof. M. H. Buckham, President University of Vermont; Lew E. Aubury, Mining Engineer, Delegate from the California Miners Association; O. S. Breese, Manager *Mining and Metallurgical Journal*, Los Angeles (also Delegate from the California Miners Association); Charles H. Shinn, Berkeley, Collaborator, Division of Forestry, U. S. Department of Agriculture, and Inspector of Experiment Stations of the University of California; C. A. Colmore, Foreman Santa Monica Experiment Station, California; George P. Wittlesey, Washington, D. C., Recording Secretary and Treasurer of the American Forestry Association; W. Goodrich Jones, Temple, Tex.; Charles A. Keffer, Mesilla Park, Ariz.; Samuel B. Green, University of Minnesota, Minneapolis, Minn.; Col. Adolph Wood, San Bernardino, Cal.; Charles S. Swisher, Washington, D. C.

Mr. Kinney welcomed the Association to Southern California, this being its first meeting on the Pacific Coast. He pointed out that the presence of persons from many parts of the Union showed a live interest in the subject of forestry, a subject which he regarded as a matter of vital importance to California, a question of expansion under our own flag. A great arid country lies at our door, he said, and we have the opportunity to conquer a great empire, to be taken up by people of our own blood and language, who will do a great deal to build up our trade and commerce.

Mr. Kinney made the announcement that the Park Commission of Los Angeles had tendered the Association a drive through the parks of the city; that a trip up Mt. Lowe was being arranged; also a trip to Squirrel Inn, and a reception by the Chamber of Commerce. He called attention to a beautiful vase of *Eucalyptus ficifolia* which decorated the stand on the platform, the gift of Mr. A. Campbell Johnson.

Hon. W. S. Melick, of Los Angeles, a former member of the State Legislature, read a carefully prepared paper describing the relation of "The State and Forestry," as published in this issue.

He was followed by Mr. Gifford Pinchot, Forester of the Department of Agriculture, who explained the forest work carried on by the division of which he is chief, also the work of the U. S. Geological Survey and the General Land Office of the Department of the Interior. He stated that his division was in full harmony with the Geological Survey, and that the results obtained were consequently more than doubled. Mr. Pinchot then turned to the question of forest protection, and by means of stereopticon views emphasized the necessity of guarding against fire and sheep, the two great enemies of old and young growth. He also dwelt on the good that can be accomplished by an organized body of persons, such as the American Forestry Association, and expressed the hope that its membership might be greatly increased, as its objects became known more generally throughout the country.

Mr. J. B. Lippincott, of the U. S. Geological Survey, read an interesting description of "The Bitter Root Forest Reserve," following it with a series of stereopticon views of the mountains, forests and lakes of that region.

The Chair, having been empowered to appoint a Committee on Resolutions, named the following: W. G. Kerckhoff, Gifford Pinchot, Adolph Wood, G. H. Maxwell, Elwood Mead, T. P. Lukens and N. W. Blanchard.

Adjourned to 10 o'clock Thursday morning.

Second Day's Sessions.

Mr. Kinney called the convention to order at 10 o'clock Thursday morning. Mr. Knight read letters of regret from United States Senator Perkins, Congressman R. J. Waters, Congressman-elect J. C. Needham, Dr. C. A. Schenck, of Biltmore, N. C.; W. N. Beyers, President Colorado State Forestry Association; Sir Joly de Lotbiniere, Vice President of the Association for Canada; Mr. Elwood Cooper, President State Board of Horticulture; Mayor Phelan, of San Francisco, and others.

A paper by Mr. A. Campbell Johnson on "A Forest Experimental Station" was read by Secretary Whittlesey. Mr. W. H. Hawgood read a valuable paper on "Some Relations between Forests, Percolation and Water Supply." Mr. S. M. Woodbridge, Vice President Chemical Agricultural Works, presented an interesting paper on "Water Conservation in Soils." Mr. Elwood Mead made a strong plea for "Leasing the Public Grazing Lands." Mr. W. W. Everett presented the lumberman's side of the question in a paper on "The Practical in Forestry." Mr. O. S. Breese discussed "The Relations of Mining to Forestry."

A recess was then taken until 2.30 p. m.

At the afternoon session papers were read as follows:

"The Reclamation of Drifting Sand Dunes in Golden Gate Park," by Mr. John McLaren, Superintendent of the Park, (read by Secretary Whittlesey). "Sequoia of the Sierras and their Distribution," by Prof. W. R. Dudley, of Stanford University. "The Influence of Forests upon Storage Reservoirs," by Mr. James D. Schuyler. "A California School of Forestry," by Rev. George W. White, President University of Southern California (read by Professor Stabler). "Forestry in North Dakota," by Mr. W. W. Barrett, State Superintendent of Forestry in North Dakota (read by Secretary Whittlesey).

Mr. F. H. Olmsted, City Engineer of Los Angeles, then addressed the meeting on the subject of "Forest Preservation and the Watershed of the Los Angeles River," illustrating his remarks by a large map of the watershed. He expressed gratification that the Forestry Convention was being held in Los Angeles, and said that its work was appreciated. "I feel," he said, "that we need such an object lesson. It is not always easy to see why the Government is not more careful of our interests. But the growth of the city has been such that our hands are full, and so it is not strange, perhaps, that we are lax in looking after our watershed. Yet no interest could be more vital. One of the teachers attending the National Educational Association Convention laughed at the Los Angeles 'River.' But we can forgive her. With my experience of several years I have yet to see, in many respects, a more remarkable stream. Its limited watershed, the limited rainfall, and dry seasons cannot prevent it from furnishing a steady supply of water. I regard it as a wonderful stream. Most of the slopes of the watershed are covered with brush—we can hardly say timber. But I observe that these slopes are as well protected as though covered by coniferous growth. The formation of the basin favors the growth of brush."

Mr. Olmsted then described the geological formation of the mountains surrounding the San Fernando Valley, which he called an awful picture of desolation and drought. "But it is really a great filter," he said, "through which the water is percolating to the river." Mr. Olmsted thought the difficulty with the Government rangers is that they do not live in the mountains, but merely make trips into them. In the whole basin there are three men who have ranches, and they have a personal interest in putting out fires. "In time we shall have municipal guards to watch this basin," he concluded; "we cannot afford to take any chances of having our water supply diminished."

At the suggestion of Mr. Olmsted, Mr. Kinney then called upon Mayor Eaton, of Los Angeles. His Honor said, in part: "I did not come here to-day to deliver an address. Mr. Olmsted said there would be a possible niche to fill in, and so I accompanied him. I cannot add much to what he has said. For the short time he has been City Engineer he has made himself very familiar with this subject.

"Mr. Olmsted spoke of the large gravel beds in the valley portion of the Los Angeles River watershed, which he described as a natural underground reservoir. In this connection I might say something as to the possibility of increasing the flow of the stream by enlarging the saturated area in this mass of sand and gravel, which extends along the base of the mountain shed on the north side of the valley. It is of great depth and has an area of about twelve thousand acres, extending from the mouth of two main cañons to the river, with a surface inclination averaging about seventy-five feet per mile. The plane of the saturated portion of this deposit has a gradient of about fifty feet per mile, which leaves an average depth of at least one hundred feet of dry material above the ground water, having a void capacity sufficient to supply the present average normal run-off for six years without replenishment. A very considerable portion of this area is wholly unsuited to agriculture, as it consists of dry sand and boulder washes, which parallel the base of the mountains, after emerging therefrom, and extending at intervals over a width of about two miles. The floods of later years have been confined to one of these channels, and I believe it quite practicable to divert the flow into a large number of channels and thus secure a greater absorption during the periods of excessive rainfall. About one year in five there is a large run-off which passes beyond the point where it is available in maintaining the supply of this stream.

"The western slope of the Sierra Madre and Coast range is very steep and few suitably located surface storage sites are to be found, and in the absence of these, the only method remaining for increasing the supply is to store the surplus rainfall below the surface. We should commence where the rain first hits the ground, by preserving our timber and plant growth, so that it will protect the soil from erosion and retain it on the precipitous surface of our rainshed, which in reality is about the only area in Southern California that yields anything to the run-off, with an average precipitation. The western half of the Los Angeles River watershed contributes little, if anything, to the waters during the normal flow of that stream. It being principally valley, the usual rainfall is consumed by evaporation and plant growth.

"The importance of protecting the sources of our water supply is not generally appreciated by the people. These scientific papers and discussions, while exceedingly interesting to us, must be followed by an active campaign on lines that will engage the attention of those with whom the solution of this matter rests. The average citizen thinks that timber has value only for commercial use, and that brush is only an incumbrance. Most of our mountain watershed in Southern California is below the snow line, where the erosive effects from precipitation are greatest, and the brush is the principal protection.

"When the people have learned that existence in this country depends upon the maintenance of the water supply, and that it is the chief factor in the development of all our resources, there will be no difficulty in getting protection for the forests and plant growth of our watersheds."

Mr. T. S. Van Dyke then made some remarks on "Irrigation Problems." He said in part: "The productive power of the United States has almost reached its limits. A little more may be done by improved methods of agriculture. But if we are to keep pace with the rest of the world in production we must take up irrigation, not only in the West but in the East, because it is found that in the East the product is increased as much in proportion by irrigation as in the West. It is hard

for some of us to understand that we cannot expect to see any more large irrigation works built by private enterprise. We here are simply the pioneers. We must create a public sentiment and keep it going. There are of course many projects. One trouble is that private works do not pay. The reason is this: If you have a city of any given number you can calculate that 97 or 98 per cent will take water from the pipes of a water supply system, but if you have a given area of land and a big body of water back of it and bring it down to the land, about 85 or 90 per cent of the population will not take the water.

"This is a strange statement, but it is true. The most rapid rate of settlement has been at Redlands, but the rate has not been large enough even there to insure the success of an irrigation company which depended solely on the annual payments for the use of its water. All attempts in India, Europe and the United States to build irrigation works have resulted in disaster. The most rapid rate of settlement will not do it unless the rate of payment for water is so high as to be a bar to settlement. In the next place the majority of settlers on every ditch do not wish to raise oranges and alfalfa. The crop they wish to raise is tender-feet. They want to take out strangers and sell them land. In nearly all cases the profit has been to the land owner and not to the builder of the works.

"The Government must take up this matter, just as it takes up river and harbor improvements. If not the Government, then the States must do it. Mr. Mead's idea is a good one. It meets the objection that it would cost too much to carry out such a scheme.

"It has been suggested that the difficulty of building water works could be met by co operation. The first step is that four or five men working together build the ditch, the land furnishing meantime feed and supplies for them and their teams. The land has built the ditch. The next step is that some one man comes along with money and buys a large tract and hires some one to build the ditch; then he sells off the land in lots and gets back the money from the buyers, and when it is all sold he steps out and the land owners own it, and it becomes a land owners' company. If he works it right he will make money; but the difference comes out of the increased value of the land. That is the way almost all the works in Southern California have been built. There are but four exceptions. Riverside started as a City Water Company. In 1883 they had to turn it into a land-owners' company. Every one of these companies has been a success, while the others are a failure. No one will now plant any large area unless he belongs to a land-owners' company.

"Another way to accomplish the same thing is by building a ditch and selling the water right, a perpetual right to water, for so much money. It has been partially successful, but it cannot be relied upon any longer. Consequently we must look to the State or the Government and we must create a public sentiment. It will take a long time to do it. The great trouble is that the East does not understand the question. We must go at it in some way that does not excite their fears of jobbery. There is some reason for this fear. Mr. Olmsted has said that every man on a certain river had a dam site; but if the Government began buying dam sites it would be found that every one of those men had two for sale." Some discussion followed as to the Los Angeles River and its water supply, participated in by Messrs. Sprague, Hyde and Steele.

Professor Dudley mentioned some interesting facts in regard to palms, to the effect that he had found palms growing on the desert at the mouths of cañons where there was a salty deposit.

James Boyd strongly advocated keeping sheep out of the forest reserves. Mr. Maxwell thought that in some parts of the country grazing might be permissible in the forests, but that it should be absolutely prohibited in Southern California.

Mr. Pinchot stated that he had tried to bring out the same idea last night. Mr. Kinney thought that any overstocking of pasture lands was disastrous. He thought that the leasing of public lands necessitated a strong and able body of men in control, and that it was inadvisable to undertake such a policy until we can surely control it.

Professor Shinn expressed his pleasure at the good prospects of forestry in California, and related his first experiences in Southern California years ago. He knew of no place in the United States so well adapted for comprehensive work, and no place where we can learn so many lessons. This convention is just the beginning of a comprehensive organization, he said. He wished every one could see the Sequoia and be uplifted thereby. He thought there was no greater work than to save the forests. If we keep the forests alive, we are aiding to preserve civilization. Let us go home feeling that we are brothers in a great work for the forests, he said, as against the destructive forces arrayed against them.

Mr. Baldwin, President of Pomona College, thought an important question was, where the water comes out. In his land, he said, at a height of 7,000 feet one miner's inch of water was worth fifty cents a day. His question was how to get it before it was lost. If it can be done by planting Sequoias above the 7,000-foot level, it would pay to do it. He was willing to spend some money if it would pay. He wanted to know what to do with the ten or twenty thousand acres on the high levels; the rainfall is from twenty to fifty inches; there is plenty of soil and a good deal of natural forest.

Professor Dudley thought we ought to call upon the Government experts in such matters; he had no doubt that they would take up such points and that the number of experts would be increased if the people requested it. Mr. Richards called attention to the fact that trees and roots make conduits for the water into the soil. His experience had been that the efficiency of these conduits depends upon their size; that is, the size of the tree, and consequently it never would pay to plant trees that grow to any great size; smaller ones are much better. Mr. Kinney said that in Australia there are portions where there are no springs, but the natives take the roots of trees and plants, cut them in sections and hang them up and get enough moisture to live on.

Mr. Pinchot, in reply to Professor Dudley, stated that the Government would be only too glad to send experts to take up all such questions in the way he had suggested; all they wanted was the work to do and the money with which to do it.

At the evening session Mr. F. H. Newell, the Corresponding Secretary of the Association, and Hydrographer of the United States Geological Survey, gave an illustrated lecture on the work of his division and the different methods of obtaining, preserving and utilizing water supplies in different parts of the country.

Following this Mr. George H. Maxwell, Executive Chairman of the National Irrigation Congress, addressed the meeting on "Nature's Storage Reservoirs," being a concise commentary on the subject, as published in this issue.

Col. Adolph Wood then took the chair and Mr. Kinney read a paper on "Forest Problems in the West."

At its conclusion, Mr. Maxwell, for the Committee on Resolutions, submitted its report, which was unanimously adopted, as published in full, hereto attached.

Mr. Whittlesey moved a vote of thanks to the Forest and Water Society of Southern California for its cordial assistance in making this meeting of The American Forestry Association a success. He also moved the thanks of the Association to the newspapers of the city and the State for the generous manner in which they had published advance notices of the meeting, and for their full and able reports of the proceedings. These motions were carried.

The convention then adjourned.

The Resolutions Adopted.

Complete Text of the Report of the Committee on Resolutions.

WHEREAS, "The tree is the mother of the fountain," and the forests and foliage of our mountains must be preserved in order to maintain both the surface and underground supplies of water for irrigation, navigation, water power and other purposes, and to prevent the ruin and desolation which has followed the destruction of the forests in so many of the older countries of the world; and

WHEREAS, the very life of the communities which have already grown up in the arid region of the United States, and the further development of that vast area of our national territory, with all its attendant benefits to the entire country, depends absolutely upon the preservation of the remaining forests and the reforestation of denuded forest areas; and

WHEREAS, the problem is a national one, and involves the preservation of national resources, the destruction of which would be disastrous to the people of the entire country:

Now therefore be it resolved by the American Forestry Association—

1. That we earnestly urge upon the Congress of the United States the importance of carrying into full effect the legislation enacted with a view to securing the broadest and most effective action by the National Government for the preservation and reforestation of the forest lands of our country and the resulting conservation of our timber and water supplies, and wise and systematic utilization of our lumbering resources.

2. That we favor the adoption of a system for the leasing of the public grazing lands under which the revenues would be devoted to forest preservation and irrigation development in the States and Territories where situated, but without any grant in trust or otherwise of the title of the land to the States. Where, however, the value of the forest areas as sources of water supply so far overbalances any possible value they may have

for grazing purposes, as is the case in Southern California and other places, no grazing whatever should be allowed in the forests.

3. That we commend the action of our National Government, and especially the interest and efforts of the Secretary of the Interior and the Secretary of Agriculture and of the Division of Forestry of the Department of Agriculture, through Mr. Gifford Pinchot, and of the Division of Hydrography of the Geological Survey, through Mr. F. H. Newell, and of the Irrigation Investigation of the Department of Agriculture, under Mr. Elwood Mead, to increase our knowledge of forest problems and of their relation to the conservation and maintenance of our water supplies, and inasmuch as the State of California offers unusual facilities for the investigation of the close connection between forest preservation and irrigation, we urge that a thorough investigation thereof should at once be made by Mr. Elwood Mead in that State, in connection with the irrigation investigation of the Department of Agriculture now being made under his charge, and that the investigations as to water supplies now being made by the Division of Hydrography of the United States Geological Survey should, wherever practicable, embrace an investigation into the actual effect of forest denudation upon the flow of streams from the denuded watershed.

4. That we commend the efforts of the National Irrigation Congress and the National Irrigation Association and of all local organizations, such as the Southern California Forest and Water Society, to awaken and unify public sentiment as to this great question of forest preservation, and we strongly urge the vital importance of absolute harmony of policy and concentration and unity of purpose among all who are laboring in the cause.

WHEREAS, the efforts of the U. S. Government for the preservation and right use of forests throughout the country are now scattered among three agencies, viz: The General Land office, the U. S. Geological Survey, and the Division of Forestry, and

WHEREAS, very serious loss of efficiency and waste of power is the necessary result of this diffusion of energy: therefore be it

Resolved, that the American Forestry Association calls the attention of Congress to this wasteful and deplorable condition, and strenuously urges the consolidation and unification of the national forest work

Resolved, that the American Forestry Association learns with much pleasure of the establishment of the Forest School of the University of Southern California, and that it urges upon the Federal forest authority the desirability of co-operating with it in its good work.

WHEREAS, the Forest and Water Societies of California and of Southern California have requested the Honorable Secretary of Agriculture to cause to be made a full investigation of the forests of California and their condition and needs; and

WHEREAS, such an investigation is the necessary precursor of the best treatment of forest problems: therefore be it

Resolved, That the American Forestry Association urges upon the Honorable Secretary of Agriculture the speedy completion of this investigation, which has already been begun.

WHEREAS, The Commissioner of the General Land Office and other public officers have repeatedly and officially advocated the withdrawal from sale or entry other than mineral of all public lands of the United States more valuable for forest purposes than for agriculture: therefore be it

Resolved, that the American Forestry Association once more urges upon the President the reservation of all public timber lands, pending full examination

of their character, and especially of the mountain forest at the headwaters of the Sacramento River and its tributaries, as also in all the arid districts of the country.

WHEREAS, for many years the forest and brush covering of our mountains have been destroyed by fire, thereby very materially diminishing the supply of water for irrigation, and if Nature's slow process in reforesting is depended upon without aid from man, most serious loss will result in retarding the progress of developments, especially in Southern California: therefore, be it

Resolved, That it is the sense of the American Forestry Association that the Federal Government take steps at the earliest possible time to reforest portions of the Forest Reserves of Southern California that have been denuded by fire, and are reasonably safe from fire in the future.

Resolved, That this Association endorses the request to Honorable R. J. Waters to secure the passage of a law making every one responsible for damage done by fire made or used by him, on all public lands. (Appendix "A.")

Resolved, That this Association requests the Secretary of the Interior to put into immediate operation in the Forest Reserves the principles involved in the request to the Honorable R. J. Waters to secure the passage of a law making every one absolutely responsible for damage done by fire made or used by him.

Appendix "A."

LOS ANGELES, California, July 19.
HON. R. J. WATERS, M. C.

DEAR SIR: You are hereby requested to secure the passage by the next Congress of a law substantially as follows:

"Whoever kindles, uses, or leaves after using, any fire, whether made by himself or others, that does any damage to grass, brush, timber or other vegetation on land of the United States, beyond a circle of six feet radius from the center of such fire, shall pay a fine of

one hundred dollars, without regard to the amount of care used to prevent such damage."

"As this is an innovation on all precedent it may at first arouse some opposition. But the records of our courts will show the present law almost worthless, because the words "negligently" or "carelessly" throw on the prosecution the burden of proof, which is almost impossible to secure. Even the sheep herder who fires the woods on purpose always shelters himself behind the assertion that the fire escaped in spite of his care.

Every one should be made absolutely responsible. If any one does not know how to make a fire that is safe, or how to put it out when done with it, let him pay for the lesson or stay out of the woods. There is absolutely no excuse

for a fire escaping. There is so much rebuilding of fires left by others that one should be responsible for that also. There is no hardship in this, for there is everywhere plenty of ground on which it is safe to make a fire, and where it is fit for camping there is plenty of water to extinguish it. It is nearly always pure recklessness, or else is caused by the stupid building of fires so large that they cannot be extinguished. No one of experience ever does this for cooking or for comfort. It is only to look at it. If so, it is worth one hundred dollars

The fine should be made light so that there will be no objection to its enforcement. Fifty dollars might be better. It is always easy to find who made or left a fire. Proving the manner in which it was handled is quite another matter.

T. S. VAN DYKE.

The State and Forestry.

Being an Address Delivered at the Summer Meeting, Los Angeles, Cal., 1899.

(NUMBER ONE OF THE SERIES.)

Although hailing from a city and a valley whose life-blood is in so large a measure dependent on the protection of her contiguous forest reserves; realizing that our shortened water supply to-day is the direct result of the disastrous conflagrations which last year and three years ago swept through those cañons and over those mountains, ruthlessly destroying thousands of acres of those water-conserving forests; and standing now in the peril of having the balance of those watersheds stripped of their snow-catching and rain-holding foliage, it would be idle to read to this interested body an essay on the necessity of forest protection.

Your presence and the splendid programme provided are evidence enough that you realize that the axe of industry and the torch of ignorance and of carelessness must be stayed, if our orchards and our homes are to be maintained with the life-giving waters.

The American Forestry Association, perhaps more than any other body, realizes that America, especially arid America, must awaken and throw off her cloak of carelessness and chance, put on her robes of system and watchfulness, and go forth to protect and propagate before it is everlastingly too late.

This convention, then, needs not so much the alarm of fire and destruction sounded as that we should formulate a system of protection and propagation in forestry and then awaken the slumbering people by the trumpet of education and legislative action.

Perhaps every one here will agree—

First. That forests are of vast importance in the economy of nature.

Second. That forests influence the humidity of the air and the earth (*a*) by screening the soil from the sun's heat; (*b*) by the large surface of the leaves exposed in radiation, and (*c*) by the copious evaporation from the leaves.

Third. That the uncontrolled destruction of the forests is in progress and should be stopped.

Fourth. That the experience and history of those sections and countries where the forests have been conserved show that improvement has resulted.

Fifth. That such conservation and improvement should be made by governmental regulation and protection.

Sixth. That it is the imperative duty of man and of government to prevent the excessive waste of wood.

Seventh. That the dense ignorance that prevails in regard to forestry should be dispelled, (a) by organizations like the American Forestry Association and the Southern California Forestry and Water Society; (b) by a free diffusion of forest information through the press; (c) by the establishment of schools of forestry in our universities.

America, of all great countries on the globe, was originally the most thickly wooded. Her primitive forests were of immense extent. But opulence made us profligate. The last census showed a forest area reduced to 481,000,000 acres, and that still being reduced by an annual output of twenty billion feet of lumber, being ripped out by thirty-odd thousand sawmills and careless annual fires denuding hundreds of thousands of acres.

Restrictive legislation has been slow in the United States. In 1817 the first Congressional action was taken and that restricted the cutting of Oak and Red Cedar. When the Timber Culture Act of 1873 was passed, it was a great step forward, and although over 5,000,000 acres were entered under it in one year, it was a failure so far as the propagation of forests is concerned in this arid Southwest. My acquaintance with hundreds of timber culture claims in this district leads me to assert that in not a half dozen instances were the trees planted and grown as the law provided. I don't believe there are 100 acres of forests in Southern California as the result of that law.

As others will cover the general forest conditions and national needs, this paper

is curtailed to a brief review of the conditions in California, to the end that this State may more effectively co-operate in this forest movement. The dependence of the valleys on the forest-covered mountain watersheds has not stayed the hand of the axeman nor the fires of carelessness or maliciousness. Neither has there been rational legislative action. In this matter of forestry, California has had spasms and spurts, but little systematic growth.

On March 3, 1885, a State Forest Commission was provided for, but after an existence of 54½ months of political turbulence (at a very large expense to the State, \$33,495 of which was spent on forest stations), the commission was abolished; and on March 23, 1893, they turned over the forest station experiment work to the State University, and appropriated \$4,000 to be used for that purpose.

To day we have in California two State Forest Stations; one in Santa Monica cañon, of 20 acres, and one near Chico, of 29 acres. The general character of the trees in the former is the Eucalypti. In the latter the conifers predominate. I am familiar with the work and conditions at these stations, especially at Santa Monica. I have only good words for their management. With the money at their disposal for this purpose the Agricultural Department of the University has done faithful, economical service.

But the provisions under which our State maintains these stations are far inadequate to the importance of the subject. It is a wrong policy at all times merely to keep in existence any department of state. There should either be support enough to make that department increasingly useful with good results, or else abolish it. On the floor of the Assembly, in the session of '97, I amended the appropriation bill to provide for \$8,000 to carry on this work of propagating and experimenting in forestry, but Governor Budd vetoed the appropriation. Since that time these stations have been simply kept alive on such

meagre support as the Regents of the State University could spare.

In our laws in regard to carelessness with fires in the mountains, we are woefully behind the times. We have two laws on the subject, one passed in February, 1872, and the other in March, 1891. Both are ineffective, as we know by the number of fires, and by the few arrests and convictions. Section 3345 of the Political Code, which provides that constables may call out persons subject to poll taxes to fight fires, without providing any penalty if they don't respond, or any payment if they do, illustrates the impotence of our laws on this subject.

As the object of this convention is to formulate some policy to be pursued in the matter of forestry in furthering the good national work so well begun, especially in this district, under Supervisor of Forest Reserves, Col. B. F. Allen, the views of each one may help; therefore, I recommend, so far as California is concerned:

First. That the National Government be given every aid and encouragement possible in its efforts to protect the forests in the reserves.

Second. That protection be supplemented with a proper system of propagation that the denuded portions be re-

covered as proposed by Mr. T. P. Lukens.

Third. That the State revise its laws in regard to carelessness and maliciousness in firing forests, etc., to the end that offenders may be detected and guilty persons punished.

Fourth. That our forest experiment station work be broadened from mere existence to a field of usefulness that will discover, propagate and distribute the trees best adapted to the various mountains, foot-hills, mesas, valleys and other conditions of the State; perhaps founding additional forest stations on Mount Hamilton and Mount Lowe.

Fifth. By perennial appeals to the people, through this and all other organizations, as well as through the press, for them to plant trees, plant trees, plant trees and then take care of them; impress upon them that individual action should come first in all things, and the State and nation are to aid where individual effort cannot go.

Sixth. Plant trees.

Seventh. Take care of your trees.

Eighth. Plant trees.

Ninth. Take care of your trees.

Tenth. Plant trees. And my forty other recommendations are the same as these.

W. S. MELICK,
Los Angeles, Cal.

Water Conservation in Soils.

Being a Paper Read at the Summer Meeting, 1899.

(NUMBER TWO OF THE SERIES.)

Most individuals have general ideas upon special subjects, the whys and wherefores of which they pretend to know nothing about—*e. g.*, any one can analyze a face to the extent of saying: "That is an honest man," or "I would not trust such a one." And yet if the criticiser should be called upon to give the minute details of the face, he would probably, in nine cases out of ten, be incapable of specifying objectionable points, or, at least, of defining why they

are objectionable. So in regard to our mountains; we often hear that they are the great reservoirs which store up our water and enable us to irrigate our fertile valleys during the dry season. It is to show why this is so that I propose to give the results of a few simple experiments, in regard to the porosity of soils and their absorptive and retaining powers for water.

In the first place let me remark that there are comparatively few cisterns or

reservoirs in our mountains that hold large bodies of water. In the technical sense a reservoir is "a basin, either natural or artificial, for collecting and retaining water or other liquids."

There are two essentials to make a reservoir a success: First, there must be means for collecting the water; and second, means for retaining it until it is needed. When we speak of the mountains as reservoirs, the word is not used in its ordinary sense, for I believe that the great volumes of water that continuously flow from our mountains are held in the interstices of the soil and rocks. My own investigations show that our different soils hold from about 17 to 26 per cent of water, although some authorities make a much larger percentage.

Different kinds of soils vary in regard to their porosity, and the same soils vary to a very great degree in regard to their absorptive power of water, depending upon the amount of moisture already contained in them. For example, here is a sample of red maca soil—it is hard and dry, containing but a trifle over one per cent of moisture. Water was turned on it and it absorbed only one-twentieth of the amount of water absorbed but a short distance from it by soil of the same kind, which contained, at the beginning of the experiment, about 8 per cent of moisture. This experiment was carried on on comparatively level land; but if on a hillside you see that 95 per cent of the water would have run off.

This may be an extreme case, but it is remarkable how much water will run off from the soil when it is dry. We see the same effect if we dip a dry feather in water: when we pull it out it comes out dry. But if we moisten it and then dip it in water, it comes out saturated.

It seems necessary then in order to have our land absorb the maximum amount of water that it should retain a goodly percentage of moisture. Or in other words, if we wish to fill our mountains with water and preserve the great

est amount of rainfall, they should be kept moist.

Having shown that it is necessary to have some moisture in the soil in order to have it absorb the rainfall readily, and thus make our mountains a reservoir, let us look at the other side of the case—that of retaining the moisture; and I regret to say that the experiments are not so complete and numerous as they should be, as they have only been fairly begun.

In the first place, let me call your attention to the fact that capillary action in soil is in every direction from a given point. Water spreads out sidewise, as well as upwards and downwards by this action. Soil that had been thoroughly irrigated was taken and the amount of water determined at 26.12 per cent. Some of this soil was put in beakers, filling them about half full, and placed in the laboratory. On the following day 66 per cent of the moisture had dried out. Tin cans, without either bottoms or tops, were pressed down into the soil, and the soil taken from the side of the can, and a slide passed under the can, thus cutting off connection from the earth beneath. It was found that about the same amount of water had disappeared from these cans as had disappeared from the beakers. Where these cans had been pressed some inches below the surface of the ground, and the soil above raked, or cultivated, there was practically little loss of moisture where they had been covered with a mulch.

Conclusions from these facts are very obvious—that in order to make reservoirs of our mountains, it is necessary to keep them in such condition that they will readily absorb water and retain it. And that this result can be brought about only by keeping them covered with a product of growth, or in other words, with the forests, as these forests make a covering, or mulch, for retaining the moisture.

S. M. WOODBRIDGE, PH. D.
Lenapuate Experimental Ranch and
Laboratory, South Pasadena, Cal.

Nature's Storage Reservoirs.

Being a Paper Read at Los Angeles by the Executive Chairman of the National Irrigation Congress.

(NUMBER THREE OF THE SERIES.)

Nearly every one now recognizes the need and importance, all through the arid region of America, of great storage reservoirs to save the waters that now, in the seasons of high water, run away to the ocean, not only wasting the wealth that the use of the water would produce, but oftentimes carrying destruction in their pathway, as the floods sweep down the mountain sides and through the valleys.

There are not so many who realize the equally important fact that Nature has already made for us great storage reservoirs which must be preserved if we are to maintain the water supplies that we are now using. These natural storage reservoirs are absolutely essential to the very life of many communities in the arid region, and yet, in many places, we are allowing them to be recklessly and ruthlessly destroyed.

Much that I would have said to you on this subject has already been better said by others. In his address to-day Mr. Schuyler strongly brought out the close relation between forests and reservoirs, and showed how essential it is, if we are to utilize the opportunities which Nature has created for building storage reservoirs in the mountain cañons, that we should preserve the forests and the foliage that covers the mountain sides, so that the winter storms will not bring down masses of detritus which will rapidly fill up and destroy the storage capacity of the reservoirs.

He has showed, too, how imperative it is, if we would preserve our sources of water supply, that we should preserve the reservoirs which Nature has provided for holding back the water in the natural sponges, made by the network of undergrowth and roots and decaying leaves, and shrubs and brush and trees

which in so many places line our hill-sides and the precipitous slopes of our mountain cañons. And he has showed you how, when this natural sponge is once destroyed by fire or grazing, the waters will rush down in torrential floods, carrying away the scant remaining soil, and making it difficult and often impossible to restore the growth on the slopes that are left barren.

Mr. Olmstead, the City Engineer of Los Angeles, also portrayed to you most vividly what a wonderful natural reservoir existed to enlarge the water supply of the city of Los Angeles from the Los Angeles River, by filling with water in times of flood the great gravel bed lying between that river and the mountains, leaving it to gradually percolate out into the river in the later months of the year.

In this suggestion there are great possibilities for water storage in probably every arid State, where the water can be led out in time of floods onto the high mesa lands and the porous sandy and gravelly soils on the higher levels can be saturated with water in seasons when it is abundant, leaving it to gradually find its way out into the canals and natural channels on lower levels in seasons when it is needed.

Mr. Olmstead has given us another illustration to prove the fact, now so generally recognized, that water stored on the headwaters of navigable rivers, and first taken out on the bench lands for irrigation, will find its way back into the river in the low-water season when it is most needed for navigation. The use of the water for irrigation is merely another illustration of water storage in one of "Nature's storage reservoirs" until it is needed for navigation, and shows how superficial is the objection sometimes made to the use of water for irri-

gation which has been stored for the benefit of navigation.

I was deeply impressed by what was said by Mayor Eaton and by Mr. T. S. Van Dyke as to the lack of information by the public generally on these subjects, and the need of a campaign to arouse the interest of the general public and awaken a public sentiment which would demand and accomplish the solution of the various problems that confront us in the preservation of our forests and water supplies. And I could not help thinking that if the enormous importance of these matters was generally appreciated there would not be a man who is now tilling an irrigated farm or vineyard or orchard in Southern California who would not be here to-day.

Every irrigator from an underground supply would be here if each would only stop and ask himself: "Where is the source of supply of the well or the tunnel from which my water comes? How long will it last? How do I know that Nature is replenishing for me the supply from which I am drawing?"

As you watch an artesian well, every one realizes that the beautiful drops that are thrown up from below by the unseen power to glisten and sparkle in the sunshine have not come up underground direct from the sea. They were at some time evaporated from the ocean and carried in clouds to the mountains and precipitated there. Now what checked them from rushing down the hillside and back through stream and river to join again the ocean from whence they came?

Somewhere in their onward course they were stopped by some leafy covering which held them until their course was turned downward into the earth. And from thence they have percolated through some underground channel or stratum until they have found a vent through the artesian well that has brought them once again to the surface. They may have fallen with last winter's rainfall; they may be coming from some one of "Nature's storage reservoirs" underground, which has been gradually filling for a thousand years; it may be that each

winter's rainfall is replenishing the underground supply as fast as it is being drawn off, and it may be that it is not.

But of one thing we may be sure: If we allow our mountain slopes to be deforested and permit the destruction of the undergrowth and foliage which did check, in their downward flow, the waters that are coming to us now, our underground reservoirs will cease to be replenished and refilled. The waters which should find their way down into the earth to come up again in our wells and out through our tunnels will rush down the steep and bare mountain slopes in torrents to the sea. And not only our underground supplies but our surface supplies as well will be gone, and aridity will overcome our fertile fields just as it has where the forests have been destroyed.

This need not happen and will not happen if the people will wake up to the possibility and the danger. All we need to do to prevent it is to preserve these storage reservoirs of Nature and see to the maintenance of conditions that will perpetually replenish our underground reservoirs. How are we to do this? By a campaign of education. It is absolutely essential that the whole community all through Southern California should be aroused to the vital and far-reaching importance of this great subject. The people must be awakened from their apathy. The dead wall of indifference on the part of the people generally must be broken through.

We must unite all who realize the magnitude and immediate importance of the subject to preach a crusade to awaken a right public sentiment about it, not only in Southern California, not only in the West, but all through the East as well. It is a national, not a local, problem, and as a national problem we must treat it.

The preservation of our forests means not only the preservation of water supplies for irrigation in the West; it means the preservation of water supplies throughout the whole country for power, for navigation, and for all the manifold

needs for which the waters of the Eastern streams and rivers are used.

The American Forestry Association is a national organization. It is already strong and influential. It has worked wonders already in its labors for forest preservation. Let us make it still stronger and more influential by extending its membership and resources. By doing so you are putting in the field an army of peaceful and ceaseless workers to protect your homes from destruction by Drought—an enemy as much to be feared as any foreign invader.

The National Irrigation Association is another organization fighting in the same field, one of its purposes being forest preservation. It is strongly advocating the inauguration of a leasing system, which will enable the now wasted resources of our great public domain to be utilized so as to yield a revenue for forest preservation and irrigation development in the arid region. Several million dollars annually could be realized from such a leasing system. Of course the mountains of Southern California have too great a value as sources of water supply to permit of their ever being leased for grazing. But after excluding all forest areas which should be exclusively reserved for water conservation, there are still left in California over 25,000,000 acres of public grazing land.

Through this National Irrigation As-

sociation we must first unite the West in favor of one distinct policy, and then turn to the work of converting the East. It needs only concentration of purpose and tireless work to accomplish this. The wage-earners of the East want wider fields for labor. The manufacturers of the East want new markets for their wares. Where can either get what they want so fully as by the development of the great arid West which is capable, with irrigation for its irrigable lands, of sustaining a greater population than the whole United States holds to-day.

And here in Southern California there is a local organization which every one who has any interest in the welfare of the people of this section should join. It should number its members not by tens but by thousands. And its influence will grow as its membership roll lengthens.

Again, the National Irrigation Congress will convene for its eighth annual session at Missoula, Montana, on the 25th of next September. Southern California should send a delegation to take part in its deliberations, and to give aid and strong encouragement to the efforts of the Irrigation Congress to bring before the minds of the people of the whole nation the importance of these great problems, and secure the national legislation necessary to solve them.

GEORGE H. MAXWELL.

A Forest Experimental Station.

Being a Paper of the Summer Meeting.

(NUMBER FOUR OF THE SERIES.)

Among the many questions of vital interest for the discussion of which The American Forestry Association has met in Los Angeles, I think the need of a Forest Experimental Station, and what it may hope to accomplish, must appeal to us all.

Before reaching our mountains in California we must generally pass through a belt of foot-hills, often too barren and too steep for cultivation. In the San

Joaquin Valley this belt of foot-hills extends often ten to fifteen miles; occasionally groups of these hills reach out some way into the cultivated valleys, and these conditions prevail to some degree in Southern California.

Here, in the city of Los Angeles, if you will take the street-car to the Fremont gate of the Elysian Park, looking north from the Southern Pacific yards, you will be confronted by these dry bar-

ren foot-hills—their arid, unsightly appearance brought out in sharp contrast by the plantations of trees and shrubs around the Fremont gate—a scene fairly representative of hundreds of thousands of acres scattered through California and the dryer portions of this southwestern region. These hills are also representative of the greater portion of over three thousand acres comprising Griffith's Park, a grand heritage of our people, but entailing also its responsibility.

Los Angeles can never permit these barren spots to remain almost alongside our beautiful homes. We must cover them with trees and shrubs, guided in our selection by the experience of other countries. Should this be accomplished the lesson will be of incalculable benefit to all the Western country, and we may confidently hope that the United States Government will guide and assist us in this work. We must appreciate the good work done by Mr. Ellwood Cooper, Mr. Abbot Kinney and other pioneers in forest work.

In approaching the selection of trees suitable for foot-hill planting, I think we must somewhat resolutely refuse to consider our Eastern forest trees or the trees of other, and of cooler, portions of California. Selection has often been made on this basis. After having planted unsuitable trees, we try artificial watering and other plans of cultivation to keep them alive, in direct opposition to Nature's plan, so ably discussed by Darwin—the survival of the fittest. Let us seek trees from semi-arid regions, injured by centuries of long, dry summers, and a limited rainfall. As best answering these conditions, I think Australia offers the most inviting region for such research, more especially since that country has been quite active in forest work.

The name of the late Baron Ferd Von Mueller has for over forty years been associated with forest planting in all parts of the world, describing and introducing the varied and the beautiful Australian flora. His work on "Select Extra-Tropical Plants for Industrial Culture or Naturalization" has been translated

into all languages. The first fragmentary publications of this work were at one time printed here in California by Mr. Ellwood Cooper, formerly President of the State Board of Horticulture. Prof. Charles Naudin, a great leader in scientific cultivation, has adopted this work in a somewhat altered and enlarged French form, more especially for the use of countries on the Mediterranean Sea, where, in parts, there exists a climate very similar to our own in California.

The following quotation from this work applies directly, in my opinion, to the question of forestry in California:

"Furthermore, as methodic forestry is as yet limited everywhere to indigenous kinds of trees, except in India, and at the Mediterranean Sea, where Eucalyptus, much through the initiating early efforts of the writer, became reared on a forestal scale, it may be presumed that the present pages will also aid in vastly amplifying forest operations by transfers of peculiarly superior kinds of sylvan trees from hemisphere to hemisphere in a truly cosmopolitan spirit, so far as this can be carried out within climatic scope; renewal and even originating of forests having become so needful in many regions of the world."

The continent of Australia contains some three million square miles, a large portion having a dry and wet season, and a comparatively light rainfall. It would be an attractive task to describe the forest trees of Australia, the great family of Myrtacæ, including the Eucalyptus, Angophoras, Metrosideros, Melaleucas, etc., and the Leguminosæ, numerically the largest of these great Australian families, containing over three hundred species of Acacias alone—but the limits of this address will not permit. Some description of these trees and shrubs, successfully introduced into France, can be found in a work in the Public Library of Los Angeles, by P. Mouillefert, Professor of Forestry at the National School of Agriculture at Grignon, entitled "Trees and Shrubs for Forestry, Useful or Ornamental Purposes," giving the description and uses

of more than 2,400 species and 2,000 varieties cultivated or introduced into Europe and more particularly into France.

On March 3, 1885, California created a State Board of Forestry, and it is to that Board that we owe, directly or indirectly, nearly all we know of experimental forestry in Southern California. The thousands of trees reared and distributed by them are now old enough to judge of their good and bad qualities. By far the larger number were Eucalyptus. Should our visitors be asked what trees are most prominent in our landscape, what trees have done most to beautify our streets and parks, I think they would reply, the Eucalyptus. Ten to twelve species out of one hundred and fifty have been pretty thoroughly tested in our parks and elsewhere; we have learned that Eucalyptus Globulus (Blue Gum) and Eucalyptus Robusta (Swamp Gum) will not succeed on our foot hills. We have found several varieties well suited for this purpose, and there are probably many more which have not as yet been tested.

At the Forest Station at Santa Monica are the original 50 to 60 species of Eucalyptus, planted out by our former State Board of Forestry. These should prove valuable for collecting and distributing seed and for identification of species, though I am sorry to say they are now of a shape that render it rather difficult to obtain specimens of seed or fruit. We have now, however, planted out duplicates of nearly all of the varieties, in the Elysian Park, and in a few years we shall have specimen trees for comparison.

For economical or other reasons the State Board of Forestry was abolished. The Forestry Station at Santa Monica was handed over to the University of California, and, perhaps from lack of funds, from that time very little has been accomplished. The locality for the station was, I think, not well chosen. It is too inaccessible; we need a Forestry Experimental Station in our parks—where the public can see it and become interested in it. Since the formation of

our Forestry School at Los Angeles, such a station has become more than ever a necessity—to give the students practical lessons in arboriculture and knowledge of forest trees.

A beginning in this direction has already been made. A rare and beautiful collection of trees and shrubs, numbering some three hundred specimens, exists in the Elysian Park. These specimens were collected and planted by a former resident of Los Angeles, Mr. Harvey, assisted by W. S. Lyons, formerly State Forester, and others interested in these matters. Many rare and valuable trees and shrubs are growing well, and would form a very good beginning for a suitable botanical collection. It is of the greatest importance, however, to commence systematically; let each great botanical family come in its proper sequence, and let a plan be mapped out giving proper space to each genus.

I have not here dwelt on what is perhaps outside of a Forest Association—the selecting and testing of avenue trees; the introduction of flowering shrubs for beautifying our lawns and gardens.

Such a station near our homes would be extremely useful. From the many brilliant-colored flowering shrubs of Australia we could select some rare and beautiful plant to light up the conifers and palms which, too often, form the only ornament of our lawns and gardens. Los Angeles, so progressive in other matters, has been slow in this work. Hundreds of botanical gardens exist elsewhere in the world. It was over three centuries ago that Italy and Germany, having recognized the necessity for so doing, commenced to establish botanical gardens.

Is it not time that we should profit by the countless beautiful gifts offered to us by Nature, more especially in this favored climate, where we may mingle the trees and shrubs from our Eastern gardens with the gorgeous extra-tropical vegetation of the New World?

A. CAMPBELL JOHNSON,
Los Angeles, Cal.

Summer Meeting Notes.

Insect Enemies of Trees.

The following letter from A. D. Hopkins, Vice Director and Entomologist of the West Virginia Agricultural Experiment Station, Morgantown, W. Va., was read at the Summer Meeting at Los Angeles at the session of July 20:

"It was my intention to prepare a paper for the Summer Meeting of the Association, but the accumulated duties during my absence of some ten weeks, conducting investigations for the Division of Entomology, United States Department of Agriculture, in the forests of the Northwest, have left no time for me to do so.

"I desire to say, however, that while there is not much agitation of the forest question in West Virginia, the subject is being studied here, and some of the problems are receiving especial attention, the results of which will form the subject of a paper for a subsequent meeting.

"I also wish to suggest that insect enemies of trees should receive more attention from students and investigators of forest problems. Insects are vastly more destructive to forests and forest products, in their direct attacks and influences, than any one, but a specialist in this particular branch of study, can conceive; and when we take into consideration the inter-relations of insects with the diseases of trees and forest fires in wide spread devastations of timber, the subject presents itself as one of the important problems in forest inquiry; yet, so little is generally known of this subject, or its importance is so little appreciated, that one seldom sees reference to it in the writings of our principal specialists on forest questions.

"The possibilities of preventing losses from insect invasions and their destructive influences, through a better and more general knowledge of the subject, are far greater than is supposed. In fact, as we become more familiar with the peculiar habits of some of the

destructive insects and the relation of agricultural and lumbering methods to their destructive ravages, quite simple and practical preventives and remedies are suggested, which, if put into practice, will prevent the loss of some of our most valuable forest resources.

"It is therefore earnestly hoped that the members of the Association will take some interest in this phase of the forest question and stimulate inquiry along this line by noting and reporting unhealthy conditions of forests resulting from causes other than fire. The writer will gladly assist in this inquiry by direct correspondence, or through the columns of THE FORESTER.

"Sincerely regretting that I cannot attend the Los Angeles meeting and take part in its proceedings, I am,

"Very truly yours,

"A. D. HOPKINS."

Sight-Seeing on Tally-Hos.

A large number of delegates to the convention of the American Forestry Association, under the guidance of Park Superintendent Garey, visited several of the parks yesterday. The party drove through Elysian Park in tally-hos, and examined closely the botanical garden there, where trees are growing that can be found in few other places in this country.

The delegates were particularly interested in the experiments the park department is making to grow trees and plants sent here from the tropics, some of which have been more successful than was expected. There has not been time enough to accomplish anything with the seeds and slips received here from Manila, although some are growing.

The different varieties of trees were shown the visitors, and their uses fully explained. After visiting Elysian Park the party went to East Los Angeles Park and inspected the plants in the hothouse there, some of which are of a variety to be found in no similar place in this country.—*Los Angeles Times.*

Recent Legislation.

Minnesota.

The Minnesota State Forestry Board completed its organization several weeks ago by the election of officers and the appointment of committees. The personnel of the new board, under the provisions of the law as published in the June FORESTER, is as follows:

C. C. Andrews, of St. Paul, Chief Fire Warden; Prof. Samuel B. Green, of Hamline, for the State Agricultural College; John Cooper, of St. Cloud, Frederick Weyerhaeuser, of St. Paul, and Orville M. Lord, of Minnesota City, for the regents of the State University; Judson N. Cross, of Minneapolis, for the State Forestry Association; Greenleaf Clark, of St. Paul, for the State Agricultural Society; A. L. Cole, of Walker, for the State Horticultural Society, and Judge William Mitchell, of the Supreme Court, for the State Game and Fish Commission.

The board organized by the election of Captain Cross, President; Mr. Clark, Vice President; General Andrews, Secretary. A committee was named to perfect the organization, and consists of Captain Cross, Mr. Green and Mr. Clark.

An executive committee, made up of the president, secretary and Professor Green, was named for the purpose of arranging at once for a visit of inspection of the Minnesota forests by Professor Schenck, forester of the famous Biltmore estate.

The interest of the general public has been shown in the assurances given that in the near future gifts of forest lands aggregating thousands of acres will be made to the board.

An Achievement of Perseverance.

The Forest Commission bill which has been signed by the Governor and is now in full operation with Arthur T. Hill, of Saginaw, Charles W. Garfield, of this

city, and Land Commissioner French as members, is the result of the persistent efforts of one man to have a start made, in an official way, toward forest preservation in this State. That man is Mr. Garfield, of this city. Many others have been interested in this work, but Mr. Garfield's experience in the Legislature, on the Board of Agriculture, and as an officer in local, State and national horticultural and similar societies, has aided him in finding a way to secure the passage of a bill which provides for taking up the forest matter systematically, where other efforts have failed. Aside from the utilization of waste areas and the effect of deforestation on our climate—being possibly responsible for the long summer droughts Michigan did not formerly have—the reforestation of the denuded Pine areas of Michigan promises large ultimate profits to the State. But the time between seed time and harvest is so long that capitalists cannot be interested, and the State itself seems to be the only agency adequate to undertake this necessary work. It has been begun none too soon.—Editorial, Grand Rapids, Mich., *Democrat*.

Remunerative Timber Lands in Canada.

The annual report of the Department of Interior of the Dominion of Canada states that the timber dues collected during the year 1898 amounted to \$119,769.03, being an increase of \$50,274.85 as compared with the previous year. Of this amount \$21,081.26 was for bonuses, ground rents, royalties and dues on timber cut from lands in the railway belt in the province of British Columbia. The total revenue received from timber in Manitoba, the Northwest Territories, and the Yukon territory, up to July 1, 1898, was \$1,569,893.17, and the total revenue from timber within the railway belt of British Columbia up to same date, \$326,086.19.

An Interesting Discovery.

Gen. E. Bouton, of this city, in boring a well on his ranch at Bixby Station, on the Terminal Road, this week, at a depth of 500 feet encountered the trunk of a tree of which the drill brought to the surface several pieces. The wood is charred, and shows the grain of the Cypress tree, and is in perfect preservation. What force this find gives to the preacher's cry, "There is no new thing under the sun!" There were forest fires on this part of the coast so long ago that the limit of recorded time is infinitely small in comparison to it. It is possible that this find will be interesting to students of coast flora. The drill also brought up Oak and tule leaves in a very good state of preservation and exactly like those growing to-day—*Los Angeles (Cal.) Times*.

Spruce Pulp for Newspapers.

The utilization of Spruce pulp for making the ordinary paper on which newspapers are printed is the subject of a carefully-compiled table, says the *Boston Transcript*, which shows the enormous consumption of this product. A cord of Spruce wood is equal to 615 feet board measure, and this quantity of raw material will make half a ton of sulphite pulp, or one ton of ground wood pulp.

Newspaper stock is made up with twenty per cent of sulphite pulp and eighty per cent of ground wood pulp. The best known Spruce land, virgin growth, possesses a stand of about 7,000 feet to the acre, taking the best as a basis. Twenty-two acres of this best Spruce land will therefore contain 154,000 feet of timber. An average gang of loggers will cut this in about eight days. This entire quantity of wood turned in at any one of the large mills will be converted in a single day into about 250 tons of such pulp as goes to make up newspaper stock. This pulp will make about an equal weight of paper, which will supply a single large metropolitan newspaper just two days.

Preservation of Philippine Forests.

There are many rare woods in the Philippines, which may be made a source of great wealth to this country if properly protected. If speculators are allowed to have their own sweet will in the jungles, however, the same thing will happen which has happened in some of the richest timber districts of this country—the land will be reduced to an arid and cheerless desert, for there is nothing more dismal than a tract of land which has been denuded of trees by the greed of men who care only for immediate returns.

The British Government established in India a forest department, whose officers are scattered all over the country. Their duty is to see that the young trees are not destroyed by predatory animals, to prevent and extinguish fires in the dry season, to study the district to which they may be assigned and set out new trees which may suit the climate and conditions, and generally to look after the section of jungle under their charge.

Something like this may be necessary in the Philippines, to say nothing of there being some need for it in certain parts of the United States. The recklessness with which Americans have destroyed their own wealth is equaled only by the speed with which they replace it. We cut down our forests and ruin our climate, and then invent systems of irrigation to do what nature did without our help. We destroy all the shade trees within miles of a new town, and then contrive unnumbered devices to keep the houses cool by artificial means. We ruin our health by an unnatural and feverish way of living, and then pay immense sums to marvelously skillful physicians who have made a study of nervous diseases. When we learn to preserve our inherited wealth as well as to acquire new riches, we shall be the greatest people on the face of the earth.—*Editorial, Washington Times*.

THE FORESTER.

A MONTHLY MAGAZINE

Devoted to Arboriculture and Forestry, the Care and Use of Forests and Forest Trees, and Related Subjects.

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SPECIAL ANNOUNCEMENT.

In order to present to the readers of THE FORESTER a complete report of the proceedings of the Summer Meeting at Los Angeles, together with the resolutions adopted and some of the valuable papers read, it has been found necessary to curtail some of the usual departments and omit others.

In compliment to those zealous advocates of forestry in California by whom the American Forestry Association was entertained during the week of the convention, several of the papers published in this issue have special reference to the Pacific Coast. Those of a more general nature, and more applicable to the interests of the country at large, have been reserved for future issues, in order that their value may not be in the least impaired—as would be the case were any attempt made to compress into a single issue the entire number of papers recorded in the report of the convention.

The energy displayed by the advocates of the proposed new forest reserve in Northern Minnesota, in the vicinity of Leech Lake, mention of which was made in the July FORESTER, has given the project a great impetus, with every indication of a successful outcome. As the plans at present are in a rather tentative

by the account of the Summer Meeting, the map and account of the project prepared for this issue have been held over for the September number.

At the meeting in Chicago, the latter part of July, a joint committee on organization was provided for to promote the best interests of the project. The St. Paul members of the committee are: J. J. Hill, C. P. Noyes, George Thompson, F. A. Young, A. H. Lindeke, A. K. Pruden, E. C. Stringer, Jesse A. Gregg, E. Ganish, Dr. Henry Hutchinson, Dr. Parks Ritchie, Ross Clark, Dr. H. M. Bracken, Dr. C. L. Greene, George F. Gifford.

A similar delegation of fifteen has been selected to represent Minneapolis on the committee, but the names of this contingent have not yet been announced. The organization will be perfected at an adjourned meeting to be held in Chicago on August 11.

The need of forest legislation in Colorado, of which THE FORESTER made mention in the June issue, is well exemplified by the frontispiece of the present number. It is more than likely that citizens of many other States will regard the illustration as applicable quite as well to their own localities. "An ounce of prevention" is a very efficacious prescription, but that the health of the forests is not always conserved in that way, this picture gives evidence.

The coming issues of THE FORESTER will contain, in addition to these convention papers, a number of articles by leading officials of the U. S. Government who are authorities on forestry in its various phases; by college professors whose investigations are attracting attention, and by men whose work has been more particularly on the lumbering side of the question.

Among the interesting features of the September issue will be a very thorough consideration of "The Forest Ranger System in the United States," by one whose official position makes his contribution authoritative—the Commissioner of the General Land Office of the Department of the Interior.

The forest resources of the new colonial possessions of the United States will be accurately described in a series of papers by writers who have studied them within the past year. The first paper of the series will be published next month under the title: "The Forest Resources of Porto Rico."

CHIPS AND CLIPS.

Experiments being made for utilizing sawdust indicate a commercial success.

It is estimated that forty per cent of all the White Pine lumber manufactured in this country is used for boxes.

In some parts of Russia the only food for the people consists at present of acorns, leaves and the soft bark of trees.

The Argentine Republic, which has no timber of any account, imported last year 48 million feet of White Pine, 68 million feet of Spruce, and 88 million feet of Pitch Pine.

W. H. Mills, of San Francisco, has been appointed honorary expert in the Forestry and Fisheries Department of the Paris Exposition of 1900 by U. S. Commissioner-General Peck.

A Canadian expert in forestry, John Durkin, died last month at the General Hospital in Toronto. He was 57 years of age, and was an official in the woods and forests branch of the Ontario Crown Lands Department.

Thirty-two thousand acres of timberlands in Raleigh County, West Va., were bought two weeks ago by the Bowman Lumber Company of Williamsport, Pa., their total holdings now being 65,000 acres, all contiguous.

Forest fires in the vicinity of Lyon Mountain, near Plattsburg, N. Y., several weeks ago drove game of all kinds to the clearings, and, in some instances, into the village. Deer, bear and wildcats were seen almost daily.

Paris contains more trees than any city in the world. These trees are principally of three kinds—the Chestnut and Acacia, such as line the Champs Elysees, and the Lime tree, which grows in such abundance in the Bois de Boulogne and on certain of the outer boulevards.

A marked illustration of changed conditions in the Saginaw Valley, Michigan, is shown by the reduced shipments by water from that locality. A few years ago ninety per cent of the mill product went out by water, a single season's shipment once aggregating 858 million feet. Last year the total amount was barely 90 million feet.

A heavy purchase of timberland was made last month when Michigan capitalists bought large timber holdings near San Bernardino, Cal. The property comprises 6,000 acres of Pine land, a sawmill of 50,000 feet daily capacity and a box factory with similar capacity. The standing timber on the purchased land aggregates 82,000 feet.

On account of the high prices of cottonwood a Memphis firm, one of the largest box manufacturing concerns in this country, has decided to try gum in a number of its boxes. It is found that the gum can be well dried, so that there is no odor whatever about it, and a fairly clear surface for lettering is afforded.

The sale of the hardwood timber on the Menominee Indian reservation has been abandoned. The law providing for the sale of timber on reservations specifically names Pine, but does not mention hardwood, and it is therefore believed that the Indian Commissioner has no authority to sell it without instructions from Congress.

Cuba increased its purchases of lumber from the United States nearly threefold during the first four months of the year, the shipments during that time of year being valued at \$607,563 as against \$258,076 during the corresponding period of last year. The difference is expected to be still greater later in the year, for it will be less difficult, after the hurricane season is passed, to secure vessels for West Indian voyages.

Surveying Forest Lands.

A party of engineers left Albany, N. Y., the latter part of July to survey the tract of forest land in the Adirondacks, recently given by the State to Cornell University for forest experimentation. The land consists of 30,000 acres in townships Nos. 23 and 26 of Franklin County, in the vicinity of Saranac Lake. The purchase of this tract, a year ago, consumed the greater part of the appropriation (\$500,000) made by the Legislature of 1898 for the extension of forest preserves.

Counterfeiting Nature.

Entertaining in "shanty style" is the up-to-date method of affording recreation for one's friends in the lumbering districts of Canada. Recently a wealthy lumberman took two hundred prominent guests to his estate in the woods, where modern conveniences were disdained for the novel experience of a real "shanty dinner," with demonstrations of life in a lumber camp. All the scenes were represented on a beautiful lawn, which for the time being was entirely transformed into a wilderness which rivaled the primeval forest.

A Montana Conflagration.

A press dispatch from Anaconda, Mont., stated that a forest fire broke out in the mountains west of that place, in the vicinity of Mount Haggin, a fortnight ago. The fire originated near the base of the mountains from the camp-fire of some picnickers. It spread rapidly through the forest on the sides of the mountain, both east and west, doing great injury to the property of a number of woodsmen. The fire was said to be visible 100 miles away.

At midnight the sight was brilliant, with the snow-capped peak of Mount Haggin towering heavenward above the mass of flames, which then covered several thousand acres. The mountain sides are heavily wooded and there are no prospects of rain. The fire must burn its way out, either to perpetual snow or to the timber line.

Canadian Incentive for Forest Study.

The Commissioner of Crown Lands for Ontario offers a prize of \$10 for a paper on "The Forestry Problem as Applied to Ontario," to be written by a graduate of the School of Practical Science. No restriction is made as to choice of subject. It may relate to the engineering phase of forestry, to forest fires and prevention, timber cutting, forest reproduction, or any other allied subject.

Papers are not to exceed 2,000 words, and the successful manuscript is to become the property of the Bureau of Forestry for publication in the annual report. Manuscripts are to be sent in to the Bureau of Forestry on or before December 1, 1899. The decision as to the merit of the manuscripts will rest with William Houston, M. A., McMaster College; Alexander Kirkwood, Crown Lands Department, and Thomas Southworth, Clerk of Forestry.

The Signs of the Times.

This will probably be the last season of the Sawyer & Austin mill at La Crosse, Wis. For some time there have been rumors that this would be the case, the company sawing all the logs it can and selling the remainder and take the mill down to Pine Bluff, Ark. The stumpage in the new purchase is said to be about 800,000,000.

One more year and the great lumber firm of Knapp, Stout & Co., of Menomonie, Wis., that has operated in that section for forty years, will have cut the last timber and the concern will take up its residence in the South, where they already have a large plant in operation. Thus one by one the old lumber concerns are winding up their affairs and moving into the South or further West. It was a source of great wealth, and more fortunes have been made in lumbering than have been made out of any one other product in the State.—*The Lumberman's Review.*

Recent Publications.

Mr. Gifford Pinchot's "Primer of Forestry," Part I., which was reviewed in the July FORESTER, will shortly be issued by the U. S. Department of Agriculture as an official document. It will be published as Bulletin No. 24 of the Division of Forestry. A great amount of interest has been displayed in the book, and it is sure to be widely read.

It is to be expected with confidence that the book will quickly make its entrance into the school-room and the school library, and there prepare the way for its successor, "Practical Forestry," and that the Primer in its completeness will bring many fresh and enthusiastic minds and hands to bear upon the forest studies of their own country, which from day to day are moving steadily to the front. By the time the younger readers of Mr. Pinchot's book have become of age, or perhaps long before, the profession of forestry will, past question, offer inducements which will call for many of our best and most efficient men.

The New York Agricultural Experiment Station will shortly issue a circular describing one of the enemies of forest trees—the Forest Tent-Caterpillar. This insect has been abundant this year throughout the central and eastern portions of New York. The caterpillars resemble the common Apple-Tree tent-caterpillar, except that they have a row of cream white spots down the back instead of a white stripe, as has the Apple-Tree tent-caterpillar. They do not build a nest. They

feed upon the foliage of a large variety of forest trees, especially Maple, Elm and Basswood, also various kinds of fruit trees.

The caterpillars spin oblong, white cocoons in any convenient place, along the fences, in the grass, under rubbish, on the trunks of the trees or partially concealed in a leaf which has been drawn about the cocoon. In about ten days a brown moth will escape from each healthy cocoon. In a few days the females lay their eggs. They are placed on the smaller twigs in masses, reaching nearly or quite around the twig, abruptly rounded at each end and covered with a glistening, frothy varnish. Each mass contains about 200 eggs. The caterpillars do not come from the eggs until the following Spring.

Every healthy cocoon that is destroyed means one less moth, and, as a fair percentage will be females, each one of which will probably lay 200 or more eggs, it is apparent that collecting and destroying of the cocoons means a decided decrease in the number of caterpillars next year.

Early in Ju'y the egg masses appear on the twigs. They will show plainer when the leaves are gone this Fall. While it may be impracticable, in most cases, to collect them from the forest trees, on shade trees, which are not too large, they can be easily found. On fruit trees it is little trouble to find them. These egg masses should be searched for especially when pruning the trees. Whenever found they should be destroyed at once. Bulletin sent free upon request.

NOTE.

The edition of THE FORESTER for November, 1898, having been exhausted, it has been found necessary to have a new one printed. Members of the Association and subscribers who may need copies of that issue (No. 11, Vol. IV,) to complete files for binding, will be supplied if they notify the publishers to that effect.

A limited number of complete copies of Vol. IV of THE FORESTER are offered for sale. Price, postpaid, \$1.00, unbound; durably bound in green cloth, \$1.50.

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The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

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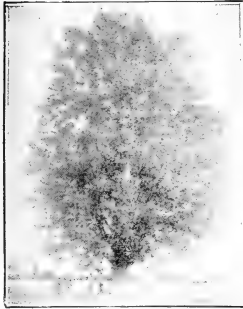
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FOREST PROBLEM IN THE WEST

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THE U. S. FOREST RANGER SYSTEM

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PORTO RIGAN



MINNESOTA'S

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The Forester.

VOL. V.

SEPTEMBER, 1899.

No. 9.

The United States Forest Ranger System.

An Official Review of the National Forest Reserves and their Administration.

BY THE COMMISSIONER OF THE GENERAL LAND OFFICE
OF THE DEPARTMENT OF THE INTERIOR.

Much has been written as to the theory of forest preservation and the resulting benefits, but little is known, to the general public, of the administrative details in connection with the objects in view. It may be of interest, therefore, to the readers of THE FORESTER to be informed of some of the machinery which experience has thus far shown to be necessary and practicable.

In the eleven States and Territories of Arizona, California, Colorado, Idaho, Montana, New Mexico, Oregon, South Dakota, Utah, Washington and Wyoming there are 36 forest reserves, containing an aggregate area of about 46,000,000 acres. These reserves are divided into nine districts, each having a general officer, known as a Forest Superintendent, in charge. Each district is divided into supervisors' districts, the number depending on the number of reserves, total area and difficulties of supervision, as affected by topography and liability to fires and depredations of all kinds. For each of these supervisors' districts there is appointed an officer called a forest supervisor, who has direct charge of the reserve or a portion of a reserve forming his district. There are 39 such supervisors' districts. Each reserve is divided into patrol districts, the size of

each patrol depending upon topography and the liability to fires and depredations; and a forest ranger, whose headquarters shall be at some central point in his subdivision, is appointed for each such district. There are 350 patrol districts, or rangers' subdivisions, in the 36 reserves. Two hundred and fifty rangers for immediate duty were authorized May 2, 1899, to serve until October 15, 1899. One hundred additional rangers were authorized to enter upon duty July 15, to serve until October 15, 1899. The rangers report to the supervisors and are under their immediate supervision. The supervisors report to the superintendents and the superintendents report to the Commissioner of the General Land Office in Washington.

The forest superintendents are directly responsible to the Commissioner of the General Land Office for the proper administration of the reserves. They receive from the Commissioner all orders and instructions, and are required to see that they are carried out. The forest supervisor is responsible for the work pertaining to his district, and for the proper discharge of duties by the rangers, and reports to the superintendent. The respective duties of these officials are described in detail in the following pages.

The Superintendent.

The forest superintendents are required to post themselves thoroughly as to all the rules and regulations governing the reserve, as laid down in a general circular of instructions issued June 30, 1897, and reissued, with amendments, August 5, 1898; and to see that these regulations are enforced, to observe the results of their operation and to report thereon. They are to obtain information against persons violating the provisions of the forest fire law, and report it to the proper United States attorney, and to render all necessary assistance in their prosecution. They are to give special attention to the instructions regarding forest fires and to co-operate with the supervisors in all large and important fires which are liable to get beyond the control of the supervisors and their rangers, and, when necessary, to employ additional help to extinguish the fires.

They are required to study the effect of sheep grazing upon the reserves; to examine as to the question of the free use of timber and stone as provided by the regulations; timber trespasses; lands in the reserves more valuable for mineral than for timber; areas in the reserves more valuable for agricultural than for forest uses. They also have charge of the appraisal of timber to be sold, and many other similar duties. They promulgate all orders from the Commissioner, and examine and pass upon all reports made to him by the supervisors and rangers.

The Supervisor.

The Supervisor must have his headquarters in or near the reserve of which he is in charge. He must familiarize himself with all the conditions existing in his district, especially in regard to forest fires. He must see that notices of the forest-fire act of February 24, 1897, which are printed on cloth, are posted in conspicuous places in the reserve; that all campers, hunters and others found in the reserve are duly warned as to their camp fires and their attention called to

the fire act. They have immediate supervision of the rangers and are required to be in and through the reserve to see that the time of the rangers is fully occupied in patrolling their districts, clearing up old trails, cutting new trails and performing their duties generally. They make weekly reports of daily service rendered, and monthly reports on the general conditions existing in the reserve. They also make detailed reports to the superintendent on forest fires, showing:

First Class: The number of camp or small fires found left burning, which were afterward extinguished by the forest officers or rangers.

Second Class: The number of fires (not included in the first class) which had gained considerable headway before being located and extinguished. Total area, in acres, burned over; number of volunteers, if any, who aided; number of extra men hired, if any, to aid; total amount paid for the extra help; amount of other extra expense incurred (not including amount paid for extra help and for tools).

Third Class: Number of large and important fires requiring extraordinary effort, time and expense to extinguish (not included in the first or second class), which were extinguished; total area, in acres, burned over; number of volunteers, if any, who aided; number of extra men hired to aid; total amount paid for the extra help; total amount of other extra expense (not including amount paid for extra help and for tools).

All Classes: Total amount expended during the month for tools, the dates of fires, the names and addresses of the parties responsible for their starting, the origin, the damage done, the probable market value of the timber burned and the effect upon the forest cover and water supply.

The Ranger.

The Rangers are required to be constantly on guard, to patrol their districts, to extinguish camp and other fires, to report to the supervisor all fires as indicated above, and to carry out their in-

structions as prescribed by a general circular dated May 12, 1899. They make monthly reports of daily service rendered, which reports are examined by the supervisors and superintendents and are then forwarded by the superintendents to the United States General Land Office.

A ranger must provide himself with horse and equipment, while the Government furnishes him with the various implements necessary to open trails in the dense forest, to construct fire barriers and to extinguish and surround fires. Each ranger is provided with a nickel badge, which is worn as an evidence of his official authority.

The official titles of the reserves and the men in charge of them are as follows :

Arizona and New Mexico.

The superintendent of the six reserves in Arizona and New Mexico is W. H. Buntain, of Santa Fe, New Mexico. These reserves have an aggregate area of 7,234,080 acres, consisting of, in Arizona, Grand Cañon, 1,851,520 acres; San Francisco Mountains, 975,360 acres; Black Mesa, 1,658,880 acres, and Prescott, 10,240 acres; in New Mexico, Pecos River, 411,040 acres; Gila River 2,327,040 acres.

This district is divided into six supervisors' districts, with Fred. S. Breen, of Flagstaff, Arizona, as Supervisor of the Francisco Mountains Reserves; *W. P. Hermann, Flagstaff, Arizona, Supervisor of the Grand Cañon; Mathew H. Rowe, Showlow, Arizona, Supervisor of the Black Mesa; W. H. Thayer, Prescott, Arizona, Supervisor of the Prescott; J. B. Wilhoit, Pecos River, New Mexico, Supervisor of the Pecos River Reserve, and Albert S. Osterman, Silver City, New Mexico, Supervisor of the Gila River Reserve.

Twenty-eight rangers were assigned to this district in May for immediate

duty, and, on July 15, nine additional for the Arizona Reserves and five additional for the New Mexico Reserves, making the total force of rangers for the Superintendent's district forty-two.

The twenty-eight first assigned were distributed as follows: Grand Cañon Reserve, 5; Prescott Reserve, none (the Supervisor acting as Ranger); San Francisco Mountains, 8; Pecos River, 5, and Gila River, 5. The fourteen additional rangers were appointed as rangers-at-large, being assigned from time to time to such reserves as the Superintendent sees fit.

Northern California.

The Superintendent of the three reserves in Northern California is Charles S. Newhall, of Fresno, Cal. These reserves contain an aggregate area of 4,923,535 acres, and consist of the Stanislaus Forest Reserve, 691,200 acres; Sierra Forest Reserve, 4,096,000 acres; and the Lake Tahoe Reserve, 136,335 acres.

There are four supervisors' districts, with W. C. Bartlett, Tallac, Cal., as Supervisor of the Lake Tahoe Reserve, having also the general supervision of the Stanislaus, of which last-named Reserve George Langenberg is the Supervisor in immediate charge, reporting to Mr. Bartlett, J. W. Dobson, Raymond, Cal., Supervisor of the Northern Division of the Sierra Reserve, and Harrison White, Visalia, Cal., Supervisor of the Southern Division of the Sierra Reserve.

Twenty-six rangers were first authorized, and 8 additional, on duty at large, for assignment to duty on July 15. Of those for immediate duty there were assigned to the Stanislaus 4, and to the Sierra Reserve 22.

Southern California.

The Superintendent of the five Southern California reserves is B. F. Allen, of Los Angeles, Cal. These reserves contain an aggregate area of 3,784,594 acres, consisting of the Pine Mountain and Zaca Lake Reserve, with an area of 1,644,594 acres; San Bernardino, 737,-

[Since the preparation of this article the death of Supervisor Hermann has been reported to the General Land Office. His former district has been placed temporarily under the direction of Supervisor Breen.—ED.]

280 acres; San Gabriel, 555,520 acres; San Jacinto, 737,280 acres, and the Trabuco Cañon, 109,920 acres. They are divided into five supervisors' districts, with B. F. Crawshaw, Santa Barbara, Cal., Supervisor of the Western Division of the Pine Mountain and Zaca Lake; Willis M. Slosson, Nordhoff, Cal., Supervisor of the Eastern Division of the Pine Mountain and Zaca Lake; W. A. Buick, San Bernardino, Cal., Supervisor of the San Bernardino, and W. A. Border, Los Angeles, Cal., Supervisor of the San Gabriel. The Trabuco Cañon and San Jacinto form the other supervisors' districts over which Mr. Buick will soon assume jurisdiction, a contingency caused by some special work, and Grant I. Taggart will take his place as Supervisor of the San Bernardino.

Forty-five rangers in May and June, and 10 entering on duty July 15 were authorized. There have been assigned to the Western Division of the Pine Mountain and Zaca Lake 8; Eastern Division of Pine Mountain and Zaca Lake, 8; San Bernardino, 8, and to the San Gabriel, 12.

Colorado and Utah.

The Superintendent of the five reserves in Colorado and the two in Utah is W. T. S. May, of Denver, Colorado. These reserves have an aggregate area of 4,046,720 acres, comprising, in Colorado, the Battlement Mesa, 858,240 acres; Pike's Peak, 184,320 acres; Plum Creek, 179,200 acres; South Platte, 683,520 acres, and the White River Plateau, 1,198,080 acres. In Utah, the Fish Lake, 67,840 acres, and Uintah, 875,520 acres.

This district is divided into seven supervisors' districts, each reserve constituting a district. E. C. Carter, Colorado Springs, Colo., is the Supervisor of the Pike's Peak Reserve; Oliver T. Curtis, Debeque, Colo., of the Battlement Mesa; Stephen H. Standart, Pine, Colo., of the South Platte; Frank J. Steinmetz, Colorado Springs, Colo., of the Plum Creek and White River Plateau, and George

F. Bucher, Coalville, Utah, of the Uintah and Fish Lake reserves.

Sixteen rangers were assigned in June for immediate duty, and 18 additional entered on duty July 15. Of the first-named on duty 2 were assigned to the Pike's Peak Reserve, 2 to the Plum Creek, 3 to the South Platte, 2 to the the Battlement Mesa, 3 to the White River Plateau, 1 to the Fish Lake and 3 to the Uintah.

Idaho.

The Superintendent of those portions of the Bitter Root and Priest River Reserves lying in Idaho is James Glendenning, of Grangeville, Idaho. This area consists of about 3,997,160 acres—about 3,456,000 acres of the Bitter Root and 541,160 acres of the Priest River Reserve being in this State.

There are three supervisors' districts, the Bitter Root having two. Benton Mires, Elk City, Idaho, is the Supervisor for the southern part of the Bitter Root, and W. D. Robbins, Grangeville, Idaho, for the north end. Robert S. Bragaw, Priest River, Idaho, is the Supervisor of the Priest River.

Fifteen rangers were assigned for immediate duty—10 to the Bitter Root and 5 to the Priest River Reserve. Eleven at large for duty from July 15 were authorized.

Montana.

The Superintendent of all the reserves in Montana is J. B. Collins, Missoula, Montana. These contain an area of 5,040,000 acres, comprising that portion of the Bitter Root Reserve lying in Montana, with an area of 691,200 acres; the Flathead 1,382,400 acres; the Lewis and Clarke, 2,926,080 acres, and the Gallatin, 40,320 acres.

Each of these constitutes a supervisor's District, John B. Weber, Hamilton, Montana, being the Supervisor of the Bitter Root Reserve in Montana; Gust Moser, Missoula, Montana, Supervisor of the Lewis and Clarke Reserve, and W. J. Brennan, Kalispell, Montana, supervisor of the Flathead Reserve. No

supervisor for the Gallatin Reserve has yet been named permanently.

Twenty-nine rangers were assigned to these reserves in June for immediate duty, 8 being for the Bitter Root, in Montana, 9 for the Flathead, 6 for the Lewis and Clarke and 6 for the Gallatin. There were also authorized for these reserves, on July 15, 9 additional rangers, for assignment to duty at the discretion of the Superintendent, making a total force of 38 rangers.

Oregon.

The three forest reserves in Oregon—the Cascade Range Reserve, area 4,492,800 acres; the Bull Run, area 142,080 acres, and the Ashland, area 18,560 acres, or an aggregate area of 4,653,440 acres—constitute a Superintendent's District, of which S. B. Ormsby, Salem, Oregon, is the Superintendent.

There are three supervisors' districts, the Northern Division of the Cascade Range Reserve and the Bull Run being under the supervision of W. H. Dufur, Dufur, Oregon; the Central Division of the Cascade Range forming another supervisor's district, under Ralph B. Dixon, of Roseburg; and the Southern Division and the Ashland another, in charge of Nat Langell, Jacksonville.

Forty rangers were assigned for the entire season—37 for the Cascade Range, 2 for the Bull Run and 1 for the Ashland.

South Dakota and Wyoming.

The Black Hills Reserve, in South Dakota and Wyoming, the Teton, the Yellowstone National Park Timber Land Reserve, and the Big Horn Reserve, make a district of which C. W. Garbutt, Sheridan, Wyoming, is the Superintendent. The total area of these reserves is 4,407,840 acres, the Black Hills, in South Dakota, having 1,166,080 acres, and in Wyoming 45,600 acres; the Teton 829,440 acres; the Yellowstone 1,239,040, and the Big Horn 1,127,680 acres.

There are four supervisors' districts. Charles Deloney, of Jackson, Wyoming, is the Supervisor of the Teton and that portion of the Yellowstone lying imme-

diately south thereof; A. D. Chamberlain, Cody, Wyoming, is the Supervisor of the remainder of the Yellowstone National Park Reserve; W. N. Jackson, Big Horn, Wyoming, is the Supervisor of the Big Horn Reserve, and H. G. Hamaker, Custer, S. D., is the Supervisor of the Black Hills Reserve.

Twenty-seven rangers—9 for the Black Hills, 5 for the Yellowstone, 8 for the Big Horn and 5 for the Teton were authorized for immediate duty in June, and for duty July 15 9 additional for the Black Hills and 9 additional for the Wyoming reserves.

Washington.

The Superintendent of the reserves in Washington is D. B. Sheller, Tacoma, Washington. These contain an aggregate area of 8,121,880 acres, comprising that part of the Priest River Reserve which lies in this State, area 103,960 acres; the Washington, 3,594,240 acres; the Olympic, 2,188,800 acres, and the Mount Rainier, 2,234,880 acres.

The Washington and Priest River form a supervisor's district, of which Edward Burin, Custer, Washington, is the Supervisor; F. C. Mathewson, of Shelton, is the Supervisor for the Olympic, and George McCoy, of Napavine, for the Mount Rainier.

Twenty-three rangers—8 for the Washington, 6 for the Olympic and 9 for the Mount Rainier—were authorized for immediate duty, and for duty on July 15 eleven more as rangers at-large.

In concluding this review it may be proper to state that only persons physically, as well as otherwise, qualified are selected for the position of ranger. Old age, indolence, weakness and intemperance are disqualifications which, when made known to the Department, will lead at once to the dismissal of the objectionable ranger. These officers are the sentinels in the forest, and absence from their post of duty is not permissible. This regulation guarantees constant vigilance in the hour of fire peril or timber depredation.

BINGER HERMANN.

The Forest Problem In The West.

Being a Paper Read at the Summer Meeting, Los Angeles, Cal., 1899.

(NUMBER FIVE OF THE SERIES.)

BY THE PRESIDENT OF THE FOREST AND WATER SOCIETY OF SOUTHERN CALIFORNIA.

The economic interest of the American people in their forests everywhere, and especially in the West, is to preserve the integrity and water-holding power of the mountain water-sheds of the country. This is clearly the public interest, whether these mountain water-sheds could or could not support by their products and wise use a system of management guaranteeing the integrity of their water-holding power. The public interest is both economic and humanitarian in preserving the mountain forest covering. Without forest preservation most of our remaining wild public land districts cannot be settled, and districts already settled are likely to lose in man-sustaining power. This has occurred already over wide areas of the world from undue forest denudation, on the one side by the irregular or exhausted water supply and on the other by the destructive action of flood and torrent through sudden rainfall delivery from bared areas. The proper preservation of forest balance does not require that ripe timber should not be cut, or that other uses, such as mining, should not be enjoyed.

The interest and requirements of districts vary in what treatment of forested areas is most advantageous. In most of the West and in all of the Southwest, the conditions of topography, rainfall and climate exact the highest care and treatment of the comparatively small forested area, all of which in the Southwest is on mountains or high plateaus only.

In this district it were better, for the country and for its people, that no use should be made of forest lands or forest products than to have the forests wasted and burned as at present is generally being done.

However, no such drastic remedy as the isolation of the forests from human

use is necessary. Under a proper and intelligent forest system the integrity of the water-sheds can be safely maintained, and yet plenty of use can be found for both land and products; uses that can go on without fatal results to the forested area.

It is only in the extreme southwestern mountains that the conditions are such as to counter-indicate the cutting of any timber or even firewood in the mountains. But even here mining, resorts, power companies and irrigation works can be established with no disadvantage to the trees or chaparral, but rather to their increased safety. The nation can gain by preserving its forests in safe proportion, and can in no way consent to see this proportion of safety to its people diminished. The nation will gain by forest preservation even though the system be without any resources or power of self-sustenance.

While forestry has become a living issue in the Atlantic States, through the depletion of perennial flow of springs and streams and increased flood action, and probably by greater and increasingly injurious extremes of frost and heat arising from forest destruction, in the West and Southwest effective forestry is a question of life or death.

With irrigated districts, present or prospective, the conservation of the Forest Natural Reservoirs is at least as important as the conservation of any part of the rainfall by artificial storage diversion or distributing systems.

The lands on the mountains and water-sheds in this part of the United States are in large part Federal public lands. By the extensive reservation of forested mountain lands from sale or settlement, the Federal Government has committed itself to a rational forest system. What the situation demands and what the

people desire is a forest management of these important mountain water-sheds that will serve the highest interests of the entire community. Interests built up under the neglect and waste and abuses of the Government's forestal mistakes and laches should be treated with all the consideration that the safety of the communities affected and the welfare of the great majority of the people will permit.

All foresters, and especially all foresters in the Southwest, endorse, and must endorse a Federal forest policy, whether the forest management pays its way or not.

The Government forestry systems of European nations, of Canada, Algiers, India and Australia, are self-sustaining, and for the most part bring in considerable revenues. Curiously enough, it is in the countries like Spain, Arabia, Persia and Turkey, in which forestry is neglected, where national productive power has most diminished, and in which both nation and people individually are poorest.

The success of other countries in maintaining national forest systems invites our attention to this subject.

The principal revenue from all forest systems is from the sale of forest products. These are mainly merchantable timber and fuel. The Western districts in which the principal areas of public lands exist, are situated so that one part or another of California would resemble their conditions closely enough for preliminary plans and outlines of forest management appropriate for the entire Western public land area.

California contains mountains and plains, valleys, farm lands and deserts. In the northwest its climate is one of, if not the moistest in the United States; in the southeast it is one of the most arid. In the Redwood belt there is a very large rainfall, and almost continuous fog and mist between the rainy seasons. In the Cocopah desert years pass without a drop of rain, or even a cloudy day. California conditions, carefully considered, can do much to outline a

forest and public land policy. What is the public land situation here?

California contains 99,361,083 acres of land, of which

The area appropriated is	40,392,418 acres.
The area unappropriated is	43,841,044 "
The area reserved is	15,127,621 "
	99,361,083 acres.

This gives a substantially accurate picture of our land situation. In the other Western States the public lands are in much larger proportion, as an annexed table will show.

The above figures, however, do not give the exact facts. Of the appropriated area some has gone to the State for taxes. In some of the mountain counties this tax area is quite considerable. The State Comptroller and the county officers thus far have found no general record of this tax land, therefore no one can now tell to what it amounts.

Of the area reserved, a considerable part is patented and in private hands. In some reserved districts, the proportion of private holdings is large, in others very small.

The National Yosemite Park, of about one million acres area, is a little more than half in private hands. The San Gabriel Reserve, from the Cajon West has a very small proportionate area in private hands, while the San Bernardino part of the forest reserves of the South has a considerable area in private hands.

The Reserve System suggests the policy of Switzerland. In that republic experience has demonstrated the immediate and often awful results of forest denudation on steep, high mountains to lower agricultural lands.

From this experience has been evolved a forest system which lays out as a part of its functions forest reserve districts. The lands within these, whether public or private, are under public control, and not a tree can be cut without public authority. We may come to this system some day.

There are in this State about 83,000 square miles of public lands in the hands of the Federal Government. An

examination made by expert civil engineers on section lines, and mapped by the old State Board of Forestry, shows in its reports that the mountain land with merchantable timber is substantially all in private hands. There is, speaking generally, no timber of merchantable quality and accessibility in California not in private hands.

Fuel and small wood costs more to bring out of the high Sierras at present than it will bring. There are restricted districts where the waste and fallen wood, or small standing timber could pay its way for use as ties, posts, fuel or mining, but no large revenue is in sight from this source at present. Consequently, the sources of revenue and support of foreign systems is absent in California.

We may assume that the known conditions of California in this respect in one or another of its districts apply to those of the entire West.

There is, however, a source of revenue to the Government from a rational management of its mountain forest lands, when handled in conjunction with the development by public irrigation works of the vast area of arid public land.

The reason why there is such a large amount of public land in California and in the West generally, is that the land is all in an arid climate, and that it is therefore incapable of supporting a farmer or settler, without a secure supply of water for irrigation, and often for domestic use.

The mountain forested areas are all incapable of agriculture in the Southwest. There is consequently no gain of productive area, as in the settlement of Ohio, for instance, by denuding them. On the other hand, these forests are the natural reservoirs of the Southwest.

The forests in this section are of the highest importance both to the irrigation districts already developed, and also to the enormous areas that may by future irrigation works be made fertile.

Storage reservoirs, diversion works, ditches, etc., are all safer and more permanent when under a forested watershed than when under a bare one. In

the first case, with forest covering, there is a minimum of flood action, and practically no torrential detritus to fill up the works. From a denuded water-shed, the water delivery is irregular, torrential and detritus-laden.

The public land now at its limits, or near its limits of support of population, can, by judicious irrigation works, be made capable of supporting a population of between fifty and one hundred millions. Irrigated land has always been as capable as that for supporting the densest population from agricultural returns. We see this in the history of the Euphrates and the Nile. In both of these cases, and in the more modern developments in India, we see that the important works were carried out by the community or Government, were managed by the community, are thus managed, and that new work for further development in the application of water to land in genial and dry climates, such as those of India and Egypt, is planned or being executed solely as Government undertakings.

There are three good reasons with us for this policy. The first is that the lands susceptible of improvement are largely public lands. The second is that the undertakings are too large for most private initiative, and the third is that a public administration of irrigated lands is the only one in which the land occupants can feel safe in not becoming serfs of the water company, as is now practically the case in the rich, irrigated valley of the Po, where the returns are large, but the people in misery.

Governments in the past and Governments now recognize the advantage and propriety of making their lands productive by public irrigation works. The peoples who have done this in the past have been among the greatest. One of the most powerful governments of the present day, that of Great Britain, is now, as it long has been, engaged in such irrigation development. The dam on the River Nile, near Assouan, will be the greatest land reclamation work in the world. The values created by the

application of water to land in Egypt will far exceed the values created by the exclusion of water from land in Holland. Both are Government undertakings.

In this country the Government has undertaken land reclamation by excluding water, as by the Mississippi dykes. It has also added to land-values and product-values by the construction of harbors and canals, thus reducing or removing freight tariffs or lighterage and landing tariffs. The States on, or having rivers, have been benefited by this policy. So also the Coast States, or those on the Lakes or served by the great Sault Ste. Marie Canal have been benefited; so has the country generally been benefited.

It is eminently proper that the people's Government should apply this policy to the development of the rich and sunny Western lands that cannot produce and serve mankind without water. In this case the benefit is direct to the public. It is the public land that will be most benefited. It is homes for the people that will be created. It is of course markets and a high productive power population in our own bounds that we thus create. It is the conservative agriculturist that we thus introduce and encourage to balance the more radical bodies of employes in the great manufacturing districts. Fifty million such Americans will consume more American products and support more American trade than all our present foreign trade combined.

Taking the public land area as a whole we find some that is inherently worthless, some that can be made good and productive, some where forests and their products can be safely used under reasonable regulations, some where the forests can only be safeguarded, but not used, as in the chaparral mountains of the South, and a wide district that is at present used for pasturage, excessive and premature. The pastures thus constantly deteriorate and carry less stock.

The public land pastures have deteriorated and are deteriorating in stock and sheep-carrying power. Fighting and dis-

order is everywhere present among the pasture users. Sometimes they have wars. These stock and sheep men, as far as seen, welcomed a proposed system of leasing the public lands appropriate to pasture, under judicious restriction as to the number of stock permitted on each section and the time of year when the stock should go on. The public lands in California have a present value for pasturage that varies with seasons. It is estimated to have an annual rental value of not less than \$250,000 and may exceed half a million dollars. Its rental value varies with the seasonal rainfall. The stockmen would be glad to pay rent and thus know upon what feed they could rely, without the present accompaniments of murder and arson.

Those districts where pasturage injures the water-sheds could have the stock reduced to a safe number by reasonable regulation or entirely removed.

When we consider the vital importance of the entire forest question, and past and present precedent in the matter of forestry and irrigation; when we consider the effect of forest denudation in filling up navigable rivers and harbors, the importance of water to miners, to cities and to irrigators; when we further reflect on the empire at our hand and in our borders to be created by irrigation works, we can agree that forests, reservoirs and public land management all go hand in hand.

The land system as a unit can be self-supporting and revenue producing. All interests can be fairly dealt with and the country brought to its highest productive power.

Those who engage in promoting this great work have strenuous efforts before them; they deserve the garlands of reward as civic patriots as much or more than those who foment distant foreign wars. The conquest of this empire within our bounds for our own children is more useful, more profitable, more secure and more glorious than any foreign conquests can ever be.

ABBOT KINNEY,
Los Angeles, Cal.

Minnesota's Proposed New National Park.

An Organization Formed in Chicago to Secure the Perpetuation of Natural Grandeur at the Headwaters of the Mississippi River.

The most important forest reserve project ever inaugurated by public sentiment in the United States was successfully launched at Chicago on August 11. The meeting was held at the Chicago Athletic Club, where there were assembled deputations of prominent citizens from Minneapolis, St. Paul, Duluth and Chicago to consider the feasibility of creating a grand national park and forest reserve about the headwaters of the Mississippi River in Northern Minnesota.

This section is one of marvelous natural beauty, where there are eleven hundred lakes replete with fish, untrammeled forest wilds abounding in game and an ozone unsurpassed. By those who have lived and hunted in that region its value as a health-resort is highly regarded. Its location is one easily accessible to great numbers of people.

Prominent among those who have recognized the advisability of pre-empting these lands for the public, before timber pillagers and forest fires have marred the beauty of nature, has been Col. John S. Cooper, of Chicago. Two motives impelled him to arouse public sentiment to action: First, the duty of the National Government to take such action as should make the headwaters of the Mississippi common property forever; second, the preservation for historical, educational, sport and pleasure purposes of a region which otherwise, if left alone, is doomed in a short time to become a barren waste, denuded of timber, crossed by dry water ways, unfit for agriculture and the scene of disastrous timber fires.

The enthusiasm evinced at the preliminary meeting, to which reference was made editorially in the August FORESTER, left no doubt as to the immediate success of the plan to form a national organization. This having been done the future seems propitious for favorable action by

Congress in consummation of the project.

"The Minnesota National Park and Forestry Association" was the title adopted for the organization, and officers were chosen as follows:

President—Cyrus M. Northrop, President of the University of Minnesota.

First Vice President.—Theodore Roosevelt, Governor of New York.

Second Vice President—Judge Horace L. Burton, of Tennessee.

Third Vice President.—Judge Hubbard, of Cedar Rapids, Iowa.

Treasurer.—John H. Whitbeck, of Chicago.

Corresponding Secretary.—Col. John S. Cooper, of Chicago.

Recording Secretary.—H. M. Bracken, of St. Paul.

Executive Committee.—Mayor Carter H. Harrison, of Chicago; C. S. Dennis, E. W. Blatchford, C. L. Hutchinson, George M. Nelson, Messrs. Beard, Clark, Gray and Work, G. G. Hartley, A. G. Comstock, S. H. Stewart, F. M. Stevenson, F. W. Leavitt, W. B. Mirschon.

The object of forming the association is thus described in the constitution adopted:

"The object of this association is to preserve as a great national park, so far as practicable, the native forests, waters and topography of an extensive tract of land in the northern part of Minnesota, together with the wild game in the woods, that an intelligent system of forestry may be established therein, and that our citizens may have, for generations to come, a great region abounding in native and cultivated forests and waters, to which they can resort in search of health and enjoyment, and that preservation and renewal of the forests may be inaugurated in the central Western States of the Union.

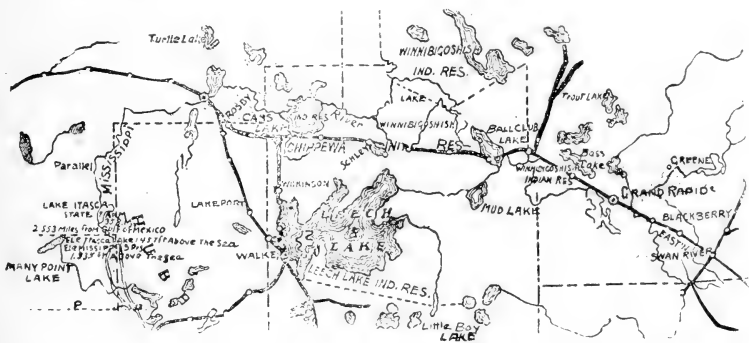
"Any citizen of the United States of good character and in sympathy with the object and purposes of this association shall be eligible to membership, and shall become such member when elected by the executive committee of the association, but no dues shall be required from members. The funds necessary to carry out the object and purposes of this organization shall be raised by voluntary contributions, and shall be paid to the treasurer, to be by him disbursed as directed by the executive board."

In order to assure a more general appreciation of the project and the desirability of early action by Congress, it was

together the objects of this association will be facilitated; therefore be it

"Resolved, That this association shall immediately organize for an expedition into that region during the coming Autumn, and that the following gentlemen be appointed a committee to have full charge of the same, viz:

Col. John S. Cooper, C. L. Peck, John H. Witbeck, Otis R. Glover, Marvin Hughitt, Jr., Wesley M. Lowrie, Henry S. Fitch, O. W. Nixon, George E. Cole, L. W. Pitcher, Harry G. McCartney, Dr. Frank Billings, W. C. Brown, T. P. Shonts, B. Thomas and J. B. Clow, of Chicago; Thomas H. Shevlin,



MAP OF THE REGION WHICH CONGRESS WILL BE ASKED TO SET ASIDE AS A NEW NATIONAL PARK.

decided to take a delegation of Congressmen and other prominent public men on a trip of investigation to the Leech Lake country early in October—the Indian Summer there—in order that they may gain personal knowledge of the proposed reserve. The following resolution was passed providing for the trip:

"Whereas, It is believed that there are no legal or practical obstacles in the way of establishing a national park in the northern part of Minnesota, which may not be overcome by the joint action of Congress, the State of Minnesota and private parties having vested interests in that territory, and that by bringing the representatives of all those interests

Thomas Lowry, James Gray and C. A. Pillsbury, of Minneapolis; George R. Finch, George C. Squires, Charles Cristadoro, J. I. Hill and Charles S. Fee, of St. Paul.

The only circumstance lacking to make the spontaneity of thought and action complete was the reluctance of the Duluth delegates to enter heartily into the scheme, for fear of certain commercial disadvantages to that city by the withdrawal of nearby lands from settlement, if included in the proposed reserve.

Congressman Page Morris presented this view of some of his constituents, but added that all would approve if the

project would not conflict with the interests of Duluth people.

Colonel Cooper replied, calling attention to the fact that two hundred thousand tourists a year to such a reserve might be of greater financial interest to Duluth than the trade of scattered settlers in that region, after forest fires had devastated everything.

Mr. Christadoro said the efforts now being made were to save for posterity "a few hundred acres" of forest land in Minnesota, and that those who criticized did not sufficiently understand this intention. He pleaded for recognition of the necessity of preserving natural forests for the benefit of future generations.

The Duluth delegates were assured that no part of the purpose of the forest reserve organization is to interfere with the ownership of merchantable Pine, or the rights of Indians or settlers already on the ground. When this is generally

understood by those having interests involved, it is believed that their cordial support will be enlisted forthwith.

Various sub-committees will be appointed on finance, press, etc., by the executive committee. There is every prospect of good results for forestry in general from such energetic efforts.

Those who took part in the final organization of the project, were:

Chicago—Col. John S. Cooper, Henry S. Fitch, George E. Cole, S. C. Eastman, Dr. Nixon and F. S. Baird.

Minneapolis—Mayor Gray, S. F. Johnson, Vice President Board of Trade; Drs. Beard, Bell, Moore, Crafts, T. H. Shevlin, A. H. Linton and F. W. Leavitt.

St Paul—Drs. Bracken and Hutchinson, Ross Clark, George M. Nelson, Charles Christadoro and E. V. Smalley.

Duluth—Col. C. H. Graves, Congressman Morris, F. A. Patrick and J. C. Hunter.

Forest Conditions of Porto Rico.

Review of the Forest Resources of the Island, by the Special Agent of the U. S. Geological Survey, for Issue by the Department of Agriculture.

FIRST PAPER—CONDITIONS AFFECTING FOREST GROWTH.

A FEW EXTRACTS FROM THE ADVANCE SHEETS.

(BY COURTESY OF THE SECRETARY OF AGRICULTURE.)

Porto Rico was originally mantled by forests from the level of the sea to the summit of its mountains. It is doubtful if there was a single foot of its area which was not at some time covered by tree growth, varying in height from the diminutive mangrove bushes which border the seashore to the gigantic deciduous trees mingled with the fronds and trunks of towering palms, which add height to the loftiest peaks and ridges. To understand the distribution and natural occurrence of these, it is necessary to explain briefly the topographic and physical features of the island.

The island is the most eastern and the smallest of the four Great Antilles. But

though it nowhere attains the great altitudes of the other Antilles, the island is practically the eastward continuation of the Antillean chain of uplifts, the upward extension of a remarkable submerged mountain slope, which, at least on the north side, descends nearly 30,000 feet to the bottom of the Brownson Deep, until recently supposed to be the deepest hole in the world. The island is 95 miles long, 35 miles wide, and has an area of 3,668 square miles. It is 500 square miles less in area than Jamaica. Its area is 300 miles greater than that of Delaware, Rhode Island and the District of Columbia combined, and 1,300 square miles less than that of Connecticut. At the same time, in proportion to area, it is of

all the Antilles the most productive, the most densely settled, and the most established in its customs and institutions. It is also notable among the West Indian group, because its preponderant population is of the white race, and because it produces food-stuffs almost sufficient to supply its inhabitants, in addition to its exports to some of the neighboring islands.

Its outline presents the appearance of an almost geometrically regular parallelogram, nearly three times as long as broad, with its sides following the four cardinal directions. The sea line is nearly straight, and the coast is usually low, especially on the southern side, although there are a few headlands. It is void of fringing keys and deep indentations of its coast, such as border Cuba. The coast line is 360 miles.

Porto Rico, like all the Antilles, in comparison with the United States, has a configuration ancient in aspect, although comparatively new in geologic age. Of the four chief topographic features of the Great Antilles (central mountains, coast-border topography, interior plains and enclosed mountain basins) only the central mountains and coast-border topography are represented upon this island.

The central mountains are largely of one physiographic type. The coast-border topography is more complex and diversified, consisting of three subtypes, which may be called coast hills, parting valleys and playa plains. The mountains constitute the major surface of the island, approximately nine-tenths of the whole. The other features collectively make an irregular and lower lying belt around the coastal margin comparable to the narrow rim of a high-crowned alpine hat.

The whole island is practically an elongated elevated sierra made up mostly of volcanic rock, surrounded by a narrow collar or dado of limestone hills, former marginal marine incrustations which have been elevated. Viewed from the sea, these mountains have a rugged and serrated aspect, consisting of numerous

peaks and summits with no definite crest line, rising from a general mass, whose steeply sloping sides are deeply corrugated by drainageways; they present the aspect of a wrinkled handkerchief—a figure of description ascribed to Columbus in telling Queen Isabella of the Antilles. Their surface has been etched by erosion into innumerable lateral ridges, separated by deep gorges.

The main crest line extends from Mayaguez on the west through Aibonito and Adjuntas to Humacao on the east. This is called the central Cordillera west of Aibonito and the Sierra de Cayey east of that town.

There are virtually two crest lines in the eastern half of the island. The northern branch is the Sierra Luquillo, which practically extends from the west of the San Juan-Ponce military road to the northeast cape. This range contains the highest island summit, El Yunque.

These mountains, as a whole, when looked down upon from the highest points, present the aspect of a sea of conical peaks and beaded ridges, rather than a dividing ridge. The highest eminences of the billowy summits nowhere exceed 3,500 feet, and this altitude, if attained at all, is reached by only one peak that of El Yunque, at the extreme northeast. The height of this peak is given on the Spanish maps at 4,087 feet, but it is reported much lower by other authorities. Other summits of the island, although numerous, hardly anywhere exceed 3,000 feet.

Through the mountainous mass numerous and copious streams ramify in every direction. These have deep valleys singularly free from cliffs, and they etch the surface into many lateral ridges and points. Of these streams, the largest and longest drain into the north coast, the next largest flow to the west, while the streams of the south and east sides, although copious, are comparatively short. The upper ramifications of the three principal rivers of the north coast reach southward nearly across the island.

Besides the wide alluvial plains near the mouths of the streams, to be described

later, the lower stretches of these northern streams present considerable areas of bottom land, extending for some distances within the margin of the mountain area, rarely broadening out into local circular mountain valleys. Their upper portions are steep angular gorges, however, where habitations are confined to the slopes and not the valleys. There are other streams of the island which also present small areas of bottom land indenting the mountainous area for a very short distance from their coastal borders, notably the Portugues, near Ponce on the south, and the Anasco on the west.

The most unobservant traveler remarks the radical natural differences which take place upon passing from the mountains into the lower lying coastal plains and foothills, especially upon the south side. The coast-border topography comprises a narrow belt of low hills and plains encircling the main or mountainous mass of the island, and broken in continuity upon the northeast, southeast and west by spurs of the central mountains which run across it into the sea. This border region of itself is an exceedingly diversified area, presenting two conspicuous major types of relief, coast hills and playa plains, and generally a third type, which may be called parting valleys.

On the north the coast hills stand as steeply sloping solitary mounds or domes, rising singly or in chains above wider extents of plain lying between them and the mountain front. The citadels of San Juan are built upon a hill of this character; others rise to the east and west of the city as far as Rio Grande and toward Arecibo.

Along the shore from the southwest cape of Porto Rico to within three or four miles of Ponce, except where occasionally broken by playas, coast hills are finely developed. These hills, like those of the north coast, are the remnants of what was once a steeply slanting bench plain. The slant is from the central mountains toward the sea, where the hills are in some places terminated by a

steep scarp or sea bluff 100 feet in height. The interior side scarp of these hills is bordered by a valley occupied by the lake of Guanica, separated by still another row of hills called the cerros from the central mountains.

On the southwest end of the island there are two parallel rows of hills separated from each other and the interior mountains by long and fertile valleys. The interior chain of hills, which extends from north of Cabo Rojo to within three miles of Yauco, passing west of San German, is of a peculiar type not seen elsewhere on the island. It is a single chain of highly rounded wooded hills of the type called "knobs" in this country, and "cerros" by the Spaniards. They owe their configuration to a thick cap stratum of hard mountain limestone, the lower portion being composed of the softer decomposing rock. Where the cap has been removed erosion has widened the valleys into great elongated plains or vegas.

For want of a better, the term "playa plains" is used for the wide alluvial plains found at more or less frequent intervals along the entire coast between the hills which limit them. The word "playa" means literally "shore" or "strand." Many cities of Porto Rico are situated upon the interior border of such plains where they meet the foothills, several miles from the port of entry, which is located at the immediate seashore, and which is usually designated "playa," in order to distinguish it from the city proper. These playa plains are usually fan-shaped in area, with their broader base next to the sea, where they are often many miles in width, and stand only a few feet above the ocean. They are bordered by escarpments composed of the sharp rise of the coast hills, and extend with constantly decreasing width backward up the stream valleys toward the central mountains. Ponce is situated upon a typical playa plain, which extends a short distance back of the city up the valley of the Rio Portugues. To the west of Ponce the playa plains are quite exceptional.

The name "parting valley" the writer has given to certain long and narrow valleys which sometimes occur between the foothills and the front central mountains. Some of the streams, as they emerge from the mountains and cross the lower country, tend either to bend along the mountain front as they pass from it or to send out laterals parallel to the same. The erosion attendant upon such phenomena produces long parallel valleys at the junction of the mountains and foothills. Parting valleys of this character are especially well developed on the south side of Porto Rico, such as the plain of Saba Grande and the depression of Guanica lagoon. Other parting valleys of a similar character are developed in many places around the rest of the island, although perhaps not quite so extensive in area.

Several features which are more developed upon the other Great Antilles are exceptional or lacking in the configuration of Porto Rico—notably, interior mountain valleys, bordering benches of elevated coral reef, the coast lagoons or lakes, and the mangrove swamps. The interior mountain valleys of Porto Rico are not conspicuous features, nor are they completely closed (without drainage outlets), like those of Jamaica.

Elevated reef benches or *seborucco*, which in Cuba form the narrow coast rim of hard rock and protect a softer interior, thereby producing the excellent pouch-shaped harbors, are but faintly developed in Porto Rico. This material was seen only at the entrance of San Juan Harbor. The coast lagoons or lakes are collections of water in swales of the coastal plain on the north and in parting valleys of the type of Guanica, previously described. Mangrove swamps are extensively developed around the interior margin of San Juan Harbor.

In the Southern United States and the Antilles, where altitude is not a controlling factor, the chemical and physical composition of the soils are two of the chief factors producing vegetal differences. Inasmuch as the soils of Porto Rico, with the exception of that of the

playa plains, are all residual (the surface decay of the underlying rock); it is impossible to make a clear presentation of the forest conditions without a few remarks upon the nature of the rocks. Inasmuch as all cultural and natural aspects are intimately associated with geologic structure, a few words upon this subject are absolutely essential to a complete understanding of the subject. But in a brief review, such as this, having called attention to the omission, we may speak briefly, not of the history, but only of the present condition of the soils.

The chief and radical differences of flora in Porto Rico occur between the red clay mountain soils and the calcareous foothill soils, the latter being of the open-textured white limestone type which abounds from Florida southward, but is not common in the United States.

The mountain areas present but little if any barren indurated rock surface, but are covered with a deep red soil, to which vegetation clings tenaciously. This mountain soil is one of the most marked features of the island, and to it are largely due many of its agricultural and forest conditions. Were it less tenacious and sticky than it is (and language can hardly convey an idea of the unctuousness of this stickiness, which is especially disagreeable in a road material) the mountain slopes of Porto Rico would now be washed and dreary wastes of barren rock. This mountain soil is mostly red ferruginous clay, accompanied by much pebble and other rock debris. It is naturally ameliorated by the vast amount of humus derived from the native vegetation. Decay is so rapid under perpetual warmth and moisture that the volcanic rocks quickly rot and weather into soils of this character. The regolith or decayed superface of the rocks is unusually deep on these mountains, extending down 50 or 100 feet, correspondingly affording a splendid medium for root hold and penetration.

Owing to this soil the mountains were originally wooded and are now cultivated to their very summits, verticality of slope presenting no obstacle to cultivation in

the minds of the natives. The writer has seen the steepest possible slopes cultivated to the highest degree in coffee and tobacco; in fact, the most productive crops of this character are grown upon declivities upon which the American farmer would not risk limb and life.

Much of the soil of Porto Rico is now abandoned and in the condition known throughout the English-speaking West Indies as "ruinate." This has resulted from long cultivation, from the failure to apply fertilizers, and, in some cases, from erosion. Land of this character was observed in many parts of the island. The reclamation of these lands by forestry, or the methods of scientific agriculture, is one of the problems which Porto Rico presents to the civilization of its new owners.

Regarding the climate of Porto Rico, no attempt will be made to describe it other than to state a few facts relating to its bearing upon the distribution of life and culture. The whole island may be divided into a wet and a dry belt, on the north and south sides of the central Cordillera, respectively. The greatest rainfall, which sometimes attains 120 inches a year on the slopes of El Yunque, is at the northeast end. On the south side, from Guayama to Cabo Rojo,

the climate is dryer, but most of the island is wet in comparison with the standard of the United States.

The higher mountains are slightly cooler than the coast belt, but the temperature is so uniformly warm that altitude has but little bearing upon distribution of vegetation. The mountains are constantly bathed in moisture, either by daily rainfalls or dense mists which collect upon them at night, except upon the lower portion of their southern slopes; hence, it may be said that the superfluous is never dry and the subsoil is constantly saturated in the mountain region.

On the southern coast, however, owing both to the porosity of the limestone, which quickly drains off the moisture, and to the intermittent dryer periods, the surface above has a parched and arid look, especially in the long dry season. Some portions of this south belt are very arid, and great complaint was heard in places that the rainfall for the past two years had been insufficient for domestic supply. In fact, to cultivate the staple crops of the lowlands of the south coast, irrigation is necessary. This is practiced with great skill and at considerable cost along the whole southern border from Guayama to Cabo Rojo.

[Continued in next issue.]

Ontario Forest Reserve.

The Ontario government is making rapid progress toward the adoption of a complete system of reforestation, having recently set apart an important reserve in Frontenac and Addington Counties.

After inquiries from time to time as to the most eligible territory for a reservation in the eastern part of the province, the Commissioner of Crown Lands came to the conclusion that the McLaren limits, now operated by Isaac Allan, of Mississippi Station, were the most suitable for the purpose. These limits cover parts of the townships of Abinger, Miller, Barrie, Clarendon, Palmerston, Ashby, Denbigh, Effingham, South Caninto, Olden, North Sherbrooke and

Oso, and contain an area of 273¾ miles. The territory is watered by numerous lakes and streams and lies on the headwaters of the Mississippi River, a stream of considerable importance flowing into the Ottawa River, and on the headwaters of a branch of the Madawaska River. All the good land available has been either sold or located, and the merchantable pine timber has been almost entirely cut away. The Pine growth remaining consists of young trees springing up, which are spread over considerable areas of the territory, and, if protected from fires and allowed to attain a fair growth, will, it is deemed, become a valuable asset of the province in the near future.—*Canada Lumberman.*

The American Forestry Association.

A Special Meeting at Columbus.

The American Forestry Association held a special meeting at Columbus, Ohio, on August 22 and 23. The meeting was held under the auspices of the Columbus Horticultural Society, and the arrangements made by the officers of that organization were all that could be desired. As an affiliated society of the American Association for the Advancement of Science, all privileges of accommodations and entertainment, as well as railroad rates, were shared by members of the Forestry Association.

The sessions were held in Horticultural Hall, Ohio State University. At 2 o'clock on Tuesday afternoon, August 22, the meeting was called to order by William R. Lazenby, President of the Horticultural Society, who was made chairman of the convention. The attendance was not large, but all present manifested a deep interest in the proceedings and evinced an enthusiasm that was inspiring.

Among those present at this and the subsequent sessions were: Dr. W. J. Beal, Vice President for Michigan of the American Forestry Association, and Professor of Botany and Forestry in the Michigan Agricultural College; Dr. C. E. Bessey, of Nebraska State University, Vice President for Nebraska; Rev. James Poindexter, President of the Ohio State Forestry Bureau; S. C. Mason, Professor of Horticulture and Forestry, Berea College, Kentucky; William Saunders, Director of the Canadian Experimental Farms; Dr. B. B. Halsted, of the New Jersey Experiment Station; Prof. A. D. Hopkins, of the West Virginia Experiment Station, Vice President for West Virginia; John F. Cunningham, Secretary of the Columbus Horticultural Society; Prof. J. A. Holmes, Vice President for North Carolina; Prof. L. C. Corbett, of West Virginia University; J. J. Janney, Columbus; Prof. F. W.

Rowe, of the New Hampshire Agricultural and Mechanical College; Prof. N. L. Britton, Superintendent of the Botanical Garden, Bronx Park, New York City; W. R. Beattie, Columbus; T. A. Scott, Westerville; F. R. Luke, Ohio State University; Prof. J. H. Lageman, Columbus; J. F. Cowell, Superintendent of Parks, Buffalo, N. Y.; William R. Lazenby, Professor Horticulture and Forestry, Ohio State University, and President of the Columbus Horticultural Society; L. M. Freeman, Rex, Lecturer on Forestry.

Telegrams and letters of regret were read from Gifford Pinchot, Forester of the U. S. Department of Agriculture; Dr. C. A. Schenck, Forester to the Biltmore Estate, North Carolina; W. W. Ashe, Consulting Forester, Raleigh, N. C.; Prof. John Craig, Iowa Agricultural College, Ames, Iowa; George W. Minier, Austin, Ill., and others.

In a brief opening address Professor Lazenby welcomed the Association to Columbus. Speaking of the rapid and reckless destruction of the forests of Ohio, one of the best agricultural States in the Union, he called attention to the average annual rainfall of Ohio, and whether it had been materially increased or its distribution greatly modified by the removal of the forests. "We do know," he said, "that our soil rapidly loses its summer moisture; that our springs and wells are failing and our streams and rivers are more capricious in their flow; droughts are more severe and floods are more common." He urged the planting of trees upon all land that was not cultivated or that was cultivated at a loss.

After the appointment of a committee on resolutions and hearing verbal reports from the members representing different States, a formal address was delivered by Rev. James Poindexter, president of the Ohio Forestry Bureau, on the past

and future work of that department. John F. Cunningham also read a paper on "Observations upon the Woodlands of Ohio."

The session then adjourned, the remainder of the afternoon being spent in an inspection of the native trees and shrubs on the grounds of the State University.

At the morning session of the second day the following papers were presented and read: "Natural Regeneration of Forests on Old Fields in Eastern Kentucky," by Prof. S. C. Mason, of Kentucky; "Lumbering in Northern Michigan," by Dr. W. J. Beal, of Michigan; "The Rate of Growth and Temperature of Various Varieties of Forest Trees," by William R. Lazenby, of Ohio; "Capitalistic Review of Conservative Lumbering," by C. A. Schenck, of Biltmore, N. C.

These papers will be fully considered in coming issues of THE FORESTER. A discussion was then held on twenty questions, which had been printed upon the programs, relating to the extension of general interest in Forestry, and the characteristics of various trees, conditions of growth, insect enemies, etc. This proved to be a very profitable feature of the session.

During the afternoon a number of short excursions were taken to view large and unique specimens of native trees bordering the Olentangy River. Before the close of the meeting the Committee on Resolutions presented a report which was unanimously adopted.

A paper on "Are the Trees Advancing or Retreating upon the Nebraska Plains?" was read by C. E. Bessey, of Lincoln, Neb., at the meeting of the section on botany, of the Science Convention.

Results Will Compensate.

The Minnesota forest reserve scheme will need the co-operation of the General Government, and it will doubtless receive it. Both the last and the present national Administrations have shown their sympathy with forest preservation movements. During the past five years a number of large national parks have been created from Government lands. One of the latest of these is the Lake Tahoe Forest Reserve in California, consisting of 136,335 acres which was set aside by the proclamation of President McKinley last April. The Government will continue this policy and other bodies of public land will be withdrawn from sale and created into parks. One of the chief objects of the proposed Minnesota reserve is to protect the headwaters of the Mississippi River. The need of this is plain, and it should encourage the promoters to persevere in their plans notwithstanding the difficulties to be overcome. The results will compensate for all the labor and patience involved.—*Editorial, Philadelphia Press.*

Investigation of Red Fir.

The Division of Forestry of the Department of Agriculture at the present time has sixteen men in the State of Washington gathering data regarding the growth of Red Fir and how best to keep the land in a productive condition. Fir is a rapidly growing timber and Gifford Pinchot, chief of the division, believes that with proper care there should be a perpetual supply which should maintain Washington as a great lumber producing State in perpetuity.—*Amer. Lumberman.*

A Popular Parasite.

The mistletoe has become so popular as a Christmas decoration in England that it seems likely to be exterminated in certain places. It was formerly permitted to grow in many apple orchards, sometimes seriously injuring the trees, but with the increased demand this has all been removed. In some places steps are being taken to propagate it, and young apple trees can now be purchased, on which the parasite has become established.—*Plant World.*

Forest Protection.

Minnesota's Example.

The annual report of the Chief Fire Warden of Minnesota, Gen. C. C. Andrews, has been recently sent out, and shows a very satisfactory and aggressive enforcement of the laws relating to forest fires.

The object of the fire warden law is to prevent great forest fires from starting, or if, unfortunately, they have started, to extinguish them before they become unmanageable. Prevention is the main feature of the law, as is seen in the importance attached to posting and publishing warning notices. Thus far the State has expended, under this law, less than \$5,000 a year, including the one third of county expenses which it pays; and the expense of the thirty-odd counties affected by the law has averaged less than \$100 a year, yet the State has escaped the heavy losses suffered by nearby States.

Reports from the fire wardens, made to the Chief Fire Warden, of forest fires in 1898, show that there were fifty-one such fires, which burned over 21,580 acres, much of which was light timber or cut over lands. The total damage reported, \$9,063, is accounted for in part by some of the damaged timber being cut the succeeding winter. Seventy-eight per cent of the whole number of fires reported were extinguished or controlled by fire wardens or their helpers. A man in Todd County was made to pay a fine of \$100 and costs for carelessly causing a fire which spread a half mile into a neighbor's field, where it fatally burned a woman and severely injured a boy who tried to protect her. There were several other vigorous and effective prosecutions. The number of acres reported as burned over by prairie fires was 54,360; damage, \$13,436. The number of such fires caused by burning grass, straw or stubble was 23; by railroad locomotives, 14, other causes 5, unknown 25.

The report contains numerous illustrations of the Minnesota forests, describes

some of the timber country in Beltrami and Cass Counties, also a splendid Pine forest on the south shore of Cass Lake, recently made accessible by railway; and some very fine forest on the north shore of Vermillion Lake, belonging to the State University, which the Chief Fire Warden advocates being set apart as a demonstration forest for the use of the school of forestry connected with the Agricultural College and Experiment Station. If this were done, he thinks the State University of Minnesota would outrank all other Universities except Cornell in this country in the important science of forestry, which is so rapidly coming to the front. The need of roads and paths in the Itasca State Park is commented upon.

There is a splendid review of European forestry, historically considered. In proportion as the people are informed in regard to forestry will they be disposed to use precaution against the ravages of forest fires. The importance of setting apart primeval Pine forest lands as a health resort is urged upon the State.

Forest Fire Laws in Pennsylvania.

Dr. J. T. Rothrock, State Forestry Commissioner of Pennsylvania, and Vice President of the American Forestry Association for the Keystone State, said, in a recent statement to the Philadelphia "North American":

"The recent destructive forest fires in Centre County bring prominently forward the laws which were passed by the Legislature of 1897 for the suppression of forest fires, and the question may be raised, and doubtless will be, are these laws effective?"

"The best answer to this is found in the fact that ten years ago the loss to this State by forest fires was estimated, by those most competent to judge, at \$1,000,000 annually. In 1896 the loss was \$557,056. In 1897 it was \$394,327. With every effort on the part of this

office to secure information, the loss to the State by forest fires in 1896 only sums up \$53,345. In other words, something has caused a gradual decrease in forest fires during the ten years past from \$1,000,000 worth of property destroyed to \$53,345—that is a saving in one year of \$946,655.

“The Spring of 1899 was remarkably dry as the trees were coming into leaf. An unusual number of forest fires were started in Luzerne, Lackawanna, Pike and Monroe counties, as well as in some other counties. There always will be such seasons, and we may expect that they will show an increase in the usual number of forest fires until we are authorized by law to throw over the affected districts such thorough protection as is afforded by other civilized countries.

“The fire laws passed in 1897 are two. First, the act of March 30, ‘making constables of townships ex officio fire wardens for the extinction of forest fires, and for reporting to the Court of Quarter Sessions violations of the laws for the protection of forests from fire, prescribing the duties of such fire wardens and their punishment for failure to perform the same, and empowering them to require, under penalty, the assistance of other persons in the extinction of fires.’ This act has been upheld by the Supreme Court.

“The second act was approved the 15th day of July. This act makes it the duty of the County Commissioners ‘to appoint persons under oath, whose duty it shall be to ferret out and bring to punishment all persons or corporations who either willfully or otherwise cause the burning of timber lands within their respective counties, and to take measures to have such fires extinguished where it can be done,’ and it provides a penalty for failure on part of the County Commissioners to attend to this duty.

“The obvious duty of the State is to protect its citizens against those who ignorantly, carelessly, or with criminal intent would waste or destroy property. It is, therefore, the duty of Commissioners of counties where forest fires prevail

to make an honest effort to apprehend those who start them.

“Unless a general rain occurs within a reasonable time, we have cause to fear that destructive forest conflagrations will happen elsewhere than in Centre County, and the officers named in the laws above mentioned would do well to weigh very carefully their responsibility under the circumstances.”

An Enlightened Policy.

During the present year the State has come into possession by purchase of additional large tracts of the Adirondack forest. This acquisition has been made under the special law and appropriation passed at the instance of Governor Black.

The reclamation of these woods from private ownership is an enlightened policy. The entire “wilderness” should have remained a heritage for all the people of the State. Its benefits as a magnificent park, a conservator of the water supply and an unequaled sanitarium could not be estimated. But while various clubs and individuals have secured possession of some of the choicest portions of the great tract, there is enough left under State control to constitute the finest State park in the world if it is properly guarded and cared for.—*New York World*.

The Dawn of Success.

While most of the States have not taken any notable steps in the direction of scientific forestry, or of any adequate care of the forests that remain to them, yet in nearly all of them the subject is now engaging the attention of earnest and thoughtful men. The campaign of education in favor of forest preservation has begun to achieve successes in all parts of the Union. The people are beginning to understand more and more clearly the importance of the issue and the urgent necessity of applying a remedy to the evil of the careless wasting of our noble woods.—*San Francisco Call*.

THE FORESTER.

A MONTHLY MAGAZINE

Devoted to Arboriculture and Forestry, the
Care and Use of Forests and Forest
Trees, and Related Subjects.

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FORESTER.

The patriotic interest of the American people in everything pertaining to the new colonial possessions has prompted the publication of a review, which, while not exhaustive, is sufficiently full to answer the great majority of questions of immediate interest concerning forestry in Porto Rico. It embraces the results, in part, of observations made during a rapid reconnaissance through the military department of Porto Rico by R. T. Hill in January, 1899, during which he became familiar with its forests, and, by inquiry among various persons engaged in wood-working trades, obtained valuable information as to the qualities and uses of the native timbers. The complete report contains not only a clear statement of the forest resources of Porto Rico and the extent of its timber lands, but also such succinct descriptions of the physical features of the island as are necessary for an understanding of its forest problems. It will shortly be published by the Department of Agriculture.

An announcement of interest to all who appreciate the undoubted advisability and necessity of forest conservation in this country, is the appointment of Hon. John Gifford, of Princeton, N. J., to a chair of forestry at Cornell University. Mr. Gifford gave early evidence of his earnest consideration of the subject as well as of his zeal in promoting a scientific

investigation and popular realization of forestry in general, in the founding of the "New Jersey Forester," which made its appearance at the beginning of 1895. As editor of the New magazine he worked assiduously for the advancement of the cause, and as proprietor showed that convincing enthusiasm which cannot be dampened by mere lack of financial support. The magazine having developed under his capable management into an organ of considerable influence, far beyond the bounds of its original scope and local character, Mr. Gifford consented to a continuance of its publication by The American Forestry Association. Through this medium THE FORESTER has reached every part of this country, and finds interested readers also in Canada, England, Germany, France, Italy, and even India, all of whom will follow with interest the further efforts of Mr. Gifford in his chosen field.

The position which Mr. Gifford has just accepted is the Assistant Professorship of Forestry, which was offered him immediately upon his receiving the doctor's degree in forestry at the University of Munich. He will take up his new work in the early Autumn, when there will be offered to the student body the following courses under his care: Forest protection, forest administration, forest history and politics; forestry, with special reference to silviculture; and German forest literature.

An interesting description of the country included in the proposed new National Park in Northern Minnesota will be a feature of the October issue of THE FORESTER, which will also contain further papers of the Summer Meeting at Los Angeles, additional notes of the special meeting at Columbus, and a report of the meeting at Missoula, Mont.

An able article, of especial value to those whose interests are linked with forestry through irrigation, will treat of percolation and water supply, as affected by forests—a subject which has attracted very considerable attention.

The work of State organizations, in arousing general public interest in forestry, will be described by taking the example of an active organization—that of Massachusetts.

Among other features of this and following numbers will be articles presenting views on forestry as applied to mining, sheep grazing, agriculture, and storage reservoirs. The articles on colonial forests will be continued.

CHIPS AND CLIPS.

India-rubber heels on shoes, decreasing the fatigue of marching, will be adopted, it is said, by the French army.

Port Blakely, Wash., recently sent a steamer laden with three million feet of lumber to Taku and Woosung, China.

The hardwoods in the vicinity of Cadillac, Mich., are estimated at eleven billion feet, of exceptionally fine quality.

Notwithstanding a law to prevent the pollution of streams by mill refuse, the Ottawa River is reported to be filled with sawdust.

At the Paris Exposition of 1900 the Canadian exhibit of forestry will be under the supervision of J. M. Macoun, of Ottawa. A complete collection of native woods will be shown.

A large quantity of standing timber, including Elm, Basswood, White and Red Oak, Sycamore, Whitewood, Birch and Soft Maple, in Ontario, has been sold to a syndicate to manufacture for export to British markets.

North Africa claimed a cargo of nearly half a million feet of Canadian lumber in the beginning of the month, four-fifths of it going to Tunis and the remainder to Morocco. Buenos Ayres took a cargo even larger than the preceding.

The distinction of having produced the best quality of Cork White Pine ever grown in North America is accorded to the Cass River country, Michigan. Since 1864 nearly a billion feet of logs have been rafted down that river.

Tamarack gum is being sought in Canada by a patent medicine company or use in its preparations. The tree grows well in the highlands of new Ontario, north of the height of land, but is found only in swampy places in the older part of that province.

In parts of South America where Mahogany is used for railroad ties and other ordinary uses, the native business men are said to prize the cheap Hemlock and Pine boards which are sent in the form of boxes and crates from this country.

The Chinese propensity for decapitation has manifested itself in an unusual way recently. Li Hung Chang is reported to be one of the leading promoters of a huge lumber-mill project in China, to give some of the forest monarchs the *coup-de-grace*.

A forest reserve is likely to be established in the Lake Temagamingue district of Ontario, as the result of a visit by the Commissioner of Crown Lands. A dense growth of White Pine exists all around the shores of the lake greatly in excess of what was previously known.

The timber supply of Georgia has been estimated by lumbermen of that State as sufficient to last only nine years at the present rate of sawing, 2,600,000 feet daily. The timber resources of the State at present are placed at one and a half million acres, calculated to saw three thousand feet to the acre.

The finest Spruce area in Canada, as it is claimed to be, will be opened to development by the new Restigouche & Western Railway, which is now being constructed. The line extends from Campbellton, N. B., a distance of 110 miles to St. Leonards, on the St. John River, to a region hitherto inaccessible.

Although Colorado has considerable timber, it is of coarse quality, suitable only for the roughest uses. It is estimated that four-fifths of the lumber and timber used in the State is imported. White Pine comes from Wisconsin and Minnesota, a large amount of Yellow Pine is used, while the products of Oregon and Washington mills also finds a regular market.

Forest Fires in Three States.

Cheyenne, Wyoming, Aug. 27.—Forest fires are raging about Laramie Peak, in the northern portion of Laramie County. They have been burning for the past ten days, and have destroyed a large quantity of valuable timber.

Deadwood, S. D., Aug. 27.—A fire has been raging in the timber east of this city in the Two Bit District for the past twenty-four hours. The country is very dry, and fears are entertained that the fire will get beyond control. Sixty range riders are fighting the flames.

Denver, Colo., Aug. 27.—Forest fires, which it is thought were started by camp fires, are raging in the foothills near the entrance to Platte Canon, about twenty miles south of here. The fires started five miles up the canon, and burned over the mountains on both sides of the canon and are now devastating the timber section along the foothills. Millions of feet of lumber have been consumed, and there are reports of loss of life.

The Power of Public Sentiment.

The Connecticut legislature has passed a law protecting the trailing arbutus. This is said to be the first law ever passed in any State of the Union for the protection of a wild flower. A newspaper article calling attention to the need of such a law is credited with having aroused sufficient public sentiment to secure the passage of the law.

Aboriginal Simplicity.

A novel tramway is in operation in British Columbia. It is formed of trees from which the bark has been peeled off, being firmly bolted together and used for rails. Upon these runs a car with grooved wheels ten inches thick. The tramway is two miles long.

An Alaskan Enterprise.

The Alaskan trade is becoming the center of important lumber developments. A newly-organized company at

Seattle, Wash., has secured large timber concessions, consisting of hard Cedar of an exceptionally fine quality, on the west coast of Alaska. Sunny Point, on Prince of Wales Island, has been selected as the industrial center of the business, with stores on Cholmondelay Sound.

A Relic of Old Manila.

Rosewood and Mahogany attract the attention of visitors to the Hotel Orient in Manila. The interior is described as being beautifully finished in hand-sawed wood, the staircases of the first three floors being of Rosewood. Solid Mahogany forms the floors, the boards being twenty-two feet long and two and a half feet wide. Though in use twenty years, these boards are still in perfect condition.

A Friendly Suggestion.

Now that some attention is being paid by the most practical of lumbermen to forest subjects, the forest primer recently issued by the Division of Forestry of the Department of Agriculture at Washington will be assured of a wider circulation and more general study than would formerly have been the case. Timber owners are coming to realize that there are many comparatively inexpensive methods by which their interests can be conserved and their properties, to some extent, preserved from the dangers which threaten them by fire and insect pests. These are treated of quite elaborately in this so-called primer, which is such mainly because of its style and the direct and simple way in which the questions with which it deals are presented. The time is at hand, moreover, when more attention will be paid than in the past to conservative methods of lumbering, and it is not too much to hope that some of the simpler and less expensive methods of forest culture will be put into practice. At any rate, there are many lumbermen and timber owners who will read with interest this book, and perhaps find in it some suggestions of value to them in the conduct of their business.—*Editorial, American Lumberman.*

Recent Publications.

"Orchard and Forest Tree Culture" is the title of a pamphlet printed by order of the English Parliament and now being circulated. It gives the complete evidence of the official horticulturist, W. T. Macoun, of the Central Dominion Farm, Canada, before the Committee on Agriculture and Colonization of the House of Commons.

Mr. Macoun appeared in response to the committee's request for such information as would enable them to care for the interests of tree-owners generally. He described fruit-tree culture at length, answering many questions of the committeemen, and then spoke of his study of forest trees.

"Taking the forest belts, which cover an area of about twenty-one acres," he said the objects of planting were to find out how long it would take trees to reach a certain height; the rapidity of growth of each variety; the proper distance apart to plant to get the best results; and the value of trees as wind-breaks for crops grown in the vicinity of them.

"During each year the heights of a large number of trees in this belt are taken, and the data published. This will be valuable when the time comes to reforest parts of Ontario, and I think that time is not far distant.

"It has also been found that much depends on the way in which trees are planted, and the proportion of thick and thin-foliaged kinds there are in the belts. For instance, if a farmer plants a few acres of Ash expecting to reap a large crop in twenty-five or thirty years, it is likely he will have to expend a great amount of labor to bring these to perfection,

because the Ash is a thin-foliaged tree. By mixing some thick-foliaged trees, such as Box Elder, Maple, or other sorts, planted as a cover crop for the ground to prevent the growth of weeds and to obtain proper forest conditions, he will be able to get the best conditions in the shortest time at the least expense. These are a few of the objects and advantages of the forest belt."

Several North American trees either new or little known, are described by Prof. C. S. Sargent in the *Botanical Gazette*. One of the trees is a new Elm (*Ulmus scrotina*), with a trunk forty to fifty feet in height and from two to three feet in diameter, which has long been confused with the Cork Elm (*U. racemosa*). It is an autumn-flowering species, and thus easily distinguished from all others. It is found on the banks of the French Broad River near Dandridge, Tenn.; on limestone bluffs of the Cumberland River near Nashville, Tenn.; near Huntsville, Ala., and Rome, Ga.

A magnificent new Palm is also described under the name of *Serenoa arborescens*. It is thirty or forty feet in height, with one or several stems only three or four inches in diameter. The leaves form a crown at the summit of the stem, and are two feet wide and long, and are on petioles about two feet in length. It grows on the margin of swamps near the Chockoloskee River in Southwestern Florida. In order to accumulate sufficient material to determine the status of this and other little-known forms, Professor Sargent made several exploring trips to the Keys of Florida.

NOTE.

The edition of THE FORESTER for November, 1898, having been exhausted, it has been found necessary to have a new one printed. Members of the Association and subscribers who may need copies of that issue (No. 11, Vol. IV.) to complete files for binding, will be supplied if they notify the publishers to that effect.

A limited number of complete copies of Vol. IV of THE FORESTER are offered for sale. Price, postpaid, \$1.00, unbound; durably bound in green cloth, \$1.50.

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The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

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ARIZONA



IRRIGATION

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IN THE PINERIES NEAR DU BOIS, PENNSYLVANIA.

The Forester.

VOL. V.

OCTOBER, 1899.

No. 10.

Massachusetts Forestry Association.

What It Is and What It Does; Some Suggestions for Similar Organizations in other States.

BY THE SECRETARY OF THE ASSOCIATION.

In talking with a Southern gentleman at the National Capital within the past year I was told that "Massachusetts has had her day, and in the present hour she cuts but a small figure in these United States."

Perhaps Massachusetts people will be unwilling to accept this statement in its widest application, but we must admit that in point of proportional forest resources we are sadly behind many of our sister States. This, of course, is in a measure due to the fact that the State is very generally fertile, and, as we understand the principles of forestry, it is not desirable, as a rule, to hold in timber and cordwood the land which is capable of growing other crops more profitably.

By the census returns of 1895 (the latest available statistics on this subject) it appears that the woodland area of this State is nearly a million and a half acres, and that its valuation is almost \$24,000,000. This is a gain of over 71,000 acres in ten years, but the valuation shows a depreciation of more than \$1,300,000 in a like period, notwithstanding the increased acreage. In point of valuation our woodland is to-day some \$440,000 ahead of what it was thirty years ago, and the acreage shows almost identically the same figures in increase. On the whole, judging from the census returns of woodlands of various classes,

their character appears to have improved in the ten years, from 1885 to 1895, but the depreciation of considerably more than a million dollars in value in that time seems to indicate that further improvement is possible.

As to the so-called unimproved and unimprovable land of the State, which includes permanent pastures, swamps and other waste country, it is pleasing to note that its area has declined since 1885 by nearly 250,000 acres. It is not so reassuring, however, to note that the value has shrunk by nearly \$4,000,000, which seems out of proportion to the loss in area. This loss is not offset by any gain in arable land, for there has been a loss in area in that class, and with a gain in valuation notwithstanding. It is not offset by the gain of 71,000 acres in woodland, for that is less than one-third of the total loss of unimproved and unimprovable lands. Some of this unimproved land has, no doubt, gone into residential property, but the tremendous loss in valuation still remains.

"But why all these dry-as-dust statistics?" some one asks. It is to show more clearly one reason why the Massachusetts Forestry Association exists. The problem in this State is, not to increase our wooded area as a whole, necessarily, but to make the most of what we have in the way of growing trees, and in

making lands which are worthless for other purposes, yield a revenue both to their owners and to the Commonwealth.

This is the home problem. Beyond our political borders we have a natural interest in wide areas of commercially valuable forest in the States to the north. Massachusetts is dependent on those forests in many ways. Many of the streams which rise in their midst furnish water power to important manufacturing interests in Massachusetts. Those forests have a more or less direct bearing also on the general commercial prosperity of Massachusetts, inasmuch as Boston is the business center of New England. If the forests are mismanaged and wrecked, many lines of business enterprise in Massachusetts will be seriously affected. It is impossible, however, for a Massachusetts association to exert any direct influence in other States, but its Forestry Association hopes to be able to inspire citizens in those States to act for themselves and to assist in the work as far as it may be permitted.

At the time that the initial conferences were being held looking to the formation of the Massachusetts Forestry Association, the organizers placed themselves on record to the effect that unless the Association could have influential support, both moral and material, its field would be restricted and its services be practically valueless. It must be a business corporation in every sense of the word, but any profits which may accrue belong, not to the corporate members as such, but to the Commonwealth of Massachusetts and to New England at large. As an earnest of this spirit one gentleman subscribed \$1,100 on the spot. Since then four others have done likewise. These donations of \$1,000 and the life membership fees are invested in the permanent fund, which it is hoped will shortly be swelled by other donations, that the Association may be enabled to enter upon its career of greater usefulness.

The Association was barely on its feet and trying its first steps when the hurri-

cane of war swept down upon the land, and the child was obliged to retire and wait for the storm to pass. At the time of the incorporation, which was in June, 1898, the membership numbered one patron (a subscriber of \$1,000 or more), four life members, and some thirty annual members. Almost immediately after the cessation of hostilities with Spain the Association arose once more, and applications for membership began to come in. The growth has ever since been steady and healthy and the rolls showed on the first of October 5 patrons, 18 life members, 239 annual members.

This growth seems to indicate that there is an intelligent public interest in the subject of forestry and tree-culture in Massachusetts, and the Association has been thus encouraged to apply its energies systematically to increase that interest. During the past Winter it has carefully prepared a bill providing for the codification and amendment of the laws relative to the preservation of trees, and has given its support to several other legislative measures bearing upon the forestal welfare of the Commonwealth. Most of the bills succeeded, but most important of all in the eyes of the Association was its own codification bill. This provided that every town in the State should annually elect a Tree Warden, who should have sole charge of and be held directly responsible for the roadside trees and shrubbery. The bill carefully defined his duties and increased his powers. Heretofore the election of a Tree Warden has been permissive merely, and not more than five or six towns ever availed themselves of the privilege. It is now mandatory with all towns. The law having been enacted, the Massachusetts Forestry Association will endeavor at once to interest responsible citizens in the several towns of the State in the necessity for choosing none but competent and public spirited men for the post, and offering whatever assistance the Association may be able to render once the Warden is duly installed in office. Naturally the Association cannot exert any influence in the

electioneering line, as it is not a political organization and has no desire to meddle with the private affairs of the towns. As the office carries no salary unless the towns see fit to provide one, none but public-spirited persons will seek the position.

The Tree Warden law is, of course, primarily for shade tree protection, but it will indirectly awaken an interest in the better management of woodlands and timber. The original draft of the bill also included a most important provision for a forest fire warden system, but this the legislative joint committee on agriculture did not see fit to report, on the ground that its provisions were too drastic. This matter must therefore be left for another year. That there is sore need of a more stringent fire law is shown by the records of the past Spring. Six towns, situated in various parts of the State, have thus far this year been subjected to heavy losses. Much of this destruction might have been prevented had there been an adequate law governing the setting of fires, defining a system for their prompt extinguishment, fixing the responsibility for their origin, and providing for the punishment of the offenders.

With a view to bringing the subject of forestry and of roadside-tree culture more generally and more forcefully before the people of Massachusetts, in a plain way, the Association has spent the Summer months this year in securing an original set of photographs of existing conditions, ideal and otherwise, throughout the State, from which lantern slides may be made. Lectures will soon be prepared to accompany the pictures (for the pictures will carry greater conviction than mere words, and are therefore the primary factors), and next Winter will be started a campaign which it is hoped will be as successful as those which have been conducted in similar fashion in Pennsylvania and other States.

Another means of helping farmers in the improvement of their woodlots and in the planting to trees some of their valueless waste land, and for the guid-

ance of Tree Wardens and others in caring for shade trees and roadside shrubbery, is found in a concise little book, which the Association expects to publish before long. This book is the work of Warren H. Manning, of the Executive Committee of the Association, and the funds for its publication are being subscribed by members and other interested persons.

In many other ways the Association has been and is still active. For example, a committee of business men has been hard at work for many weeks past in taking testimony from persons representing various lumber interests all over the country on the subject of a lumber tariff. They have studied the matter carefully and from all sides, and now report that the interests of our forests demand that foreign lumber of all kinds shall be admitted duty free. Another committee, composed of members living in the cities and towns infested by the notorious gypsy moth, has been engaged during the past Summer in following the State's work of attempting to exterminate this pest. This committee, after studying the work, will return a report to the next General Court, advising a continuation of the crusade in its present form, or suggesting some new plan of action in accordance with what it considers the interests of the State demand. The Association also furnishes articles relating to forestry and tree-culture to the daily press, and it is most encouraging to note the readiness of the papers generally to publish all such articles. In several instances these articles have been accorded positions in the editorial columns.

On the whole the outlook for a life of useful activity seems bright to the Massachusetts Forestry Association. It already possesses the courage to go ahead, and it needs only the active support of every interested citizen of the State to hasten the day when scientific forestry shall be as common as are destructive lumbering operations and forest fires at the present time.

ALLEN CHAMBERLAIN,
Winchester, Mass.

The Reclamation of Drifting Sand Dunes.

(GOLDEN GATE PARK, CALIFORNIA.)

Being a Paper Read at the Summer Meeting, Los Angeles, Cal., 1899.

(NUMBER SIX OF THE SERIES.)

About 700 of the 1,040 acres composing the reservation were originally acres of drifting sand that moved with every gale, heavy storms sometimes moving it to a depth of three feet in twenty-four hours. This sand is sharp and clean, with nothing in its composition of a loamy nature, barren and poor, so poor that barley sown on its surface, after being plowed and cultivated in a favorable season with plenty of moisture, grew only about six inches in height, and failed to perfect its seed, although perfectly protected from winds by a high embankment on its westerly side.

The first operation necessary in the reclamation of ground of this sterile nature, was to bind the sand to prevent its moving. Experiments were made by sowing barley, also by sowing seeds of the blue and yellow shrub lupin *Lupinus Arborea*, also by planting seeds of *Pinus Maritima*, all of which were partially successful; but the first complete success was with the planting of the entire area with the sea bent grass (*Calamagrestis Arenaria*), which was done by planting the roots about three feet apart, and run in with the plow. A furrow was run about fifteen inches deep, in which a few roots were dropped, about three feet apart; then two furrows were turned, in which no roots were set; in the third furrow roots were again planted, and so on over the entire tract. Where the dunes were too steep for horses to travel, pits were dug by hand and the roots planted the same distance apart as when the land was plowed, care being taken to firmly press with the foot the sand immediately about the roots. Moist or even wet weather is, of course, the best time to plant this grass, the best season for planting being between December 1 and February 15. If planting be de-

layed much later, dry weather is apt to set in before the plants become firmly rooted, and the consequence is many are lost either by drought or by being blown out by the winds.

Where any large areas of plants were blown out by the roots, care was taken to have the ground immediately replanted, a gang of men being sent after every storm to pick up the scattered roots and to plant them deeper if possible than before. The entire tract being planted with this grass, the next operation was the building of brush fences across the wind about 100 yards apart and from four to six feet in height, on the sheltered side of which young seedling trees were planted, averaging five feet apart. A variety of trees were experimented with, among which were the Norway Maple, which is so highly recommended in European works of reclamation; the Tamarix and the Poplar, the Monterey Cypress, the *Pinus Insignis*, the *Pinus Maritima*, the *Acacia Lophantha*, the *Acacia Latifolia* and the *Eucalyptus*, *Viminalis*, *Globulus*, etc. All these made satisfactory progress, excepting the Norway Maple and the Poplar, the summer winds blowing off every leaf, almost as soon as formed. The *Acacia Latifolia* and *Acacia Lophantha*, the Monterey Pine, the Monterey Cypress and the Tamarix are all about equally well adapted for standing exposed sea winds, and all seem to thrive equally well in the sand; but we find that the barren sand does not contain nutriment sufficient to grow trees more than ten feet in height, or until the tree begins to form heart wood.

About that stage of growth the tree begins to show signs of distress, the leaves of the conifers gradually grow shorter, the bark gets bound and the

whole tree shows a stunted, starved look. Acres and acres are now in that state, and unless given assistance will die outright. Several years ago the work of fertilizing the forest trees was begun, and wherever a load of loam, manure or other good rich dressing was spread, the hungry tree responded very quickly by making good growth, a more thrifty look was noticed, and in less than a year they had a vigorous, healthy look, showing that want of nourishment alone was the cause of their stunted appearance.

Now that the young Pines, Cypress, Eucalyptus, etc., are up twenty or more feet high, with good soil and plenty of water, most any tree that thrives in the neighborhood will do well. The Willow, the Elm and the Poplar, as well as the Oak and the Maple, are doing very well, and all of the shrubs, such as Rhododendrons, Azaleas and many others very well, indeed, protected as they are by the shelter of the hardier kinds.

JOHN McLAREN.

Minnesota's Park for the People.

Symposium of Views of the Forest Expert, the Lumberman and the Press.

Friends of forestry and others have long wished to have a portion of our northern Minnesota forest reserved as a park, health resort and game preserve. The Itasca State Park already created, of less than 20,000 acres, but for the increase of which the last legislature appropriated \$20,000, has realized this wish only in part.

Col. John S. Cooper, of Chicago, having come forward with a project of a "national park" of 7,000,000 acres, the happy audacity of his plan has aroused the interest and discussion which are desired.

I do not suppose that anything like 7,000,000 acres will be taken for a national park, but hope that a reasonably extensive area will be appropriated before interest in the subject subsides. The annual report of the Commissioner of the General Land Office shows that the United States still holds in northern Minnesota 6,000,000 acres of public land, stretching (though not all in a compact body) from the eastern limit on the north shore of Lake Superior to the Red River Valley, a distance of 350 miles. In the eastern and northern parts the surface is broken, and to some extent rocky. There are extensive swamps, mostly covered with stunted Spruce. But the region as a whole,

though perhaps of a sombre cast, abounds with clear lakes and streams, is a natural forest of Pine, Spruce and mixed woods; has always been, and still is, the covert of valuable game, and is well adapted from its prevailing sandy soil and coniferous foliage for a national park health resort. There are spots that are ideal for sylvan beauty.

Contiguous to these United States lands are, in round numbers, a million acres of valuable Pine and mineral lands belonging to private parties, and a million or more acres of cut-over lands belonging to private parties; also about three million acres of school and swamp lands belonging to the State of Minnesota as the gift of Congress. Of the 6,000,000 acres of United States lands, probably 3,000,000 acres are non-agricultural, yet suited for forestry.

I speak only for myself, but I favor a national park, and one just as extensive as it can reasonably be. I will not venture now to advise how it should be created. It might be by act of Congress authorizing the Secretary of the Interior to select and set apart all such tracts as are unsuited for agriculture, or a commission of disinterested and eminent men, such as selected and set apart the national forest reserves, might be authorized to create it. Under the latter

system is a method of eliminating all lands better suited for other purposes than for forestry. The authority that would be least liable to political and local influence would have my preference.

Much opposition to the proposed national park is being made by the newspapers of northern Minnesota from a mistaken apprehension that it will withdraw farming lands from settlement, obstruct lumbering and retard the general prosperity. In answer to this I have repeatedly, in various newspapers, cited the example of the Black Forest (so called from the dark color of its coniferous woods), a tract ninety miles long by from thirteen to forty miles wide, lying in Baden and Wurtemberg, and which, though essentially a forest, managed on forest principles, and a most popular health and summer resort, still has within its limits cities and villages, a population of a million, fine roads, manufactures and cultivated farms. The Thuringian and all other forests illustrate a similar fact that land which is better fitted for forest than for agriculture can be maintained as forest so as to yield a continuous revenue and afford the benefits of a park, without preventing the cultivation of any neighboring agricultural land. If I am not mistaken the Adirondacks, in which the State of New York now holds a million acres as a forest reserve and park, contains several villages, many private summer homes, good roads, and while affording all the benefits of a park, of a fish and game preserve, and of a summer resort, is the theater of active prosperity; and there can be no doubt whatever that if a reasonably extensive national park be established in northern Minnesota it will greatly increase rather than retard the general prosperity.

Under the free and easy public land system which the people, through their Congress and Government, have permitted, the timber lands in Minnesota, as well as elsewhere, have been disposed of in a prodigal manner. Within the past fifty years a hundred million dollars'

worth of Pine has been cut in Minnesota, for which the Government has received less than \$7,000,000. The greater and best part of the Pine forest has been cut; and now, if the people of the country at large wish to reserve a few groves of the remaining Pine belonging to the Government as a future health resort, it does not become any one to make too violent an opposition.

The lumbermen of Minnesota, as a class, are broad-minded and liberal, and will not oppose a suitable national park. But timber thieves and all such as "dead and down" timber rascals will oppose it and make their opposition felt. It is a question which concerns the public quite generally and ought to be decided promptly or it will be too late.

C. C. ANDREWS,

*Chief Fire Warden of Minnesota and
Secretary of the Minnesota State Forestry
Board.*
St. Paul, Minn.

The Minnesota National Park and Forestry Association has set itself to the task of securing a national park for the plain people of the United States. In area, its acres will count by the millions, and in scenic and native conditions this combined forest reserve and park will be among the most picturesque and primal solitudes that are grouped around the headwaters of the Mississippi River. Its forests are magnificent and stately, the cascade and rivulet trickle down its slopes and gorges. It has lakes that silver spot its open landscapes, the air is crispy and bracing, it is easily accessible to some twenty millions of people, and for Nimrods, Waltons and tourists it has the savage beast, the game fish and a vestige of what is left of old America, and of unvandalized domain. It is proposed to keep the ruthless axe of the nomadic chopper out of the woods, and to spare the coming generation a gloomy vista of blackened stumps, sand-strangled streams and gorges filled with slashings or sawdust.

This forest is one of the few left east of the Rocky Mountains; but in all its

grim grandeur of massiveness and magnitude, it will be but a desolation of slabs and stumps and moss-covered charcoal in less than a decade if timber rapacity is not repressed. The movement now being made has forest preservation as one of its objects, and if an act of Congress can be secured to make national property of this splendid domain, the timber thief, the fire fiend, and some other repellent annexes to camps and saw mills, will give up the ghost or quit the country. The regulating of timber cutting will avert the climatic catastrophes that follow the wholesale destruction of forests the wide world over, and will give the people of the Mississippi Valley a domain as large as an ancient kingdom, where the debilitated can renew their strength, feast their eyes on landscapes tranquilizing and superb, or carry out their Nimrodic instincts to the haunt of the wolf and the den of the bear. It would seem that public opinion would be a unit in this movement, but, while it is not unanimous, there is sufficient weight and momentum to give the project a reasonable hope of success.

In the establishment of forest reserves and national parks the Government of the United States has confined itself to the Pacific coast and the extreme West, the whole making an aggregate of 40,000,000 acres. The Mississippi Valley has not had a Lazarus crumb from the tablecloth of Dives. It may be the country has grown too fast, and has ribbed out an empire before its juvenile mouth was filled with second teeth. It is no longer a stripling. It is now the commercial spine of a nation. It has turned the sod of the prairie, and made a patchwork of orchards and fields of the wilderness. It teems with life. The church is on the hill and the school house in the valley. The throats of furnaces breathe like Vesuvius. The chasms are bridged, the streams spanned, and steel rails spread a web of blue-white lines on mountain slopes and from sea to sea.

From the valley of the American Nile crowds of men and women make their

annual trips to the hills of New Hampshire, the rock-ribbed slopes of Old Maine, the gorges of the Adirondacks, the crags and woods of the White Mountains, to the Yosemite and the Yellowstone, and the white and yellow sand-lines of two oceans. What about a Minnesota diversion for Nimrods, Waltons and tourists? It is within twenty-four hours' reach of twenty millions of people, who, if rigid and forceful in their several avocations, are as eager and intent in their once a year go-out for health or rest, or in man-like quest of some sport or other that shakes the sawdust out of brains, and nerves the hand for the gun or the fishing-rod.

In a commercial sense, aside from all other considerations, a home park for the tribes of the Valley would be a magnet for the largest dollar ever made. It has been a matter of dispute with some as to whether or not this privilege would be abused. Would it become a monopoly, or a whole mob of monopolies, as has been the traditional practice of some sportsmen's clubs in securing the control of hunting and camping grounds? In this instance exclusiveness would be impossible. The Minnesota National Park would be for all the people. It will have no necktie or club button privileges, if the program as on the card is lived up to. Such an outing place as is proposed, if anywhere near the descriptions given of its natural characteristics, and if free from that yellow paint that too often gets on scenic maps, the Park of the Valley would be a godsend to its people and an honor to the nation.

The last of the great Pine timber tracts of the Northwest lies in the upper portion of Minnesota, a vast region of many thousand square miles which was once too remote from transportation to make the marketing of its lumber easily practical. Out by the port of Duluth, and south by the highway of the Mississippi River, and out also from the stations of the railroads which have been steadily invading that region, there have long

been coming the old streams of logs. Minnesota is by no means a new region for the lumberman, but a part of the State, more especially that covered by certain Indian reservations, is still uncut, and is looked on eagerly by the eyes of those men whose capital is invested in the lumber trade. The eastern and northwestern portions of Minnesota have been well logged off. The forest fires at Hinckley and elsewhere, which wiped out whole villages and destroyed scores of lives, show what possibilities of ruin there are latent in a slashed-off, abandoned lumber country. Little by little the axe and the saw have been working toward the last of the great Northwestern Pine forests.

It is not the purpose of this forestry organization to injure any existing property rights. It is the intention to be not unjust, but just, to the Indians who live in that country. It is not the intention to rob the State of Minnesota, or any citizen of that State in any particular, but to benefit that State and its citizens. The organization is not presumptuous enough to ask for any given limits for this national playground. The gentlemen of the organization have merely asked the members of Congress to come out and see that country, and then to decide the question whether it should belong to the people of America or be given over to the axe and saw of a few lumbermen, who must soon ruin it, as they have ruined the Pine tracts farther to the east.

The organization of the National Park and Forestry Association will give impetus to the general movement to save the forests in the States and Territories. There is now very little opposition to the plans inaugurated by the Government for the preservation of forests, and in most of the older States there is a strong sentiment in favor of a system under which the trees so ruthlessly destroyed in the timber States of the East may be replaced. In the prairie States much progress has been made.

The State of Minnesota, under its own forest laws, is taking some care of its forest lands, and each year a report of the wardens is submitted as to ravages of fire and destruction from other causes. Of the 11,890,000 acres of natural forest in the State 10,889,000 acres are in twenty-three counties. Seven million acres lie to the west of Duluth, and here the members of the new park association propose to establish a national park that shall preserve the natural forest, its plants and animals. The only opposition to this will come from those who believe that it would be against the interests of the State to reserve any great extent of wild land from settlement. This opposition may be overcome by the plan pursued in other States where parks have been located in a way not to interfere with the development of remote sections of the State.

The necessity for prompt action, in view of the rapidity with which large areas of forest are denuded of timber, is shown in the following press dispatches from that section of country:

"Two hundred men are now gathering in camps on Turtle River, north of Cass Lake, to cut 300,000,000 feet of Pine. The camps on the upper branches of the Mississippi, where 300,000,000 additional feet of Pine is to be cut, were established last year, and 35,000,000 feet has been driven down the Mississippi to Bemidji, and is now being loaded on cars—800,000 feet each day—and railroaded out of that region on the Brainerd & Northern.

"If the Ojibway Pine is sold to these lumbermen under the Nelson law, every Pine tree in the whole region, except at Itasca Lake, in the State Park, will be cut and turned into lumber before the expiration of the ensuing fifteen years at the present rate of destruction. It will then be absolutely impossible to prevent devastating and enormous forest fires similar to those which have heretofore occurred in the cut-off Pine regions of Minnesota."

The Congressional party invited to explore the country advocated for a Government reserve by the Minnesota National Park and Forestry Association, left Chicago Thursday, September 28, arrived in St. Paul the next morning, left the same evening over the Great Northern Railway, and at last accounts had reached Walker, Minn., where a houseboat was taken for a trip down Leech Lake. The original itinerary was changed so as to visit Otter Tail Point, where a council was being held by the Pillager and Chippewa Indians. After meeting several influential chiefs, the party returned to Walker for a banquet

in their honor in the evening. On Thursday, October 5, the party was expected to proceed by special train to Duluth, thence to Minneapolis and Chicago, concluding the journey on October 7.

The present plan of the Association is to ask that only 800,000 acres be set aside now, to begin the new park. This area would include seventy lakes of considerable size, besides several hundred small ones, with a number of square miles of finest White Pine trees. The settlers in this region have become enthusiastic supporters of the plan, since they have learned of its true scope.

The Example of Pennsylvania.

Reappointment of a Worthy Official in Spite of Political Clamor— Unanimous Approval by the Press.

The Governor of Pennsylvania, on September 18, reappointed for four years, as State Commissioner of Forestry, Dr. J. T. Rothrock, vice president of the American Forestry Association for Pennsylvania.

Joseph Trimble Rothrock was born in McVeytown, Mifflin County, Pa., April 9, 1839. He was graduated from Harvard University in 1854, and in 1868 received his medical degree from the University of Pennsylvania. From March, 1865, to November, 1866, he was engaged in exploration in British Columbia and in Alaska. He had previously served in the civil war. From 1869 to 1873 he was actively engaged in the practice of medicine in Wilkesbarre. From 1873 to 1876 he was surgeon and botanist to the Wheeler Exploring Expedition of the United States Engineering Corps and served in Colorado, Arizona, New Mexico and California. The University of Pennsylvania elected him Professor of Botany in 1876, which position he still holds, though granted leave of absence since 1893 to serve as Commissioner of Forestry of the State. He has delivered

many lectures in the interest of forestry, and has written several books on the subject.

Governor Stone has done the State a service and added luster to his administration by reappointing Joseph T. Rothrock as Commissioner of Forestry for another four years' term. This State first waked up to the necessity of doing something for the preservation and perpetuation of her forests about eight years ago. This awakening was due largely to the public addresses and writings of Professor Rothrock, and when the Legislature in 1893 was moved to authorize the appointment of a Forestry Commission to look into the subject of State forestry, Dr. Rothrock, though a Republican, was selected by the Democratic Governor Pattison as the head of that commission.

The State has made progress since then. The Forestry Commission made a most instructive and valuable report on the forests of the State. The commission of two gave place to a single Commissioner of Forestry, to which place Governor Hastings appointed the

one man in the State pre-eminently qualified for the position, Joseph T. Rothrock. The commission had collected information on forests and forestry. The Commissioner applied himself to the task of getting legislation under which forests might be protected and new growths of timber encouraged. As a result we have our fire-warden law, acts to encourage tree planting, the act providing for the creation of forest reservations at the headwaters of our chief rivers, the act providing for the purchase by the State of unsettled lands, sold for taxes, for the purpose of creating forestry reservations out of them.

Before Dr. Rothrock came to their rescue our forests had scarcely a single law on the statute book in their interest. Now Pennsylvania stands in the van of the States which manifest an intelligent concern for their forests and provide for their protection. We will have three large forest reservations as soon as the Legislature will appropriate the money to secure the land, and many smaller reservations through the purchase by the State of wild lands fit for forest growth. Our forests will be protected from burning by fire wardens, and partial relief from taxation will encourage farmers to plant trees.

A new and intelligent interest has been awakened in this State on the subject of forestry, and to no one man is this due so much as to Dr. Rothrock. He has been the soul and inspiration of the forestry movement in Pennsylvania—its intelligence and executive head. We are glad that Governor Stone recognizes this, and we embrace with pleasure this opportunity to commend him for a most excellent appointment.—*Phila. Press.*

Recently Governor Stone has made several appointments which merit the hearty commendation of his fellow citizens. The one, however, which has probably caused the most general satisfaction is the reappointment of Dr. Joseph T. Rothrock to the position of Commissioner of Forestry. All who

have the interest of forest culture at heart will feel particular gratification, because it insures for a term, at least, the continued advance of this important work in Pennsylvania. Dr. Rothrock is eminently fitted for the post of Commissioner of Forestry; in fact, there is probably not another available man in the State as well equipped for the work as he is. He has held the office since its creation, and he has done more than any one else to bring the State to a realizing sense of the importance of taking active steps for the preservation of the forest area which remains, and to interest agriculturists and others in the subject of tree planting and the desirability of planting more woodlands. In every respect he has filled his office worthily, and it would have been a severe blow to the forest interests of Pennsylvania if he had been removed.

Governor Stone, since his incumbency, has frequently made removals and appointments which have not met with popular approval. He has often shown too much partisan zeal in such matters and too great an inclination to listen to the voice of ex-Senator Quay rather than to that of the people. Dr. Rothrock, it is said, was marked for removal, to make room for some one having greater ability as a political worker. The report carried widespread dissatisfaction and protest, and it is gratifying to learn that it was without foundation, or, if his removal was in contemplation, that Governor Stone has listened to the voice of the people, and not to the demands of the factional politicians. It is much pleasanter to commend than to disapprove, and for once Governor Stone merits the hearty approval of the citizens of the whole State by his reappointment of Dr. Rothrock as Commissioner of Forestry.—*Phila. Ledger.*

So little has yet been done in this country toward the protection of our forests that any step in this direction, in whatever part of the United States, is cause for national satisfaction. Six years

ago some public-spirited citizens of Pennsylvania induced the Legislature to authorize the appointment of a Forestry Commission, and Governor Pattison, himself a Democrat, selected as its head Dr. Joseph T. Rothrock, a Republican, who was universally admitted to be the best man for the place. Two years later, when a single Commissioner of Forestry was given charge of the matter, Governor Hastings appointed Dr. Rothrock, with the approval of all good citizens. Under his leadership, acts have been passed by the Legislature for the creation of forest reservations at the headwaters of the State's chief rivers, and for the purchase by the State of unsettled lands sold for taxes, with a view to creating forest reservations out of them, while a body of fire wardens has been established to protect the forests from burning.

On every public ground, Dr. Rothrock deserved reappointment when his term expired. But, although a Republican in his opinions, he is no politician, and hungry office-seekers clamored for his place as a reward for their services to the party or the machine. There was fear that the Quay Governor would yield to these demands, but he has happily disappointed the public by commissioning Dr. Rothrock for another four years. The advocates of forest reform throughout the country will be encouraged by this evidence that the movement has already grown strong enough to command the respect of the politicians.—*Evening Post, N. Y. City.*

While there are many things in the administration of the affairs of the State to criticize, there are also some to commend. One of these is the reappointment this week of Prof. J. T. Rothrock to be Commissioner of Forestry. It was reported a few months ago that Professor Rothrock would be retired at the expiration of his present term, but Governor Stone has shown that he is not utterly devoid of sense in retaining in the

service of the State this most capable and popular servant.

As Commissioner of Forestry, Professor Rothrock has given the Commonwealth the benefit of his large experience and the enthusiasm which he brings to the consideration of the subject. He believes that there is no one thing more deserving the attention of the people than the restoration of the forests and those still left in the mountain region of Pennsylvania. He has been at the head of all these movements to promote tree culture, and through his efforts much good has resulted. The laws relating to forest protection and growth have been largely enacted through his personal efforts, and it would have been a lasting shame to remove him from a position of such great usefulness.

With the assurance of a certain tenure, Professor Rothrock can go ahead with those plans which have been under consideration in his department, and the whole State will applaud the Governor for once setting aside merely political considerations in making an appointment.—*City and State, Philadelphia.*

In the reappointment of Professor Rothrock as State Commissioner of Forestry Governor Stone certainly consulted the best interests of the Commonwealth, wisely casting political considerations to the winds.

In technical and practical knowledge of the subject of forestry Professor Rothrock is easily in the front ranks of his profession. During his eight years of service in his present position he has become thoroughly familiar with the needs of Pennsylvania in the matter of reforesting its denuded and barren acres, and is better qualified than any other man to make practical suggestions as to the best means of protecting the existing forest area of the State.

Professor Rothrock's reappointment is to be commended without qualification, and the State is to be congratulated upon the prospect of securing his efficient services for another term.—*Phila. Times.*

Sheep Grazing in Arizona.

A Paper on the Statement that the Forest Reserves are Injured by Grazing.

[THE FORESTER assumes no responsibility for views expressed in signed communications. The opposite view on this question will be published in the November issue.—ED.]

The object of the American Forestry Association and of the Department of Forestry of the United States Government is to be attained, if at all, by candid, conservative and careful investigation of all the conditions of each locality and the establishment, for each locality, of such conservative regulations as the conditions, after such study, are found to require. There have been in the past many statements of a general nature, some of them coming from apparently high authority, that were based upon facts and conditions found in limited localities and applicable only to such localities. Such statements are extremely unfortunate, not only because they are unjust to local interests, but that they break the confidence of the settler of these localities in the Department of Forestry and bring into ridicule the whole plan of forest reservation among the settlers, on whom, in Arizona, at least, the preservation of the young forest most depends.

In the July FORESTER appeared an article on "Natural Reforestation in the Southwest," in which the author discussed sheep grazing in the forest reserves of "Central Arizona" from the standpoint, evidently, of facts and conditions found in California, and falls into the grievous errors above referred to. I do not wish to criticize the author, who, we feel, was the victim of misplaced confidence, with, possibly, too much theory on the science of Forestry, but justice to the high aims of the Department of Forestry, as well as to local interests, demand that the facts be known and that these errors be corrected before injustice be done. I quote from the article referred to:

"The topography of Southern California and Arizona is such that, at best, much of the rainfall flows off in imme-

diately floods," etc. After the statement in most positive terms of the necessity of excluding sheep from the forests of both California and Arizona, the writer adds, in justification of his position:

"As a specific instance in illustration of the destructive effect of grazing, the forest reserve in Central Arizona may be cited. Many of the streams which flow into the Salt River have their sources in these reservations. Whenever sheep have been driven there in large numbers, the farmers of the Salt River valley have suffered material injury from the canals and laterals filling with sand and silt." Then follows a paragraph on the same subject which is probably quite practical and true for the precipitous mountains of Southern California, but, if intended to apply to the forest reserves of Central Arizona, it is worthy the pen of a Cervantes.

There are three forest reserves in Arizona: the "Black Mesa," the "Grand Cañon," and the "San Francisco Mountain" Forest Reserve. The former lies on the east border of the Territory. The writer is personally familiar with very little of it, but understands the soil and conditions there are very similar to those of the other two reserves. As the waters of the "Grand Cañon" reserve all flow, when they flow at all, into the Colorado River, that reserve could not be referred to or affect this question. In fact, only a small per cent of the other two reserves lie on the southern slope. After a residence of eleven years at the foot of the San Francisco Mountains, and constant familiarity with all parts of the latter reserve, and with the grazing of both cattle and sheep thereon, we are forced to the conclusion that the author of the article referred to has been imposed upon by the parties from whom he derived his information.

The district composing this reserve, and the western end of the "Black Mesa" forest reserve as well, is a plateau comparatively level, averaging six to seven thousand feet above sea level, covered for the most part by an open forest of pine timber bounded on the borders, where the plateau descends into the deserts or timberless plains, with a belt, a few miles in width, of scrubby Cedar. On the south it breaks off abruptly into the tributaries of Salt River, the headwaters of which extend into this plateau in the form of precipitous cañons one thousand to fifteen hundred feet deep, which are fed by numberless springs that burst out at the bottom of these cañons.

The formation of this entire plateau is volcanic. It is covered with extinct volcanoes and evidences of volcanic influence. The stratified formation is everywhere broken and shattered, and the soil is of a loose, porous nature, so that the rains and melting snows are drunk up by the soil like a sponge and appear again, if at all, only at the bottom of the cañons, or small springs at rare intervals on the Mesa which disappear in a short distance from the point at which they rise. We have absolutely no running streams on this Mesa, or forest reserve. It is not precipitous and does not wash. To illustrate: The draw that passes through Flagstaff heads at the foot of Mt. Agassiz and topographically drains an area of more than two hundred square miles, has no outlet but empties into a little valley five miles east of town. It seldom runs to this valley and never more than once or twice during the year, and is often dry the entire year.

The forest reserve districts of Arizona have been used for grazing sheep for twenty to thirty years. We have never before heard it claimed that "The canals and laterals of Salt River valley filled with sand and silt" because of the sheep grazing on the forest reserves which lie two hundred miles further up the river; and one familiar with the mountain plateaus and with the dry, sandy, dusty, and windy districts and plains

through which the waters of the Salt River and the canals and laterals of the Salt River valley flow, after leaving the mountain forest reserves, would be hard to convince that the sheep on the mountain materially affected the filling of the canals and laterals referred to. If there were any such results, they would be constant, and it could not be said that "Whenever sheep have been driven there in large numbers," etc., these results were seen, because the ranges of these forest reserves have been used constantly for twenty years, and the results would be constant and universal in the Salt River valley.

There is little in common with the sheep-grazing industry of Arizona and that of many districts, perhaps any district of California. The scarcity of water on the mountain plateaus of Arizona has confined the summer ranges of each individual sheep breeder to a more or less definite locality during the summer and dry season, within which he owns or controls the permanent water supply. He is a settler. This is his home from which he comes and goes as the season may require. There is no undergrowth or "cover," and none is needed to "hold back the snow or prevent surface floods."

The great enemy to the forest and to the wool-growers is the forest fires which burn up the feed for the flocks and destroy the young and tender Pines. The grazing off of the grass and weeds by the sheep and the vigilance of the sheep owners are the greatest safeguards against these forest fires. Where the timber has been cut and the laps and brush left scattered upon the ground, these fires are inevitable, and destructive to much of the larger growth. Steps should be taken to require parties cutting timber to clean up carefully all combustible material left behind, whether on private or reserve lands.

It is the popular idea that sheep graze in close, compact herds and hence trample out what they do not feed off. This is incorrect. They are not closely herded or bunched except in driving or corraling, which, in well-managed herds, is

seldom done, and when scattered on the range the tramping of the small tree plants is slight.

There are in the San Francisco Mountain forest reservation districts on which sheep have been grazed constantly for twenty years or more, others on which cattle only have grazed, and a few districts on which neither have grazed at any time to any considerable extent, and we have yet to find the man who can go over these districts and point out which district has been grazed by sheep, which by cattle, or the district on which no stock has ranged. There is practically no difference in the growth of these districts. It is claimed by the oldest settlers that forest fires were more frequent

and destructive in the early settlement before the grazing by sheep and cattle, and that in the growth of the young Pine, the reforestation is greater where it has been protected by the stock and the owners of the stock. Systematic efforts on the part of both the Department and the herdsmen will bring much better results. Let us have an intelligent, candid investigation of this question in each locality by capable men who come seeking truth, and without preconceived notions and theories which they, consciously or unconsciously, seek always to sustain and prove.

(Signed)

E. S. GOSNEY,
Flagstaff, Arizona

Forest Conditions of Porto Rico.

Review of the Forest Resources of the Island, by the Special Agent of the U. S. Geological Survey, for Issue by the Department of Agriculture.

SECOND PAPER—FOREST ASPECTS OF THE ISLAND.

BY COURTESY OF THE SECRETARY OF AGRICULTURE.

Those who have read Kingsley's interesting description of the tropical forests of Trinidad, or Lafcadio Hearn's vivid pictures of the vast woods of Martinique, will be disappointed not to find such forests and woods duplicated in Porto Rico, except in the single instance of the summit portion of El Yunque, in the Sierra Luquillo, where there are about eight square miles of virgin forest. The island, although wooded in the sense that it is still dotted by many beautiful trees, is largely deforested from a commercial point of view. Porto Rico, at the time of its discovery, was undoubtedly completely covered by forests of many species of trees, but these can hardly be said to exist at present. A few insignificant patches of culled forest also occur in the central and northwestern portions of the island which will be described presently.

To the casual observer, the aspect of Porto Rico, in places, is still that of an open wooded landscape. The farms and

plantations, excepting the tobacco and sugar fields, are not cleanly cleared like those of the United States, but, on the contrary, individual trees are abundant and well distributed everywhere. Along the roadsides, around every hut, and throughout the coffee plantations are many trees, a few of which are remnants of the aboriginal forests, while most of them have been planted for shade or fruit. Grange trees, Mangoes, Aguacates, Breadfruit, Mameys, and other stately trees are common, while, as in our own deforested region, there are a few timber-making trees which have been spared the ax. Besides these larger trees, Flamboyantes, Nisperos and Guanabonas of smaller growth add their foliage to the wooded aspect of the island.

So far as was observed by reconnoissance methods the island presents two strongly marked and contrasting zones of vegetation. One includes the whole of the mountains and north coast region and the other is the foothill country

of the south coast. The first is a region of great and constant humidity, high altitudes and stiff clay soils; the other a region of dry calcareous soils, seasonal aridity and low altitude. The transition between these vegetal zones is very abrupt and immediately noticeable as soon as one passes from one of these regions to the other. It is true that the rainfall is less on the south coast and the country in general more arid, but there is also an immense difference in the capacity of the two geologic soils for retaining moisture and for root penetration, the clay soils being always saturated, while the limestones are porous and dry.

The climate of Porto Rico, although in general warm and humid, has a milder temperature and a greater constancy of moisture on the highlands than in the lowlands, while upon the latter there are occasional periods of drought. Accordingly, the mountains are constantly clad with fresh green verdure (consisting of such remnants of the primitive flora as have escaped the destruction of man) and cultivated trees, while the flora of the border region has at times a dry and yellow aspect.

The Mountain Woodlands.

The general growth of the mountain region consists of deciduous trees of many species, freely intermingled with shrub and grass, and above 1,000 feet with tree ferns. In some places the undergrowth is made up largely of ferns of numerous species, many of which are so tall and dense of growth as to constitute a veritable jungle.

Much of the mountain landscape is now occupied by cultivated crops of coffee, tobacco, fruit trees, shrubs, etc., broken by verdant pastures of tall Para and Guinea grass, which constitute the staple forage of the island. There are many large cultivated shrubs and bushes, attaining the size of a peach tree, which give an aspect of primeval wildness to one who first sees the country; hence, it is that some of these mountainous portions of the island which have the

aspect of thick primeval forests, when first viewed from a distance by the traveler from the temperate climes, are really the most highly cultivated.

Such wooded lands are often occupied by the coffee plantations. The coffee bush, which attains no great height, is always accompanied by an overgrowth of dense shade (the first essential to the life of the coffee bush), so that the latter has the appearance of an underbrush in the midst of high forest trees. The writer has often found it difficult to convince a fellow traveler that he was in a coffee plantation and not a jungle, until a tree could be found full of the bright red berries which distinguish the coffee plant. In fact, a Porto Rican coffee plantation, with its accompanying shade trees, is an artificial forest.

In preparing a coffee plantation, the native forest is either thinned of all except the highest trees or completely cleared of all growth and new trees planted for the express purpose of affording shade. These trees grow so rapidly that, by the time the coffee bush reaches maturity at the end of seven years, they are very tall forest trees, giving a dense shade above the bush.

The mountain trees are, of many genera. They are largely hard woods, occurring singly or in varied associations, and not as collections of a single species, such as the Pine forests of the United States.

The Forest of El Yunque.

Single specimens or small groups of trees, however, which have been spared the woodman's ax, may be found throughout the upland portion of the island. In one place, however, the original forest has been preserved. This forest is upon the summit of El Yunque, the highest peak of the island, situated near the northeast end, and has been protected by its inaccessibility. Although the mountain is hardly over 3,200 feet in altitude, it is constantly bathed in moisture, and the steep trails to its summit through red clay and mud are almost impassable for man and beast. The forests on El Yunque consist of

almost impenetrable jungle of trees, underbrush and lianas, and are exceedingly wet, the rainfall averaging 120 inches per year. Some of the trees of the primeval forest of El Yunque have been described by Dr. George Eggers, the only botanist who has studied it, in a letter written to Sir Joseph Hooker in 1883, as published in "Nature" (London, 1884):

"As for the general character of the Sierra Yunque forests, they of course resemble in their main outlines those of the other West India Islands. Here I found several interesting trees, especially a beautiful *Talauma*, with immense white, odorous flowers and silvery leaves, which would be very ornamental. The wood is used for timber, and called Sabino. A *Hirtella*, with crimson flowers, I also found rather common. An unknown tree, with beautiful, orange-like foliage and large, purple flowers, split along one side; and several other as yet undetermined trees and shrubs are among the most remarkable things found.

One of the most conspicuous trees in some parts is the *Coccoloba macrophylla*, which I found on my first visit to Porto Rico. This tree is found up to an altitude of 2,000 feet, but chiefly near the coast, where it forms extensive woods in some places which, at the time of flowering, with immense purple spikes more than a yard long, are very striking. The tree is named Ortegon by the inhabitants. It does not seem to occur on any of the British islands, but to be confined to Porto Rico and Hayti."

Logs are still cut from the edge of the Yunque forest, but the cost in time and labor of securing timber therefrom is far more than it would be to import similar woods from Santo Domingo. A few acres of forest are also preserved here and there in the Sierra Cayey and the Cordillera Central, notably between Aibonito and Adjuntas. Collectively, these small patches will not aggregate ten square miles of standing timber, and have been largely culled of their most valuable trees. There is also a small patch of forest preserved in the pepino

hills, near Aguadilla, upon a small piece of land belonging to the Government. There may be a few more acres elsewhere. Otherwise, in a commercial sense, the mountains are deforested, although some excellent trees still stand, just as Walnut trees are found preserved in the deforested areas of the United States.

The Coast-Border Woodlands.

The second class of flora inhabits the foothills belt lying between the southern front of the Central Mountains and the southern coast, a region which is comparatively arid. The wide playa plains and stream valleys of this belt were also once covered with large trees, a few scattered examples of which have been preserved, but in general these have been destroyed in order to clear the land for sugar culture.

This flora is markedly different from that of the mountain region, although there are a few species of trees common to both regions. It is largely of the type of low, shrubby, thorny, leguminous, and acacia-like trees, with compound leaves and thorny trunks or stems covered by *Tillandsia* (Spanish moss), and largely of the type of growth known in the United States as the Chaparral. In the dry season this flora produces a brownish landscape, as distinguished from the evergreen of the mountain region. This Chaparral-like flora is thorny and dense, especially on the coast hills between Ponce and Yauco. In this region it is accompanied by a thick undergrowth of grass, and, with the rolling hills and "tepetate" soil, repeats nearly every aspect of the Lower Rio Grande country of Texas.

The limestone summits of the hills, or cerros, west of Yauco are covered by a remarkable growth of Chaparral, including Tree Cactus, among which are organ-pipe forms resembling those of the California deserts and the tree opuntias of Mexico, accompanied by thorny brush, the whole draped by moss.

The products of the forests and other vegetation of Porto Rico are numerous,

although of no great export value. They are of greatest importance to the inhabitants of the island, however.

The names of the woods here given are as they were written by the native Porto Ricans who assisted in their collection, and as they are spelled in the Commercial Directory of Porto Rico.

Among the products of the forest the following trees are used by man :

FOR TIMBER AND FUEL.—Algarroba, Ausubo, Capa Blanca, Capa Prieta, Laurel Sabino, Laurel Blanca, Guayacan, Ucar (Ucare or Jucare), Espejuelo, Moca, Maricao, Mauricio, Ortegón, Tachuelo, Cedro, Cojoba, Aceitillo, Guaraguao, Maga, Yaiti, Palo Santo, Tortuguillo, Zerrezuela, Guayarote, Higuera, Tabanuco, Mora, Hueso, Hachuelo, "Ileucedran."

FOR CORDAGE.—Mahagua, a tall malvaceous bush.

FOR DYEING AND TANNING.—Moca, Brasilete, Achiote, Granadillo, Maricao, Dividivi, Mora, Gengibrillo, Camasey, Vijao, Mangle.

RESINOUS TREES.—Tabanuco, Pajuil, Algarrobo, Mamey, Masa, Cupey, Maria, Guayaco.

FOREST TREES YIELDING FRUITS.—Pina, Nispero (Medlar Tree), Mango, Guanabana, Cocotero, Aguacate, Naranjo, Jacana, Mamey, Wild Orange.

The writer, during his stay upon the island, collected sixteen specimens of the native woods, which are utilized by the people in construction and other industries. Nine of these were found to be very hard, close grained and heavy. The samples of equal size and of approximately the same condition vary but little in weight and are remarkably similar in hardness. The following shows the comparative weight of the nine samples.

Mora, 61.8 pounds per cubic foot ; Guayacan, 76.8 pounds per cubic foot ; Hueso, 60.0 pounds per cubic foot ; Ausubo, 70.2 pounds per cubic foot ; Ucare Negro, 64.2 pounds per cubic foot ; Pata de Caba, 60.0 pounds per cubic foot ; Ucare Blanca, 61.8 pounds per cubic foot ; Hachuelo, 70.2 pounds per cubic

foot ; Algarrobo, 64.2 pounds per cubic foot.

Extreme density is shown by small pores (ducts) and in numerous, minute, mostly continuous medullary rays, imperceptible to the naked eye. The main structure is made up of thick-walled cells. The annual layers of growth are small and comparatively indistinct, owing to the irregular diffusion of the large ducts, which in most northern woods clearly mark the layers of growth. The wood fibers are strongly interlaced (cross-grained), giving a "tough," uncleavable character to the wood. The samples of Mora, Guayacan, Hueso and Ucare Blanca show a tendency to check and warp in seasoning, while Ausubo, Ucare Negro, Pata de Caba, Hachuelo, and Algarrobo appear to maintain good form in drying out. The injury from checking of the former is, however, not great, and appears not to impair the usefulness of these woods for certain purposes. All are capable of receiving a high polish and require but little "filling."

Ausubo, Ucare Negro, Pata de Caba, Hachuelo and Algarrobo are eminently cabinet woods of great value and attractiveness ; Mora and Ucare Blanca are less attractive for this purpose, but may have limited use. Guayacan and Ausubo are especially adapted for small turnery, tool handles, etc., where great hardness and wearing qualities are needed. Pata de Caba and Algarrobo closely resemble the rosewoods of commerce. With a permanent black stain, Ucare Negro and Hachuelo are useful substitutes for Ebony. Ausubo is similar in appearance and a good substitute for the valuable "Coccoloba" (Coccoloba), so much imitated by inferior woods. Laurel Sabino, Cedro, Capa Blanca, Capa Prieta, Guaraguao and Maga are characteristically lighter, softer and coarser grained than the nine species above mentioned. The weight of these samples varies but little, the average being 38 pounds per cubic foot. With the exception of Laurel Sabino, all are attractive in grain and suitable for finishing woods.

The following descriptions give, in part, the specific characters of the various samples:

MORA.—Color, bright orange-brown, probably darkening with age and exposure. Radially cut and polished surface satiny. Similar in general appearance to Osage Orange. Much used for fellies.

GUAYACAN.—Heartwood dull yellowish-brown, with dark olive-brown streaks; sapwood pale yellow, with brownish areas. Smoothed surface, oily to the touch. Exceedingly hard, brittle and difficult to cut. It grows in comparative abundance in the entire mountain chain and on the southern coast of the island, producing a wood which is very solid and resistant. On this account it is much sought after in the shipyards for blocks, pulleys, spokes, tires, and many other things requiring great strength. The resin from the Guayacan Lignum Vitæ is highly valued for gout.

LAUREL SABINO.—Color, clear olive-brown. A straight-grained wood, similar in color but finer grained than the heart of Tulip and Cucumber tree of the United States.

CEDRO.—Color, pale reddish-brown. Wood fibers interlaced, the wood splitting irregularly. Very similar to the Mahogany of commerce. Probably *Cedrela odorata*, the well-known cigar-box wood of commerce. It is no longer abundant in Porto Rico, and is now largely imported from Santo Domingo, costing \$150 per 1,000 feet. It still grows in Aguadilla and near Aibonito, Juana Diaz, Cayey and Luquillo.

HUESO.—Color, light yellow, with irregular, thin yellow-brown streaks; wood fibers strongly interlaced. A tough, uncleavable wood, used for hubs.

AUSUBO.—Color, clear, dull, reddish-brown. Wood fibers slightly interlaced and appearing straight grained. Resembles somewhat a fine-grained Teak. It is the chief and most-used timber on the island, being noted for its great durability. It is used in the making of wagon spokes, which are turned out by machinery in Ponce, and small stocks of it were noticed in several towns. It is

close grained and beautiful in color, and should be utilized for veneering; it would make most excellent furniture.

UCARE NEGRO.—Color, dark amber-brown. Wood fibers interlaced, but appearing to be straight grained. Remotely resembles a very fine-grained Black Walnut.

PATA DE CABA and ALGARROBO.—These samples are so similar in details of structure as to be from the same or closely related species. Color, rich, blackish-brown, irregularly mottled, and streaked with areas of pale reddish-brown; sapwood (present in Pata de Caba) light brown. Wood fibers strongly interlaced, giving smoothed surface a "curled" appearance. Very attractive cabinet woods.

UCARA BLANCA.—Color, light ashy-brown. Wood fibers strongly interlaced. Remotely resembling fine-grained heartwood of American Elm.

GUARAGUAO.—Light reddish-brown, streaked with lighter and darker shades. An exceedingly cross-grained, porous wood, somewhat similar in color to Cedro. Suitable for a cabinet wood.

CAPA BLANCA.—Color, clear light-brown. Structurally similar on the radial section to American Beech. Straight grained, and suitable for interior finish. Used for rollers in coffee hulling mills.

CAPA PRIETA.—Color, rich light-brown, with darker streaks and mottlings. Wood fibers interlaced, but wood appearing to be straight grained. Radial section structurally similar to Capa Blanca. Tangential section somewhat similar to dark heartwood of American Elm. Handsome wood for interior finish. Used for flooring.

HACHUELO.—Color, rich, dark yellowish-brown, with streaks and mottlings of light yellow-brown. Wood fibers interlaced, but appearing rather straight grained on the finished surface. Valuable for cabinet work.

MAGA.—Color, rich chocolate-brown. Wood fibers slightly cross-grained, the smoothed surface appearing straight grained. The rich color and attractive grain of this wood should make it valuable for cabinet work.

Irrigation and Forestry.

The Joint Meeting in Montana—Resolutions Adopted at Columbus.

The eighth Congress of the National Irrigation Association was held at Missoula, Montana, September 25, 26 and 27. On invitation, The American Forestry Association joined in the meetings through the presence of its many members.

The close relations between forestry and irrigation made the meetings of value to those more especially interested in the former subject, though the papers and discussions aimed primarily at a more general understanding and appreciation of the latter. The scope of this work, as described at the Congress by G. E. Mitchell, of Washington, D. C., is:

“The proper presentation of the problem of satisfactorily disposing of the grazing lands by the leasing system and the securing of a just and equitable share of improvement appropriations for the development and improvement of interior States along with the seaboard States.”

More than two hundred duly accredited delegates, from seventeen States and Territories, were present at the sessions. All the Western States were represented, and among the more distant States were Maryland, West Virginia, South Carolina and Indiana. Among the representatives from Government Departments in the District of Columbia were F. H. Newell, Corresponding Secretary of the American Forestry Association, and Bailey Willis, U. S. Geological Survey; J. W. Toumey and Milton Whitney, U. S. Department of Agriculture; Judge Best and Walter H. Graves, U. S. Department of the Interior; and E. J. Glass, U. S. Weather Bureau.

Nearly a score of papers were read by men prominently identified with the irrigation interests and general development of arid lands in the West. The congress was the most successful one held in four years.

(Further report in next issue.)

At the special meeting at Columbus, Ohio, August 22 and 23, an account of which appeared in the September issue of *THE FORESTER*, the resolutions presented and adopted in the name of The American Forestry Association declared in favor of—

1. The creation of an international commission, through M. Meline, of Paris, to arrange for a Congress of Forestry at the Paris Exposition of 1900.

2. The purchase and reservation, by the State of Ohio, of tracts of timber land at the headwaters of the principal rivers of the State in order to prevent the increasing loss of life and property by flood, and for the better preservation of a water supply in time of drought.

3. The establishment of colleges and schools of forestry in the various States, with as much assistance as possible, in encouragement of the work, from the Department of Agriculture.

4. Commending the policy adopted by the State of Pennsylvania in the appointment of an expert forester to organize and conduct the forest interests of the State, and to educate its citizens in practical forestry.

5. Urging the suitable presentation of the subject of forestry at the meetings of teachers' associations, farmers' institutes, and other similar gatherings, “to the end that the people may be taught to give earnest attention to this much-neglected, but vitally important interest.”

6. Extending the thanks of the Association to the Columbus Horticultural Society for the arrangements made for the special meeting, and in recognition of the work being accomplished by the Society.

The report was signed by W. J. Beal, vice president of the association for Michigan; C. E. Bessey, vice president for Nebraska, and William R. Lazenby, professor of forestry at Ohio State University.

Forest Protection.

Fires in Nehasane Park.

The extreme drought in the Adirondacks during the past summer has been almost unprecedented. For months practically no rain fell and the surface of the ground in the dense forest, which usually contains a considerable amount of moisture, became thoroughly dry. Even the moss in many of the swamps, usually saturated with water, was so dry as to be readily burned by fire. In consequence numerous fires were started in all parts of the woods, and the methods of forest protection employed by the State and private owners were put to a severe test. Probably no more complete organization for forest protection is found in the Adirondacks than in Nehasane Park, the property of Dr. W. S. Webb, in Herkimer and Hamilton counties, New York. The park is primarily a game preserve and the system of protection was devised by Dr. Webb to prevent poaching as well as to guard against forest fires.

The park, which covers an area of about 40,000 acres, is divided into four sections, each watched over by an experienced woodsman, who lives at a point from which all parts of his section can be easily and quickly reached. The houses of the rangers are connected by telephone and there is an admirable system of roads and trails. In case of fire in the park, the superintendent, who lives at Nehasane station, and the rangers are notified by telephone, and all available men are called out to extinguish it. If it occurs along the railroad which traverses the park, the "Nehasane Fire Service" is put into use. This consists of a large tank placed on a flat car to which is attached a box freight car, containing a small engine, used to pump the water from the tank, and a complete outfit of fire hose, axes and other articles used in fighting fire. In case of a severe fire along the railroad Dr. Webb is notified by telegraph and a locomotive is

dispatched to draw the "Fire Service" to the scene.

During the past season extra men were employed to follow each train on speeders and to extinguish any fires which were set. Some days as many as five fires were started by the locomotives and immediately extinguished. In several cases, however, the "Fire Service" had to be called into play, and with its aid the fires, which might have proved very disastrous, were put out.

One very severe fire was started in September and burned over about four acres before it could be controlled. The workmen from the lumber camps on the park were called to assist and at one time as many as 100 men were fighting the fire. Trenches were dug completely about it, streams of water were thrown by the "Fire Service," and sand was brought from the railroad track.

A constant watch was kept on the fire after it was once controlled. This measure was very necessary, for the fire continued to smoulder in the deep duff and every now and then burst forth anew. Trees were undermined and, as they toppled over, scattered sparks in all directions. Occasionally the fire would run up a Birch tree and pieces of burning bark would be blown over the trenches upon the dry leaves. If constant vigilance had not been exercised in the manner described a considerable area would doubtless have suffered.

A Bit of Historical Information.

The awakening interest of lumbermen in forest protection is shown by the following excerpt from a letter to the Division of Forestry from a prominent lumber firm in Michigan, regarding the abuse, rather than the use, of the forest wealth of that section.

That lumbermen themselves speak in this vein is sufficient evidence that the facts are exactly as stated, and that no one can offer in rebuttal any argument

on the score of "sentimental reasons," or "theorizing opinions" of "misinformed enthusiasts"—terms which are sometimes applied to those who favor forest conservation as opposed to forest destruction. The letter reads:

"Answering your circular letter of July 5, 1899, upon subject of protection of forest, we beg to say that positively no effort to do this, other than to save valuable standing timber when aflame or threatened, has ever been made in this vicinity. To protect trees too young and small for sawing is not thought of. Owners of timber simply go on their lands and as quickly as possible remove timber fit for lumber, with positively no thought or care for the life and protection of the young trees, or varieties not at the time valuable for lumber, leaving debris to dry and finally burn, resulting in the total destruction of all remaining.

"Large areas are now simply scenes of desolation. Waste—pure, simple and shameful—has characterized the removal of the forests once here, which were magnificent. Many varieties, notably Hemlock, Beech, Soft Elm, were left to burn, or were destroyed in clearing lands. We think it is within the truth to say that not over 50 per cent of the possible quantity available for man's use has been utilized—the remainder has perished. 'Tis true that the demand for the cream only, largely accounts for the waste; still, splendid interest on the cost of protecting, years ago, the timber not then valuable, would now be realized, as is instanced by the fact that despised Soft Elm, the very best of which was bringing only \$3.00 per M in log, is now sought for at from \$9.00 to \$11.00, and the lumber is in demand at \$18.00 to \$28.00, shipping point. Beech would not then be accepted at any price in logs. The lumber now fetches \$10.00 to \$15.00. The destruction of Michigan forests is relieved from the charge of act of vandalism only by the fact that the owners did it, and, under the law, could do as they wished with their own; but their action has deprived posterity of a fine heritage."

The Kind of Trees to Plant.

The example set by Kansas City in improving its streets by the construction of parallel parkways in which to plant shade trees on scientific principles, has been followed by other towns through Missouri and adjoining States. In reply to inquiries, the City Forester of Kansas City, L. F. Timming, gives the following observations on his experiments:

"The tree which ranks first in my estimation as a shade and ornamental tree is the Hard Maple, of which there are two varieties; namely, the Sugar Maple and the Black Maple, but on account of their slow growth I prefer to alternate them during the first ten years with some faster-growing variety, for example, the Soft Maple. Of the Soft Maple we also have two varieties, namely the Red Scarlet Maple and the White or Silver Maple, of which the former is less liable to become affected by insects than the latter. As an all-round shade tree for our city I know of none better than the Soft Maple, but it requires some training while young in order to keep the head in proper balance with the trunk. If once well developed it will stand high winds about as well as the average tree, but it is liable to be attacked by the treesoc moth, but not to any great extent.

"The Sycamore tree has also two varieties, the Oriental and the Sycamore Maple. The Oriental Plane tree is the better, and is an imported variety. The Sycamore Maple is our common native Sycamore, and it belongs to the Maple family, and is therefore subject to the same natural requirements as the Soft Maple. It is a rapid grower and does not break as easily as the Soft Maple, and is not so liable to be attacked by insects as the Soft Maple or the Elm. It bears transplanting and trimming remarkably well. Its drawback is that it grows too large for an ordinary street tree, and as it becomes full grown the bareness of its branches and the constant shedding of its leaves during the summer are its principal objections. Deep soil is preferable, but not an essential."

Municipal Care of Trees.

The Department of Forestry of the City of Springfield, Mass., has shown commendable energy in the protection of trees along streets in that city. The City Forester, William F. Gale, has lately issued a circular letter saying:

"The cutting of roots of trees being one of the most common injuries to which shade trees are subject, the Supervisors of Highways and Bridges, at the request of the City Forester, have instructed the employees of the city having the laying of walks and the setting of curbing's,

not to cut the roots of trees without his consent.

"The attention of contractors, excavators, builders, and all others having to do with the laying of walks and grading, is called to the order of the Supervisors, and they are requested to instruct their men that the cutting of roots of trees within the highway is *not allowed*, except as provided above. Section 7 of Chapter 54, Public Statutes of this State, which forbids the mutilation of trees, applies to their roots as much as to any other portion of the tree."

Forest Fires of a Month.

Extensive forest fires throughout the Adirondacks were not only the cause of some property loss, but of much uneasiness to summer residents and campers. However, Col. William F. Fox, superintendent of State forests, in an interview concerning the fires, declared that the reports were exaggerated.

He said the fires were alarming in appearance, and made much smoke, but that with few exceptions no merchantable timber was destroyed, as the fires in almost every instance stopped when they reached a piece of thick woods. The most damage to timber was done by the fire on top of Black Mountain, Schroon Lake, Fulton Chain. The Tupper Lake fire threatened the lands of the Cornell College of Forestry at Axton, in Franklin County.

The college professors, with a large body of students, fought this fire and kept it out of the college forest. They were assisted further by some engineers of the State engineer's office, who were busy surveying the lines of the college tract. All the lumber and wood pulp companies put men at work to save their own woods. There were 231 fire wardens at work, who receive \$2 a day, one-half of which is paid by the town in which the fire wardens are put to work. The expense of paying for this work, so far as the State is concerned, will be taken out of the \$350,000 appropriated this year to buy forest lands.

In New England, the forest fires in South Harwich and South Chatham continued with unabated energy. One section of fire, which threatened to sweep through the entire village of South Chatham, was checked by backfires and trenching just in time to save the village from a general conflagration. The fire wardens and their gangs of men came from all directions and fought the flames.

After having been beaten back, the fire soon started again in two new forks, one toward the

western section of South Harwich and the other toward the eastern section of Chatham, the former having crossed the railroad track. Everything was as dry as tinder, there having been no rain for about two months.

In Arkansas disastrous fires were reported in the southern portion of Calhoun County, the only hope of relief being a heavy rainfall. Fire fighters worked day and night, several being prostrated by the heat while at work.

A large area in the Ouachita Valley was devastated, and large herds of stock were driven from their pasturage. Considerable property of stove-makers in the woods was destroyed.

A great fire was reported in the early part of September in the Sierra Madre Mountains, southeast of Old Baldy, in Southern California. The fire started in Stoddard's Canyon, the press reports estimating that at least 40,000 acres were burned over, some of the trees being from four to six feet in diameter and nearly 200 feet high.

Forest Superintendent B. F. Allen issued a statement denying these claims, and placing the area at 3,000 acres, entirely of brush.

Big Timber, Mont., September 26.—A raging forest fire is in progress west of this town, on the east side of the Crazy Mountains. It is likely that disastrous results will follow to some of the ranchers in the Norwegian settlement, toward which the fire is rapidly approaching. The fire is between the east fork of the Big Timber Creek and Antelope Creek, and will in all probability destroy an area of sixty square miles of fine timber before it burns out. The flames are plainly visible from this town, twenty-five miles distant. The whole east side of the Crazy range is brilliantly illuminated and presents an awe-inspiring spectacle.

The Prevention of Forest Fires.

Three Chapters on a Question of Importance.

A Letter.

To the Editor of THE FORESTER: I enclose an article published in the *Oakland Enquirer* a short time ago. You will see that, in the absence of expert knowledge, this article does not venture upon positive assertions, but puts the view of the matter taken by the old mountaineers as a plausible hypothesis. I would like to be informed, either through THE FORESTER or in some other way, whether the government bureau has ever considered this aspect of the forest problem in California and, if so, what arguments it relies on to refute the mountaineers.

Scientific authority is the best in these matters, we all know, and yet the practical experience of old-time residents of the forest regions cannot be despised, and unless these old-timers are seriously mistaken in their premises, the Government is incurring a serious risk in the Yosemite National Park and in the forest reserves, by excluding all fires, instead of letting fires run through the forests periodically, thereby destroying the undergrowth and, more particularly, the accumulation of dead trees, leaves and branches.

A Clipping.

Aside from the stockmen who would be glad to browse their flocks and herds upon the national domain, every one in the forest regions of California indorses the policy of maintaining national parks and forest reserves. But it is hard to find in the region of the California reserves a single settler or landowner who believes that the present plan of forest protection will bring forth good results in the long run.

The great point of difference is the extinguishment of forest fires. During the summer the efforts of the Government foresters are devoted to preventing fires and to extinguishing them when they do occur, the object being, of

course, the praiseworthy one of saving the forests from destruction. But in the judgment of the settlers, while this seems wise for the time being, the ultimate effects are likely to be bad, for the reason that there will be such a growth of underbrush and such an accumulation of forest debris that sooner or later there will come fires with which no human exertion can cope. And then the forests will go up in one mighty blaze.

In the view of the settlers, California, with its rainless summers, calls for a different method of forest preservation from that which would be judicious in more moist climates. They say that the true method is to burn over the forests every summer, whereby the fires would be made so light that the trees would suffer no injury, and great fires capable of destroying a whole forest will be prevented. This is exactly what the Indians used to do, the settlers argue, and wholesale destruction of forests in their time was unknown. So firmly rooted is this conviction among settlers and forest owners in the Sierra region of California that on some occasions private owners have refused assistance to put out fires on timber lands owned by them, because they wanted them burned over as a measure of safety.

The idea that the Indians were better foresters than the scientific experts of the present day seems a peculiar one, but it is seriously maintained by many intelligent people.—*Editorial, Oakland Enquirer.*

A Comment.

(By the Superintendent of Working Plans, Division of Forestry.)

California is not the only State in which the annual burning of the forest is considered among the residents the best method of protecting the timber from heavy fires. In certain sections of the East, notably in the Atlantic Pine belt,

many owners of timberland make it a practice to burn over their land every spring soon after the snow melts and before the surface of the ground has become so dry that light fires cannot be kept under control. The object of this annual burning is to destroy the layer of leaves, twigs, etc., which has accumulated on the ground during the previous year. If the work is done soon after the snow melts, the ground is somewhat moist so that the fire burns slowly and can be kept under perfect control. The season of growth has not fairly started at this time and the fire is less liable to injure the timber than if the burning were done after the sap had begun to run.

Most land owners who treat their forests in this manner burn the entire area, merely with the view of protecting the standing timber. In this they are successful, but at the same time a large amount of young growth is destroyed. If the owner of an open Pine forest wishes merely to save the standing timber without regard to the future value of the land, no better plan can be recommended than to burn the area every year in the manner just described. The ultimate effect on the forest is, however, disastrous.

The effect of repeated fires on the productive power of forest land was studied in Southern New Jersey in 1897 by Gifford Pinchot, the results of whose investigations have been published by the New Jersey Geological Survey. In this report it is shown that repeated fires, combined with steady cutting of merchantable timber, reduce the forest so completely that the land is practically worthless. Many figures are given to show that burned areas in New Jersey are producing not more than one-sixth of the amount of wood they might have yielded, and that the quality of the product is vastly inferior to what would have grown on unburned land. It is shown also that even this small amount of timber would not have grown were it not for the marvelous power of the Pitch Pine to resist fire and to sprout after the trees were killed back.

Careful observers in the Sierras report that there were formerly many open parks and meadows which, since the occupancy of the country by the whites, have been covered with forest trees. Knowing as we do that in former times the Indians burned the forest regularly, the inference must be drawn that these openings were caused by fire; in other words, that the forest was gradually becoming less dense in burned sections and, on the edge of the timber belt, was probably gradually retreating from the prairies. It is obvious that if the young growth is constantly destroyed by fire, there will be no trees to replace the old specimens which die or are cut down.

In advocating the annual burning of the California forests the mountaineers are considering only the protection of the standing timber and are ignoring the future production for coming generations. A private owner may be justified in pursuing such a policy, but the Government or State must make provision for the future as well as for the present. A measure which destroys the foundation of the future forests must not be thought of for a moment on Federal lands, and some different method of protecting the forest from fire must be devised.

The mountaineers are entirely right in stating that the material, which accumulates on the ground where the land is not burned, makes a very hot fire, and that the danger would be lessened if there were areas where there is no inflammable material. No intelligent man would, however, advocate indiscriminate burning without a force of men to control the fire.

If burning were resorted to at all as a protection against heavy fires, it should be confined to areas where there is no valuable young growth; but our belief is that it would be possible to organize a system of forest police which would be effective in protecting the standing timber as well as the young growth.

H. S. GRAVES,
Washington, D. C.

THE FORESTER.

A MONTHLY MAGAZINE

Devoted to Arboriculture and Forestry, the
Care and Use of Forests and Forest
Trees, and Related Subjects.

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FORESTER.

The mission of THE FORESTER has been, and will be, to advance the interests of scientific forestry and related subjects in every practicable way. One of these ways, and an important one, it believes, is to afford through its pages ample opportunity for an intelligent discussion of the problems involved, though not accepting responsibility for the views expressed by others. Even fair-minded men may oppose when they do not know the whole truth; but when opportunity is given for learning the facts, THE FORESTER will have confidence in the decision of its readers.

"Prompt action" is the watchword of the Minnesota National Park and Forestry Association, to secure the reservation of valuable lands in the northern part of that State as "a park for the people." And with such experienced leaders and successful business men in charge of the project, there is the hope of great things resulting from the present trip of Congressmen and public-spirited citizens to inspect the country.

The general approval of the plan could not be evidenced more clearly than by the thorough agreement of the daily press and the lumber journals on the point of the advisability of the new reserve. Of the articles included in the symposium in this issue, the first is taken from the St. Louis *Lumberman* and the second from

the Chicago *Record*, while the third expresses the views of the Chicago *Inter-Ocean*.

For the diffusion of general and particular knowledge regarding the achievements of the United States in every branch of science relating to agriculture, including forestry, during the nineteenth century, the 1899 year-book of the Department of Agriculture will be extremely valuable. One of the first thoughts in arranging the scope of the coming volume has been its distribution at the Paris Exposition.

The Division of Forestry will contribute a short history of forestry in the United States, and also an account of the efforts of private land-owners to apply the principles of forestry. More has been done in this direction than is generally supposed. The owners of woodlands in many instances have handled their wood crops with prudence, and have shown the desire and the ability to preserve the forest without ceasing to use it, and farmers in the treeless districts have improved the agricultural resources of their lands by tree planting.

Where private owners have utilized merchantable timber without injuring its productive power, and to establish new forests, there has been the intention and idea of true forestry. In the Spruce lands of the Northwest small trees have been left standing, so that a second crop is assured. In New England White Pine has been planted in waste places with encouraging results, and the same can be said of Larch in Massachusetts. In the treeless States of the West, the Osage Orange, the Catalpa, Maple, Elm, Box Elder, Scotch Pine and Norway Spruce have acted splendidly as windbreaks, and along the banks of the streams the planting of trees has done good service in fixing eroding soil, preventing the increase of floods, checking excessive surface drainage, arresting the formation of gullies, and otherwise conserving the fertility of the soil.

It is desired to secure from the public at large such information as will be pertinent to a complete review of the forest interests of the United States. Any one who has practiced forestry, on whatever scale, will be supplied with full information by communicating with the Division of Forestry.

The press of news matter has necessitated the insertion of several additional pages in this issue, and the withholding of two valuable papers intended for this issue, which will appear next month.

CHIPS AND CLIPS.

The importation of wood pulp into Italy is greatly on the increase.

A Vancouver timber merchant has just made the first importation of Australian hardwood into British Columbia.

John Crowe, a forest ranger in the Rat Portage District of Ontario, was recently drowned in the Mimikon River in that province.

One and one-quarter million square miles is the estimate of the timber area of Canada, as given by the U. S. consul general at Montreal.

One of the most valuable timber trees in the great Northwest, the Red Cedar, grows to a maximum height of 300 feet and a diameter of 14 feet.

Norway supplied Great Britain with twice as much ground wood pulp last year as the United States, Canada, Sweden and Holland combined.

Immense Spruce forests will be opened to commercial development by the extension of the Atlantic & Lake Superior Railway to Gaspé Basin, Quebec.

Paper shingles have been introduced into Japan by an enterprising Tokyo firm as substitutes for the wooden article. The new idea is a slab of thick-tarred pasteboard, more easily managed than ordinary shingles and costing only half as much.

Some historical trees have lately come into the New York lumber market from the Wilderness battlefield of the Civil War. The bills of lading showed that the trees had been felled and the lumber sawed there. In some of the planks the minie balls can be seen plainly, the wood directly adjacent to the bullets being discolored or rotten, but not enough to damage the lumber.

While the display of forest products which Canada will send to the Paris Exposition of 1900 will include everything from the tree to the semi-finished product, it is the intention of the special commissioner to give attention also to recent exports of wood manufactures.

A bureau of forestry has been established in connection with the Canadian Department of Interior, and has been placed in charge of Elihu Stewart, former mayor of Collingwood, a Dominion land surveyor, who has made a special study of the various woods of that section during the past twenty years, and has often acted as arbitrator in forest matters.

The possibilities of a lucrative export trade in Tamarack between Canada and Great Britain received something of a setback in this reply from the Imperial Institute of London in answer to inquiries from the Dominion: "Gum of any kind is practically unknown in England, gum-chewers being confined to Canada and the United States." But there is said to be a good demand for tamarack for medicinal purposes, so that some samples will go abroad at any rate.

The portion of the State of Washington west of the summit of the Cascade range is covered with the heaviest continuous belt of forest growth in the United States. This forest extends over the slopes of the Cascade and Coast ranges, and occupies the entire drift plain surrounding the waters of Puget Sound. Excepting the highest mountain peaks and the sand dunes of the coast, which are treeless, the valleys of the Cowlitz and Chehalis Rivers, which are dotted with small Oaks and other deciduous trees, and the stunted Yellow Pines occupying with open growth the barren Steilacoom plain, all of western Washington is covered with a magnificent forest.

The Almighty Dollar.

The need of eternal vigilance in protecting the forest reserves of the National Government is emphasized by the conduct of certain logging and milling companies in Western Washington. When the reserves were set apart under the Cleveland Administration, it was provided that the owners of timber lands within the limits could deed them to the Government and receive in return an equal acreage of good standing timber elsewhere. Officials who have been investigating the matter find that the companies have practically denuded the land, which they now wish to exchange for well-wooded tracts. As there was nothing said in the law about cutting off the growth before the transfer, it appears that the lumbermen have succeeded in

their sharp practice as far as they have gone. The prevention of further despoilment is the least the Government can do.—*Buffalo (N. Y.) Express.*

In Enlightened Africa.

The Congo Free State has issued a decree intended to prevent the extinction of the india-rubber tree in that country. The law provides that not less than 150 trees shall be planted for every ton of rubber yielded annually. The gathering of rubber, except through incisions in the bark, has been prohibited for some time past, but the law has not been strictly enforced. Hereafter violations will be subject to the infliction of a fine not exceeding \$2,000, or by a term of imprisonment.

Recent Publications.

For more than a year the Division of Forestry has been engaged in giving practical advice and assistance to private owners in conservative methods of handling their woodlands. An account of the first important work along this line is about to be published in Bulletin No. 26, entitled "Practical Forestry in the Adirondacks," by Henry S. Graves. The publication is important as containing a description of the first successful attempt at systematic forest management on a large scale in the Adirondacks. The work described consisted in the preparation and the actual carrying out of a forest working-plan in Nehasane Park, of 40,000 acres in Hamilton and Herkimer counties, New York, owned by Dr. W. Seward Webb, and on an adjoining tract of 63,000 acres, owned by Hon. William C. Whitney.

Mr. Graves discusses at length the problem of Forestry in the Adirondacks, and shows what lines of work are practicable at the present time on the above mentioned tracts, as well as what could be done in the way of Forestry by the State of New York, were the cutting of timber on State land not prohibited.

In considering the problem of forest management by the State, Mr. Graves says: "The chief purpose of the State in maintaining large preserves is to protect the important water-

sheds and to provide a future supply of timber. The revenue which could be derived from the sale of lumber is a secondary consideration. The State can go further than the individual in the direction of systematic forestry, for it can afford to make investments with the expectation of but small profits, or it can wait many years before realizing anything at all. Moreover it may be satisfied with indirect returns in the general benefit to the community. The New York State holdings in the Adirondacks now exceed 1,000,000 acres, and are being increased as fast as appropriations can be obtained for the purpose.

"At present the constitution of New York prohibits the cutting of timber on State land, so that its management consists only in protecting the forest from fire and theft. But undoubtedly the constitution will in time be changed so as to permit conservative lumbering on the State preserve. Were this possible, the system of management which would be practical at the present time would necessarily be very simple, and would not differ to any great degree from that which can now be used by lumbermen and other private owners. The general plan for cutting Spruce should be the same as that presented in the working plan given in this report, namely, to remove the old timber above a certain diameter and, where necessary, to leave selected trees above this size for seed. In this working-plan ten inches at three feet from the ground has been made the average minimum limit for cutting. The State of New York, however, could afford to

leave all trees under twelve, and if necessary, all under fourteen inches in diameter; in other words, to leave a larger amount of money invested in the forest than the private owner.

"The State of New York could further carry on thinnings, for the improvement of the trees left standing, rather than profit from the sale of the timber. Thus the removal of many one-log Spruce trees, six to ten inches in diameter, which are usually left standing by the lumbermen, would benefit the forest to a considerable extent by giving more growing space and light to the trees which remain. In the same way small trees, which could be used for pulp, often stand in dense thickets, and a thinning of one-fifth or more of the crop would enable the remainder to grow much more rapidly. If a contractor were obliged to cut these trees he would undoubtedly raise his contract price. The State of New York could pay this price for the benefit of the forest. But at present most private individuals could not afford to make such an investment. Under certain circumstances the State could probably girdle some of the large, crooked hardwoods which are crowding small Spruces and Pines, or if necessary, cut them down; but for a lumberman in the Adirondacks such work would not be profitable at the present time.

"The State would have a special advantage over the private owner in being able to enforce stricter regulations on the contractors in regard to the careful construction of roads, sparing the small growth in felling timber, in building skidways, bridges, etc., and lopping the branches from the tops as a protection against fire. The lumberman can carry out these regulations only so far as they do not to any great extent affect the cost of logging. Moreover, the State could employ a much larger force of experts to superintend the marking of timber and to watch the work of the contractors, or, in other words, could take better care of the forest than the private individual."

Referring to the private owner the author says: "The only reason for lumbermen and most private owners to adopt forestry is the financial one. Private individuals and clubs to whom the income from the forest is less important than its preservation are in the same position as the State. But lumbermen have invested their money in forest land or stumpage as a business matter, and, unless the ultimate returns are greater from forest management than from the ordinary methods of lumbering, they cannot be expected to consider it at all. * * * Hitherto many lumbermen, who have looked up the matter of forestry, have not adopted it because they have been unable to make a compromise with the foresters. Either they have wished to strip the land, or the foresters have insisted upon certain measures which the lumbermen could not afford.

"Every plan of forest management in this country must be in a measure a compromise

between the owner of the forest and the forester. The former must consent to leave a certain amount of capital invested in the forest in the form of growing wood, and obtain his returns from merchantable timber after the necessary period of growth has passed, or from the increased value of the land. The forester, in turn, must give up certain operations which would benefit the forest."

And again: "The object of the forester is to obtain for the owner a large revenue from the timber, but at the same time to leave the forest in a condition to produce a second crop in a comparatively short time, and to reseed the openings made in lumbering with young growth of valuable species."

The general plan for cutting Spruce, as recommended in the working plan and as actually carried out on the two preserves under consideration, was to remove all trees ten inches and over in diameter, with the exception of such specimens as should be needed for seed. The plan of work advocated was accepted by the lumbermen, and during the first year, fifteen lumber camps were operated and 9,783 acres were lumbered for Spruce and Pine.

The publication contains a detailed description of the forest on the two tracts under consideration and a study of the habit, growth and production of the Spruce. Mr. Graves has drawn freely from the material contained in the "Adirondack Spruce," by Gifford Pinchot, quoting a certain amount of descriptive matter and a considerable number of tables. The yield tables have, however, been reconstructed, and have been simplified to make them more easily handled in predicting the amount of future crops.

The most instructive chapter in the book is probably that which discusses the loss incurred by ordinary methods of lumbering. By measurements taken in the woods, it is shown that the loss occasioned by cutting unnecessarily high stumps amounts to two per cent of the total product. Similarly the author shows that a considerable loss is occasioned by the unnecessary use of Spruce for skidways and by leaving large tops in the woods.

Throughout the book the author's statements are supported by numerous photographs, which add interest to the publication. The practical character of the book and the straightforward way in which it is written will make it sought for by all interested in conservative methods of handling timber lands in any part of the country.

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THE AMERICAN FORESTRY ASSOCIATION.

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The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

Owners of timber and woodlands are particularly invited to join the Association, as well as are all persons who are in sympathy with the objects herein set forth.

THE FORESTER.

BEREA COLLEGE,

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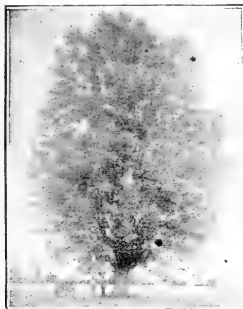
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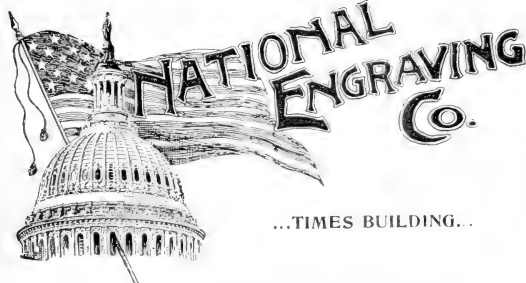
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ARIZONA



IN THE WOODS

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A TYPICAL FOREST SCENE IN WESTERN WASHINGTON.

THE FORESTER.

VOL. V.

NOVEMBER, 1899.

NO. II.

Effect of Forests on Water Supply.

Being a Paper Read at the Summer Meeting, Los Angeles, Cal., 1899.

I.—INVESTIGATIONS REGARDING RAINFALL AND PERCOLATION AS RELATING TO WATER SUPPLY THROUGH FOREST INFLUENCES.

The waters of the earth derive their existence from the heavens above and have no other source. This is the fundamental principle underlying all discussions on water-supply. There is no spontaneous process of production, no water manufactory in the recesses of the earth, no source but the clouds.

Forests interpose between earth and sky and become factors in the engineering problems of water-supply. Their action is in the direction of increasing precipitation, decreasing evaporation, and modifying floods. It is proposed in this paper to review some of the more salient relations between forests and water.

Many meteorological stations in connection with forestry have been established in France, in Germany, in India and elsewhere. In this country the subject has also received attention, but on a more limited scale. It is an unfortunate fact in regard to all subjects connected with rainfall that systematic observations must have been conducted over a long series of years—at least thirty-five—in order to obtain data upon which to predicate positive results.

The records of a few years may be, and frequently are, very misleading. The secular meteorological changes tend to move in cycles of wet periods and drouth. No conclusions can safely be accepted that are not based on records extending suffi-

ciently back into the past to embrace and give full weight to these cycles.

The records of precipitation at Philadelphia extend back to 1825. Charting the precipitations gives a wave-like curve descending very low in 1825 but with its sinuosities all well above that point until 1881, when the minimum precipitation of 1825 was again closely approached. The period of extreme low precipitation was fifty-six years. The years of maximum precipitation were 1841 and 1867, the period being twenty-six years.

Taking the total of sixty-four years and averaging the annual rainfall by periods of four, eight, sixteen and thirty-two years we get the following results: The averages by four years run from 22 per cent. low, to 19 per cent. high—as compared with the average for the entire period of sixty-four years. The eight-year groupings gave results from 11 per cent. low, to 11 per cent. high—and the thirty-two-year—2 per cent. low, to 2 per cent. high.

Analyzing the recorded rainfall at Los Angeles for the past twenty-seven years and averaging by periods of five years gives results ranging from 35 per cent. below to 16 per cent. above the average seasonal rainfall for the entire period of twenty-seven years. The extreme low points of the Los Angeles precipitation curve are twenty-two years apart, being from the season of 1876-77 to 1898-99.

The fluctuations to which the average annual rainfall is subject have been very exhaustively discussed by Mr. Binnie, M. Inst. C.E., in a paper read before the Institution of Civil Engineers, London, in 1892.

From close analysis of records, of forty-two stations in various parts of the world, covering periods of from fifty to ninety-seven years, he drew the following conclusions:

That for records of five years the probable error in averages ranged from minus 16 per cent. to plus $17\frac{6}{10}$ per cent., the limits of error decreasing to minus 2 per cent. and plus 2 per cent. for periods of 30 years and over. And that the least number of years the continuous records of which would give an average annual fall that would not be materially altered by extending the record, would be thirty-five years. He also concluded that dependence could be placed on any good record of that duration to give an average rainfall correct within two per cent.

These examples will serve to illustrate the uncertainty attached to any deductions based on rainfall records of short duration. As a case directly to the point we have certain French observations made about sixty miles south of Paris. The observations for one year gave the precipitation over woods as 33 per cent. in excess of that over open ground. Three years continuous observations changed this to 2 per cent.

Long records for forest purposes are rare. The necessity for long records is but one of the many obstacles in the way of arriving at absolute comparisons between precipitation over woods and open grounds. Even after sufficient time shall have elapsed to reduce this particular trouble to a minimum, there will still remain the errors inherent to measuring rainfall and the difficulty of obtaining two locations, the one wooded and the other bare, whose conditions are absolutely comparable.

Rain-gauges are not instruments of precision, yet no conclusions can be more accurate than the data upon which they are based. The gauges record all that falls within them, but, except in still weather

and with gentle rains, they do not intercept all that they should. Some very interesting and instructive data upon this subject has been published by the U. S. Department of Agriculture. It is shown that with the common unprotected gauge very large errors sometimes occur. It has also been shown that the decrease in catch of gauges raised above the ground formerly believed to have been due to height, is in reality due to increased freedom of wind action.

There is also another and perhaps even greater element of uncertainty attendant upon rain-gauging, viz.: The smallness of the actual collecting area of a gauge and the comparative immensity of the area of the country to which its readings are applied. With a ten-inch gauge to every four square (and this is a distribution far above the average), the ratio of area would be as about 200,000,000 to 1. At Rothamsted, in England, there is a rain gauge with an area of one thousandth of an acre. The catch on this gauge from 1853 to 1880 was about nine and eight-tenth per cent. more than the catch in an adjacent five-inch gauge. The ratio of their respective catchment areas is as 320 to 1. Now, if this ratio of area gave a variation of nearly ten per cent., we must not rely too implicitly on the results shown by applying the readings of a gauge to an area of country several hundred millions times the area of the gauge. The rain-gauge is an invaluable instrument, but to fully profit by its readings we must recognize, as with other instruments, its limitations and surroundings.

All these various difficulties considered, we are not warranted in hoping for any decisive direct quantitative comparison between the rainfall over wooded and open grounds similarly situated and exposed. However, while lacking in direct proof of this point, we do not know from the records of the various forest stations that woods reduce temperature and increase the humidity of the air, and, therefore, must to some extent increase precipitation.

The efficiency of foliage in mechanically arresting and condensing moisture is well known. If there are doubts, a walk

through underbrush on a misty morning will carry conviction to the most sceptical. A notable instance of the economic value of this feature of vegetation is to be seen at Ascension—a place that I visited in 1879.

It is a volcanic island lying a few degrees south of the equator and about midway between Africa and South America. It has an area of 30 to 40 square miles and is used as a naval station by the British Government. The water supply is obtained from near the summit of Green Mountain, so named from the fact of its being about the only green spot visible on the island. The summit elevation is about 2,800 feet above the sea, and its green cap of vegetation is maintained by the almost constant drip from trees and rocks of the moisture mechanically collected from clouds and fogs, eked out by light passing showers.

That the drip from trees should play so prominent a part in a domestic water supply is very satisfactory testimony to the efficiency of woods in mechanically increasing precipitation. Interesting experiments have been made as to the amount of condensation of aqueous vapor by leaves, but it does not appear that the velocity, if any, of the surrounding air was taken into account.

Cloud or fog is a manifestation of water in suspension, and it is obvious that the more rapidly the cloud is moved against any surface the more water will be brought into contact with that surface in a given time and the more it will collect. Unless condensation tests are conducted with reference to air velocity they will not furnish complete values. As before said, it is questionable whether a numerical value can ever be satisfactorily established for the action of forests in a direct increase of rainfall, but it is without question that their effect is in that direction—the point of uncertainty being one of quantity only.

In the matter of conserving of the water that has fallen, forests are important factors. They intercept the sun and rain, saving the earth from packing hard under the baking of the one and the persistent beating of the other. They appreciably

decrease the quantity that would otherwise pass rapidly off into the runs and waterways and be lost in floods. Not only do they lessen the wasteful and destructive expenditure of water in floods, but they afford greater time for the earth to absorb to its full capacity the water held back by the mechanical obstructions of the forest floor. They also reduce the quantity lost by evaporation.

These things we enter on the credit side of the forest account with water supply, and on the debit side make the sole entry of the water used in supporting plant life. It remains to ascribe values to these various items and strike a balance.

All permanent water-supplies are drawn directly or indirectly from the rainfall absorbed and stored within the earth. Directly by the means of wells, tunnels, infiltration galleries and similar structures; indirectly through the medium of running surface streams, which in turn draw their supply from visible springs and the unseen accretions that enter along their beds from groundwater at high elevation.

The surface water which flows into the streams after rains gives but a temporary and passing supply. The permanent flow comes from ground storage. It must not be thought from this that all ground-water reappears at some time or other in the surface streams. Much passes on unseen to the sea. Its place of discharge into the ocean is at times well marked.

Off the east coast of England there is a sub-marine valley, called the Silver Pit, 20 miles long by from 50 to 250 feet deep below the general surface of the adjacent ocean bed. The extraordinary depth precludes it being due to currents, and from the circumstance of the depression occupying, as it were, the focus of the concave chalk formation of eastern England it is held to be the place at which the inland groundwaters are discharged through the chalk.

Coming right home we have a discharge of oil into a sub-marine valley of great depth off Redondo, indicating a probable discharge from the inland oil fields. The direction of these under-ground flows is at times difficult to trace. Latham, the noted sanitary engineer, in some of his sewage

investigations found the ground-water of a valley passing partly straight down the valley in conformity with the surface configuration and partly turning more or less abruptly and passing under the hills and coming out on the further slope.

The capacity of the earth to receive and convey water is all-important to us. Whatever agencies give the rain freer access to the earth should be well studied. The condition of the ground-surface is of vital importance and it is here that forests exercise one of their most beneficent functions—a quality which in itself is more than sufficient to justify our constant efforts in preserving and extending our wooded areas.

All soils are dependent upon their top surface as to whether they absorb water or not. Take an extreme case: sand covered by an asphalt pavement, a great capacity for water but no mouth to take it in. Take an ordinary case, as exemplified by tests made at Colby, Kansas, by the U. S. Department of Agriculture. Comparative measurements of the moisture in soil were made at a depth of twelve inches under three separate conditions: First, a covering of natural prairie sod; secondly, bare soil, top cultivated; third, bare soil, sub-cultivated. The tests were continued daily throughout the months of June, July, August and September. Throughout the tests the cultivated soils showed over twice the moisture in the soil under the natural prairie top.

It has been suggested that the chief cause of the difference may have been due to the water taken up and evaporated by the grasses. A study of the record at times of rainfall, when there could have been no evaporation to speak of, does not, however, support any such assumption. In fact it is of interest to note that evaporation from plants which derive their water supply from the capillaries of the soil does not necessarily reduce the moisture of that soil at any time; that depends upon whether the sub-water is ample to keep up the demands of the capillaries. If the supply is good, a pipe does not show less water because the faucet at the end is open.

The percolation gauges at Rothamsted,

the place previously spoken of, gave as an average for 20 years that 47½ per cent. of the total rainfall percolated through 20 inches of soil and 44.9 per cent. through 60 inches. The surface of the soil was kept clear of vegetation.

The capacity of sand for receiving and transmitting water can be well illustrated by the water supply of The Hague, capital of the Netherlands. The city is situated about two miles inland from the North Sea and has a population of 190,000. Its domestic water-supply is drawn from a tract of uncultivated country lying near the sea and covered with sand dunes, similar to portions of the New Jersey coast. The sand is described as very pure and white. The water is fresh to a depth of 66 feet below the sea. It is gathered by infiltration pipes and pumped to its destination.

Through the courtesy of Mr. Corey, the United States Consul at Amsterdam, I am able to give the percentage of percolating water as about 40 per cent. of the rainfall. According to other information, from 30 to 50 per cent. of the rainfall can be collected, the variation being according to the season of the year. In summer a loss is stated to take place by reason of vegetation. This draws attention to the point that whether vegetation aids ground storage or not depends largely upon the nature of the soil. In the case of sand, such as described, it is detrimental inasmuch as it impedes penetration and aids the extraction of moisture.

The water conductivity and capacity of various soils have received much attention at the hands of forest experimenters. By conductivity is meant the capacity to transmit water, and by capacity the quantity that a given volume of soil can be caused to receive into its interstitial spaces, generally spoken of as its voids. Of the quantity that can be thus introduced into dry soil, part can be removed only by processes of evaporation. It is held within the capillaries and as films around the grains, and will not yield to gravitation. The texture of the soil is the governing factor in rate of conductivity. It ranges from well-rounded pebbles through the gradations of sand and loam to clay. It requires

no mental effort to realize that conductivity is a very important element in storm runoff, and the yield of a ground-storage.

It is to be regretted that the literature of the subject is scant and unsatisfactory. The greater number of the records of tests that I have been able to collate are based on experiments with downward filtration. This is a very unsatisfactory method of

determining the lineal speed of percolation, the ingoing water is always in conflict with the displaced air, and the results are vitiated. In my own tests I always use horizontal percolation with free top surface or upward percolation. Either method gives very uniform results.

H. HAWGOOD,
Los Angeles, Cal.

(To be continued.)

Natural Reproduction of Forests on Old Fields in Eastern Kentucky.

Being a Paper Read at the Special Meeting, Columbus, Ohio, 1899.

Among the different phases of forestry that I have studied in this region, I have chosen this upon which to present a few observations because I feel that it touches a subject of first importance in American Forestry.

The vital question in forestry is, when a tree falls will another take its place? So much of formerly timbered land is demanded for agriculture that the answer must be no a great many times. And yet if we are to have trees in the future the "tall Oaks" must "from little acorns grow," and the conditions under which they are to grow must constitute the foundation of all forestry.

While in restricted areas, as on the treeless prairies, and on small tracts in older and more highly developed regions of the country, seed-sowing and hand-planting may be resorted to, yet till forestry is a much older science than it is in our country, and forest products have greatly increased in prices, the great majority of young trees must come by reproduction under natural conditions.

I can hardly present to you the conditions prevailing in the Berea region without reference to the geology of the country. Leaving the Ohio River at Cincinnati we pass southward through a horse-foot shaped area, the famous Blue Grass region underlaid with Silurian limestone.

Bordering this, as though constituting the shoe, is a narrow exposure of Devonian consisting for the most part of black bituminous shales, exceedingly poor soil-making material. The beds lying over and outside of this are clays and fine sandy shales representing a great silting period in the sub-carboniferous. The erosion of these has largely formed the yellow clay soil that overlies the Devonian shales, giving the "flat lands" glades and shashes which are characteristic of this horse-shoe strip of country. These lands are "tight" in the vernacular of the region, becoming saturated with water during the rainy Winters and holding it till late in the Spring. In the hot, dry periods of Summer they dry out and bake like brick.

Above the shales, in the sub-carboniferous, we have a layer of fine-grained gray and buff sandstones which cause a bench to extend all around the hills at this level. This is succeeded by the massive mountain limestone, twenty to fifty feet in thickness, capped by the millstone grit of about the same exposure.

It is to the readily eroded character of the shales at the base and the resistant nature of the limestone and more especially of the conglomerate at the top, that we owe the peculiar and picturesque topography of the region. Bold, outstanding, flat-topped "knobs" with broadly spread-

ing bases, long lines of precipitous cliffs, deep, narrow valleys, darkly shaded coves and hollows, "rock-houses," abrupt "pinnacles," and "rock-castles" fairly startle the traveller at every turn. Above all this stretches away the level plateau of the coal-measures, but gashed and furrowed on all sides by the ragged valleys leading to the lower level. A difference in altitude of five or six hundred feet in half a mile is no unusual thing. The resulting character of the roads and their effect on the price of lumber and farm crops, not to mention the effect on social life and education, I leave to your imagination. As climate has everything to do with reproduction and growth of trees, this must not escape mention.

This is a region of abundant rainfall, the precipitation being from forty to fifty inches annually. Four months, from December to the first of April, amount almost to a rainy period. While occasional extremes of cold, when the mercury registers from 20 to 25 degrees occur, weather above the freezing point is the rule, so that the Winters are a succession of drizzling rains, mild freezes, wet snows, thaws and bright weather. A period of considerable dryness may be looked for from some time from June to September, though very heavy rainfalls may occur in that time.

I have been thus particular in describing the year's climate because it is to the generally wet, open character of the Winters that I attribute the prolific growth of seedling trees of a great number of varieties.

Where acorns will germinate uncovered on the surface of a compact clay soil, the conditions as to moisture and temperature may be considered good.

The lower Devonian and border Silurian lands were originally covered with a dense growth of the different Black Oaks, some White Oak, Black and Sweet Gum, Cherry, Sassafras of great size, Scarlet Maple and other species. On higher ridges more White Oak was found, some Chestnut, many Hickories of several species, large numbers of Pine, a mixture of *P. virginiana*, or Jersey Scrub Pine, but here a tree often seventy-five feet high and two feet in diameter with *P. echinata*,

the short Yellow Pine of the western States.

The most valuable of this growth has been cut out and sawed, but much still remains. In the valleys among the hills, on the benches and in the heads of the rich coves is found a mixed hardwood growth of great value. White Chinquapin, Red and Black Oak, four species of Hickory, Beech, Soft and Sugar Maple, Buckeye, Basswood and Ash grow to fine size and unusual height, the density of the growth and the steepness of the slope both forcing them up in search of light. Higher up, above the grit-rock, lie the ridges clothed with the Chestnut and its close associate, the Chestnut Oak or Tanbark, *Quercus prinus*.

What I shall call Old Field No. 1 lies one-and-one-half miles southeast of Berea. The soil is a compact yellow clay over black Devonian shale. The surrounding growth is the usual mixture of these lands—the Black, Scarlet and Spanish Oaks, some White Oak, Hickories of four species, Soft Maple, Gum and two species of Pine. The field is about fifty rods long by thirty rods wide. It had been cultivated a good many years, how long I could not learn, and was turned out "about fifteen years ago," but was not pastured, as is so often the case.

The stand of young Pines upon this is complete, excepting a short distance on the washed banks of a little draw. The growth is almost wholly *Pinus virginiana*, or the "Black Pine," the local name, with a slight mixture, not 10% of *Pinus echinata*, or Yellow Pine. There are also a few Oaks, Hickories and such, but their number is insignificant.

An average specimen of Black Pine was cut as close to the ground as possible and was found to show twelve rings of growth and to be four and one-half inches in diameter. This was twenty-seven feet high, was clearing itself of branches for a few feet only, many dead ones still adhering to the tree.

An average specimen of Yellow Pine gave practically the same dimensions, but was straighter and cleaner in trunk, being clear of branches for half its length. What the growth was surrounding this

field fifteen years ago I cannot state accurately, but it could not have been very different from that at present, and now the Yellow Pines that might have seeded the field are fully as numerous as the Black. The greater vitality of the Black Pine seed and seedlings is strongly evinced here, as it is along roadsides and in pastures all over the country.

Field No. 2 is near the foot of the hills but still on the yellow clay soil. It is a rounding knoll of about two acres and was a part of one of the oldest fields in the region, having been abandoned about forty years. Here again there has been a complete stand of Pine, though they have been cut for house logs till in places the cover is a good deal broken. The stand is about one to every eight feet square on the average, which admits too much light. An average specimen of *Pinus virginiana* was cut and found to be 9½ inches in diameter at two feet and sixty and one-half feet high, showing thirty-eight rings in the stump. Six inches of the diameter growth had been made in the first ten years. The trunks of these and others were slightly crooked and was cleared of limbs more than six feet, the recently dead branches remaining to form ugly knots for thirty feet above. Trees of a foot or over in diameter had been cut here.

A small mixture of Yellow Pine in the grove gives opportunity for comparison. While there are not more than one per cent. of them the owner assures me that there has been a much larger proportion but they have died and fallen down. Those remaining show evidence that in many cases the Black Pines are overtopping them, and the fact that in all cases they have cleared themselves of branches perfectly to more than half their height shows that they will not endure shade as well as the Black Pine. The leader on Yellow Pine in early Spring is stouter, the branches are also stouter and stiffer, so that the tender growth is not bent about as much by the winds. This fact gives rise to much clearer and straighter bodies in the young timber. The difference is much that between Scotch and Austrian Pines when grown together.

A sample specimen of Yellow Pine cut was 8½ inches in diameter, 59½ feet high and showed 37 rings of growth at two feet. The growth was more evenly distributed throughout the period and a comparison between old trees would lead me to think that this will continue to make a steady gain for a longer time than the Black Pine and remain a sounder tree.

Field No. 3 lies up the hollow directly above No. 2 and has about the same history, save that when abandoned for cultivation it was pastured. Instead of a full stand of trees they are in groups and patches or singly on the lower ground and are heavier bodied, short and broad-topped except in the center of a considerable group. In such conditions, even, it is to be noticed that the Yellow Pine has formed a clean trunk for a considerable distance, and young trees seem often to do this under their own cover only.

Higher up on the sides of this hollow, where the cattle did not care to range, the stand of Pine is full, both species about equally represented. Many trees are ten to twelve inches in diameter and fairly on the way to make good saw-logs. Here again the Yellow Pine is much the best cleared of branches and presents straighter and cleaner trunks.

Field No. 4 is about 20 miles southwest of Berea, near the little station of Gun Sulphur. The location is a rather thin clay and gravel soil on the top of the bluff above the limestone. The millstone grit in this section is pretty well thinned out. This field was cleared 20 years ago and put in corn for two years, then abandoned. The growth is wholly Black Pine and perfectly dense, so that one can scarcely find his way through. The average height is about 20 feet and the diameter 3 inches.

Similar examples of reproduction of Pines could be multiplied indefinitely but these are good types. The Yellow Pine possesses much more value as a timber tree, and follows the more sandy ridges. The Black Pine, known to most of you as the Jersey or Scrub Pine, reaches a size to make profitable saw logs in this region, a character which I think it does not possess elsewhere. Its range is the wet flat-lands

rather than the drier ridges where the Yellow Pine is most abundant. In places where the two are associated the Black Pine will take the land to the exclusion of the better tree and forms dense thickets in all open places where it can find space sufficiently light and not too much trampled. It does not seem in the least disturbed by the severe droughts and heat to which it is often subject in July and August. It will endure almost as much shade as a Cedar.

Field No. 5 lies at the foot of the high peak near Berea, known as Bear Knob. It was a long time in cultivation, contained an orchard, a few relics of which still remain and was last tilled in '56 or '57, the owner being able to locate the date approximately by its relation to family affairs.

Here the predominating growth is hard wood, though some fine pines are mingled with this. The growth is dense, the young trees reaching up fifty to seventy feet high with clean, straight trunks cleared of branches for 20 to 30 and even 40 feet. Many of the trees are beginning to form crowns, others are still in the pole stage of growth. The cover is almost perfect. The species represented are, first, the Black and Falcate Oaks, some of which are a foot in diameter; White Oaks are next in number and are the most beautifully proportioned young trees of the species I have ever seen, with slender bodies, as clean as telegraph poles, six to eight inches in diameter. I shall study with interest to see whether they will be able to hold their supremacy in height with the Black Oak tribe. Hickories of the Shell-bark and Pig-nut species are six inches to ten inches in diameter and in the hands of a less conservative owner would have been sacrificed to the spoke trade before now. On the lower end of this field where a few decrepit Poplars (*Liriodendron*) have furnished the seed to be blown a hundred yards, we find a dense, shapely growth of this most valuable Southern tree.

What I shall call Field No. 6 is of a very different character from the preceding. This is a piece of "cove" land, being a widened-out, amphitheater-like head of a narrow valley and lying just above the mountain limestone, but passing the mill-

stone-grit and heading in the sandy shales of the coal measures. Its sides are so steep that it was "tended" when in cultivation on the contour plan, *i. e.*, around the cove on a level. A wagon would hardly venture into it, produce and timber being removed on the low one-horse "slides," or sledges peculiar to the country. This field was one of the first opened in the region, over fifty years ago, and the last crop of corn was raised on it in 1864. It is entirely covered with a thrifty timber, the cover in most parts being perfect, though somewhat thin in others from the cutting out of the new growth for various purposes. I am assured that it was a clean field when the last crop was raised, the present growth being wholly from the seed since 1864. Of the taller trees over half are of "Poplar," so-called in the South, the White-wood of the northern markets, *Liriodendron tulipifera*.

If the White Pine is the queen of the northern forests, certainly the Poplar ranks as queen of the southern, and at the rate the old growth is disappearing, we must hail with satisfaction the appearance of a new growth under conditions which indicate that it is readily reproduced. In the better part of the field, in a hollow with a northern and northwestern exposure, these beautiful young trees tower up from fifty to eighty feet, with clean, smooth trunks as round as columns. Already a good many of them a foot in diameter and over have been cut out to make house logs. The best remaining specimen I cut and sectioned every eight feet for study. At a foot high it was seventeen inches in diameter and showed thirty-three rings, which would indicate an age of thirty-four or thirty-five years. The ground must have seeded in at once on the turning out of the field and the seed must have blown from old trees two hundred yards away.

Hickory of two species, from six to nine inches in diameter and forty to fifty feet high, were in the field, while better ones had been cut to make spoke stock. A large number of Black Locust had been cut for posts, the trees being five to eight inches in diameter, so that scarcely representative specimens were left standing.

This last field is only one of many of similar character, though many of them when cultivation ceases are pastured, which invariably results in an imperfect cover and poor quality of body growth. Dogwood and Redbud are the common under-growth. Often grapevines get in and become a great detriment.

The fact that by the time the young trees have reached this age the owners often think the timber rotation of sufficient

length and clear the land again, prevents, in a good many instances, these young forests from growing to a profitable age. The lessons from them, however, are full of significance and encouragement for those who would take such tracts in hand for forest purposes.

S. C. MASON.
Berea College,
Berea, Kentucky.

Second Growth Pine vs. Agriculture.

Some Views on the Desirability of Crops Under Varied Conditions.

In discussing problems of forest policy, sufficient account is not always taken of the varying needs of localities with regard to maintaining forest areas. Often the matter is treated as if the preservation of forests everywhere and under all conditions were a desirable thing. Thereby local antagonism is aroused and desirable legislative measures prevented.

I wish to discuss briefly the question of to what extent it is desirable that forests be maintained in those portions of Michigan, Wisconsin and Minnesota, into which agricultural settlers are now actively going. As everybody knows, these regions have heretofore been the chief seats of the White Pine industry. Everybody also knows that from large portions of this area the mercantile Pine has disappeared, and that in most of this territory soft wood lumbering on a large scale will have come to an end in about ten years. The people of the region all appreciate this and are generally looking towards agriculture to replace lumbering as their principal means of subsistence. The question now is: Will it be most advantageous to them to continue this attribute; or would it be wiser to adopt such measures as will establish, by the side of agriculture, a series of industries based upon raw material obtained from local forests.

It should be stated at the very beginning of such an inquiry, that this question will

be settled with sole reference to the wishes of the local population. It may well be that it would be for the benefit of the nation if these tracts were set apart exclusively for the purpose of raising White Pine timber. But assuredly such will not be the case. The land in this region is nearly all in private hands, except only the northern part of Minnesota. So there can be no question of establishing a national forest reserve, either in Michigan or Wisconsin. There are in the latter two states no very large tracts into which the agricultural settler has not already made his entrance. Railways are traversing the region in all directions, towns and villages are numerous and growing. The time has long gone by for imposing upon these territories a policy not desired by them.

In order to bring about any sort of legislation tending to keep a considerable amount of land under forest, it is necessary, therefore, to convince the local residents that it is for their own interest to do so. At present they are very doubtful as to this. A proposition that forests are to be maintained by public authority, meets with the objections that this would keep the country from developing, and that the country needs the taxes to be derived from these lands if owned by private parties. The lands denuded of their timber growth are rapidly falling into the hands of specu-

lators who endeavor to sell them to agricultural settlers. That they are meeting with considerable success in this direction is undoubted. Although much of this sort of land is unquestionably unfit for agriculture it is extremely difficult to say just which is and which is not, as no detailed survey of the region has ever been made. Some sort of agriculture can undoubtedly be carried on over a considerable portion of these tracts. By that I mean that settlers may manage to make a living upon them. I do not believe that any of them will ever become as well-to-do as the settlers on the adjacent hardwood lands have good reasons to expect.

Next to the interests of the settlers themselves, the people to be considered are the business men in the towns. In fact, these form really the most important element, and whatever they approve of is likely to be advocated by the representatives of these districts in legislative bodies. Now this class of men cannot expect to derive much prosperity from the farmers established on the former Pine lands, because their ability to buy will always be small. On the other hand, if the denuded tracts were devoted to the regrowth of construction timber, they would derive practically no revenue from these lands for a period of seventy or eighty years. But if these tracts were used for raising timber with short rotation, it would be possible to make them the basis of a permanent industry in manufacturing various kinds of woodenware, packages, boxes and the like. These factories would employ large numbers of men, larger numbers proportionately than the present lumber industry, with good ability to purchase, and therefore be the very best basis for the prosperity of the business people of the towns.

Of course, it does not follow that the short rotation management would be the most profitable for the owners of these lands. It is altogether likely that within the next decade, with improved fire and tax laws, some of the lumber companies owning such lands will find it profitable to raise thereon Pine with long rotations for construction lumber. This is particularly true of those large concerns who are

able to employ the greater part of their capital in cutting Southern Pine during the long interval when their Northern second growth is maturing.

But such a condition will not be brought about unless the laws regarding fire and taxes are changed so as to treat the lumber concerns fairly and give them protection. Such laws, furthermore, cannot be hoped for unless the people of the locality can see their own direct advantage in maintaining forests. It follows that any future public management of forests in the Great Lakes region must, for some time to come, devote itself principally to the production of short-rotation material. This observation is intended to apply especially to those tracts stocked with soft woods. As to hardwood material, the original supply is still so far from being used up that questions of future restocking need not yet be discussed.

It is important to keep these principles in mind so as to be able to overcome reasonable objections to laws looking toward permanent maintenance of forests of large extent in the Great Lakes region. Incidentally they illustrate the point that the wisest forest policy is not always identical with the most rational management by the proprietor who looks only to the financial return.

ERNEST BRUNCKEN.

Relation of Forestry to Commerce.

The necessity for the preservation of the trees of the forests, to insure the protection of the rivers and streams of the state, and the maintenance of waterways for commerce, was emphasized strongly in a recent speech in Utica, N. Y., by Hon. David McClure. The speaker, who was a member of the Constitutional Convention of 1894, related the enactments of that convention for the protection of the forests, which was the most important question before that convention, he believed, since the life of the canals depended upon the protection of the streams which fed them.

Mr. McClure advised that the creation of a single-headed commission for the care of the forests should be urged.

Sheep Grazing in Arizona.

Second Paper on the Statement that Forest Reserves are Injured by Grazing.

AFFIRMATIVE VIEWS OF A RESIDENT.

[THE FORESTER assumes no responsibility for views expressed in signed communications. The opposite view on this question was published in the October issue.—ED.]

It is almost impossible to overestimate the value of the forests in Central Arizona, that is the Black Mesa and San Francisco Mountain Reserves, in reference to the preservation of the water supply of the Salt River and Gila Valleys. The drainage of these two Reserves through their numerous tributaries is, to wit., Hell's Cañon, Sycamore Cañon, Johnson's Cañon, Ash Fork Creek, Oak Creek, Beaver Creek, Clear Creek and Pine Creek and numerous other tributaries or "feeders" rising on this high plateau, which composes the Black Mesa and San Francisco Mountain Reserves, and flowing into the Verda and Salt Rivers and thence on directly to the country around Phoenix. They are the highest forest areas of the whole Territory, and from their extreme height, some six to eight thousand feet, and parts as high as ten and twelve thousand, and the large and almost unbroken forests which cover them, they present in themselves ideal conditions for catching and condensing the clouds and precipitating the moisture upon these high tablelands.

The effect of sheep grazing in large bands under the herding system, to any intelligent person, who has ever observed the same carefully, cannot fail to be pernicious in many ways. Large bands of sheep passing through these forests bruise and stunt, and very often break down, the young Pines. In passing by on the cars of the Santa Fe, just near the town of Williams, in an enclosed graveyard the young trees look exceedingly thrifty and beautiful, while on the outside or the public grazing grounds, there are scarcely any small trees living, and those that are to be found are stunted and broken and show plainly the effects of the trampling of stock. No unprejudiced person can pass

by and see the contrast between the trees in the inclosure and the poor, broken, withered and small trees on the public grazing ground without being forcibly struck with the difference.

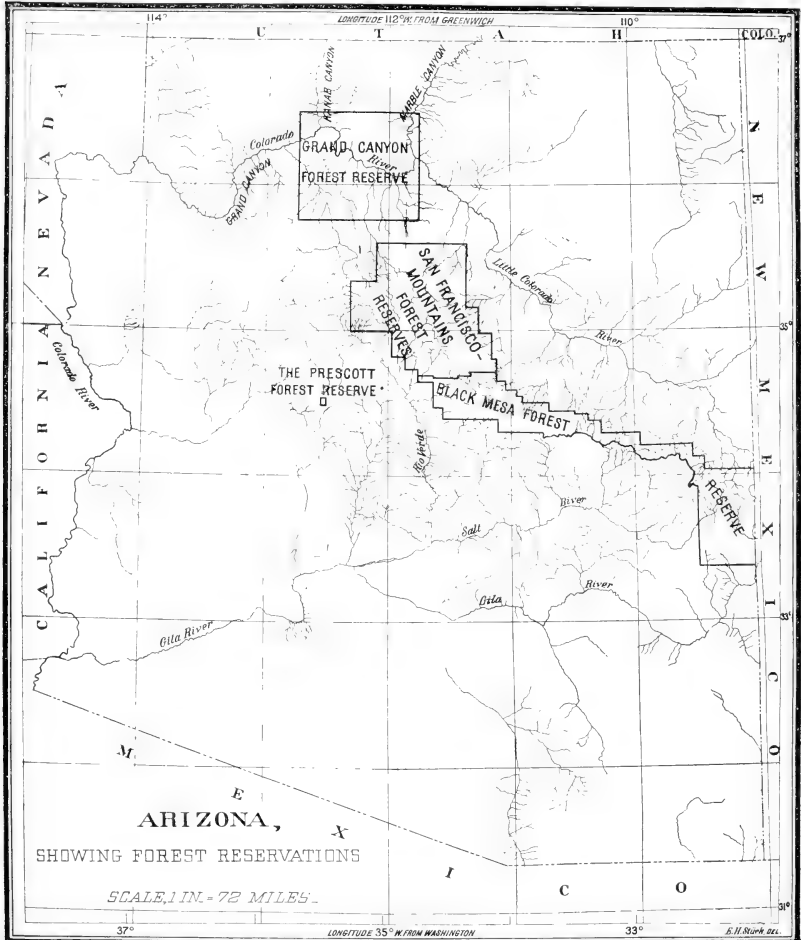
The sheep in the above named reservations are herded in large bands (from eighteen hundred to twenty-four hundred in a band), by an ignorant Mexican herder and his dog. He carries on his borro his entire outfit, consisting of scanty bedding, rations for two or three days and his cooking utensils. Three times each day—morning, noon and night—he builds a fire to prepare his meals, and he has very little regard as to what becomes of the fire after it is once built; for soon he has packed up his cooking utensils and other belongings on his borro and is off with his sheep again.

For several months during the year, especially in the Winter and Spring (the latter part of the Winter and through the Spring and Fall), these high elevations are constantly swept by strong winds, and at those times, as there is very little rain, everything is exceedingly dry and inflammable. Now consider that there are three hundred thousand sheep, and one herder to every two thousand kindling his fire three times each day, and you can form some idea of the impossibility almost, under such circumstances, to prevent forest fires. The owners of these sheep, in most cases, cannot see more than one or two bands each day, and in that way it is impossible for them to give this matter of forest fires very careful and close attention.

In regard to the fact that the streams are fed by the springs down in the cañons, that in itself shows to any thoughtful person the greatest necessity for protecting the forest cover and supplying as much shade, in the way of trees, as possible to

prevent the springs from drying up or largely diminishing in their flow. It is a fact that is well known, and about which there can be no controversy, that, in the early settlement of the Atlantic States, many streams, and even creeks, that were clear and deep and in whose channels

flowed large volumes of water, from the denudation of the timber from the adjoining hills and valleys, directly ceased to flow, or flowed only at long intervals during the rainy seasons, after the land was cleared up and the settlements became thick.



AN OFFICIAL MAP OF ARIZONA.

The silting of the canals in the Salt River Valley from large bands of sheep, which summer upon these mountains and upon the reserves in Central Arizona, going from the reserves across to the watersheds of the streams and around in the vicinity of the canals of the Salt River, is something that one, who is acquainted with the effects of sheep-grazing upon the land, would be compelled to notice, on account of their pulverizing the soil in their course. The loose porous soil is then drifted by the high winds or washed by the rains of Winter and Summer into

the canals, rapidly filling them up. In the San Francisco and Black Mesa reserves the Government has land naturally suitable for forest growing, and if the proper care be taken there will always be timber growing up as the matured timber is consumed by the increasing population, and water flowing from these natural reservoirs, prepared by infinite wisdom, through all time to beautify and enrich a great and noble State.

Yours truly,
(Signed.) ROBERT PERRINE.
Williams, Arizona.

Forest Fires.

California.

The picturesque slope of Mount Tamalpais, opposite San Francisco, was the scene, the middle of October, of a forest fire which destroyed several suburban villages near Mill Valley and burned Live Oak and Redwood forests. The rain finally extinguished the flames which a small army of fire fighters had struggled with ineffectually for several days.

In the Santa Cruz Mountains forest fires also did much damage, burning over a country dotted with small fruit farms and vineyards. The lack of water after a long dry season prevented successful resistance to the fires, but in one case 40,000 gallons of newly-made wine were used as an extinguisher. The wine was pumped from the vats and then forced through pipes upon the flames.

Another fire in the thriving, artificially-planted forest of the late Adolph Sutro was extinguished by the San Francisco Fire Department after sixty acres of Eucalyptus, Pine and other trees had been damaged.

Pennsylvania.

Destructive forest fires raged on the Allegheny Mountains, and many thousand dollars' worth of timber were reported destroyed.

After two days of hard fighting the fire warden of Union Township, assisted by a

large number of men, succeeded in subduing the flames on the E. & G. Brooke Iron Company's woodland, on Round Hill. About 500 acres were burned over.

A press report from Altoona says that during the last week in October "more actual damage was done in that section than five figures could represent." The loss to owners of standing timber, fences, bridges, telegraph poles, and barns is estimated at \$100,000 in Blair, Cambria, Clearfield, and Center Counties. In previous years the woods have been kept more or less damp by the Fall rains, but this season the forests are dry as tinder, after six weeks without rain. The resinous smoke from the fires causes inconvenience even to the townspeople.

Texas.

Forest fires were reported in Hardin County, Texas, in the beginning of October, "not a vestige of grass being left here, and no rain to amount to anything since July 2."

In the same State occurred other extensive fires between Wallisville and Turtle bayou, with considerable damage. There is much "Loblolly" Pine in this section.

Advices from Houston tell of daily damage in the counties of Chambers, Tyler, Hardin, San Jacinto and Polk, a section ordinarily a good grazing country, but now suffering from extreme drought.

West Virginia.

From all along the West Virginia Central Railroad come reports of great damage. Many farmers about Bayard, W. Va., have lost all their hay and corn, others their barns and crops, having been ignited by sparks from the surrounding forest fire. The mountains around Bayard are ablaze, and the town is without fire protection.

A trainload of water was sent out by a

lumber company, whose log and truck men are fighting the flames.—October 28.

Maryland.

Thousands of men are fighting forest fires all through the Alleghenies. The mountains are reported to be one mass of flame all the way from Oakland to Grafton. Timber in the Flintstone and Town Creek section is reported burning, and the loss will be heavy.—October 27.

Forest Protection.

Protecting the Public Domain.

President McKinley, on October 21, issued a proclamation changing and enlarging the boundaries of the Prescott Forest Reserve in the Territory of Arizona. The reserve, which originally contained 10,240 acres, now embraces about 423,680 acres.

The reserving of this additional area has been necessitated by the reported urgent need for withdrawing these forested lands from the operation of the Act of June 3, 1878, under which they were being rapidly subjected to wholesale spoliation in the interest of large mining corporations operating some distance therefrom.

The Santa Yñez Forest Reserve, in the State of California, has been created by a proclamation dated October 2. The total area is about 145,000 acres.

The region set apart is traversed by the Santa Yñez mountain range, and lies north of the private land claims bordering on the coast and south of the private land claims bordering on the Pine Mountain and Zaca Lake Forest Reserve.

On Congressional Recognition.

William J. Nisbet, of the Indian Forest Service, one of the greatest authorities in the world on silviculture, declares the United Kingdom could save the \$50,000,000 now paid annually for foreign timber by giving proper attention to the reforestation of absolutely waste lands in Great Britain and Ireland. "Every penny of

that vast sum," he says, "could be saved, besides giving healthy and remunerative employment to thousands of people." If this is possible in Great Britain, how much greater are the possibilities of practical results in this country. Forestry is a subject which should be no longer slighted by Congress.—*Phila. Item.*

A Fair Prophecy.

Despite the official reports that the forests of Michigan, Wisconsin and Minnesota are nearly exhausted, announcement is made that an army of 35,000 men will be engaged in cutting down Pine trees in that region during the coming winter.

It is evident that the call for forest preservation has been made none too soon. Unless the lumbermen are speedily checked, the water supply of the great lakes may be endangered. Already navigation is difficult in some of the connecting channels and there is talk of building a dam across the Niagara river at Buffalo to raise the levels.

When the forests have been laid waste there will be loud lamentations in the lake towns, though now they view the situation with apparent complacency.—*Utica (N. Y.) Press.*

An Important Decision.

A matter of very great interest to citizens generally has been decided by the Illinois Supreme Court, which has

ruled that the shade trees in the street in front of a man's property belong to him, and cannot be cut down or mutilated without his consent.

The suit was one in which a property owner sued a telephone company for cutting off the limbs of his trees in order to make room for its wires. The decision is *prima facie* evidence that the value of

trees is becoming more generally recognized everywhere and augurs well for greater public interest in forestry itself. There can be no doubt that were the general public more fully aware of the principles of forestry, there would be manifested a very pronounced sentiment for the protection of trees, both in the cities and forests.

In the Woods of Minnesota.

Trip of a German Forest Expert Over the Site of the Proposed National Park. Some Considerations Indicating Large Profits to the State from Small Expenditure.

BY THE FORESTER OF THE VANDERBILT FOREST, BILTMORE, N. C.

The map tells us that Leech Lake's shoreline extends over 574 miles. The state of Minnesota, measured from north to south, is only 384 miles long. Imagine! If the shoreline, with all its bays and beaches and spurs and tongues, was stretched lengthways through Minnesota it would reach way down into Iowa! But shorelines do not belong to the chapter of economics.

Safely landed, with the help of an Indian pilot, we enter the woods. As usual, a belt of low hardwoods, Oaks, Elms, Maples, Birches and so on, occupies a narrow strip of land along the water-front. Nature has selected the fittest. Storms blowing across the lake with unbroken force are sure to turn over any Pines that might boldly show their heads beyond the level of the hardwood crowns. The long body of the Pine is a capital lever for the wind, with the help of which a tree is easily uprooted. The shallow root system of the White Pine subjects it badly to the storm's deadly attacks.

A look at the big hole caused by the wind tearing out a tree by its roots allows us to judge the quality of the soil. It consists of sand, with a slight admixture of loam, a soil which abroad, where the population is dense, is considered good for farming. No wonder, then, that the im-

migrant-settler is easily induced to occupy such and similar ground, offered to him by Uncle Sam's kindness free of charge, or at a low price by speculators who secure from lumbermen, at a nominal sum, large tracts, denuded of tree growth.

We see such land advertised in the papers as "the bonanza of Minnesota," "the poor man's paradise," "the Cripple Creek of the farmer." But woe to the inexperienced new-comer, trapped by these eulogies! To bring the ground in tillable condition is expensive, while the growth of potatoes, corn or cereals will exhaust the soil thoroughly in five years.

There is so much good land available in the United States that it does not pay to occupy medium land cleared from its cover of trees, even if it is given to the farmer free of charge. The federal and state governments have allowed, in the state of Minnesota alone, an area of several million acres to be transformed into an unproductive waste. The main principle of political economy, that the productiveness of every acre of national soil must be maintained or increased, has been overlooked. If the production of meat and hides pays best on a given soil, let us use it for cattle pasture. Where field crops are most remunerative, let us raise them. On land which is so rocky or so sandy as to bear

tree growth only, let us raise trees, and that kind and size of trees which pay best.

A look at the Pine woods surrounding us on Leech Lake tells us in a moment how trees should be raised. At the foot of their mother-trees we find millions of small Pine seedlings trailing on the ground. Where a windfall has removed the parent trees, the children at once shoot ahead towards the sky, growing at the rate of twenty inches per year. Why should we not imitate the wind, cutting all such old trees which have reached merchantable size and allowing their progeny of seedlings to fill the gap! This natural system of working a forest will allow ground fit only for tree-growth to continue to be productive after the virgin timber has been removed. If Nature herself were not sure to restore young trees in the place of the old ones, there would not be any forests on this globe. Imitating nature's ways, it is easy to maintain forests.

Why, now, does the timber owner allow the ground to be barren? Why does he give it up to the state for non-payment of taxes after cutting the old trees? Does he not realize that sapling trees thirty years old are worth twenty-five cents apiece, if the value of trees 120 years old is \$2, figuring at three per cent. compound interest? Does he not see that skillful handling of the ax when removing old trees can result in 500 saplings per acre, which will grow up into timber of superior quality standing close together and clearing one another from side branches?

The timber owner is well aware of all these natural facts. But he is aware, too, of another not natural fact: The absolute certainty of the second growth to fall a prey to fires before it has time to fortify itself against conflagration by forming a heavy layer of fire-proof bark around its stump. In the case of the flat-rooted White Pine, even old trees, having their long roots imbedded in combustible mould, are badly subject to death from fires. The owner is undoubtedly wise, when leaving the land bare and barren.

But is the commonwealth wise in allowing the area of barren land to increase annually, in Minnesota alone, 125,000 acres?

Should it not either employ a staff of guards to prevent fires on private land after lumbering, or else establish as a national forest and keep under proper care all such land as is fit for growing trees, and for nothing else?

We, the public, ruling and loving this country, must select through our legislatures that way which is best adapted to our peculiar economic and legal conditions. For our legislators, a knowledge of the facts prevailing in northern Minnesota, Michigan and Wisconsin is indispensable, if they want to solve the difficult problem. Col. John S. Cooper's excursion, starting from Chicago on September 28th, affords a chance to see the actual conditions. The facts form the argument upon which the urgently needed change of Governmental land policy must be based.

Two trains, consisting of thirty cars each, loaded high with 110,000 feet board measure of pine logs, passed the depot while the tourists were awaiting their train. Six freights of that description pass Walker day by day, each one carrying to the mills what the last 150 years have produced on an area of twelve acres. There is not one, but hundreds of logging camps in the woods, and we might well be proud of the achievements of American genius in forest utilization. We do business on a larger scale than all Europe taken together. Minnesota alone produces 1,250,000,000 feet of lumber annually, and it might continue to do so if 10,000,000 acres of pine land were treated after conservative principles.

A short ride through interesting forests and swamps takes us over to Cass Lake. The white man has not had a chance yet to ruin the beauty of the Chippewa reserve. Instigated by the dead-and-down timber act, he has tried, of course, to put his hand on its chief value, the timber. As there was not enough dead-and-down timber to make logging remunerative, he has worked hard with kerosene and firebrand to accelerate the death rate of trees. Charred Pine trees on hundreds of acres bear witness to the deed.

There cannot be any doubt that on good land the farmer's plow must follow the

lumberman's ax. On medium and poor land, however, the tree must be followed by the tree, lest the national soil be allowed to lie unproductive. We hear a great deal of talk relative to reclaiming barren soil for production by means of irrigation. Why does no one lift his voice with a view of preventing productive lands from being changed into a barren waste?

Reforestation of absolutely denuded tracts is difficult and expensive. France and Switzerland are spending millions of francs annually to restore the forest on tracts wherefrom reckless use removed it decades ago. We learn abroad how to do this and that. There are a few things which we should learn not to do. Forest destruction is one of them.

Forests and swamps are nature's storage basins. If we destroy them agriculture and commerce must suffer. Suppose the advantage annually derived from the mere existence of forests, owing to their influence on water supply, public health, commerce and manufacture amounts to a million dollars. Should we not spend \$200,000 annually for the maintenance of forests? We maintain an army, a navy, an administration, a foreign service. Should we not employ local police, organized after the army pattern, to guard the forests on our private, state and federal land? Germany and France have a forest service. Why not we?

THE "FOREST SOLDIER."

After some slight training the "forest soldier" might be employed for laying out and keeping in order public roads traversing the forest. The importance of roads to transport forest produce and for fire-breaks will make it advisable to put road matters in charge of the foresters. The revenue derivable from sale of forest produce will soon be sufficient to more than cover all expenses.

The American people have seen their way clear in many a case. If they only were aware of the facts they would soon find a broad highway out of the difficulty. This is an economic question, and on better business men than the American people the sun never shown.

The facts are plain enough; millions of acres in Minnesota, Wisconsin, Michigan and elsewhere, productive of timber, have laid idle for years. Private enterprise cannot transform the waste into productive land, the transformation not having proved to be remunerative under the present economic conditions. Change the conditions! We not only complain of the non-production of 150 feet board measure per acre per annum on the deserted land. Every 150 feet board measure produced means employment of common labor in manufacturing hundreds of commodities out of wood fiber—furniture, etc. The labor required to transform 150 feet board measure into some sort of a manufactured product averages about \$3. If 50,000,000 acres fit for timber growth are lying idle, \$150,000,000 are lost annually to the American laborer in the near future.

Bewildered at our own conclusions we stop—just in time—to see at our feet the foot-prints of deer—long, pointed, a narrow bench left between the hoofs, the hind hoofs slightly impressed in the wet soil. This is a stag's calling-card, and a big animal he was. Game is getting scarce, losing its abode in the vanishing forests. Large forests cannot and shall not be kept for sport and fun only. But if sport and fun can be had in addition to economic use, why not have them? Constant use makes the instrument dull, and even sharp American wits will require filing now and then.

The White Pine, being exacting, requires nourishment and help to propagate its family. Often a generation of Poplars and Birches must act as nurses for the much-exacting aristocrats. The old tree, on the other hand, although it sends its roots over a space of 600 square feet, embracing rocks and dead stumps with root fibers, is readily killed by heavy fires. No wonder, then, that the lumbermen, instead of leaving this sensitive treasure in the forest, prefer to transform it into fire-proof money at the quickest possible rate.

If you have not seen those giants of the woods, overtowering their neighbors by sixty feet, go quickly, before they all dis-

appear. Even if the country adopts a system of forestry, such giants will not be produced any more. They are losing rather than gaining in volume and value. Now 300 years old, they have not added more than two per cent. annually to their volume for the last 150 years. Soon they will fall and decay. On the dead body, nature will plant the most beautiful velvet of tender mosses, decorating the old giant's grave. And after a while, amongst

the mosses a seed will germinate, developing into a White Pine. The young generation builds up its new organism on that made by its ancestors, just as human beings continue business footing on their fathers' work.

There is no room in the dictionary for all our names; all we can secure to last longer than our life is a good name and memory, cherished by loving children.

C. ALWIN SCIENCK.

Dispelling an Illusion.

The fear of some citizens of Minnesota that the creation of a great National Park and Forest Reservation in that State would interfere with their material prosperity has been dispelled in large part by a consideration of the business and population in the Adirondack Park in New York. In a recent letter in reply to inquiries addressed to him by the Chief (Forest) Fire Warden of Minnesota, Colonel William F. Fox, Superintendent of State Forests of New York, says:

GENERAL C. C. ANDREWS,
St. Paul, Minn.

MY DEAR SIR:—I take pleasure in acknowledging the receipt of your letter of the 3d, and would respectfully submit the following information in reply to your inquiries. According to the State Census of 1892, there was a population of 32,071 within the boundaries of the great forest of Northern New York, or what is termed the Adirondack Park. This population has increased largely since the census was taken, it having doubled in some localities. The figures given embrace permanent residents only, and do not include the very large number of hotel people and tourists who frequent the forests during the Summer season. There are *also* a great many sportsmen who go into the woods during the Spring months to enjoy the fishing, also the hunters who go there in the Fall for the deer and partridge shooting.

Of late years the fixed or winter population throughout the Adirondacks have

become strong advocates of forest preservation. They admit freely that they can make more money out of the Summer people, tourists and sportsmen who frequent the forests than they can obtain from the lumbermen. There are over 1,000 guides in the Adirondacks. In the Annual Report of the Forest Commission for 1893 I published the names and postoffice addresses of 788 of these guides. When these men work for the lumbermen they receive \$1.00 per day and board. During the Spring, Summer and Fall, while employed as guides, they receive \$3.00 per day with board and other expenses. The livelihood of these men and provision for their families depends upon the existence of the forests.

In further reply to your inquiries I would say that the population of the Adirondack forest is more largely scattered than the figures given you would indicate. There is little tendency to concentrate in villages. Still, there are several villages which are entirely dependent upon the people who come to the woods for pleasure or health. The village of Saranac Lake contains about 2,200 people. This place is built up largely by wealthy persons who, on account of pulmonary troubles, are obliged to live in the forests. Lake Placid, with a population of about 1,500, is composed almost entirely of hotels and boarding houses. In the Summer it has a population of several thousand. These people do not want any lumbering done

near them. There is more money for them in a standing forest than in saw mills and river driving. They would rather see the logs standing in the trees than in piles in the skidways. The villages of Wells, Indian Lake and Long Lake have each a population of from 700 to 900 people, one-half of whom obtain their livelihood by work as guides.

In the Catskill forests there are several beautiful villages, notably Pine Hills, Tannersville, Palenville, Hunter, Stamford, Margaretville and Fleischmans, with a population of from 800 to 1,200 each. These villages are all dependent for their existence upon the Summer residents, who throng this region on account of its nearness to New York City; but the villagers are well aware that if the forests which

cover the Catskill Mountains are ever removed or destroyed they will lose the patronage of the Summer people and their occupation will be gone. Of the many thousands who frequent our Adirondack and Catskill forests each Summer a good proportion are from outside States. The large amount of money which these outsiders leave within the State of New York will exceed the millions which the State is paying for the purchase and preservation of its forests.

Hoping and trusting that the forest movement in your State will be successful in every way, I am

Yours with great respect,

WILLIAM F. FOX,
Superintendent State Forests.

For the Majesty of the Forest.

A young and prosperous nation is necessarily unthinking, so far as the consideration of posterity is concerned. But with nations as with individuals, age is inevitable, and may we have the good sense to profit by the experience of some older countries in a matter of beauty and utility, a tinctipation of an age that will surely come. As the years roll on and each succeeding generation continues to ignore its duty and to set aside all obligation to retain the beautiful in age, our country will soon be deprived of one of its greatest glories—its primeval forests. It is nature and the gods alone who are eternally young. "For there is hope of a tree if it be cut down, that it will sprout again." Nature is kind to her children and in spite of the many wounds inflicted upon her motherly breast by the greed and thoughtlessness of man, she is ever prompt to heal the wounds and lend her care to the new life intrusted to her keeping.

Happily the time has come when the attention of our people is being called to this important subject through the efforts of the American Forestry Association. To the majority of persons, the word

forestry suggests a vague idea of planting trees and beautifying generally, when in reality this is but a branch of the subject. "Forestry is simply the management of lands grown with forests, and its object is to derive from such lands the greatest possible benefit for the owner."

Forestry does not necessitate the appropriation of good agricultural lands; one of its greatest advantages is that wood and timber can be profitably grown on soil that is unfit for farming purposes. Germany discovered this some centuries ago, and a system of forest schools was established which has led to the grand results seen there to-day. Nor does forestry interfere with the march of civilization, nor the growth of cities. The Black Forest is an illustration of this.

The forests of Germany are its crowning beauty as well as the source of health, wealth, and national independence. And perhaps there is not a nation in the world that has paid more attention to the study and application of the beautiful in forestry and arboriculture than Japan. The Japanese make the most of every inch of ground, and take care to plant Firs and

Cypresses in barren soils that are fit for nothing else. For ornament and shade, however, the roads are lined on both sides with superb Pine trees, which give great beauty to the country and make travelling in warm weather a pleasure. And we, too, are laying the foundation for a like record in the years to come.

The United States has recently set apart 46,000,000 acres of mountain lands as a forest reserve, and has appointed a sufficient force to insure their administration and protection from fire. It is an interesting fact, that for the first time in the history of our country, the President in his last annual message, devoted space to the subject of forestry.

We have much to look forward to from the increasing interest manifested in our National and State Parks, and in the conscientious efforts of the officers of the Association to enforce the laws in punishment of wilful destruction and for the still

more disastrous results arising from carelessness in starting forest and prairie fires. The fire wardens in our State have done much to stop this evil, and the report for 1898 shows, of the total number of fires, 78 per cent. controlled or extinguished by fire wardens.

The States of New York and Pennsylvania have made more progress in a business-like treatment of forestry than any others in the Union. Pennsylvania sets the valuable example of being willing to sink large amounts of money without hope of return, simply because she appreciates the immense indirect advantage to be derived from a proper care of her forests. And let us hope that the people of Minnesota may be equally far-seeing, and may not withhold their hearty coöperation and substantial aid in furthering the work so well begun.

REBECCA B. FLANDRAU.

In the *Courant*, St. Paul.

The Forests of the Nation.

The annual report of the Commissioner of the General Land Office of the Department of the Interior, which will shortly be issued, contains the following recommendations referring especially to forestry:

The changing and enlarging of the limits of the Mount Ranier National Park, State of Washington, on the lines advised by Bailey Willis, of the United States Geological Survey, in his article, prepared especially for THE FORESTER, and published in the May issue of this year.

The extension of the Yellowstone National Park.

The appropriation of three hundred thousand dollars for the expenses of the forest service in connection with the creation and administration of forest reservations.

The enactment of a law that shall empower forest officers, special agents, and other officers having authority in relation to the protection of public lands and the timber thereon, to make arrests, without process in hand, for the violation of the laws or rules and regulations relating to the forest reserves or other forest lands of the United States.

The authority to rent or lease lands within forest reservations for any purposes not incompatible with the purposes for which such reservations are created.

Legislative provision for the entry of lands within forest reservations which are found to be more valuable for the coal therein than for forest uses.

Protecting the Government in the exchange of lands within forest reservations for those without, by legislative provision that the natural state of the tract relinquished shall not have been changed except to such an extent as may have been necessary in clearing the land for actual cultivation.

Recommendation in matter of perfected claims to lands in forest reserves (Act June 4, 1897), where ownership is established and land is reconveyed to the United States.

THE FORESTER.

A MONTHLY MAGAZINE

Devoted to Arboriculture and Forestry, the Care and Use of Forests and Forest Trees, and Related Subjects.

ANNOUNCEMENT.

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Hon. JAMES WILSON, Sec'y of Agriculture,
President.

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Make all checks, drafts, etc., payable to THE FORESTER.

SPECIAL ANNOUNCEMENT.

The next issue of THE FORESTER will be the Christmas number. It is the intention of the editor to make it noteworthy in a number of ways. There will be more of the new features which have marked the recent progress of the magazine, and which have received the warm commendation of its readers. Its contents will be even more diversified than usual.

THE FORESTER during the year 1899 has aimed to commend itself on its own merits to all who should look through its pages. If the editor may judge from letters written by its readers, it has improved in quality as well as in size and appearance, and it is confidently believed that the Christmas issue will be voted the best and most attractive number of a good volume.

But this end has not been reached without increased expenditures of a very considerable sort, cheerfully authorized in the firm belief that the improved magazine would be more welcome than ever to its old friends, through whose help, linked with the efforts of the management, THE FORESTER would reach many new subscribers. And in the consummation of this plan every friend of forestry can do yeoman's service.

"Rally 'round the tree" is the watch word, a little energy and personal influence the requisites. Public interest in forestry is everywhere increasing rapidly, in proportion as its importance becomes known. To bring the subject forward, THE FORESTER makes the following offer: To all who subscribe during the present month will be sent THE FORESTER up to January 1, 1901, with the issues of the last three months of this year, including the handsome Christmas number—fifteen months for \$1.00.

Attention is also asked to the blank application for membership in The American Forestry Association, to be found on the page facing page 270 of this issue. Let each member have this filled in and returned by a prospective new member. All applications come before the committee on membership for ratification. New members whose annual dues are paid during the current month will be furnished the above mentioned copies of THE FORESTER gratis. Duplicate blanks with any further information may be secured by addressing The American Forestry Association, Washington, D. C.

There are many evidences of a public awakening throughout the United States to the realization that the perpetuation of forests is a matter directly affecting the welfare of state and nation. There can be no denying the fact that the attention of thoughtful people has been much aroused lately to the importance of the subject.

The prospect of a great National Park in northern Minnesota has stimulated other parts of the country to action. In a letter to THE FORESTER, a member of the American Forestry Association says of this movement:

"Western North Carolina, it seems to us here, is par excellence the place for a National Park. Thousands upon thousands of acres of virgin forest, at an altitude ranging from 2,000 to 6,000 feet, are now inviting such a beneficent movement. Apart from the Vanderbilt forest of nearly 100,000 acres, the woodman's ax is fast getting in its work in this most beautiful mountain section of America, and a few years from now the opportunity of establishing a National Park here may be lost. Senator J. D. Pritchard, a man of ability and influence, is interesting himself in the project and I bespeak for the enterprise your coöperation."

CHIPS AND CLIPS.

Autumn tree-planting gives emphasis to the growing interest in forestry.

The forests which have wood "to burn," as the colloquial phrase goes, justify their name at this season of the year by frequent fires.

One million people are supported by forestry in Germany and two millions more by manufactures of which forest products form the principal material.

The steady advance in prices in the lumber trade was brought to mind rather forcibly by a pack of Chicago thieves who recently stole 60 feet of a picket fence.

A feature of the forests of British Columbia, especially of the coast, is their density. As much as 500,000 feet of lumber has been taken from a single acre.

Cornelius W. Smith, of Syracuse, N. Y., president of the New York State Fish, Game and Forest League, died at his home of heart disease, October 28, aged 54 years.

The municipal authorities of Camden, N. J., have prohibited the further posting of handbills and advertisements on trees in the public streets on account of damage done to the trees.

A series of tests, to determine the strength of British Columbia Douglas Fir produced very satisfactory results regarding the relative value of the various qualities submitted.

Elihu Stewart, Canadian Chief Inspector of Timber and Forestry, made an official trip through Manitoba and British Columbia lately to investigate the condition of the forests of Western Canada.

The local authorities in Ulster County, N. Y., are securing options on 9,000 acres of wild lands for forest reserve purposes,

under a legislative act appropriating \$50,000 for purchasing lands in the Catskills.

Pacific Coast lumbermen expect that Russia, with her trans-Siberian railway, the development of seaport facilities and the establishment of commerce on the Pacific will prove a valuable customer in the near future.

Pennsylvania seems to be experiencing a considerable awakening to the good which Commissioner Rothrock can accomplish if provided with the necessary means. But the State Treasury has no funds for forestry at present.

In Europe there are a number of good examples of remunerative forestry. The duchy of Baden derives a net annual revenue of \$667,000 from 240,000 acres of public forest, and the kingdom of Wurttemberg \$1,700,000 from its 418,000 acres of public forest.

The White Spruce is a very useful timber, grows in low swampy lands, and does not occur in large compact bodies, but interspersed among Fir and other trees. It almost equals the Fir in circumference, but does not grow to such a height nor is its stem so clear of branches.

Japan is taking kindly to the principles of forestry, the government now making provision for perpetuating the forests on a definite plan. In the main islands the forest cover has been considerably denuded, and an imperial edict has decreed that young trees shall be planted for every mature tree cut down.

The city of Santa Barbara, Cal., has consummated the purchase of 3,500 acres of mountain lands in the Santa Ynez range, in accordance with an act of Congress allowing an option of \$1.25 an acre, for purposes of water conservation. A tunnel will be built to Santa Ynez River, a distance of three and a half miles, to supply the water.

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INCORPORATED, JANUARY, 1897.

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The object of this Association is to promote :

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

Owners of timber and woodlands are particularly invited to join the Association, as well as are all persons who are in sympathy with the objects herein set forth. Fill in the blank application on the preceding page, and address only

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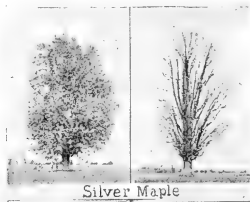
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A MONTHLY MAGAZINE

devoted to the care and use of
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to related subjects.

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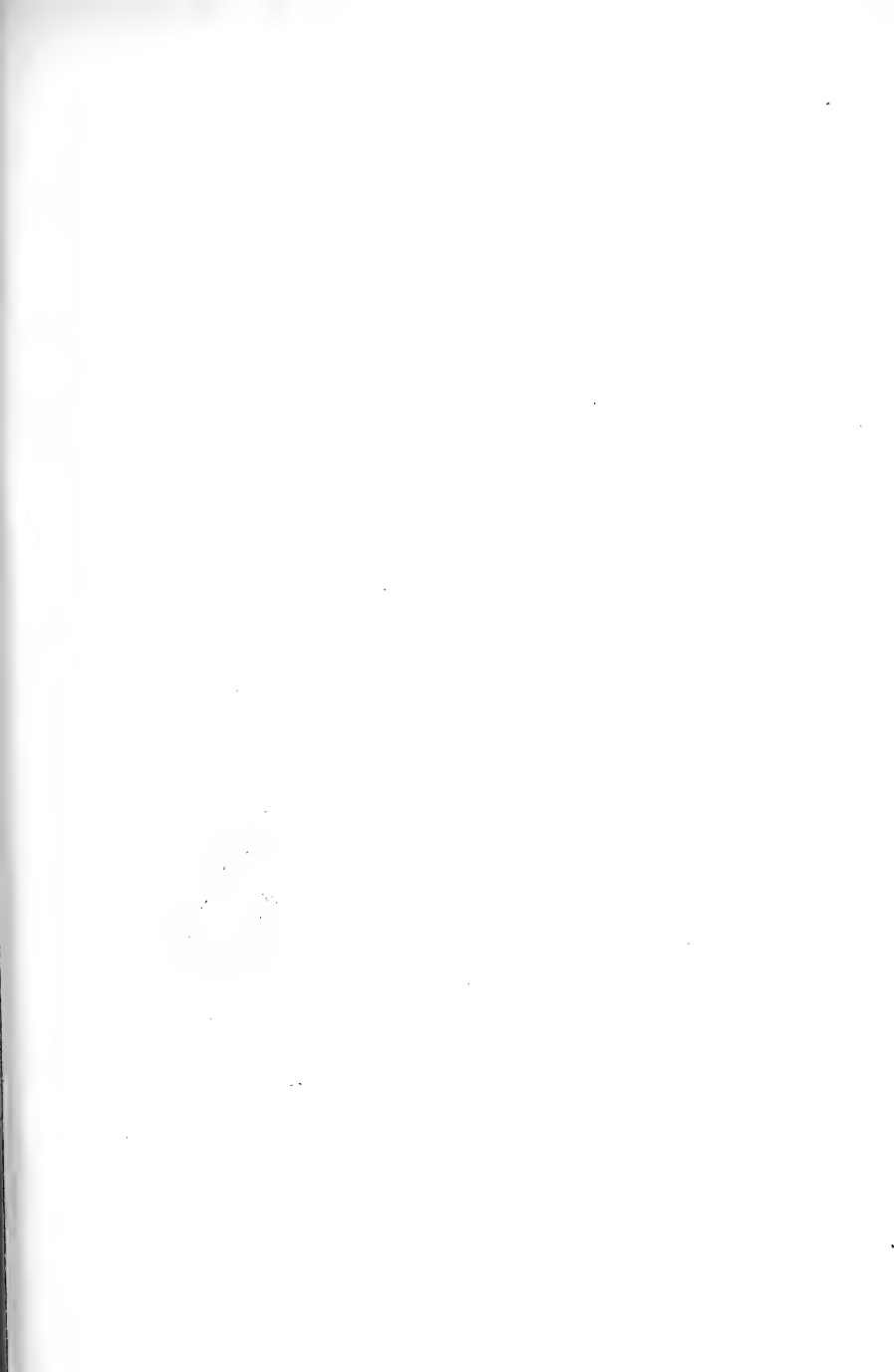


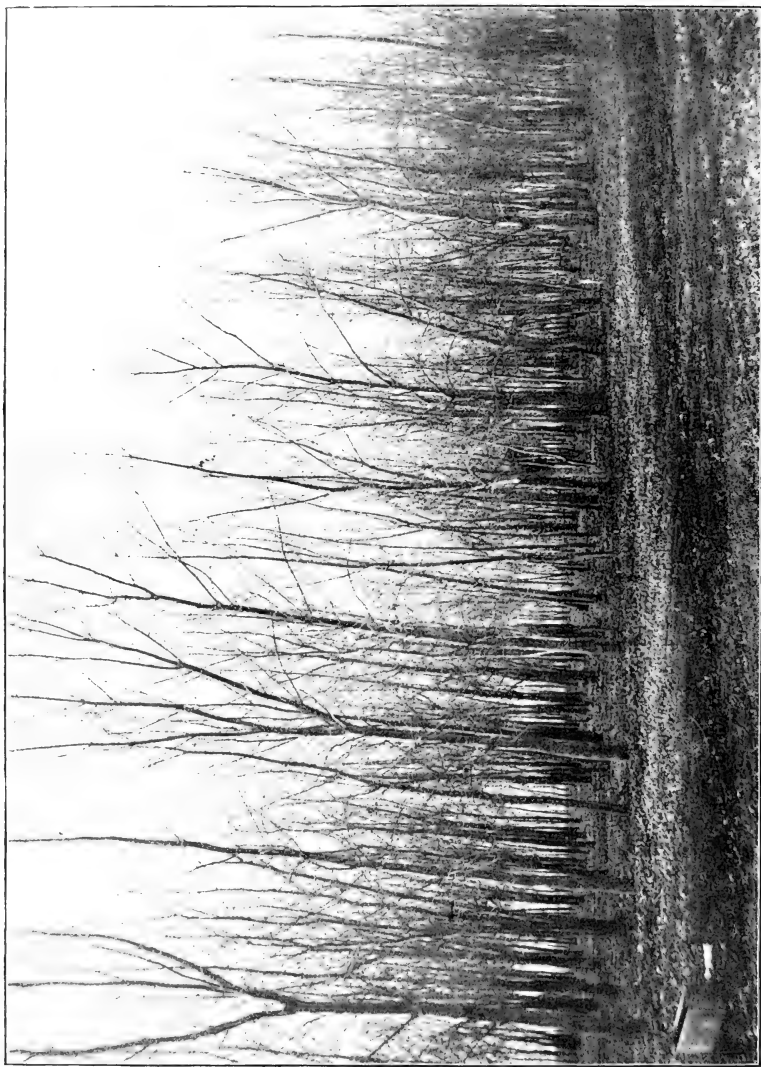
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AN EXAMPLE OF SCIENTIFIC FORESTRY.

Economic Tree Planting in Kansas, Showing a Twenty-five year old Plantation of White Maple, near Manhattan, Serving as Windbreak and Source of Fuel.

THE FORESTER.

VOL. V.

DECEMBER, 1899.

No. 12.

What Forestry Means to the United States.

BY THE SECRETARY OF AGRICULTURE.

Among the great questions which bear directly both on the present prosperity of the United States and upon the future wealth and happiness of its people, forestry occupies a conspicuous place. To realize how prominent is its part among the problems of our national life it is only necessary to glance at its relation to the great industries of the country. Practically all manufactures are tributary, directly or indirectly, to the forest. The great business of transportation would be wholly impossible without it. A failure of timber in mining is often as disastrous as the failure of the ore-body itself. Even Agriculture, without the products of the forest, would be everywhere seriously crippled and in many parts of the country almost absolutely impossible. In a word, forestry is interwoven with the whole of our present activity as a nation.

The public mind has not, however, always been awake to the vital connection of forestry with our national welfare, nor has it always understood what the term itself denotes. To quote from an article in the last year-book of the Department of Agriculture :

“The meaning of the word ‘forestry’ changes in the public mind from decade to decade. The change is due not only to a better understanding of the subjects with which forestry deals, but also to a radical difference in the way forestry is esteemed. The progress of the knowledge of any subject is almost always accompanied by a change in the point of view from which that subject is regarded. Thus, electricity, from being a matter of purely scientific curiosity, has made its way in public thought to the position of one of the foremost industrial forces of the time, with the promise of such future usefulness that whatever relates to it finds a ready hearing. In somewhat the same way forestry is gradually winning a better standing and a larger place in the consideration of the people.

“At first forestry was understood to relate to trees; and it was not until recently that it began to be seen that it has far less to do with individual trees than with forests. At that time landscape work and forestry were completely confounded, nor even at this day is the distinction always clearly made. Street trees were supposed to be the special province of the forester, and even yet one of the great Eastern cities has a city forester, whose duties are not concerned with any forest land. This point of view has served a most useful purpose, it is true, in enlisting the countenance and support of very many persons whose interest in forest matters, rightly so called, would have been small indeed, but it may fairly be questioned whether there has not been a counterbalancing loss of the good will and consideration of practical lumbermen and owners of forest land.

“Apart from the æsthetic point of view just referred to, a serious check to the progress of forestry, or, as this side of it might well be called, of conservative lumbering, was

the general praise given to European methods of forest management and the frequent and strenuous, but utterly impracticable, advice to apply them in the forest of North America. To very many of the men upon whom the introduction of forestry in the forest depended and still depends, this was a complete barrier, for it made forestry seem unworthy of even the most casual consideration. But these were mere temporary obstacles to a true understanding of forestry and marked what may have been inevitable stages of its progress. Another and a worthier point of view has been that of the effect of forests upon climate, a subject of which, it must be confessed, we know comparatively little. To-day this subject is largely replaced in general discussion by the effect of forests on water supply, with which we are better acquainted. This, at last, is one of the real and vital issues with which true forestry is concerned."

But it is only one of them. The vast material progress which, since 1865, has distinguished the United States among all the nations of the world, would never have been achieved without the great resources in timber which we have been able to command. In spite of the enormous development of the use of metals in this country, our material civilization is still distinctly founded on the use of wood. If we had not had an abundance of wood from the beginning of our life as a nation until the present day, the United States would not now be first in the family of nations in wealth and in food-producing power. Whether or not it is true that republics are ungrateful to their great men, it certainly is a fact that their citizens are careless of the resources to which their prosperity is due. That great wealth finally tends to prodigality is an axiom in human nature, whose illustration can nowhere be found better than in the treatment of the forest resources of the United States by its citizens. It is not without interest to note that the first settlers in New England, with the vast stretches of unexplored wilderness before them, and a body of standing timber to draw upon whose amount they could not even reckon, took immediate steps to prohibit the waste of wood and the destruction of forests. It was only later, when a knowledge of the vastness of their timber resources led to recklessness, that the indiscriminate destruction of forests began. Still later came the second effort toward forest protection, in which we are still engaged.

It has not been wholly due to recklessness or thoughtless haste to be rich that the destruction of vast areas of forests has occurred in the United States. Economic reasons have had immense influence and one of the chief of these is the question of taxes on timberland. Referring to the unbearable weight of the taxes too often assessed on uncut or cut-over timberlands, the article quoted above says with entire justice:

"Hundreds of thousands of acres in the white-pine region, notably in Pennsylvania, and in Michigan, Wisconsin and Minnesota, have been cut over, abandoned, sold for taxes, and finally reduced by fire to a useless wilderness because of the shortsighted policy of heavy taxation. To lay heavy taxes on timber land is to set a premium on forest destruction, a premium that is doing more than any other single factor to hinder the spread of conservative lumbering among the owners of large bodies of timber land. Not only does this policy lead to the destruction of the forest, but it reduces eventually the sums raised by taxation. Devastated lands are valueless, and therefore can not be assessed at anything like their former rates. Then follows a reduction in the sums raised, and then a higher tax rate for the rest of the real property in the region; and so, by a roundabout but certain road, the chickens come home to roost, and the men who invited the destruction of the timber that should have made and kept them prosperous have to pay some part at least of the penalty of their shortsightedness.

"It does not change such facts as these to explain how the heavy taxes happened to be assessed. It is true that the temptation to tax nonresident owners is very great; that companies are often made to suffer for their local unpopularity, and that the burden of building and maintaining roads and bridges and court-houses in sparsely settled countries bears heavily on their people. But when every allowance has been made, the fact still remains that heavy taxes are responsible for the barrenness of thousands of

square miles which should never have ceased to be productive, and which must now lie fallow for many decades before they can be counted again among the wealth-making assets of the nation. It is not greatly to the interest of any man to protect such wastes, and so fire runs over them year after year, and their possible utility recedes further and further into the future."

This instance of the destructive agencies which are constantly reducing the area of productive forests is but a single example chosen from very many because it is less widely known. Forest fires, sheep grazing without proper safeguards, and the lack of a general knowledge as to what is possible in forestry are among the other great influences at work for harm. It is only of recent years that the conservative forces have begun to make themselves felt, and even yet they are by no means up to the level of their task, albeit steadily gaining. The conflict against the forces of forest destruction, with its enormous attendant evil to the nation, as opposed to conservative forestry, with the security it brings is worthy of the best interest and effort of every patriotic citizen.

For many years a small body of earnest men has been calling public attention to the urgent need of action for the preservation of forests in this country, until at last they have convinced the people at large that something needs to be done. At first there was a general impulse to ridicule the warnings and appeals of the American Forestry Association, to which in the end nearly all of these men came to belong. There was a reason for this state of affairs, for at first much that was written and said by over-enthusiastic friends of forestry was less practical and less directly applicable to the American forest problem than it should have been. But this tendency gradually disappeared before a better understanding of the problem by the friends of forestry, and a truer conception of the real purpose of the forest reformers by the lumbermen and the general public.

At present there is scarcely an intelligent American who is not in accord with the aims of the American Forestry Association. The time has evidently come when this Association, strengthened by the approbation of its objects now practically universal among our people, is about to make its beneficent influence much more widely and practically effective than ever before. Indeed all the agencies at work for the perpetuation of our forests are taking on new vigor, forest schools are springing up here and there, young men in numbers are turning their eyes toward forestry as a profession, and the general desire of the people, expressed through their representatives in Congress, is giving greater efficiency, year by year, to the work of forest education and right forest management on the ground. Among the forces on the side of progress the Department of Agriculture has long held, and still maintains, an honorable place.

Protection, chiefly against winds, floods, and drought, and the continuous production of wood, are the prime objects of forestry. To review in detail what forestry means to the United States would be to discuss the value to the nation of practically all its industries, for practically all of them use wood, and the comfort and prosperity of practically all its people, for we all use wood in ways we could very ill afford to spare. In addition the lumber, tanning, and wood-working industries, with their enormous annual output, would have to be specially considered. Forestry means the preservation and perpetuation of all these, just as continued forest destruction means their injury or their complete decay. But my limits will not permit me to dwell upon this phase of the subject. I pass now to a sphere of forest influence with which, as a farmer, I have had special opportunity to become acquainted. It may serve as an example of how closely forestry may be related to the men of a widely separate calling.

The interest of the farmer in forestry is a vital one, and by no means confined to the effect of great forest masses on the climate or on the distribution of the rainfall. Such bodies of forest usually lie apart from the chief farming regions, and their influence, however great it may be, and however generally it may be acknowledged, is far less tangible and convincing to the farmer than the things he can see and handle on his own

farm. I have no desire to belittle the vast utility of mountain forests, or to slight what may fairly be called the appalling need of conservative forest management throughout all the great forest areas of the country. These are matters of the first importance to the prosperity and happiness of us all, and it would be difficult to give them undue weight in any consideration of the great resources of the United States. In this paper, however, I must take them for granted and go on to consider briefly what interest the farmer has in forestry on his own farm.

There being, according to the census of 1890, more than 200,000,000 acres of forest in farms, it appears at once that this is, in the aggregate, a very great question for the farmers in wooded regions. As we shall see, it is no less important for the farmer living where all the trees have been planted by the hand of man.

A farmer who has a woodlot on his farm is interested in it in three ways. If he lives in a treeless country the protection of his house, his stock, and his growing crops against freezing and drying winds is of the very first consequence. It may be objected that this matter of windbreaks and shelterbelts is outside the domain of forestry, but the objection is not well taken. Forestry deals with forest trees in their relation to the material welfare of the human race. Whether the service they yield to man is rendered in fuel, timber, or protection does not affect the definition. Nor is it material whether the protection given is against floods, snowslides, blizzards, or drying winds. All these are within the province of forestry.

The farmer in a treeless region is deeply concerned, with the presence or absence of windbrakes and shelterbelts on his farm, not only because of the essential necessity of the protection they afford, but for another and most practical reason as well. It has been ascertained by the estimates of competent men on the ground that the average value of a farm, in certain of our treeless States, is actually increased about ten per cent. by the presence of good plantations.

The farmer, where trees grow unplanted, is likewise concerned in the protection which his woodlot gives, when he is fortunate enough to have it rightly placed, but his dependence on shelter is far less than that of the man in the treeless West. Still it is often enough to make the difference between comfort and discomfort, or sometimes between prosperity and want.

In the second place the farmer is interested in forestry as a producer of wood. The planted grove or windbreak of the prairie farmer not only supplies him with part or all of his fuel, with fence posts, and with wood for other uses about the farm, just as the woodlot does more abundantly for the farmer of the wooded regions, but it may contribute, through the sale of any of these items, ready cash to no inconsiderable amount. On many farms in the East the products of the woodlot, such as ties, posts, and cordwood, bring in a very large per cent. of the yearly revenue in money. It is by no means uncommon for a farmer, to whom his cultivated fields would give but a bare living, to be lifted into comparative ease by the produce of his woodlot. For the Eastern farmer it is always harder to get ready cash than to raise produce for the subsistence of himself, his family, and his stock, and it is just here that his woodlot, rightly handled, is often his main reliance. It is hardly too much to say that under intelligent handling it might always be made so.

In the third place, the farmer is concerned in forestry because he is a purchaser of timber. The price of his agricultural machinery and of nearly all his tools is affected by the progressive destruction of our forests. His house and barn, in the vast majority of cases, are built of purchased timber and roofed with shingles which have cost him money. His produce goes to market in wooden cars hauled over wooden sleepers. His cradle and his coffin are of wood. It behooves him, scarcely less than the lumberman, and far more than many other classes of the community, to see to it that the forests of our country are not destroyed. To that end the American Forestry Association is an instrument sharpened and ready for his use. This Association, if I may be allowed a

word about an organization of which I am an officer, and in whose work I am deeply interested, has for its chief objects to bring about a wise and more conservative treatment of the forest resources of this continent, to diffuse information concerning the conservative management and the renewal of forests, and to encourage the intelligent planting of trees. It is therefore broad enough in scope rightly to be called American, and its purposes may be justly said to be patriotic, in the true sense of that strong word.

In addition to the general interest of the farmer in forestry, and even more vital to his welfare, is the condition of the plantations or the woodlot on his own farm. Forestry is a subject not to be mastered in a day, and yet the woodlot and the plantation should have all the assistance that common sense and training together can give. Such assistance the Department of Agriculture offers to the farmer for the asking.

JAMES WILSON.

The Practical in Forestry.

A Paper on the Blending of Ideas regarding Lumbering, Forest Conservation and Reforestation.

FROM THE LUMBERMAN'S STANDPOINT.

There is an ancient platitude which is often heard, that "There are two sides to every question, the right and the wrong;" but in the question and the study of forestry there are four, viz: the right, the wrong, the theoretical and the practical. Perchance the four may mingle one into the other three, or the three into the one, but it is my intention to expound the practical factor in the great, important, and far-reaching study of forestry in the United States, or, more precisely, on the Pacific Coast.

In the Oriental countries the picturesque, artistic style of the garments donned by the natives impresses the average traveler as most pleasing to his vision. He wonders at the grace, the ease of movement, the subtleness and the many evidently desirable characteristics of the costumes worn; and so, departing from the country of his observations, he is impressed by the ensemble but overlooks the other aspect of the consideration. Through the vista of his romantic conceptions he forgets to study the practical, and deeper evidences which affect the wearer of those habiliments of the past. So it is likely to be with the stu-

dent of the theoretical conditions of the forest movement.

I would not have it understood for a single moment that I am not heartily in favor of the preservation of our forests and the conservation of our waters, but the function of this paper is to dwell on the practical avenue of the consideration: to view forest preservation from the standpoint of the operating lumbermen of the Pacific Coast and of California in particular.

Certainly the numbers and the status of the manufacturers of Redwood lumber deserve and demand attention in the formulation of the acts of this Association which is so nobly championing the cause of forest preservation all over the United States. It is only right; it is only just, for the strictures of a despotism alone would forbid and repress the arguments, *pro et con*, on any subject under consideration. In truth it is to assist and further the efforts of all of us who are so deeply interested in the forest matters of moment, that I have compiled this paper.

I believe it best to throw as much light as my feeble pen will permit upon the

possible obstacles in the path of the future onward march of progress, leading toward and to the goal of successful forest measures, so that we may be strong enough and wise enough to avoid the stumbling blocks and remove the boulders of all opposition. We shall thus be able to leave for our posterity a grand inheritance—the sublime forests which the good Father Protector has given us in all their primeval grandeur. Let us all, as many are now doing, labor to preserve or reproduce, by decades of wise forest enactments, this generous, this beneficent gift.

We all love to linger, as true worshippers of Nature, in the restful calm of the vast forests, indulging in an almost Druidical reverence of the mighty giants of the Sequoia groves; listening to the music of the waving branches which sang their songs of creation long before the Infant's wail, from His cradle in the manger, heralded the advent of a new faith. We, everyone of us, delay our hurrying footsteps to draw fancy sketches of all of Nature's loveliness and drain to the full our flagon of poetic inspiration, while rejoicing that the world has been moulded in so beautiful a conception. But in our peaceful wanderings we never encounter the importunate exactions of the tax collector, or discover, on a bright and sunny morning, that our notes have matured at the bank. We theorize and sup at the board of fancy; but the lumberman, the owner of these same preserves, while feeling and appreciating the natural beauties of his possessions, has with him the omnipresent sense of business responsibility. He has paid with funds and labor, and, to preserve his integrity and status as a man, must open some avenue toward the successful future possession of a new dollar for an old one.

There may exist a misapprehension that the lumbermen of the Pacific Coast are opposed to any efforts being made to preserve the forests, because of a possible encroachment on their rights as lumbermen. A thorough canvass of the larger mill operatives and holders of extensive timber lands in California failed to discover a single individual or company in opposi-

tion to a wise supervision of timber properties. But the character of such methods of preservation must be wise and practically planned. Some of the purely theoretical may be wise, but the average mill-owner has had considerable experience with the holder of theoretical ideas on this subject and looks with suspicion and disfavor upon the "unhappy dreamers," as one of the prominent lumbermen described the type.

But let one fact be understood and appreciated to the greatest extent: the California lumberman recognizes with all of us, that only with the proper care of the forests of this State and of the Coast, under a wise preservative policy, conservative, yet radical, can our water supply of the future be assured, and the prosperity of the agricultural classes remain a comparative certainty. He continues in this line of thought and reasons rightly that, with the well-being of the latter class, will come the growth, the advancement and the prosperity of the commercial, the mercantile, the manufacturing and the social divisions of the commonwealth. Knowing these truisms and appreciating their great bearing upon the welfare of the Golden State, the lumber manufacturers and the possessors of the timber lands are heartily in support of the preservation of our State and Coast forests.

Now for the direct consideration of the practical aspect of the present question of forestry. For the sake of brevity, I will divide the subject into two sections: First, the difficulties opposing forest regulations on this Coast; and secondly, what measures will meet with the sanction of the lumber manufacturing interests.

The first difficulty met with is the enormous amount of the standing timber of to-day in this State, since the lumberman is prone to think only of the present and not of the possibly exacting demands of the future. It has been found, also, that when the mighty mammoths of the forest have been felled, there appears and spreads over the lands so cleared a dense undergrowth of the wild blackberry, with which is mingled the purple *Ceanothus*, colloquially known as the California lilac.

This rapidly growing shrub affords, in my opinion, a far better means of conservation for the waters than did the members of the original grove of Sequoias, since in many, if not all, of the localities, the thicket is so dense that it prohibits the passage of man. This feature has the evident tendency to cause the mill and forest land-owner to set aside all arguments relative to the non-conservation of the waters through the clearing of these forest lands.

But what most heavily impresses the lumberman is the fact that suitable wardens, in their minds, cannot be selected. Suppose, for example, that a supervisor should be selected by the Federal or State governments. Either of these would be prone to follow their present doctrines of economy. The warden would not receive a sufficient salary. He would thus be open to corruption in nine cases out of ten and with his fingers closely grasping a gold piece, he would find the occasion timely for a visit to a distant locality when an infraction of the forest laws was in prospect.

This absence of trust in the integrity of the appointee is to be deplored, but it is natural on the part of the millman, and makes the latter view with suspicion all endeavors to secure possible enactments for re-forestation and water conservation and the furtherance of the same through the acts of wardens. This statement may seem too sweeping, but this idea is supported by the remarks of many of the authorities who know of what they speak, from years of experience in the manufacture of redwood products. High wages seem an impossibility: without which comes the almost certain liability of corruption of the State and Federal officers.

In the consideration of the idea of governmental selection of the timber to be felled there enters the element of wisdom. This characteristic is an absolute essential. Bohemia has proven the success of similar schemes of forest supervision by the government, but the conditions confronting the warden here in California are vastly different. Let the timber of a certain gulch be selected for exploitation. The company constructs a logging

way, it may be either a skid road or a railroad, at considerable expense, and, for remuneration, this company depends upon the receipt of timber in large enough quantities and of medium qualities from the affected district. Here is where the wisdom on the part of the warden proves a necessity. Should he subject the timber to an unwise and too exacting supervision, the company would necessarily suffer a heavy loss on their logging-road outlay. From that occasion the suffering lumberman would seize every means in his power to circumvent the functions of the supervising government agent. But if the latter be wise and possessed of a thorough knowledge of his profession (for it must be a profession), the company is conciliated and a good effect accomplished. Under all other conditions save this single welcome one, the warden encourages the furtherance of a vast amount of evil, rather than of good.

The greatest danger feared by the mill owner is that governmental action will not be uniform or accurately adjusted to the varying conditions of timber localities. To be successful and of permanent benefit, the Pine, the Spruce, the Fir and the Redwood properties must be superintended jointly and wisely on a thoroughly unbiased plan or else the results will be nil.

Relative to the proposal of the governmental purchase of cut-over lands, the same does not meet with approval of the Redwood lumbermen. In the Pacific Northwest the conditions may be more favorable, since the mills are owned by individuals who purchase the logs from others. But the Redwood manufacturers own their own lands and accomplish their individual logging for their own plants. These companies will not dispose of their cut-over lands since, in the majority of cases, their logging operations extend back from adjacent rivers tributary to the ocean and the right of way over these lands determines the increments of expense and time. Again, should the companies dispose of their lands near these rivers, the occupation of such would be dangerous to the purchasers because of the frequency of log-jams and the subsequent flooding of

the adjacent properties with a possible, yes, probable, accompaniment of heavy loss of life. In many instances, companies have refused a fair price for their cut-over lands to avoid legal complications over this latter feature, and the inconveniences of the loss of the right-of-way for logging operations.

These are in part the fundamental objections on the part of the mill operators. Now for the measures which would receive the support of the lumbermen.

The primal essential in the minds of all is the absolute need of a thorough system of forest education which will simultaneously embody the essentials of the theoretical and the practical. This would insure a capable foundation for the general and specific labors of forest culture and preservation.

Secondly.—Under the supervision of either the State or the Federal governments, should they assume the direction of forest movements, a sufficient salary must emphatically accompany the position of forester. This wise feature would nullify all attempts at warden corruption by the efforts of the interested lumberman.

Third.—The political element in the selection of forest supervisors must, first, last, and for all time, be eliminated, and a thorough civil service procedure be inaugurated in the selection of these officials. The technical qualifications, allied with the practical, should be the basis of appointment, and not because the warden is a close business associate of the head of the government, either State or Federal.

Fourth.—The enactments designed to insure wise forestry supervision must be equal and equitable for the various timber species since the warring Redwood and Pine interests will never suffer any element or circumstance to give one iota of weighty influence to either, to the detriment of the other.

Fifth.—The idea of governmental purchase of cut-over forest lands may just as well be relegated to the rear of forest possibilities on account of the evident opposition of the lumbermen. Perhaps some few companies in isolated cases might favorably entertain the contemplated pur-

chase, but the important majority would not.

In the furtherance of these ideas the lumbermen of California and of the Pacific Coast will undoubtedly give their individual and united support. Each and every one of them is heart and soul with the movement, provided no foolish, unwise, ill-advised obstacle is placed in the way of the successful lumbering operations of their future. What they most favor, is the Bohemian policy of gradual re-forestation, which the authorities of that country have followed for decades. There every tree cut into fagots for the warmth of the poor and lowly is immediately replaced by small seedlings, transplanted from the nursery plot elsewhere. In 250 years (the minimum life allotted to the wonderful forests of Humboldt County) the lumberman feels a goodly account would be rendered by the saplings planted in this century.

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Forests for the Rich Only.

The present agitation for street and roadside tree planting draws attention to the appreciation of such plans in England. A recent traveler there, describing the road to Warwick, says:

“There are fine trees all along, many Oaks, some Poplars rising aloft, but especially tall and stately Elms; these are so plentiful that there is a local name for them, ‘Warwickshire weeds.’ Except in the parks of the rich people, however, there are no woods, no forests, no ‘belts’ of ‘timber’; the trees rise out of the hedgrows, stand beside the road, and gather about the houses. Sometimes there is an avenue of them.”

The statement that there are no forests except for the rich may be regarded as “a word to the wise” to consider in time the advisability of national parks for the people in America.

The result of the efforts of Minnesota and North Carolina to secure the establishment of national parks will be watched with interest throughout the United States.

Effect of Forests on Water Supply.

II.—INVESTIGATIONS REGARDING CAPILLARY ACTION AND THE EFFECT OF FOREST COVER AS RELATED TO WATER SUPPLY.

The mechanics of granular soils present some particularly interesting features. It can readily be demonstrated that, if the granules are true spheres and of one uniform diameter, the voids form one constant percentage of the total cubical contents, irrespective of the actual diameter of the spheres, and also that the area of passages between the spheres bears a constant ratio to the area of the circumscribing cross section, irrespective of diameter. This is a property of uniformity of size. By mixing different sizes together in such proportions that each succeeding smaller size enters the interstices of the preceding larger grains of soil may be made impervious to water, save by capillary action. This feature of mixtures will frequently explain the imperviousness of stream beds in sandy gravel. Although the voids and water passages bear a constant ratio to the total volumes and areas with grains of uniform size, the rate of the passage of water is higher the larger the grains. With very minute grains the passages become capillaries entirely and gravitation is overcome.

Capillary action is one of surface tension. Imagine a membrane enclosing each grain and stretched thereon. The tension of this imaginary membrane is analogous to surface tension. The surface tension increases with decrease of radius. The sharper the curvature the greater the tension. When neighboring interstitial spaces are filled with water to a greater or less degree surfaces or films of sharper or flatter curvature are produced. The surfaces are not in equilibrium and a movement from the flat to the sharper curves takes place, and continues until, by re-adjustment of the curves, equilibrium is established.

This is the nature of capillary action; it takes place in all directions according to

the surrounding conditions. In soils the conditions are usually such that the action is upward and opposed to gravity. Evaporation at the ground surface depletes the interstitial spaces, the films around the grains grow sharper of curvature and a movement takes place toward them from the lower interstices refilling the upper. Forests reduce surface evaporation and retard the capillary depletion of ground water. In chalk the limit of capillary action exceeds 16 feet. In sandy soils one and a half feet has been found to be an extreme. In very open coarse material the limit may be but a few inches.

The rate of percolation is affected by the temperature. The viscosity, or internal friction, of water increases with decrease of temperature. Assuming the viscosity at 32° Fahrenheit to be 100, the viscosity at 77° is found to be 50; at 86°, 45; and at 112°, 31. The viscosity of gases, contrary to that of fluids, increases with increase of temperature and as air is frequently used in making permeability tests of soils grave errors are liable to be introduced, unless these opposite characteristics are duly accounted for.

Tests at ten German forest stations show that the general effect of forests is to raise the soil temperatures during the cold months and lower them during the warm months. This has the effect of facilitating percolation during the rainy periods and retarding capillary upward action during the warm months when little rain falls. The surface tension of water is also lowered by increase of temperature, causing less capillary resistance to gravitation and increasing percolation.

The rate or velocity of percolation is very variable. It varies with every soil, from no movement whatever, to over 100 feet per hour. Each soil is more or less a law unto itself and must be studied by it-

self if exact results are sought. There is one great distinction between water flowing freely in open channels or pipes of measurable size, and percolating water. The flow of the former is a function of the square root of the head, while the flow of water traversing minute passages varies directly with the head.

Capacity, as previously stated, is the quantity of water which can be introduced into a dry soil. It is usually expressed as a percentage of the soil volume. The total quantity that a soil is capable of imbibing is termed its maximum capacity. This quantity is divisible into two parts: the one removable by drainage, the other by evaporation. This latter part is again sub-divisible into two parts, one brought to the surface by capillary action and there evaporated; the other almost permanently retained within the soil, requiring for its removal long continued applications of heat. This part is termed hygroscopic moisture.

German authorities have determined the maximum capacities of various soils to range from 46½ per cent. for quartz sand to 70½ per cent. for humus, and the minimum capacity or water remaining after gravitation to range from 17 per cent. to 49 per cent. Of the minimum capacity the portion retained as hygroscopic moisture has been determined by Longbridge, of the California Experiment Station, to range from less than 1 per cent. for sand to 14½ per cent. for clays, these percentages being referred to maximum capacity. The wide range in the figures serves to illustrate the necessity of experimenting directly with any soil under consideration if exact data are required.

Of the different capacities the hydraulic engineer is more particularly concerned in that which relates to the quantity that may be drained out; on the other hand, the arboriculturist is much interested in the amount of capillary water from which plant life largely draws its supply. An authority on effects of forest cover (Dr. E. Ebermayer), found that, except for the top layers, unshaded soil had more capacity than shaded soil. Taken as a whole, however, for a depth of 32 inches

he found the soil under young Spruce trees to have 2 per cent. and under old Spruce trees 7½ per cent. greater capacity than naked soil. These are very instructive figures.

THE "FOREST FLOOR."

It is manifest that the character of the forest floor, *i. e.*, the litter covering the ground, must have a marked effect upon the absorption of water. Wollny found as a result of his experiments that under a grass cover there was 50 per cent. less percolation than in naked soil. He found a litter of Oak leaves to pass 42 to 74 per cent. of the rainfall, Spruce litter 46 to 78 per cent., Pine needles 52 to 69 per cent., Moss 39 to 53 per cent. The variations are due to varying thickness of cover. The shallower the cover the less the soil imbibed, for the obvious reason that the water was presented to it too quickly. Again, considering the Rothamsted tests, which gave the percolation of bare soil at from 45 to 47½ per cent. of the rainfall, it will be seen that ordinary forest litter will pass more rainfall than the earth ordinarily imbibes. Consequently the cover will remain in a state of saturation for a greater or less period of time during which it will protect the ground from evaporation. A soil covering of humus, however, would allow little water to pass to the soil beneath. It would be beneficial in lessening the force of storm water, but otherwise would work a loss to ground storage. Ebermayer says that besides clay it is especially humus which imbibes almost all precipitation and gives up little water to the ground below; and he adds that if the earth were covered by a humus soil of one meter in depth, subterranean drainage would be so slight that springs would be scanty and continuously flowing springs absent.

The forest floor is a most important factor in retarding storm-water and protecting the earth from erosion. This is particularly true on steep mountain slopes. The destruction of forest litter by fire, sheep, or deforestation is little short of a national calamity. Each rain washes away tons upon tons of loam, sand and

rocks to cover up the lower lands—a double disaster. The fertile soil of the higher lands is destroyed, the fertile soil of the lower lands is buried under a waste of débris.

There is one other subject to consider—evaporation. Under this head will be included transpiration from foliage. Temperature and wind are the chief controlling elements in evaporation. Woods lower temperature and reduce the velocity of the wind. It is to be expected, therefore, that evaporation in woods would be much smaller than in the open. Such is found to be actually the case. The observations of sixteen forest stations in Germany show a marked saving effected by the woods. Of the rainfall an average of 42 per cent. was evaporated in the open and 24 per cent. in the forest—a clear saving of 18 per cent. The evaporation from water surfaces in woods was found to be about 38 per cent. of that from water surfaces in the open.

As an offset to the saving in the evaporation comes the moisture transpired through the foliage, and that retained in the substance of the tree. The transpiration computed by various observers ranges from an equivalent rainfall of one-quarter inch per annum for four-year old Firs, up to 15 inches for cereals and 37 inches for grasses. Forests of mixed growth transpire about $6\frac{1}{2}$ inches. According to observations at the Austrian stations, deciduous trees transpire during the period of vegetation 500 to 1,000 pounds of water per pound of dry leaves, and the coniferous from 75 to 200 pounds. (This suggests the natural selection of conifers for our own mountain slopes.)

One remark of Hohnel, regarding the Austrian observations, is very suggestive. He says: "A plant will transpire in proportion to the amount of water which is at its disposal." This remark serves to illustrate the point that willows and other water-loving growths along the streams consume more water than they save. There is a coincidence between the fall and rise of the Los Angeles river and the budding and fall of the willow leaves.

It is estimated that a coniferous forest

will transpire 8 per cent. of a total rainfall of 20 inches and a Beech forest 48 per cent. The amount of water annually absorbed into the structure of the trees has been estimated as ranging from 19 to 25 per cent. of the weight of the wood, and 54 to 65 per cent. of the weight of the leaves.

The hard wood deciduous trees absorb 38 to 45 per cent., the soft wood 45 to 55 per cent., and the conifers 52 to 65 per cent. These quantities are equivalent to about 2 per cent. of the water required for transpiration and are in addition thereto.

On the basis of these figures a coniferous forest, which of all forest makes the best showing, will give a net increase to the ground storage of about 10 per cent. of the rainfall, to say nothing of its effect upon increased conductivity of the soil and the storm water held back so that the earth has better time to drink its fill, in themselves important items.

The State of New Jersey has wisely expended large sums in measuring the flows of its streams and in ascertaining the physical elements controlling these flows. The Engineer of that State, in language free from hesitancy, says, after long labors and study on the subject:

"We believe it will be helpful to the cause of forestry in the future if the effects of forests upon stream-flow are more carefully and accurately stated. Their effect in holding and preserving the soil upon slopes is very well known, and besides this they create a mass of humus and absorbent matter upon the surface which has an effect upon stream-flow, and the general evils resulting from deforestation are a matter of careful observation and record, so that too much stress cannot be laid upon the desirability of preserving a proper area of forest.

"The study of the streams shows that in every case, almost, it is the watershed on which is the largest proportion of forest which shows the largest flow from ground-water." This is particularly pertinent to the present discussion.

H. HAWGOOD.

M. Inst. C. E.,

Los Angeles, Cal.

Changing Mt. Rainier's Boundaries.

Official Approval of the Suggestions made by An Authority through The Forester.

An excerpt from the annual report of the Commissioner of the General Land Office, recommending to the Secretary of the Interior the extension of the Mount Rainier National Park, will be of especial interest to readers of *THE FORESTER*, in that the recommendations made by Mr. Bailey Willis, in the leading article of the May issue of *THE FORESTER* are officially approved by the head of the Government Forest Reserve service.

In the section of the report devoted to the care of the National Forest Reserves under his supervision, the Commissioner speaks as follows:

"One of the most important measures taken during the past year in connection with forest reservations was the action of Congress in withdrawing from the Mount Rainier Forest Reserve a portion of the region immediately surrounding Mount Rainier and setting it apart as a national park.

"The peculiar features of this region demand protection of a widely different and much more stringent nature than that afforded a forest reservation. The forests that clothe the slope and foothills of Mount Rainier require, as great regulators of floods, to be preserved absolutely untouched, while the fact of the presence of arctic animals in that region calls for extraordinary measures to insure to them proper protection.

"The importance attaching to effective measures to preserve these arctic forms of life was strikingly set forth in the memorial presented to the United States Senate from committees appointed by several of the scientific societies of the United States, which reads on this point as follows:

"But Mount Tacoma (Mount Rainier) is single not merely because it is superbly majestic; it is an arctic island in a temperate zone. In a bygone age an arctic climate prevailed over the Northwest and

glaciers covered the Cascade Range. Arctic animals and arctic plants then lived throughout the region. As the climate became milder and glaciers melted, the creatures of the cold climate were limited in their geographic range to the districts of the shrinking glaciers. On the great peak the glaciers linger still. They give to it its greatest beauty. They are themselves magnificent, and with them survives a colony of arctic animals and plants which cannot exist in the temperate climate of the less lofty mountains. These arctic forms are as effectually isolated as shipwrecked sailors on an island in midocean. There is no refuge for them beyond their haunts on ice-bound cliffs. But even there the birds and animals are no longer safe from the keen sportsman, and the few survivors must soon be exterminated unless protected by the Government in a national park."

"The necessity of having this unique peak and its environs preserved in a state of nature has for years attracted much attention, not only in this country but abroad, and the matter of setting it apart as a national park has long been one of international interest, eminent scientists of England and Germany being among the promoters of the move.

"In view of the great importance thus attaching to the subject, I regret to report that the area set apart fails to embrace all of the features of that region which it is desirable to have included. Certain districts have been omitted which belong more rightly within a national park than to a forest reserve, and as such should not be left without the protection of the park.

"Upon this point the views of Mr. Bailey Willis, of the Geological Survey, are of especial value. In an article in the May, 1899, issue of *THE FORESTER*, compiled partly from official data, Mr. Willis states as follows:

“The boundaries to the park as now established by law are not well considered for its future development. They are too limited. They fail to include districts whose scenic aspects are essential to the unity of the park, and whose features should not be left outside of its protection. This is most especially true of the western limit, and is to some extent true of the northern and southern bounds.”

After quoting further, at considerable

length, from the article in *THE FORESTER*, concluding with the suggestions offered by Mr. Willis, the Commissioner sums up the matter in these very complimentary words:

“From all the data available upon the subject, I am of the opinion that I can not do better than indorse the recommendation referred to; and I accordingly recommend that the limits of the park as now established be changed to conform to the boundaries here suggested.”

In the Southern Alleghenies.

Public Interest in the Establishment of a “National Southern Park and Forest and Game Preserve in Western North Carolina.”

The Parks and Forestry Committee of the Asheville Board of Trade has taken the initiative in calling an interstate meeting at Asheville, November 22, to form an association and take practical steps for consummating the plan for a great forest preserve in the wild mountain regions of that state. It is aimed to bring the matter before Congress with a popular request for a commission to inquire into the feasibility of a National Southern Park in North Carolina. A large petition has been signed and the committee is assured of the aid of the state representatives and of many influential citizens who have long favored the movement. Its importance to the South and to the Nation is claimed to be of the first magnitude, as the committee expects to prove in due time. The petition is addressed to Congress, and reads:

“The undersigned citizens and voters represent that in the mountain regions of western North Carolina there are great tracts of timber lands, blessed with a salubrity of climate that renders the country admirably adapted for health-seekers and tourists. This region, as yet comparatively little known, is threatened with the denudation of its forests by lumbering and other enterprises. The exceeding beauty of the region, with its numerous springs and waterfalls, is dependent largely on the

protection of its trees. The increased activity in the various leather and woodworking industries has, however, given an impetus to the lumbering and tanning trades, and the destruction of these mountain forest lands is proceeding to a degree which makes it but a question of a short time when the ruin will be completed. Depleted of the trees, the land will be comparatively useless. The resulting drying up of the springs and water-courses with attendant destructive floods will mark the irreparable damage done to this region unless legislative interference comes to its aid.

“The advantage to the nation at large in the establishment of a National Park in these mountains would be incalculable, from the fact of its readiness of access from all the large centers of trade, being within twenty-four hours journey, approximately, of New York, Chicago, Philadelphia, Boston, Indianapolis, etc. Your petitioners, undersigned, therefore, urge that measures be adopted looking to the protection of the region by the establishment of a National Park and Forest Reserve.”

In furtherance of the project, the Park and Forestry Committee has sent out a handsome illustrated pamphlet, calling attention to the favorable opportunities now existing and emphasizing the consequences

of present neglect. The article in question says:

“An authority, Dr. C. A. Schenck, the eminent forester, in one of his interesting monographs asks, ‘What is forestry?’ and answers that no one seems to realize the scope and meaning of the term. Present conditions in the commercial and industrial world and in the Southern Alleghenies point to the rapid destruction of the virgin woods. The student of forestry is taught, and experience has proved the teaching to be true, that deforested land, particularly in a mountainous country, is the direct cause of destructive floods. The interference and absorption by the trees distributes and regulates the rainfall. In the dry season the trees protect and hold back the evaporation of the innumerable and minute tributaries to the springs, watercourses and rivers, thus regulating and preserving the water supply, without which regulation no region can long remain attractive or profitable.

“By the present system of lumber operations the virgin forests of the South bid fair to be soon destroyed. As the authority on the subject has indicated, if the forests are lumbered out rapidly as at present and if the fires are allowed to rage unchecked as at present, the same condition will speedily prevail in the South that now prevails in the lake states. There will not, it is claimed, be any sudden collapse of the lumber industry either South or North when the virgin forests are destroyed—if we are to permit them to be destroyed. The forests will be logged over three or four times; trees that are not worth taking now will be worth taking a few years hence, and so on. Gradual slackening of the industry will take place. It will slowly step down to the level which it occupies abroad. The mills will be supplied with short logs about ten inches through on an average. Lumber will be much more expensive as the supply will not equal the demand.

“Such seems the future of the forests and the lumber industry of the South. From an innate love of nature and sense of its beauty, every one regrets the seem-

ingly inevitable doom; the woodman, perhaps, more than the townsman.

“For the commonwealth, forestry as a permanent business is extremely desirable for climatic and economic reasons, the forests acting as a source of national health, steady water supply, and revenue from land often not fit for any other production. The people as a whole are interested in conservative, lasting forestry. The individual owning forests is solely interested in money-making forestry, conservative or destructive of forests as the case may be.

“It would be an impossible task to induce individuals to come to the aid of the country in regulating the lumbering and other operations which threaten its well-being, and hence the project of a Great Southern National Park in which the forests will be conserved and timber cutting be regulated on correct and economic principles by which means an object lesson will be given to the country and a strong argument offered why the forests throughout the land should be placed under forest wardens appointed by the State.

“The establishment of such a Southern National Park somewhere in the Blue Ridge or Great Smoky Mountains would mean the care of the forests and a stimulation of their growth, and regulating the cutting of the trees at maturity; the building of good roads through what are now inaccessible woods and mountain heights; the building of inns and hotels at convenient points, inducing a vastly increased travel from the North and South on the part of tourists and others; the more or less permanent residence of wealthy citizens who would be disposed to build homes in various localities in this region as they are already doing to some extent; the perpetuation of the beauty and healthfulness of the region and its elaboration in the way of making its most beautiful localities more accessible to the great mass of the people.

“It must not be supposed that lumbering or bark gathering would be materially interfered with. The Park project, if successful, would seek to conserve these industries. Under the present system they bid fair to hasten their own undoing by

the destructive and wasteful methods now in vogue. When all lumbering and bark gathering operations are under scientific control these businesses may be confident of a steady and regular supply of timber and bark. The individual will not be interfered with in his private rights. The lands suitable for the Park will be purchased at a valuation and the owners will receive in a lump sum more than they could hope to secure by selling off timber or bark.

“Pleasure and health seekers and tourists show a disposition to come in increasing numbers to this section of the South in the winter time and in the summer visitors from the South come to the mountains year after year, building homes and entering into the progress of the various communities.

“The attraction to these people is the healthful climate and the beauty of the region, and to this healthfulness and beauty the woods and forests are the prime contributors. With the destruction of the forests and the attendant evil effects upon the region, what has it to offer to attract visitors and others? In addition it must be remembered that the South has no park conducted on the same principles and aims as those in the North.

“The central character of the region gives the project of a Southern National Park attractiveness not only to the people of the South, but to the entire nation. Being within twenty-four hours from New York and the same length of time from the Gulf States the park would be a benefit to the greatest number of citizens of the United States.”

The Influence of Forests Upon Storage Reservoirs.

Some Conditions Essential to the Maintenance of Streamflow and Water Conservation.

In an arid region, where irrigation is a necessity, and where the streams are intermittent in their flow, ranging in discharge from violent floods to trickling rivulets, storage reservoirs are essential for any considerable extension of the irrigated area.

Sites for reservoirs of large capacity are very scarce, where all conditions are right for the construction of safe dams, for the certain filling of the reservoirs, and for the convenient distribution of the water to lands suitable for its use. The scarcity of such sites renders it all the more essential that those which exist should be guarded from all influence tending to the destruction of their usefulness.

The mountain slopes of Southern California are more than ordinarily precipitous, and the denudation of these steep slopes of their forest growth by destructive fires, or by equally destructive bands of sheep, tends to loosen the surface soil and render it easily eroded, so that as the

vegetation of the mountains disappears, the streams become more torrential, and more heavily laden with debris. All this gravel, sand and soil is deposited in the bed of the reservoirs located in their path.

The result is to fill the space which should be devoted to the storage of water, thereby lessening its capacity.

The rapidity of this destruction of the reservoirs will depend somewhat upon their location; if they are in the mountains and have large watersheds of steep slopes they will more rapidly fill with coarse material. If they are nearer the plains on flatter slopes they will receive sand rolled along the bottom of the stream at their upper ends, and fine mud over the remainder of the area. Under these conditions they will fill less rapidly. The Sweetwater reservoir, near San Diego, is a type of the latter class, where conditions are most favorable. Recent measurements have shown that the deposit in the

reservoir during the eleven years of its existence has been about 5 per cent. of its total capacity. The filling has been almost directly as the depth of the water, being greatest at the dam, where the fine mud is 2 to 2½ feet deep, and is largely from the washings of plowed fields. Were this reservoir higher in the mountains the filling would be coarser and of greater volume, and if the reservoir were smaller, it would, of course, fill more rapidly.

Streams should always run clear, or nearly so, and their volume should be uniform throughout the year. The more perfectly the watersheds are covered with forest growth, decayed leaves, chapparal, and hardy grasses, the more nearly will this ideal condition of run-off be approached. The soil will be so bound with a network of roots that the rain and melted snow will pass off slowly without washing the surface, and the storage reservoirs will receive a minimum of detritus and a maximum of water.

This ideal condition, when perfectly attained, becomes in fact a substitute in large measure for storage reservoirs, and the soil itself of the mountain forests is converted into a great sponge, which constantly replenishes the springs and streams and keeps them in more uniform flow. Under such perfect conditions, reservoirs would be needed only to store the water of the rainy season for use in the Summer months, while the streams themselves would have higher irrigation duty in the dry seasons. A general extension of forest growth will make available many small reservoir sites that are now practically worthless because of the torrential nature of the streams, and their exposure to rapid destruction.

The essential, therefore, for the preservation of storage reservoirs and the general increase of stream flow is to maintain as dense a growth of vegetation upon the mountains as possible, and so patrol the sources of our streams as to prevent the spread of forest fires.

It is not well established that forests have any special influence in increasing the rainfall of a region, although the presumption

is that they have a slight tendency in that direction. But it is conceded that they have a very decided influence upon the temperature and humidity. In southern California we particularly need all such influence to counteract the effect of desert winds upon our orchards, and lessen evaporation upon our reservoirs.

The loss by evaporation in reservoirs, ranging as it does from ten to fifty per cent. of their capacity annually, according to their relative depth and surface area exposed, as well as their elevation above sea level, is one of the most important factors in estimating the duty of stored water. No other losses can compare with it, and anything which will lessen it will extend their usefulness. A general extension of the forests of the arid region must have marked effect in cooling the surrounding atmosphere, reducing the velocity and temperature of winds, increasing humidity, and lessening evaporation.

One of the encouraging features of the situation on the Pacific Slope is the rapidity with which all forest trees except the Redwood are being reproduced wherever they are protected from fires and from the ravages of sheep. Young Pines, Firs and Cedars spring up spontaneously where there is soil and moisture, and grow with vigor if let alone. This is in marked contrast to the sand plains of Wisconsin, Michigan and other more Eastern States, where the Pine forests once out, seldom reproduce themselves, but are replaced by brambles and worthless brush. With proper care, therefore, the Western forests can be made a constant source of revenue, continually replenished.

A popular misconception of the intent and object of the Government in segregating forest reserves at the headwaters of our streams, is that they are to be forever left in a virgin state, and so lost to public utility. This opinion is widely held, and needs to be eradicated, for the reverse is really true.

The forests are not and should not be regarded as too immaculate for use. It is well recognized to be far better and safer to make them a source of lumber and firewood, utilizing the older trees and encour-

aging new growth, than to allow them to go to maturity and decay untouched. The guardians of the forest preserves should be required to gather seeds of trees and plants and sow them wherever they can be induced to grow. They should keep the young groves properly thinned out and have authority to sell saw-logs and firewood wherever the trees can be judiciously spared.

One of the important, though little considered, uses of the forest to the irrigator is the conversion of organic vegetable mold into nitrogenous plant-food. This is going on through the agency of the ever-present bacteria which re-convert the organic waste of the world into innocuous and useful mineral matter. Water filtering through the soil is constantly bearing these mineral nitrates into the streams and thence out upon the lands. Streams from treeless mountains lack these nitrogenous elements to a great degree, and the water has less fertility and is less valuable for irrigation.

The effect of the destruction of forests in mountainous regions is eloquently described by the eminent French political economist, Blanqui, in a memoir read before the Academy of Moral and Political Science of France, in 1843. He says, referring to the Alps of southern France:

“Signs of unparalleled destruction are visible in all the mountain zone, and the solitudes of those districts are assuming an indescribable character of sterility and desolation. The gradual destruction of the woods has, in a thousand localities, annihilated at once the springs and the fuel. The abuse of the right of pasturage and the felling of the woods have stripped the soil of all its grass and all its trees, and the scorching sun bakes it to the consistency of porphyry. When moistened by the rain, as it has neither support nor cohesion, it rolls down to the valleys, sometimes in floods resembling black, yellow, or reddish lava, sometimes in streams of pebbles, and even huge blocks of stone, which pour down with a frightful roar, and in their swift course exhibit the most convulsive movements. No tongue can give an adequate description of their devastations in one of those sud-

den floods which resemble in almost none of their phenomena the action of ordinary river water. They are now no longer overflowing brooks, but real seas, tumbling down in cataracts and rolling before them blocks of stone, which are hurled forward by the shock of waves like balls shot out by the explosion of gunpowder. A furious wind precedes the rushing water and announces its approach. Then comes a violent eruption, followed by a flow of muddy waves, and after a few hours all returns to the dreary silence which at periods of rest marks these abodes of desolation.”

After years of agitation and discussion, the work of restoring the woods, and of controlling the floods and destructive erosion of the torrents, was undertaken by the French Government, at enormous cost, but with gratifying results, wherever carried out. The improvements consisted: (1) of the systematic planting of trees, grass and underbrush near the source of the streams to prevent the sudden and rapid collection of large quantities of rain and melted snow water. (2) The protection of the shores of the streams from undermining, and their beds from erosion, by the erection of small dams of masonry, loose rock, and brush, to diminish the grade and decrease the power of the water, to raise and widen the bed, and retain and store detritus. Many of these structures were made of green branches that were induced to take root and grow. (3) The terracing of the mountain slopes in a way to retard the run-off and guide the water into channels of light grade, where it could be conducted to the main streams without washing the soil. On one small watershed of less than 1,000 acres the Government expended \$125,000, but the benefits resulting immediately after completion were estimated at more than double that sum.

The Austrian and Swiss Governments have done a great deal of this work to restore the mountain watersheds to their original condition before the forests were destroyed, and great numbers of masonry dams have been erected to an extreme height, in one case in the gorge of Ferrina, Australian Tyrol, of 116 feet. These are

built exclusively for retaining debris and curbing the power of the torrents. The usual height of such structures, however, is about 25 feet, and they are placed as near to each other as the grade of the torrent necessitates. Their effect is incidentally to store water, as well as sand and gravel, for the voids in gravel reservoirs of that kind retain a considerable volume of water, which is given off gradually to the stream.

Such work could be done to advantage on every mountain stream in California, and I have no doubt that similar works will ultimately be undertaken in various parts of the arid West as a necessity, although it will require much agitation and united public opinion to secure appropriations from the general Government for such construction. The most important work in hand is to take measures for preventing further destruction, and thus

avoid the necessity for extensive correction of erosion in our mountain slopes and in our mountain streams. This costs less than the subsequent correction, and is more easily accomplished.

When this is well in hand, and when we have adopted practical measures for recovering our denuded mountain areas with plant growth and for protecting the forests we have left, a persistent effort should be directed toward the bridling of our torrents and the conversion of every mountain canyon into storage reservoirs. In this way only will our water supply be sensibly augmented and a large proportion of the wealth of water, annually wasting into the ocean or sinking in the deserts be retarded and retained for useful ends.

JAMES D. SCHUYLER,
Los Angeles, Cal.

For an International Congress.

Secretary of Agriculture Wilson has addressed to M. Thiebaut, Charge d'Affaires of France, French Embassy, the following note referring to the proposed international Congress of Forestry at the Paris Exposition: "Sir:—As president of the American Forestry Association, I have the honor to transmit herewith a copy of resolutions passed at the Columbus meeting of the Association with the request that you will have the kindness, through your Government, to transmit them to M. Meline."

It is hoped the Commission Internationale des Congres Agricoles, through its President, M. Meline, will call such a Congress at Paris during the Exposition.

This action is a part of the movement begun some time ago, chiefly through the instrumentality of Baron Herman, of the German Embassy, to bring about the compilation of forest statistics of all the countries in the world, on a uniform basis. The plan has already been approved also by the American Association for the Advancement of Science and the National Geographic Society.

Economic Tree Planting.

The effect of the sweeping winds on the prairies is shown in the picture of the single row of White Willow pollards, near Ames, Iowa. These trees have been permanently bent and their tops flattened by the prevailing southwestern winds.



The accompanying illustration is reproduced by permission from a photograph in the proposed exhibit of the United States Department of Agriculture at the Paris Exposition of 1900, showing the relation of Forestry to Agriculture.

THE FORESTER.

A MONTHLY MAGAZINE

DEVOTED TO ARBORICULTURE AND FORESTRY, THE CARE AND USE OF FORESTS
AND FOREST TREES, AND RELATED SUBJECTS.

THE OFFICIAL ORGAN OF

The American Forestry Association,

President Hon. JAMES WILSON,

Secretary of Agriculture.

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JOHN KEIM STAUFFER, EDITOR.

SPECIAL ANNOUNCEMENT.

The annual meeting of the American Forestry Association will be held on the second Wednesday in December, being the thirteenth day, in the hall of the Cosmos Club, Washington, D.C.

With the issuance of the present number THE FORESTER closes the fifth year of its continuous publication. In its present form, with the support of a steadily increasing number of readers, the fact of its survival emphasizes the energy and enthusiasm of the founder of the paper, and his belief that the general adoption of forestry throughout the United States is one of the greatest safeguards which could be provided. In this connection it is interesting to recall a very unobtrusive comment in Baedeker, but one which has much food for thought:

"Of all the wooded districts of Germany, none present as beautiful and varied landscapes as the Black Forest; the heights are covered with fragrant Pine forests, while the valleys are fertile and well cultivated. In this prosperous district beggars are unknown."

The establishment of a "National Southern Park and Forest and Game Preserve" in Western North Carolina is receiving much favorable comment and support from the citizens of that and adjoining States. The dissemination of the

principles and ideas of forestry has brought about so much greater interest in the preservation of the forests that what was but lately the "fad" of the few, as it was sometimes termed, has now commanded the attention of the great body of the people.

Public sentiment has been formed with the gradual absorption of ideas on the practical value of forest protection. The people of North Carolina have come to understand that under present conditions the mountain and valley lands of the Southern Alleghenies will soon be denuded of their forests unless adequate legislation is obtained to regulate the cutting of timber and to secure protection against forest fires.

The attention of the South has been attracted to the strong efforts which will be made at the coming session of Congress for the enactment of laws to form a great National Park and Timber Reserve in Minnesota, Michigan is also seeking State and National legislation to protect what remains of the once magnificent forests of that State. Pennsylvania is urging the acquisition of large tracts of unproductive mountain land for forest reserves, and New York keeps in the forefront of the forest movement. In the closing month of the year there is much cause for encouragement from the general public awakening for forestry in the year of grace 1899.

CHIPS AND CLIPS.

It is a Bavarian maxim to plant a tree in every open space.

At the end of a prosperous year, "Logs is riz" is still the burden of the lumberman's song.

It is predicted that Gum will soon be as popular as Cottonwood in all branches of the package business.

A thousand dollars tariff was collected on a single cargo of Canadian Pine at Dunkirk, N. Y., recently.

The Transvaal War has spoiled the prospects of Pacific Coast exporters who were building up a considerable trade with South Africa.

Governor Scofield, of Wisconsin, has acquired large timber tracts in Idaho, to which State he will remove at the end of his official term.

The annual meeting of the Minnesota State Forestry Association will be held the first Tuesday in December, being the 5th prox, in Minneapolis.

A five-foot flood in the Susquehanna at Williamsport, Pa., has brought down many stranded logs, much to the lumberman's delight and profit.

A Wisconsin lumber company has entered into a contract with a Chicago firm disposing of its entire lumber cut for 1900, approximating fifty million feet.

The Division of Forestry of the U. S. Department of Agriculture has increased 400 per cent. in the numbers of its working force, during the past eighteen months.

Eight hundred and four thousand feet of lumber were turned out by a Minneapolis mill, in a regular run of eleven hours, beating the best previous record by 82,000 feet.

Apropos of the convening of Congress, it seems unfortunate that the genius who counts on utilizing sawdust commercially cannot join forces with the politicians who "saw wood."

The official report of exports of forest products from Canada during the past year shows a falling off of nearly one-sixth, the total export valuation being placed at twenty six and a half millions.

The camphor tree (*Laurus camphora*) is being planted as a street tree in New Orleans, La. A tree planted in 1883 in a four-inch pot is now 35 feet high and 52 inches in circumference at the butt.

Deciduous trees can be moved very easily at this season of the year. By digging a trench around the tree now, the change of location can be made without trouble at any time during the Winter.

The Manufacturers' Association of Brooklyn, N. Y., at its November meeting, approved the resolutions recently adopted by the State Commerce Convention on "The Preservation of Our State Forests."

The American record for a single cargo of lumber exported was broken a short time ago by the Norwegian steamer "Guernsey," which carried nearly three and one-half million feet out of Portland, Oregon.

The increasing use of wood for street paving purposes in England has attracted attention to the Jack Pine of Ontario. This is a heavier, stronger and denser wood than the Baltic or Norway timber, and its durability is said to be remarkable.

There is a strong suggestion of an acceptance of the principles of forestry in a Minneapolis lumberman's purchase of large tracts of California Sugar Pine. It is said he will hold them for his sons to develop, when they become of age.

A plan is under consideration for making use of water to develop 3,200 horse power for distribution to mines in the neighborhood of Cripple Creek, Col., the source of the water supply being Beaver Canyon. A steel rock dam will be built, having a storage capacity of 150,000,000 cubic feet.

The kingdom of Saxony, from its 430,000 acres of forest, mostly Spruce and mostly on poor mountain land, derives an annual net income of \$1,900,000, being \$4.50 per acre. This is being done without exhausting the forests; on the contrary, they are worth double to-day what they were forty years ago.

The former method of transporting logs from the forests in the northern part of Pennsylvania to the saw-mills in Williamsport by floating them down the river has been abandoned by one enterprising firm there on account of the uncertainty of the water supply in recent years. Hereafter the logs will be moved by rail.

In no part of the world are the forests more appreciated, probably, than in Central Africa, in the region inhabited by the tribe of pigmies discovered by Henry M. Stanley. These people, none of whom exceed four feet in height, never leave the forest under any circumstances. They are perfectly formed and fairly intelligent, but are timid and wary of strangers.

In the reconstruction of the Ontario Cabinet consequent upon the retirement of Hon. A. S. Hardy, Hon. J. M. Gibson, for four years in charge of the Crown Lands Department, has become Attorney-General. The new Commissioner of Crown Lands is Hon. E. J. Davis, lately Provincial Secretary, who is the head of one of the leading tanning firms of Canada.

A practice in vogue in France, Germany, Belgium and other European countries, is to plant fruit trees along the public roads. The local governments plant the trees and cultivate them as a source of revenue. In Belgium there are three-quarters of a mil-

lion roadside fruit trees, which in one year produced \$2,000,000 worth of fruit. The favorite trees for roadside planting are the Cherry, Plum, Apple, Chestnut and Walnut.

The Douglas Fir was named after David Douglas, a botanist who explored California in the first quarter of this century. It is distributed over a wide area from the coast to the summit of the Rocky Mountains. On the coast it attains the greatest proportions, specimens being sometimes found rising to a height of 300 feet with a circumference of 30 to 50 feet at the base. The ordinary average is, however, about 150 feet clear of limbs, with diameter of 5 or 6 feet at the base. The straight, clear stem, bare of branches almost to the top, makes the tree peculiarly valuable from a lumbering point of view.

A prominent English lumber manufacturer, Thomas J. Marone, after touring this country and Canada in quest of supplies, says:

"The people of this country fail to realize what the people of European countries have known to their sorrow for years—that the willful destruction of forests brings want in the end.

"Reforestation is now being practiced in all these older countries, but for fifty years to come Europe will have to look to America for the greater portion of her supply of lumber. Will America, with the destruction I see on every hand, be able to supply this demand even if we are willing to pay a good price?"

The far-reaching effects of forest destruction become more apparent day by day, sometimes in ways seldom thought of by the general public. An instance of this is the perturbation caused among beekeepers by the destruction of the Basswood forest, their anxiety for the future being shown in the following comment in an exchange:

"The problem is indeed a serious one; the States of New York, Pennsylvania, Michigan, Wisconsin and Minnesota, that have produced such large quantities of

basswood honey, will possibly in the future have to depend upon clover and other sources, and instead of ranking among the leading States for honey they may possibly in time drop down to second place. Already supply manufacturers are beginning to consider what material they will have to use for sections when Basswood is gone."

The Sportsman's Willow.

A gigantic Willow tree, which had been planted near the River Chelmer at Boreham, Essex, in England, in 1835, was cut down some time ago and has been found to weigh nearly 12 tons. It was 101 feet long, and $5\frac{3}{4}$ feet in diameter, a magnificent piece of willow. It is said that this one tree contained wood sufficient for making more than a thousand fine cricket bats.

Transplanting Carolina Poplars,

An attempt will shortly be made to transplant Carolina Poplars, a species of Cottonwood, in Pennsylvania. Timber of this species is said to make excellent wood pulp, and it is ready for cutting within fifteen years from the date of planting. Dr. J. T. Rothrock, Commissioner of Forestry, determined to make the experiment on a large body of land in Pike County which recently reverted to the State.

A Great Opportunity.

In connection with the valuable suggestions on the care and commercial culture of trees from the pen of Mr. Pinchot, it is pleasant to recall the words of Dr. Hale, of Boston, at the last annual meeting (the forty-second) of the first Village Improvement Society in America, the Laurel Hill Association of Stockbridge, Mass.

The preservation, enlargement and improvement of our forest domain was, he said, "the great opportunity and necessity of our country," though he prayed that forestry might be preserved from "those landscape gardeners who know better how to plant a garden than God in Eden." Its

forests, said Dr. Hale, had made America. It was sassafras and planks that had paid the Pilgrims' debt to their English creditors. It was a New Hampshire staff that had carried the admiral's flag into Santiago Bay. Yet many States derive nothing from their woodlands, and he wished that the States might use whatever surplus was at their disposal in making forests where now are deserts.

This is a measure that is greatly needed, or will be by the coming generation. Our resources are not inexhaustible. Indeed they are already within measurable distance of exhaustion. The laws that we have are inadequate. It may be noted that Germany, France and Switzerland are constantly adding to their forest preserves and that they make them the source of considerable revenue. No man or nation is rich enough to be a spendthrift.—*Churchman*, New York City.

Impressions of European Forestry.

An American tourist, cycling through Germany, has thus written of the roadside trees:

"These trees are either for shade purposes or are fruit trees, carefully tended, which produce a good revenue for the maintenance of the road. The Lombardy Poplar is the most striking of the first class and perhaps the most common; as these Poplars are so very slender they are planted close together and consequently with their great height furnish a fair shade except when the sun is directly over the road. Others of the shade trees are Elm, Linden, Beech and Horse Chestnut. One can ride for miles on the sunniest days and be constantly in total or partial shade; and this feature makes touring in the Summer months quite pleasant.

"The fruit trees, however, presented even greater features of interest, for they furnish not only an excellent shade, but also a fairly regular source of revenue. They belong to the 'Kreis,' or township, as we would say, and are as carefully tended as the trees in the best kept orchard. One's first thought on seeing them is—Will not the fruit be stolen by those going

along? The loss thus is, however, no greater than from private orchards along the roads; and there is, of course, a fine or imprisonment ready for the trespasser here, as there is in so many instances in this land of the 'Verboten.' When the fruit is well advanced towards ripeness an auction is held and the different sections of the roads are knocked down to the highest bidder. Thus the township receives a definite amount, and the purchaser sells the fruit for the highest price he can get."

The Coming of the Light.

It is a healthy sign that more and more attention is being paid to the question of forestry by the several State governments. We have very frequently in the past urged the vital importance of intelligent forestry, but, while regretting the absence of any widespread general interest or action, it has been fully realized that the best results to the nation would accrue, not from an effervescent though enthusiastic movement, but from a slower growth. It is essential for the best results that the urgent necessity be a deep-rooted conviction, which can only be developed as slow growth. The very fact that forestry is receiving serious attention after such a period of laxity may be looked upon as a healthy clause in the future of our national forests.

America is undoubtedly in a condition far ahead of that which confronted the governments of France, Germany, and the other European countries at the time when they turned their attention to the preservation of their forests; and with characteristic energy, when the present gentle awakening becomes a strong and hearty movement, the forests of America will be placed on a footing so far above that of the European forests as to surprise our own people. And, moreover, America, in this, as in so many other things, has the benefit of being able to learn what not to do from the errors of those countries which have gone before.

Our foresters will have to deal very largely with the reclaiming and management of the original forest land; it is not

merely a question of planting timber trees for profit. No country with a forest area anything like that of the United States is so poorly equipped for maintenance, and though the 30,000 acres of New York State devoted for the benefit of the entire nation is but a trifling area in proportion, still it is a step in the right direction.—*American Gardening.*

Arousing Popular Interest.

Several papers on forestry will be read at the Forty-second Annual Meeting of the Missouri State Horticultural Society, to be held in the Opera House, Princeton, Mo., December 5th, 6th and 7th. Among the papers will be:

"Forestry for Missouri, will it Pay?" by D. C. Burson, Kansas City, Mo.; "The Care and Management of Street Trees," by Prof. H. C. Irish, of the Missouri Botanical Garden, and Hermann Von Schrenk, of the U. S. Department of Agriculture; "Ornamental Trees," by H. R. Wayman, of Alvord, Mo.; "Why our Trees are Short-lived," by Prof. J. C. Whitten, of Columbia, Mo.

An Appreciation of Forestry.

Mr. Gifford Pinchot, chief forester of the government, has just issued A Primer of Forestry, being Bulletin 24, Division of Forestry, U. S. Department of Agriculture. It is well bound, beautifully and profusely illustrated, and contains a vast amount of valuable information for the public at large and especially for citizens of Oregon and Washington, where forest protection is becoming a pertinent question, and is receiving attention at the hands of men densely ignorant of the subject, as well as a few who are well informed. The author is probably the ablest forester on the American continent at the present time and this book is intended for the general public, consequently it is written in a popular manner and is free of scientific terms. Children of the schools should read it as well as business men, stockmen, lumbermen, professional men and all others interested in forests and forest protection.—*Oregon Native Son, Portland, Oregon.*

"Nothing of more practical value, in our opinion, has ever been issued from the government office than this Primer. The subject is of vital importance to the material welfare of the country, and the in-

formation given in this publication ought to be in the possession of every American citizen. It is an excellent and most satisfactory work."—*Leslie's Weekly*, New York.

Recent Publications.

The White Pine (*Pinus strobus* Linnæus)—By M. V. Spalding, Professor of Botany in the University of Michigan.

(REVISED AND ENLARGED BY B. E. FERNOW, WITH CONTRIBUTIONS BY F. H. CHITTENDEN AND FILIBERT ROTH. BULLETIN NO. 22 OF THE DIVISION OF FORESTRY.)

The present volume represents most careful investigations covering more than ten years, the first draft having been prepared as early as 1888, since which time it has undergone careful revision and received several important additions. As the title indicates, "The White Pine" is not, strictly speaking, the work of any one person. Professor Spalding, after the first writing, made several revisions, but was then forced from press of other work to abandon the completion of the study, which then fell to Dr. Fernow. Thirty pages out of the eighty-five, however, are definitely assigned to two of the contributors, while, in addition, the important subject of measurements in the field are accredited to Austin Gray and A. K. Mlodziansky, the latter of whom also gave a portion of the material bearing upon the "rate of growth."

The monograph opens with a clear and fairly full account of the geographical distribution of *Pinus strobus*, followed by notes upon the character of its distribution by regions, with notes upon the boundaries of its distribution, and conclusions regarding its distribution in the virgin forest. In connection with this topic is a map showing the original distribution of the species, and half-tones showing the White Pine in mixture on tracts in New York State. The interesting topic of the history of the White Pine lumber industry is next taken up for a couple of pages, with some figures as to the yield of lumber from the Lake States from 1873 to 1897, and other figures. Passing then through the subject of original stand and present supplies, the natural history of the tree is reached. This, including the botanical description and observations on the morphological and histological characters, and on seeding, forms a decidedly valuable section.

As the object of the monograph is to supply the information necessary to the right utilization of the species, the topics already considered form properly a mere introduction to the discussion of the rate of growth and of the conditions of development, or the silvicultural characters of the White Pine. These latter considerations furnish the data upon which all

treatment of the tree as a forest crop will properly for the chief part depend. The matter of growth is treated consequently at some length, and the tables resulting will doubtless serve as a basis for working plans, when, in any instance, the special conditions of a specific region have also been studied and compared with these general statements. "Yield," the whole affair in a word, can then be treated with sufficient thoroughness.

This concludes the exposition of the White Pine under normal conditions, and gives place to the discussion of "dangers and diseases." On this subject F. H. Chittenden has contributed a valuable paper on "Insect Enemies of the White Pine." A discussion of the forest management of the tree here and in Germany follows, the monograph closing with a paper on the "Character and Physical Properties of the Wood," by Filibert Roth. An appendix contains numerous tables of measurements, and diagrams of growth.

In the United States, where much of the highly elaborated financial calculation deemed so essential in Germany is practically valueless at present, and is likely always to receive comparatively slight stress, it is the thorough knowledge of the silvicultural characters of any given species as well as the fact of growth which must underlie all the earlier stages of forest management. If this be true, the monograph under discussion deserves high praise. It adds very materially to our knowledge of the White Pine as a tree and as a member of a most important forest crop. It is to be regretted that this valuable data could not have been collected and put to use before so much waste had occurred through ignorance. Yet it is not too late to use it now, and there is every reason to hope that many owners of pine lands may apply to the care of a second crop the principles which were ignored in the harvesting of the first. The book, besides, will serve as a useful example for further work along similar lines. Admirable illustrations and diagrams form an important element in the work, adding much to its completeness.

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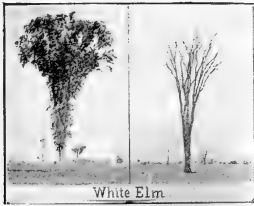
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