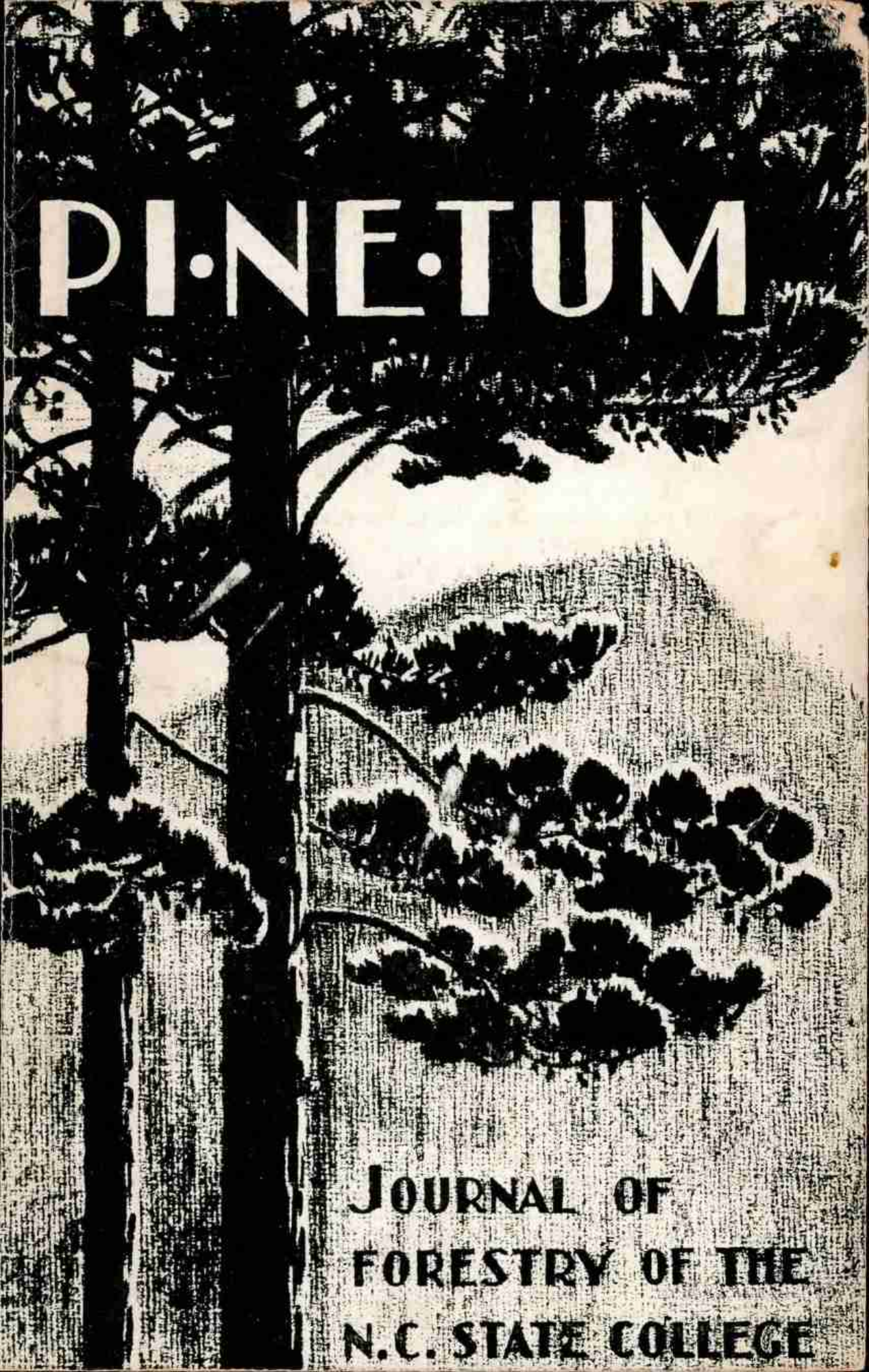

PI·NE·TUM
JOURNAL OF
FORESTRY OF THE
N.C. STATE COLLEGE

We sleep in the sleep of ages, the bleak, barbarian pines;
The gray mass drapes us like sages, and closer we lock our lines,
And deeper we clutch through the gelid gloom where never a sunbeam shines.

On the flanks of the storm-gored ridges are our black battalions massed;
We surge in a host to the sullen coast, and we sing in the ocean blast;
From empire of sea to empire of snow we grip our empire fast.

We pillar the halls of perfumed gloom; we plume where the eagles soar;
The North-wind swoops from the brooding Pole, and our ancients crash and roar;
But where one falls from the crumbling walls shoots up a hardy score.

Gain to the verge of the hog-back ridge where the vision ranges free;
Pines and pines and the shadow of pines as far as the eye can see;
A steadfast legion of stalwart knights in dominant empery.

—from "The Pines," by Robt. W. Service.

Fred J. Hartman

North Carolina

Dr. J. V. Hofmann

DEDICATION

IN 1928 North Carolina State College definitely planned to establish a School of Forestry. The administration turned to Dr. J. V. Hofmann, who was then at Mont Alto as Assistant Director of Pennsylvania State Forestry School, to furnish leadership and to proceed with organization. Dr. Hofmann performed both tasks well. The rapid growth of the Forestry School from a small, unstable unit of the College to a well-established School of favorable repute speaks for itself. And this expansion has come about principally through the efforts and optimism of Dr. Hofmann, assisted by his able staff of co-workers.

In 1929 the Forestry School at State College was an experiment. Today it is a fact. And in an attempt to show appreciation to our Director as simply and sincerely as possible, the students of the North Carolina State College Forestry School are happy to dedicate the first issue of their annual to Dr. J. V. Hofmann.

STAFF

Front Row (left to right): Page, Editor; Corpening, Business Manager; Obst, Advertising Manager; Hayes, Faculty Adviser.

Back Row (left to right): Matthews, Associate Editor; Hube, Associate Editor.

TABLE OF CONTENTS

FOREWORD

Hardly a month passes that forestry students do not meet with the question from friend or acquaintance, "You are studying forestry. Just what *is* the work of a forester?"

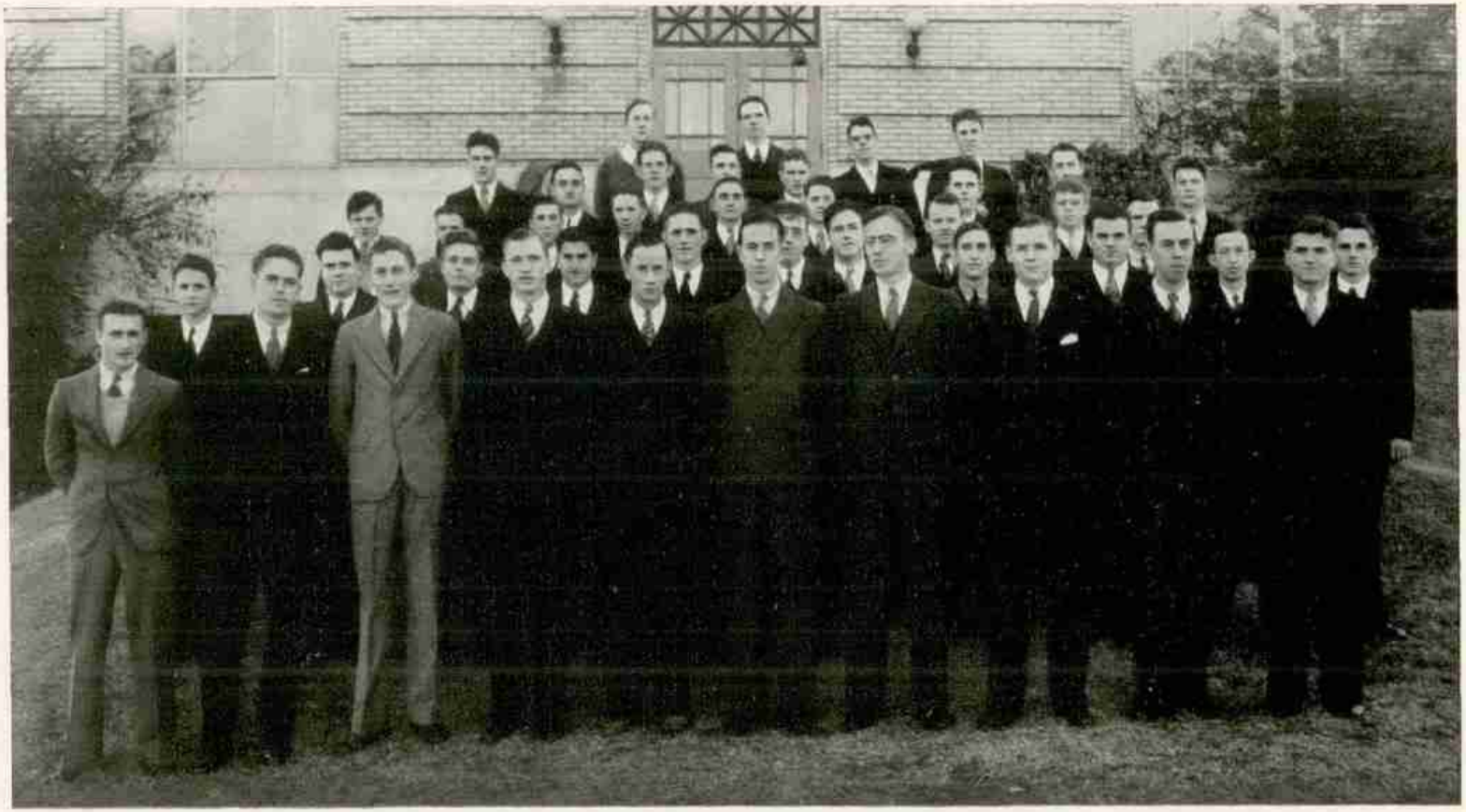
We reprint the following from Section 1, Initiation of N. C. State Forestry Club:

I am the forester. I work as a combination of many men. I grow trees for the lumberman; I help the game warden protect the game; I assist the cattleman with his grazing problems; I join the botanist in his woodland rambles, and I teach the farmer how to profit from his woodlands. Beside these I must follow many other vocations. I must understand the soils like the geologist, and I must help enforce the mining laws. Furthermore, I must teach the people how to enjoy the forests that belong to them. I must protect these forests from the ravages of fire and insects, and I must see that erosion is controlled.

My work is a combination of many works, but in it I am happy, for I, too, am serving my fellowman, and I am living in the great outdoors of God.

But even this does not adequately supply the answer. Therefore, in the first issue of Pi-ne-tum, the staff is attempting to place before undergraduates in forestry an authentic account of forestry as a vocation. To accomplish this, feature articles have been solicited from those who have been actively at work in the forest and who are or have been associated with State College Forestry School.

It is the hope of those to whom the publication of this annual has been entrusted that the first Year Book may serve to better acquaint forestry students with the many problems that confront the forester of today, as well as to furnish a cross-section of the joys and sorrows that are his.



FORESTRY CLUB—1933-34

THE NORTH CAROLINA STATE FORESTRY CLUB

The North Carolina State Forestry Club was organized with the assistance of Dr. J. V. Hofmann in the fall of 1929. The initial membership was composed, to a large extent, of former Mt. Alto Forestry students who had followed Dr. Hofmann to State College when he assumed charge of the new department. The students occupied two adjacent houses on Clark Avenue, and for the first year, 1929-30, weekly meetings of the Forestry Club were held at home. The following year, however, the houses broke up, and the students moved to dormitories, fraternity houses, and private residences. Ricks Hall was chosen as the new meeting place. Finally, in the fall of 1933 this was changed to Patterson Hall, where meetings are being held at present.

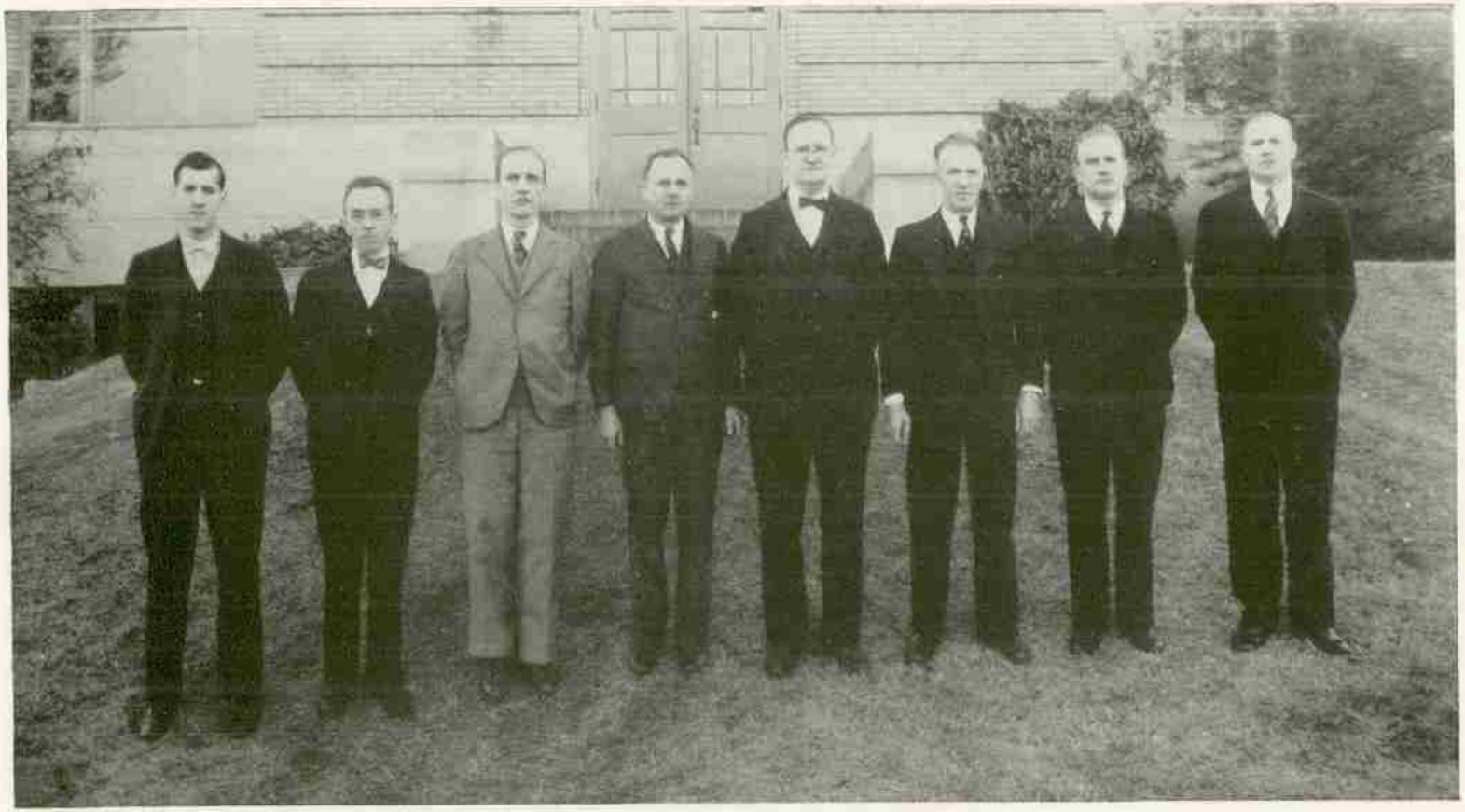
The purpose of the Forestry Club is to promote the interests of the profession, provide an outlet for topical discussion in this field, and to bring the students in closer personal contact with each other. Programs are given alternately by the different classes and consist generally of talks by leaders in forestry or closely related fields; the presentation of subjects of common interest not found in the regular curricula; discussion of topics, and some form of entertainment, musical, humorous, or otherwise. The Club takes an active part in intramural sports and sponsors general college activities.

During the fall of 1932 the first "Rolleo" was held by the Forestry Club, and it was such a success that it was voted an anual affair. It is a day-long event during which members of the separate classes vie with each other in various contests ranging from races and tree climbing to the more delicate arts, such as tobacco spitting and the crowning of the biggest liar. The winning class receives a cake and a plaque engraved with their class numerals. It is the custom to hold a dance annually during the winter or spring term.

This year saw several new features added to the Club's activities: first, the holding of one meeting each month out-of-doors; second, the publication of a forestry annual by the Club, similar to that published at other forestry schools.

All students in the forestry school are eligible for membership. Meetings are held on Thursday evenings at seven o'clock.

The Forestry Club—of the students, by the students, for the students—BOOST IT!



FACULTY

(Left to right) Slocum, Mitchell, Wells, Hofmann, Shunk, Hayes, Whitner, Fontaine.

FACULTY

JULIUS VALENTINE HOFMANN—Director of Forestry School. Instructor of Forestry Silviculture, Forest Management, and Methods of Research—B.S.F., M.S.F., Ph.D. at University of Minnesota. Alpha Zeta, Xi Sigma A, Sigma Psi, Rotary Club, Society of American Foresters, Chairman of this section in 1933, American Forestry Association, a Fellow of the American Association for Advancement of Science, and the Ecological Society of America.

RALPH WESLEY HAYES—Professor of Forestry—Instructor in Silviculture, Forest Utilization, Timber Preservation, Logging, Lumbering, Forest Finance—B.S.F., M.S.F. at Iowa State College. Phi Kappa Phi, Alpha Zeta, and Society of American Foresters.

GEORGE KELLOG SLOCUM—Associate Professor of Forestry—Instructor in Wood Technology, Timber Physics, and Mensuration—B.S.F., M.S.F. at North Carolina State College. Phi Kappa Phi, and Society of American Foresters.

BERTRAM WHITTIER WELLS—Professor of Botany, Instructor in Dendrology—A.B. and M.S. at Ohio State University. Ph.D. at University of Chicago. Phi Kappa Phi, Phi Beta Kappa, Sigma Xi, President of the State Academy of Science for 1933, and state representative of the Ecological Society of America.

ROBERT FRANKLIN POOLE—Professor and Plant Pathologist—Instructor in Diseases of Forest Trees—B.S. at Clemson College, M.S. and Ph.D. at Rutgers University. Alpha Zeta, Phi Kappa Phi, Sigma Xi, Fellow American Association Advancement of Science, Member of American Phytopathological Society, Southern Phytopathological Society, American Mycological Society, American Horticultural Society, Elisha Mitchell Scientific Society, Raleigh Natural History Club, and American Association of University Professors.

IVAN VAUGHAN SHUNK—Associate Professor of Botany—Instructor in Dendrology—A.B. and M.S. at West Virginia University, Ph.D. at Rutgers University. Phi Beta Kappa, Sigma Xi, American Association for the Advancement of Science, Society of American Bacteriologists, and the American Association of University Professors.

THEODORE BERTIS MITCHELL—Associate Professor of Zoölogy, Instructor of Forest Entomology—B.S. at Massachusetts Agricultural College, M.S. at North Carolina State College, and D.Sc. at Harvard University. Phi Kappa Phi, president in 1933, Lambda Chi Alpha, American Association of University Professors, American Association of Economic Entomologists and a Fellow of the American Asscian for the Advancement of Science.

JAMES FONTAINE—Assistant Professor of Mathematics and Research Assistant Engineering Experiment Station, Instructor in Mapping and Surveying—B.E. in Civil Engineering and M.S. at North Carolina State College. North Carolina Society of Engineers, Secretary-treasurer of Raleigh Engineer's Club.

JOHN SUMMIE WHITNER—Associate Professor of Sanitary Engineering, Instructor in Surveying—B.E. and M.S. at North Carolina State College. American Society of Civil Engineers, American Water Works Association, Secretary-treasurer of both the North Carolina Engineering Council and the North Carolina Society of Engineers, Board of Control of the Federation of Sewage Works Association representing North Carolina, and member of Raleigh Engineers Club.

SENIORS

A. B. Crow, ΑΓΡ, *"Jim"*

Pittsburgh, Pa.

Transfer from U. of Montana, Phi Kappa Phi; Pine Burr Society; Forestry Club, 3, 4; Ag. Club, 3, 4; N. C. *Agriculturist*, Feature Editor.

C. T. Prout, ΑΓΡ, *"Bolty"*

Owings, Md.

Agr. Club, 1, 2, 3, 4; Forestry Club, 1, 2, 3, 4, Treas., 3; R. O. T. C., 1, 2, Corporal.

D. C. Plaster, ΑΓΡ, *"Don"*

Winston-Salem N. C.

Forestry Club, 1, 2, 3, 4, Pres.; Agr. Club, 1, 2, 3, 4; R. O. T. C., 1, 2; Freshman Wrestling Squad; Swimming Team 2.

W. J. Barker, ΑΖ, *"Bill"*

Burlington, N. C.

Agr. Club; Forestry Club, Sec. 2, V. Pres., 3; Military 1, 2, 3, 4, Lt. Col.; Golden Chain; Thirty and Three; Student Gov't., Treas., 2, Pres., 4; Y. M. C. A. Cabinet, 4; Soc. Functions Com., 4; Publications Board, 4; Freshman Football Mgr., 4.

L. B. Hairr, *"Rabbit"*

Faison, N. C.

Forestry Club, 1, 2, 3, 4; Agr. Club, 1, 2, 3, 4.

F. A. Dorrie, ΣΠ, *"Dorre"*

Harbour Green, L. I., N. Y.

Agr. Club, 1, 2, 3, 4; Forestry Club, 1, 2, 3, 4; *Technician*, 3, 4, Sports Editor; Baseball, 3; Swimming, 3, 4, Mgr.

SENIORS

WALTON R. SMITH, AZ, *"Walt"*

Charlotte, N. C.

Golden Chain, V. Pres., 4; Blue Key; Kappa Alpha; N. C. *Agriculturist*, Editor, 4; Agr. Club, 1, 2, 3, 4; Forestry Club, 1, 2, Sgt. at Arms, 3, 4; Rodeo Mgr., 3.

A. G. SHUGGART, *"Shug"*

Yadkinville, N. C.

Forestry Club, 1, 2, 3, 4; Agr. Club, 1, 2, 3, 4; Student Grange; R. O. T. C., 1, 2, Corporal.

F. H. LEDBETTER, *"Led"*

Marion, N. C.

Forestry Club, 2, 3, 4; Agr. Club, 2, 3, 4.

B. H. CORPENING, ΑΓΡ, *"Cope"*

Lenoir, N. C.

Agr. Club, 1, 2, 3, 4; Forestry Club, 1, 2; Ath. Mgr., 3, Sec. 4, Treas and Pres.; Forestry Annual, Bus. Mgr.; Track, 1, 2, 3, 4; R. O. T. C., 1, 2, Corporal.

F. H. HUBE, ΑΓΡ, *"Fritz"*

Wise, Va.

Agr. Club, 1, 2, 3, 4; Forestry Club, 1, 2, 3, 4, Soc. Chr.; Forestry Annual, 4, Asse. Editor; R. O. T. C., 1, 2, Corporal; Varsity Rifle Team, 2, 3, 4; N. C. Students' Fair Committee, 4.

EMERY C. CHATFIELD, *"Chat"*

Peach Creek, W. Va.

Transfer from Marshall College, 1932. Forestry Club, 1, 2, 3, 4; Agricultural Club, 1, 2, 3, 4; Cross Country, 1933; Wrestling, 1933, 1934.

THE FUTURE OF FORESTRY

Ralph W. Hayes, Professor of Forestry, N. C. State College

Forestry today seems to be entering a new period of rapid expansion. The name of Roosevelt will stand out in American forest history as representing two distinct periods of development. "Teddy" Roosevelt really put our forestry work to the front by his interest and activities in establishing many national forests, and putting the management of the forests on a real business basis. Franklin Delano Roosevelt, always keenly interested in conservation of national resources, used the Emergency Conservation Work program to do two things, rehabilitate a large number of young men of the nation, and at the same time do a vast amount of constructive forestry work that has put forestry in the minds of the public as never before.

During the years intervening between the administrations of these two outstanding conservationists our forestry work developed comparatively slowly, but surely. The various branches of forestry activity have been established and developed under a well directed and constantly expanding program. The present work has brought the forestry activities of the country more or less definitely to the mind and attention of practically every mature citizen of the United States, and has created a knowledge of, and interest in, forests and forestry practices in our country much more definite than at any other time in our history.

The future of forestry is of vital interest to every citizen of our country. Many laymen do not realize how closely its future development is related to their own problems. Foresters are qualified by training to understand, and are more keenly interested in that future because of profession. Let's take a look ahead and see the possibilities in store.

The future of forestry in the United States depends on the reaction of the people of the country to education in forestry facts and demonstration of forestry practices.The problem of use of our vast acreage of idle land must be solved by demonstrating and proving to owners, whether public agencies or private individuals, the best and most profitable use for such land. If that use is for Forestry, we must demonstrate it, both by facts of growth and value and by comparable areas actually producing timber at a profit.

The problem of ownership of our commercial forest lands will solve itself, if we can prove to the private owner that he can make a profit growing timber on his land. The farm woodlot will become a prize part of every farm when the owner manages the area properly and finally realizes the profit from this land. Lands not capable of producing timber on a commercial scale must remain a public charge, but they may be made exceedingly valuable to the nation

as regulators of stream flow, as providing homes and food for wild life, game and fish, and as a means of preventing erosion.

The National Recovery Act code as adopted by our lumbermen, with the conservation clause contained therein, opens the way for getting conservation, silviculturally controlled cuttings, protection of young growth—altogether real forestry practices into the woods and onto the lands of private individuals and corporations. When we can do this we have gone a long way on the road to a solution of our idle and tax reverting land problem.

The present E. C. W. activity has provided employment for every forestry graduate in the country. It is unreasonable to expect that this work will continue on as extensive a scale as at present for long, but it seems probable that it will continue, on a reduced scale, for much longer. More foresters could be used to advantage right now if they were available. It is reasonable to suppose that more men will be needed to carry on the actual administrative work than were used before E. C. W. work started, after large areas have been brought under more intensive management. Private industry will need men, States will need more men, and the future for good foresters looks bright. Many will be weeded out during the duration of E. C. W. work as not having the outstanding qualities desired, but those who can prove their worth should make for themselves a definite place.

We, as foresters, must all help in these times of development and adjustment to educate the public to a full realization of our Forestry needs. Prove to the large and small landowner his need of forestry as a means of making his submarginal and marginal land profitable. Prove to the public that forests are necessary for recreational areas, and breeding and feeding grounds for game and fish, as well as regulators of floods and means of controlling erosion, while at the same time they are growing timber as a source of future income to help carry on the expenses of government. Prove to the individual that we all use forest products in many ways every day, that forestry is necessary to his future well being and comfort. When we have done these things, made the Individual as well as the Nation forestry-minded, we will have helped to bring about a national attitude that will demand the future forestry policy necessary for our nation, and at the same time provide a more definite place for the "Forester" in our national life.

The *measure of a man* is the height of his ideals, the depth of his convictions, and the breadth of his interests and sympathies.

THE FOREST IN RELATION TO WILD LIFE

Dalton Parker, '36

"What would game be if it did not have the forest for food and shelter?"

As the forests are a necessity for the welfare and comfort of man, so they are for the welfare and comfort of wild life. The forests provide food, breeding grounds, and protection from the many enemies.

The vast areas that once offered abundant food and protection have vanished or decreased under the invading ax of civilization. This wholesale destruction came as a result of increasing demands for forestry products and for agricultural lands, without any thought to the future.

Gone with our virgin forests are many species of wild life. Under such disturbance of the natural protection and environmental factors, many were unable to survive. When total extinction did not occur, the number of species was greatly reduced. In contrast to this, the present virgin areas which have been undisturbed have much wild life. In a recent survey of the Great Smoky Mountains of Western North Carolina and Eastern Tennessee, a spot that civilization has barely touched, E. V. Homarck collected and sent approximately 12,000 specimens of wild life to the Chicago Academy of Science. He believes that he has from five to ten new species in his collection. Undoubtedly similar areas like the Everglades of Florida, the Okefenokee swamps of Georgia, and the Great Dismal Swamp of Virginia and North Carolina will reveal similar results.

We can hardly picture this destruction of plant and animal life as man's primitive self meeting demands for himself and himself only, and yet, with the increasing knowledge of science we are beginning to face these problems sanely and sensibly. Heretofore game was a matter of little or no importance. We had it in great abundance at first, but like the forest, it vanished. We are now—and let us hope that we are not too late—beginning to see our mistake and are trying to save both. The government took it up, and with the beginning of reforestation a marked increase in the wild life of those regions so depopulated has been reported. This is the result of an increase in natural food, breeding grounds, and protection. Slowly but surely the forest areas are beginning to broaden. Animal life is contributing its share in the making of the forest by scattering seed as well as in the natural check of lesser plant growth.

Foresters are glad to see the public recognize the needless destruction of wild life that has been and still is going on, which, with proper enforcement, might be avoided. Technically, however, for-

esters do not want to see too great an increase in game, especially the larger type. The browsing animals such as deer, moose, and elk may do considerable damage to the young growth of the forest. The smaller species may prove destructive if they become overly abundant. Removing of animals from our populated regions to regions of scarcity as has somewhat successfully been done, will tend to check this.

Men are beginning to seek more and more out-of-door recreation. We are in quest of game to satisfy the primitiveness in us. We are headed for the fields and the streams. If we are to have our streams we must preserve the forest as a water-shed and as a protection against invasion. Fire, that great destroyer of the forest and its inhabitants, bird, mammal, and fish-life, must be checked. No one knows better what havoc fire wages among plant and animal life than does the forester. However, it is the duty of every citizen to do his utmost to prevent it. Indirectly, careless hunters and campers cause the death of thousands of animals yearly by their carelessness with fire. Wild life protection is a public duty and fortunately the public is slowly becoming aware of its trust.

With greater scientific management of lumber cutting, much of the useless waste has been done away with. But even with the many precautions taken, fire soon follows the logging operation.

Only in recent years, since the building of the State highway connecting Gates to Pasquotank County across the four mile width of the Great Dismal Swamp, has this semi-tropical-like jungle, rich in many kinds of wild life, been transformed into a desolate area of dead, broken and burned trunks of what once were magnificent trees. This is not the condition of the entire swamp. Far from it. But it is a vivid picture of what may and what often does follow the woodman's ax. When the highway was first constructed, the logging firm had not gotten up to the road, but with the coming of that, the picturesqueness of the swamp began to fade. Second growth is now beginning to screen the ghostliness left by past fires, but each year new fires start in the many fire hazards left by the preceding ones. And each year areas heretofore unburned are swept by the flames. Many have been the nights that the flames have been gazed upon from miles away. One could not help but behold the beauty of it and yet be conscious of the life that was going up in smoke.

With all the available literature dealing with forest problems and the damage done to the forest by fires, many farmers who own wooded lands still persist in burning over the area annually to keep down the underbrush. They are afraid that the area will become too thick. And yet, if it was scientifically stocked, there would be an annual income from the stock, plus the absence of useless

—Turn to page 19

VIRGINIA SCRUB PINE

Pinus virginiana

George K. Slocum

Scrub Pine at Hill Forest

Virginia scrub pine (Pinus virginiana, Mill), due to its wide range and prevalence in certain localities, deserves more exact study than heretofore has been accorded this species. In view of this fact, we are at the present time conducting a detailed study of the regenerative powers, growth, and management of scrub pine. The study has been conducted since the spring of 1932 and now, although the results are far from complete, we have obtained some definite data concerning this species. This study is being conducted on the Hill Demonstration Forest and surrounding territory in Durham County, North Carolina.

★

Regenerative Powers

Scrub pine appears to produce large quantitees of seed, but in reality individual trees produce relatively small amounts. The large number of cones always present on seed producing trees of this species give the crown a dense appearance and the impression of a large cone crop. This is due, however, to the fact that the old cones, already open, are retained for many years after maturity. The important fact of seed production is that some seed are produced every year instead of at intervals as is common of the other pine species.

Germination tests conducted on seed collected from forty-five trees in 1932 show that the average germination in this region was about 45 per cent. This varies with the tree and with the year from as low as 5 per cent to as high as 90 per cent for individual trees. These results are being checked again with seed collected last fall (1933) from seventy-six trees, representing all age classes.

Seed production takes place at an early age when the trees have ample crown space. Many trees were found that produced their first

cones at the age of six years. The viability of the seed produced by these trees is low, but it is an important factor in progressive reproduction. Once started, seed production appears to go on each year until death. In crowded young stands seed production begins later in life, and then, even though the stand may approach normal stocking, cones are produced in the top branches of the dominant trees in the stand.

This fact of seed production in the stand is of no benefit to the forested area, as this species will not reproduce in its own shade. Many seedlings several inches high and about two months old are found in these stands in the first part of the growing season, but no seedlings seem to survive the first summer, as none have been found the following fall. The competition for light and moisture is evidently too great for the seedlings and they soon die out. However, the open spaces and abandoned fields adjacent to these areas are quickly seeded in with a dense stand of seedlings that may run as high as 50,000 to the acre. Most of these may survive from five to ten years before competition thins down the stand.

Leaving seed trees as a silvicultural practice does not fit this species, as the trees are not wind firm when liberated by cutting. Trees left in this manner soon blow down during the winter when the ground is softened by the frequent rains. It has been found that clear cutting in the spring, after the cones have opened and liberated the seed, will insure reproduction if the underbrush is not too dense. Also, the seed may be stored in the duff for a period, but this factor has not as yet been proved.

Growth

Studies on growth show that scrub pine in pure stands on site 1, (site index 75) will develop as shown in the following table.

Age	D. B. H.	Ht.	Vol. Cu. Ft.
5	1.3	6.7	
10	2.6	17.5	
15	4.0	26.5	
20	5.2	37.0	3.5
25	6.4	45.0	5.2
30	7.5	51.0	7.5
35	8.5	56.0	10.3
40	9.5	61.0	14.0
45	10.4	65.5	18.5
50	11.5	68.5	23.5
55	13.0	71.0	31.4
60	14.8	73.0	42.7
65	17.0	74.0	54.6
70	18.8	75.0	69.0

This would be about the maximum growth to be expected of scrub pine.

Scrub pine grows quite rapidly during its early life, reaching breast high at an average age of four years. It can hold its own with loblolly and shortleaf pine for about fifty years, but makes its best development in pure stands. Scrub pine is a short lived tree and after fifty years, death by fungus and insect attack removes many trees from the stand.

There are two types of scrub pine. The first is the river bottom or lowland type which gives the best growth with a site index of 75 at 50 years. Second, the hill type or dry site type. The latter has a site index of 65 and 50 at 50 years. This species does well on the dry sites and the seedlings form just as heavy ground cover here as on the better sites. On site index 75, scrub pine will produce more than a cord, of 128 cubic feet, per acre per year for the first forty-five years.

Management

Scrub pine should be grown on a short rotation, the financial rotation being around forty-five years. The short rotation is best financially because after forty-five years the growth, as a rule, begins to slow down, and the added increment does not offset the carrying charges. Also the loss by death due to Trametes pini and the Southern Pine Beetle lower the volume production per acre when the stand reaches the age of 50 to 70 years. This loss in some cases more than offsetts the added increment of the remaining trees. This loss by disease is usually done away with by the short rotation, as Trametes pini only attacks the older trees and the insect loss is small if care is taken with the slash left after logging. Winter cutting will usually take care of any danger from insects.

Scrub pine is an intolerant species and even though the lower branches are easily shaded out and killed, the stubs are very durable and remain for many years. The stubs may remain on the tree throughout its life and thus tend to cause an inferior grade of knotty lumber to be produced. In stands of normal stocking these stubs are always present and it is a question as to the method by which they may be removed to insure clear lumber production. It might be suggested that the first 12 to 16 feet be pruned by hand when the trees are young to insure a clear log from each tree, the remainder of the stem to be used for pulp.

Scrub pine is used extensively for pulpwood and the best practice would probably be to grow this species on a pulpwood basis. It will produce about forty pulpwood cords, i.e., 160 cu. ft. cords, per acre in 45 years on the better sites. At an average price of $6.00 per cord

on the car this would make a gross income of $240.00 per acre for forty-five years or about $5.75 per acre per year.

This species is an excellent cover type due to its rapid recovery of bare areas and the denseness of the stands produced. In several 60 year old stands examined the plow furrows were still visible on the ground, thus showing its great soil holding ability especially in this region where the clay and sandy soils readily erode when left uncovered.

Scrub pine has long been considered a weed species and has been looked upon with disfavor by many. This tree has many good points and as it is so prevalent in many localities these good points should be utilized to the utmost advantage. The enemies of this tree outside of fire are few and do not do much damage if the crop is properly managed. This is more than can be said of many more valuable species and so this tree should receive due consideration.

THE FOREST IN RELATION TO WILD LIFE

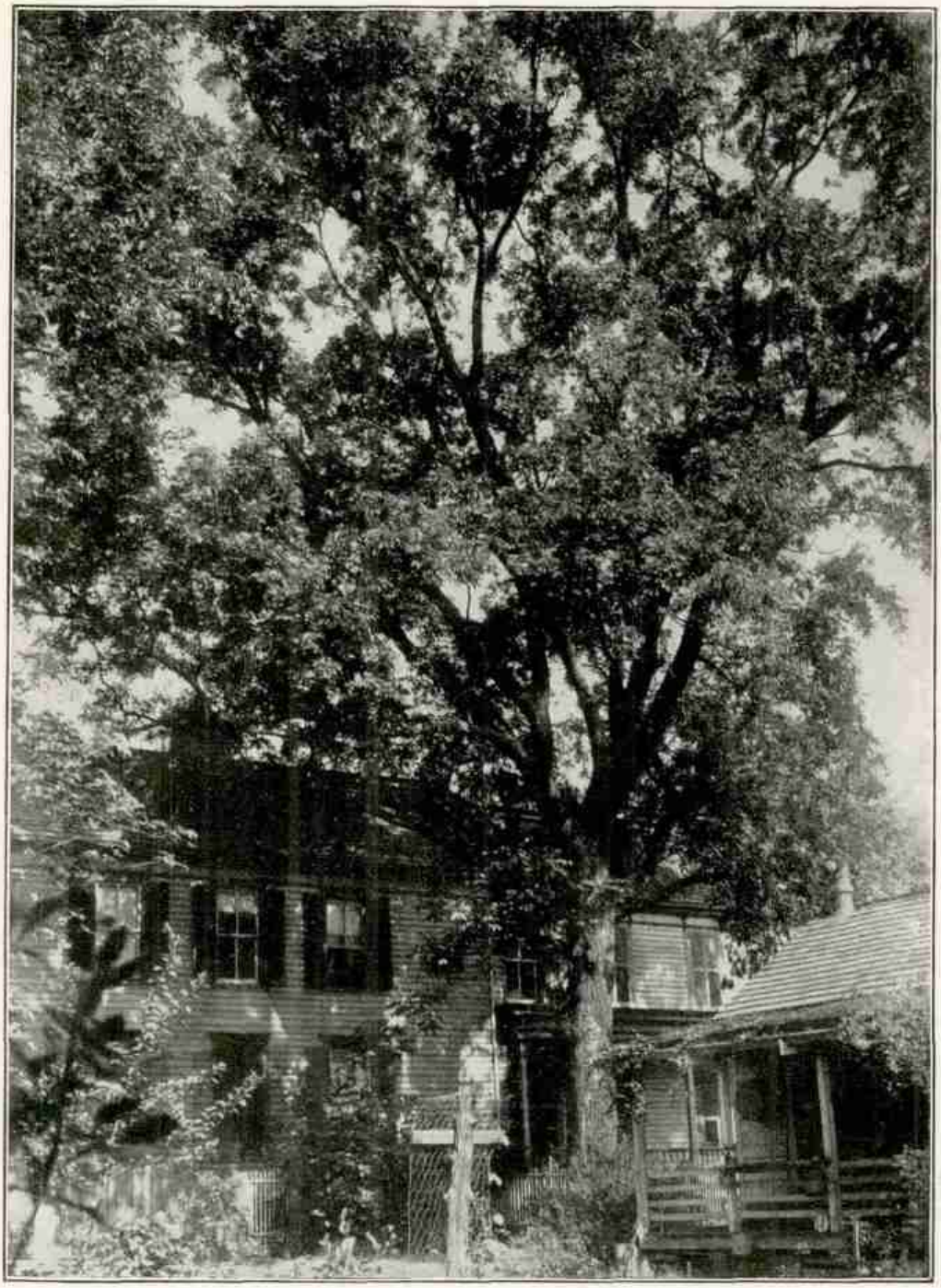
(Continued from page 15)

waste of timber that would have been worth much in the future had not the annual fires kept the old fire-scars open and started new ones. What farmer is there who does not listen to the cheery whistle of the bob-white or the drumming of the grouse? Yet these cheery sounds will not greet our ears if we continue to destroy the natural environment of our wild life companions.

It is quite true that the removal of fire hazards such as brush along roads and trails, standing dead trees, and fallen logs may mean that many of the wild creatures will have to look elsewhere for places to rear their young. But where this may temporarily destroy desirable nesting sites, it might give protection to countless thousands of others from raging fire. In such a case, many parent birds and animals may escape, but the young are doomed, due, perhaps, to the carelessness of the camper.

There are two men, one of whom is very happy, and one of whom is very miserable. The essential difference between them is that one loves the beauty of the world, and the other hates its ugliness.

—*Thomas Dreier.*



"And now, when the morning gilds the boughs
Of the vaulted elm at the door of my house—"

SALUTE TO THE TREES

Many a tree is found in the wood,
And every tree for its use is good.
Some for the strength of the gnarled root,
Some for the sweetness of flower or fruit,
Some for shelter against the storm,
And some to keep the hearthstone warm,
Some for the roof and some for the beam,
And some for a boat to breast the storm.
In the wealth of the wood since the world began,
The trees have offered their gifts to man.

But the glory of trees is more than their gifts:
'Tis a beautiful wonder of life that lifts
From a wrinkled seed in an earth-bound clod
A column, an arch in the temple of God,
A pillar of power, a dome of delight,
A shrine of song and a joy of sight!
Their roots are the nurses of rivers in birth,
Their leaves are alive with the breath of the earth;
They shelter the dwellings of man, and they bend
O'er his grave with the look of a loving friend.

I have camped in the whispering forest of pines.
I have slept in the shadow of olives and vines;
In the knees of an oak, at the foot of a palm,
I have found good rest and slumber's balm.
And now, when the morning gilds the boughs
Of the vaulted elm at the door of my house,
I open the window and make a salute:
"God bless thy branches and feed thy root!
Thou hast lived before, live after me,
Thou ancient, friendly, faithful tree!"

—*Henry Van Dyke, in Louisiana Arbor Day Program.*

THE EXPERIENCES OF A "FOOTBALL" FORESTER

Harry E. Altman, '31

Many foresters are anxious to leave the impression that they were born to be successful, and that life just naturally spread a bed of roses for their number 12's to trod upon the moment the sheepskin came their way. I am going to give you a few informal facts that may classify me a plebeian, but they will be facts just the same.

After having spent many moons absorbing some of the wisdom propounded by Dr. Hofmann and Professor Hayes, I made my debut in practical forestry work on the Nantahala National Forest during the summer of 1930. I was turned over to a fire guard the first day, with instructions to work with him on trail maintenance. We started out, he taking one side of the trail and I swinging a brush hook on the other. The hotel had packed a cantaloupe in my lunch, and I had intended throwing it away; however, my partner offered to carry it, and I remember, after working four hours, how my admiration rose for the man who could swing a brush hook so efficiently, cover so much ground, and at the same time carry a cantaloupe in the hip pocket of his overalls without even bruising it. My chief accomplishment that day was an addition of fourteen blisters, but I was proud of them just the same.

After the trails on that ranger district were brushed, the maintenance crew treated the telephone rights-of-way in a similar manner. The camp was then moved to Standing Indian Mountain in order to commence work on a trail-widening project. This was necessary in order to provide width enough for a tractor to skid lumber up the mountain for the erection of a lookout tower. The first night we slept on the floor of a shack at the foot of the mountain, but the next day a temporary tent camp was erected. The trail work consisted of digging out the side of the bank and moving it to the outer edge for a fill.

Before this work ended, I was transferred as compassman on a telephone line survey, after which I helped to construct the line, learning how to climb trees, string wires, set poles, and make "hook-ups."

I next went to Georgia (no reference to the colloquial meaning of that expression) to work on a road construction project. There I learned more about the most efficient method of swinging a mattock to slope banks and install culverts. Two weeks in road camp and I was transferred to acquisition, computing field data. This was my last job, and the summer ended with a two day inspection trip of the forest in the company of the supervisor and his assistant.

The summer of '31 I received the coveted sheepskin. After sending out ninety applications, I was offered a job as "Laborer, road construction project" on the Ozark National Forest, which I accepted.

I spent my first three weeks in the Ozark Nursery digging ditches for an oscillating sprinkling system. I was then sent to a road job on the White Rock Ranger District, and in helping pry loose, haul, and square man-sized rocks for culverts, I learned the meaning of real work. Later I acted as time-keeper, cost accountant, clerk, and general handy man. In my spare time, I continued my studies dealing with the scientific art of swinging a grub hoe. The road project ended in October, and I spent two months with the Road Foreman running levels for road location surveys. In January, I went back to the nursery and learned something of the carpentry trade by building some hundred-odd frames for seed beds. In February, I was transferred to a 55-man planting camp established for the purpose of planting half a million 1-0 shortleaf stock. Although most of my time was spent making traverses of the numerous plantations and establishing permanent strip plots, I learned something of the most efficient planting methods for shortleaf pine, and more important still, the best method of handling planting crews. March, '32 came along, and the allotments for improvement projects became exhausted, so the vagabond was out of a job. A bombardment of applications sent to all corners of the known forestry world did not even produce a temporary opening for a laborer, so I headed back to Pennsylvania.

Two weeks later, I was offered a 10-day job as planting foreman on the Forbes State Forest with the understanding that I get the trees planted properly at a lower cost than that of other years. The men on my crew were of the opinion, after two days, that they were working harder than was customary on State projects, but the trees went in fast and furiously just the same. The night that the work ended I received notice of my appointment as Assistant Forester in northern Pennsylvania. This came to me as a surprise, for nearly two years had elapsed since I had applied for the position. Did I accept? I thought, "A steady job at last," and cranking the chariot, I headed for the mountains.

I was placed in charge of an 18,000-acre tract of timberland that had just been acquired, and I looked forward to the opportunity of developing a new Division. My headquarters was a farmhouse eleven miles from the nearest town, where the roads were impassable at certain seasons of the year. Later I rented a cottage in an abandoned tannery town and "batched." I liked this life, especially after my good friend, A. B. Watson, came from Raleigh to work with

me. I felt that at last I was getting a chance to be more than just one of the hired help.

As was customary among all forestry organizations at that time, improvement funds were very limited, so I worked by myself digging ditches and hauling dirt for a partially completed road. Later a little money was forthcoming, and a fire guard worked with me. Still later four of us skidded rock for a bridge pier, installed culverts, and relaid a stone abutment that had been washed out by water. All of this is forestry, and the man in charge should know the most efficient method of accomplishing such jobs. Other experiences while working for the State included fire suppression, painting boundary, and coöperating with game wardens during hunting season.

In connection with fire-fighting, I had an experience that might bear repeating. The district had purchased a new fire plow, and everyone was itching to try it out. A slow-burning meadow fire necessitated a constant patrol that was running into money, so the Inspector and I were instructed to plow a line and let the fire burn itself out. We started for the fire, but the tractor hung up on a rock before we reached the blaze. While trying to release it the tractor tilted, and the gas ran back into the manifold, setting the machine on fire. The motor was immediately cut off and the gas cap removed to prevent the accumulation of vapor in the tank. We began to throw dirt as fast as we could to smother the flames. After five minutes, we seemed to be gaining some headway when the tank suddenly exploded with a roar and a flash that blinded us for an instant. We rolled over on the ground to put out the blaze on our clothing and upon getting up, saw the hood of the tractor lying 75 feet distant with the grass, shrubs and seedlings around it burning merrily from the flaming gasoline. On the other side of the tractor, and at about the same distance from it, was the gas tank, flattened like a pancake, starting another fire. After putting them out, we began to feel the pain of air on raw flesh and a hurried trip to the nearest doctor resulted.

In April, '32 came another shortage of funds and in company with 16 others, I found my services discontinued for reasons of economy. I was offered work on a line-plot timber survey being conducted on the Nantahala National Forest and I jumped at the chance to get back to my old stamping ground. The prize for the best day's work on that project went to the Assistant Supervisor and his compassman, a Georgia man, the distance being 225 chains with ties at both ends of the strip. Incidentally, they did not get back to camp until 8:30 that night. I worked three weeks and the survey funds became exhausted, so I continued to work up the field data on my own time.

I had worked in snake country before, but it was on this survey that I first had the pleasure (?) of unknowingly picking up a copperhead while searching in the leaves for a diameter tape. I also discovered my first still running full blast, the fire still smouldering from having been hurriedly extinguished with water.

May 5 I received the offer of a position as Technical Assistant on the Chippewa National Forest in Minnesota, and I called the dog, outed the campfire, and headed for the Lake States. Upon my arrival, I noticed quite a change in temperature and began to wish for more clothing. I was told that ice had remained on the lakes here until April 9, and I believe that now. I have been driving my car across some of the lakes in the forest since November.

Let me give you my impression of the Chippewa National Forest in north central Minnesota, where the temperature has already reached 35 below zero this year, and winter is just beginning. The forest is the oldest in the United States, having celebrated its 25th anniversary last fall. It is very appropriately titled "The Cradle of Conservation." The land surface is flat, tending to become rolling in localized spots, but the numerous lakes, large, deep and beautiful, give to the sky a deep blue color unknown to any mountaineer, and are more abundant than chiggers in South Carolina. It is interesting to note that the Mississippi River, rising 30 miles west of the forest boundary, flows through two lakes as it crosses the forest on its way southward. In Cass Lake, the first through which the river passes, there is a large island containing a lake in its center, the surface of which is four feet higher than the lake surrounding the island.

The most valuable commercial species here are norway pine, white and jack pine. Other species found in abundance are: aspen, northern red oak, white and yellow birch, balsam, white cedar, white and black spruce, tamarack, red maple, and some basswood, burr oak, rock elm, and sugar maple. Ten sections of land on the forest were purchased from the Chippewa Indians, and the magnificent stand of norway and white pine saw timber on it will never be cut except as the trees die. The lake bounding this area is noted for having a half-million dollar shore line. The average age of the timber is 300 years, and a thrifty stand of mixed pine seedlings forms the understory. Mixed hardwoods make their appearance on poorer sites and on old burns.

To get back to the experiences of a traveling forester—after a short training period, 40 of us were sent to the various E. C. W. camps on the forest to take charge of the field work. There will probably be other articles in this annual dealing with the Civilian Conservation Corps activities, so I shall only say that after work-

ing for seven months on timber stand improvement projects, I have come to the conclusion that cultural work, including release cutting, sanitation cuttings, thinnings, weedings, and fire hazard removal, is very much worth while. I am thoroughly convinced that silviculture is one of the most important, if not the most important, phases of forestry.

Part of my work last summer and fall consisted of supervising weeding crews in the world's largest nursery, established last spring, and handling crews on a 5,000-acre fire. The greater portion of the fire was centered in a series of swamps, and the line around it was a ditch six feet deep in places. Fifty wells were driven along the fire line, gas pumps attached to some of them, and pitcher pumps connected to the remainder. Fire pumps were also set up at the nearest lakes. The night crews cut a 25-foot strip inside the line and burned it on still nights. In addition, the night work consisted of watering out hot spots and soaking the line so that the day crews could hold it. An airplane covered the front during the day to pick up spot fires outside the line.

After five months as a T. A., I was made chief of party on an acquisition project that will almost treble the area of the present Chippewa Forest. A shortage of funds made it necessary to reduce the number of party chiefs after three weeks work, and I was elected, being transferred to a 60-man NRA camp in charge of cultural work.

Having passed the civil service examination after the third attempt, I am now in sole charge of the camp. The present work plan calls for three cultural crews and one fire hazard crew. In addition, two crews are engaged in a forest inventory for the purpose of revising the present management plans.

My duties include checking the work of the crews, breaking in new men, keeping the camp fully manned, locating cultural areas needing treatment, putting out bids and buying provisions, making reports and the hundred incidental problems encountered with this sort of work. Do I like it? It is the most interesting work to date, and is especially appealing because of the responsibility involved.

The average newspaper reader considers the President's Emergency Program as merely furnishing employment for people out of work, but if I had space I could show you cost figures and accomplishments that would speedily change that opinion.

Because of the impetus given to forestry and forest activities everywhere, it is doubtful if many of the N. C. State under-

graduates in the forestry department will have to take the bumps that fell to some of us already out. Personally I do not regret one of them, and I would be eager and willing to go through it all again. My belief is that studying forestry is comparable to being vaccinated for smallpox. The germ spreads through the body, and if it takes, a person will endure anything so long as it is related to his chosen profession. Here's hoping that every State man is afflicted with that disease!

BLESSING ON THE WOODS

Blest be our woods of hemlock, maple, pine,
Balsam and birch, dear Lord, our woods and Thine!
Blest be their bubbling springs, their rippled lakes,
Their ponds, and every laughing brook that makes
Rainbows and foam and crystal homes for trout;
Blest be the trails that wander in and out
Among gray bowlders drowned in soft green seas
Of velvet moss! Oh, blest be all of these!

Blest be the woods and they that dwell therein;
The scolding squirrel and his gentler kin,
The friendly chipmunk and the timid hare;
Blest be the graceful mink, the shambling bear,
The beaver on his dam, the drumming grouse,
The hawk that loves the sky, the white-foot mouse,
The antlered buck that paces, proud and tall,
With doe and dappled fawn, blest be they all!

Lord, bless the woods for perfect loveliness,
For balm that heals the soul in care and stress!
Keep them forever fragrant, cool and sweet!
From thunderbolt and flame, from gale and sleet,
From all that is unclean, from ruthless might
That gives to desolation valley, glen
And mountainside, God bless our woods! Amen.

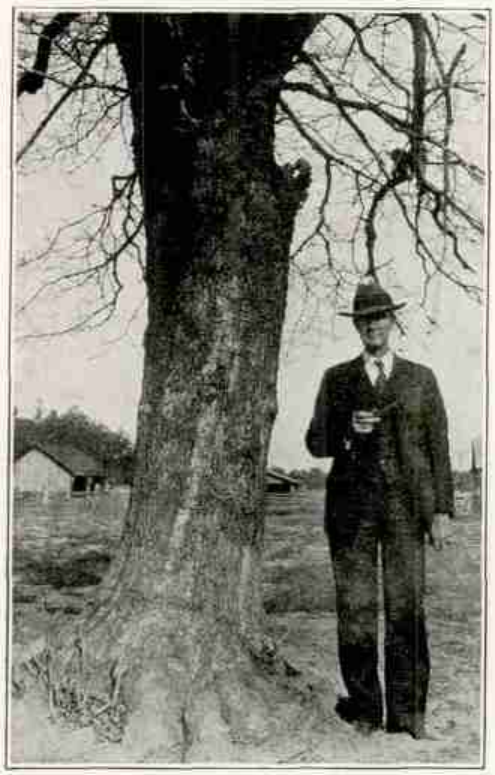
—*Arthur Guiterman in N. Y. Herald Tribune.*

THE BIG TREES OF NORTH CAROLINA

R. W. Graeber, Extension Forester

The forests of North Carolina have been credited by foresters and botanists alike with a greater range of tree species than those of any other State. On Smith's Island and in the lower Cape Fear region we find the cabbage palmetto, a sub-tropical tree, and with the spruce and balsam of Mount Mitchell, Roan Mountain, and the Great Smokies we brush the icicles of the Arctic Circle. Between these two extremes approximately two hundred species of trees are found. Beginning with the swamp or southern hardwoods in the East one group shades into another, the loblolly and pond pines of the coastal area giving way to the longleaf pine in the sandhills, followed by the shortleaf pine and mixed hardwoods of the Piedmont, and then the northern hardwood type and white pines of the mountain section.

Lumbermen, furniture manufacturers, and other industrial users of wood have long recognized the wide range of North Carolina's commercial woods represented by more than twenty-five genera and no less than seventy-five species. Yet in the face of this widespread knowledge of kinds and varieties of trees few people, at least of the present day, know that North Carolina also can boast of the size of her trees.



Dogwood (Cornus florida) with diameter of 22.2 inches—W. T. Perry farm in Chowan County.

But these big trees are fast vanishing. So finding, measuring, photographing and making record of large or unusual trees has become a hobby with the writer. In giving the following information on size of trees no claim is made other than that these trees are the largest of their species that have come to my attention and measured personally by me.

In the Ravenel primeval forest, near Highlands, you can find almost any size tree you wish. This area of 2500 acres has never been touched by fire, or an axe, and is made up largely of hemlock, yellow poplar, northern red oak, sweet birch, mountain magnolia, red maple, etc. Here I made records of a wild cherry (Prunus serotina Ehrhart) forty-eight (48) inches D. B. H. and seventy feet to the first limb, with others near by measuring thirty to forty inches; also an eastern hemlock (Tsuga canadensis Carriere) fifty (50) inches D. B. H. And when I stood by a forty-six (46) inch white pine and looked at the top one-hundred-fifty (150) feet in the air I felt as some one

has said, "Gee, it takes two men to see the top, one beginning where the other leaves off." This virgin forest is only a mile from a hard surface highway and is penetrated by well marked trails thus making it easily accessible to visitors.

Another place to find big trees is Sugar Cove in Clay County. To reach this area you follow Eagle Fork of Shooting Creek as far as you can travel with a car and then walk about three miles, high up into the cove. I made this trip after a friend had told me about a nine-foot yellow poplar (Liriodendron tulipifera Linnaeus). When I called on "Dr." Nelson Rogers, a well known character of that section, and asked him about this giant tree he said, "Will Savage is just a liar, thar ain't no nine-foot tree up thar—it's eleven-foot." I found the tree and recorded the measurements thus: Six (6) feet D. B. H. on upper side of slope, nine feet D. B. H. on lower side. And had I measured at the ground on the lower side it probably would have reached "Dr." Rogers' figure.

But big trees are numerous in Sugar Cove. Other trees measured and photographed included a chestnut (Castanea dentata Borkhausen), still living, which measured sixty-nine (69) inches D. B. H., a northern red oak (Quercus borealis Michaux) fifty-two (52) inches D. B. H., a yellow buckeye (Aesculus octandra Marshall) forty-eight (48) inches D. B. H., and a cucumber (Magnolia accuminata Linnaeus) forty-four (44) inches D. B. H.

These and many other species of large trees make a trip to Sugar Cove quite worth while. As a perfect timber specimen I would choose the yellow poplar measuring forty-nine (49) inches D. B. H. with a bole eighty-five (85) feet to the first limb, without a "cat-face" or other defect. But when you speak of value, all odds would go to a "curly" yellow poplar sixty-one (61) inches D. B. H. with a sixty foot merchantable bole. What's it worth? No one can really tell until such a tree is worked into "face-veneers," but such trees have sold, in North Carolina, for $500 to $1,000 on the stump.

But all of North Carolina's big trees are not in the mountains. The big pine of Potecasi, named for the village of Potecasi in Northampton County and recorded in published history of the State, has been heralded far and wide as a nine (9) foot tree. We know that big trees like big fish stir man's imagination, but often shrink when measured.

—*Turn to page* 37

The author inspecting a giant white pine (Pinus strobus) near Highlands, N. C.

GEORGE WATTS HILL FOREST

J. V. Hofmann, Director, Forest School, N. C. State College

When the Department of Forestry was established on February 1, 1929, one of the major problems confronting the development of a forest school was the acquisition of a field laboratory. There were no State funds available for the purchase of land, and no lands available for the use of the Forest School. After spending the greater part of a year in a more or less fruitless search for some one who would aid in the purchase of land, or donate land to the school, George Watts Hill of Durham came to the rescue. Mr. Hill owns a large farm about sixteen miles north of Durham, known as the Quail Roost farm, where he has developed his famous Guernsey herd and has built up one of the finest dairy farms in this section of the country. In connection with his dairy farm, he had considerable acreage in timber land. After discussing a plan of coöperation with the Forest School, Mr. Hill realized that the Forest School needed absolute ownership in order to carry on its work through a long time program. Consequently, Mr. Hill gave the Forest School title in fee simple to 378 acres from his Quail Roost farm. After making this outright gift to the Forest School, he has continued to finance additional tracts of land which are managed on a long term basis by which the purchase price is repaid from cash returns for products from these lands. In this way various tracts of land have been acquired until the present area of the Hill Forest is more than 1300 acres.

The area is large enough now to carry on field work with forestry students. The curriculum calls for all of the topographic surveying, and field surveying on the Hill Forest. The mensuration work is done in connection with the timber operations. Thus it is possible to make up volume tables, yield tables, and all phases of scaling and timber cruising in connection with this development. The large variety of species on the forest serve very well for a dendrology laboratory. Technical studies of yield, density, stand development and other silvicultural problems are intensively studied by the establishment of and continuous records on permanent plots. This work is done by the upper classes. Some compartments have now been cut over and the original stands taken out. The remaining age classes form the basis for the future cutting cycles. The basic management plan was begun by the senior class during the present year.

By handling the forest as a going business every student has the opportunity of helping with a forest development during the four years spent at college. All of the facts are placed before the classes in order to familiarize them with the handling of land, timber, contracts, sales, and other transactions.

During the past season it has been possible to make very rapid progress in the development of the basic management plan. This is true because a C. C. C. camp is located near the property and part of the work has been available for the Hill Forest. In addition it has been possible to get projects done by a relief crew and the C. W. A. With these developments it has been possible to open up and construct the roads and part of the fire lines. It appears that this type of work will be continued through the present year which will enable the completion of these plans. With this basic ground work completed, the forest area will become a very valuable field laboratory because of the accessibility of all parts of the area and a better opportunity of protecting the property from fire and trespass.

In addition to the opening up of the forest lands, a large headquarters building and a pond and other developments around the headquarters have been constructed. These improvements will make possible a change in the forestry curriculum because there will be accommodations for classes on the forest. It is planned to begin this work a year from the coming spring and have a summer course of about six weeks to do all of the field work with the exception of some daily trips. This will add to the course because it will enable the students to get field work in a unit and avoid breaking up the work in the forestry courses and the courses taken in other departments. Together with the field work of the forestry students it is planned to establish camps for the entire Engineering group of students to do their field work on the Hill Forest. This additional field work will make possible a complete survey and topographic map of the forest and will make a detailed base for the management plan. The Soil Survey students do their intensive survey work on the Hill Forest, which provides a soil map along with the topographic and base map prepared by the forestry students.

The Hill Forest has a variety of upland, cove and lowland types, including the pines and hardwoods, and is very typical of the Piedmont section of North Carolina. There is a wide range of conditions which provides numerous problems for the continuation of the work.

To carry on this same type of work in the Coastal Plain region of North Carolina, a forest tract has been acquired through Senator A. D. MacLean, who has provided land on the same basis that Mr. Hill has near Durham. The MacLean Forest contains 1550 acres located in Hyde County and is a very typical east coast forest region. This area is being managed on the same basis as the Hill Forest and will help to work out the problems for the Coastal Plain region.

A BRIEF STORY OF FLOODS AND EROSION

H. J. Loughead, '31

Land conservation has become one of our most important national problems. Within the last few years it has become recognized as such, and enormous projects for land conservation are now being undertaken by our national government. Perhaps the most outstanding among these is the Tennessee Valley Project. Within the Tennessee Valley plans are being completed to build enormous impounding dams for the production of hydro-electric power. To make such an investment sound, assurance must be furnished that will guarantee a long period of service. Such assurance can be had only through the correction of a number of conditions that now exist on the Tennessee River and its watershed. Floods must be reduced to a minimum by the retention of a greater proportion of the meteoric water in the soil, with a gradual discharge to surface water channels. The amount of silt now carried by the river during periods of high flow must also be greatly reduced by controlling erosion on the Tennessee River watershed.

To remedy these things it becomes necessary to regulate the runoff from the watershed, for it is excessive or flash runoff, termed stormflow, occuring quickly after periods of intense precipitation, that causes floods and erosion.

To reduce stormflow it is necessary that the condition favorable to excessive flash runoff be corrected. Stormflow is a direct result of the inability of the soil to take water into the lithosphere through the processes of absorption and percolation. Water coming to the land surface as rain, snow, etc., must be taken into the soil or it will pass off rapidly as surface flow or shallow seepage water, causing floods and erosion. Conversely if the soil is absorptive it will take a considerable portion of the meteoric water into the lithosphere and discharge such water as ground water. Ground water is discharged slowly and regularly through all-weather springs, thus reduring the possibility of floods and erosion and assuring a continuous supply of water for domestic use.

The absorptive condition of the soil is dependent upon the soil structure, which is directly dependent upon the organic content of the soil. In this statement lies the answer to all erosion problems. By changing the soil structure in such a way as to decrease its absorptive condition we increase the amount of stormflow. Such a change is enacted by the removal of the organic content of the soil. It then becomes evident that such a change will increase the possibilities of floods and erosion. Soil structure being dependent upon the organic content, it is then dependent upon the organic deposition

by the vegetation and the incorporation of this decomposed vegetable matter into the soil. The answer to the prevention and control of floods and erosion is the maintenance of an absorptive soil through a high organic content as provided by a satisfactory vegetative cover.

Such a soil cover was originally provided by nature in the form of virgin forest and grassland. Upon the advent of man and his domestic activities to wrest a living from the land, this natural cover has been removed through clearing for agriculture, logging, fire, etc. These activities under unregulated administration have so reduced the absorptive condition of the soil by a reduction of its organic content that erosion and floods have become quite noticeable, and shall continue to become even worse if steps are not taken to replace the organic content of the soil.

Erosion control now enters into the problem as a corrective measure on eroded lands. All erosion occurs in one of two forms: SHEET EROSION, and GULLY EROSION. Sheet erosion is the removal of a more or less continuous layer over the entire area. Gully erosion is the cutting of gullies by rapidly moving water concentrated in drainage channels. Sheet erosion is the more serious of the two because of the loss of enormous amounts of the top fertile soil. Gully erosion is much more noticeable and usually follows sheet erosion. After gully erosion has become active the soil is not only unproductive, but in time, if not corrected, will entirely eliminate the area from cultivation. In all erosion control two fundamentals must be adhered to, namely; reduction of water velocity by mechanical structures and the reëstablishment of a vegetative cover. The mechanical work is nothing more than an aid in establishing the vegetative cover by stabilizing the soil.

The most effective method of mechanical structure to control sheet erosion is the construction of terraces which may be of earth, brush or stone. Terraces are built approximately on the contour with only from 2 to 4 inches fall per hundred feet to provide drainage. A non-erosive drainage channel must be provided at the terrace ends to prevent gully cutting by discharge of water from the terrace.

Gully erosion is perhaps the harder to control because of the greater volume of water concentrating in the drainage channels. Mechanical structures built in gullies such as; check dams, gully plugs, etc., must be of sufficient strength to withstand the maximum flow of water during periods of intense precipitation. Perhaps the easiest method of determining maximum flow is by the water marks on the gully walls. This method is not endorsed as an infallible determination and in most field practice 25 per cent increase is added as a margin of safety. A liberal estimate of the maximum

flow is not only necessary in calculating dam strength, but is equally as important in calculating the cross sectional area of the spillway in check dams.

Perhaps the structure most used in gully control is the check dam, a dam constructed within a gully to reduce water velocity and thus stop cutting and cause a deposition of silt behind it. By building such dams an impounding basin is provided above the dam. Water impounded in these basins loses its velocity; upon losing velocity the power of the water to carry silt is greatly reduced and much

Photo by U. S. Forest Service.

Sacramento type dam of log, pole and rock construction.

of the silt load is deposited behind the dam. Through this action a delta of fine alluvial soil is deposited that will absorb and maintain a higher moisture content. It is in these silting basins that plants find the most favorable moisture conditions for growth. This is especially true in our semiarid regions of the Southwest, where it is necessary that the soil moisture content be increased before establishing vegetation. In regions of higher precipitation it is less essential that dams be built for this purpose. Smaller and fewer dams will suffice under most conditions in the Eastern section of the country. On areas of poor vegetative cover and steep slopes more and larger dams may be required. Brush dams are recommended for most erosion control work in the eastern region, except where large

heads of water on steep slopes demand more permanent and substantial structures of wood or rock. After the completion of the mechanical work, gully walls should be knocked down to facilitate in the establishment of the vegetation. All mechanical works except those on cultivated land and in permanent drainage channels are but a means of aiding the establishment of the plant cover.

Any system of mechanical erosion control must start at the gully head and be built progressively to the mouth. Under most conditions small brush dams or gully plugs should be used in the gullies highest up on the water shed, and must progress to larger and stronger dams as the particular gully demands on its lower extremity. A system of check dams may be built on any grade, but such a system is usually determined for each individual problem of erosion control. Under the most severe conditions a zero step grade is used, but under most conditions a step grade of 2 per cent will give satisfactory results.

In the planning of check dams four vital points of construction must be adhered to, namely; anchorage in gully, structural strength, the construction on a nonerosive apron or toe to catch the discharge from the dam and to prevent undermining, and a spillway of sufficient size to carry the total volume of water during periods of maximum flow. The illustration shows a properly constructed check dam of the more stubstantial type as used in the Southwest.

Under special cases of erosion control other structures are used, such as; dispersion ditches, dispersion fans and other methods of converting water out of its original channel to a location where it can be disposed of without causing damage.

Before closing, I wish to repeat that the one important end to all erosion control is the reduction of stormflow. This can only be accomplished by increasing the absorptive condition of the soil through vegetation. Although vegetation also provides a binding effect through plant roots, it alone, under no conditions will stop soil in a place once erosion has started because of excessive flash runoff or stormflow.

One impulse from a vernal wood
May teach you more of a man,
Of moral evil and of good
Than all the sages can.

—*Wordsworth.*

FIRE FIGHTING WITH THE CIVILIAN CONSERVATION CORPS

G. E. Jackson, '34

Forest fire, the greatest destroyer of forest beauty and productiveness, left its marks in Durham County, North Carolina during the final months of 1933. Several thousand acres were burned, but several thousand more were saved as fire after fire was extinguished by the boys of the Civilian Conservation Corps. During the period from October first to December fifteenth these boys put in over four hundred man days of fire fighting. Let us go with a crew to a fire and see what really happens.

The shrill sound of a whistle and the call for a fire detail bring boys from the barracks, and they go on a run to the forestry tool house where a truck with fire fighting equipment awaits them. There is a scuffle of feet, a rattle of gates as they are closed, and the crew is off. They head down the highway, make a turn into a less traveled country road, and then down a woods trail where they are greeted with the familiar smell of burning leaves and pine needles. The flame looms up before them; the truck stops. Like ants they swarm out and await instructions.

The forester gets the dope on the fire from the district warden, who has already sized up the burning area. After he finds that the fire covers over a mile front and is spreading in all directions, he gives his men the following instructions:

"Fellows, we'll have to make two crews. The warden will take one and I will take the other. Each crew will take half the fire pumps, rakes, bushhooks and axes. We will attack at this point and one section will go to the left and the other to the right. This is a surface fire, so even though it is large, it will not be hard to handle. Watch out for your personal safety at all times, for this fire is traveling fast through the thick underbrush. It must be under control before we return to camp, so let's get going."

Each man with fighting equipment takes his place on the fire front. Those with fire pumps go first and drown out the blaze so that those following can pull all burning material back into the burnt area. A line from six to ten feet wide is opened and all material across it removed. Hours pass but the men fight on. They are encouraged by their leaders and inspired by the great work which they are doing.

There is a cry of victory as the two crews approach each other after completely surrounding the fire. "It is just another fire for the C. C. C.," states one fellow, "but what a fire! If this is just a sur-

face fire, I would hate to see a real forest fire, especially, if I had to fight it."

The forester again speaks to his men: "Let's take a few minutes of rest and then each crew will go back over the area which they have covered and see that the fire has not jumped the line at any point. After that, we will go to camp and get a hot meal. You have been out over four hours, so tomorrow all of you will get a holiday."

During the fire season a smoke chaser was stationed in camp and went out on all fires reported by the look-out man on the tower at Duke University. If it were not possible for him to control the fire he notified the camp Superintendent or the nearest crew to that point and aid was sent immediately. In order to avoid false alarms, men were sent out only on fires that had been reported by authorized officials.

Throughout the fire season, each section carried fire fighting equipment with them to their daily work, for they were often called to a fire while away from camp. Over the week-ends, two sections and two foresters were in camp at all times. This made it possible to carry out efficiently the program of fire prevention.

THE BIG TREES OF NORTH CAROLINA

(Continued from page 29)

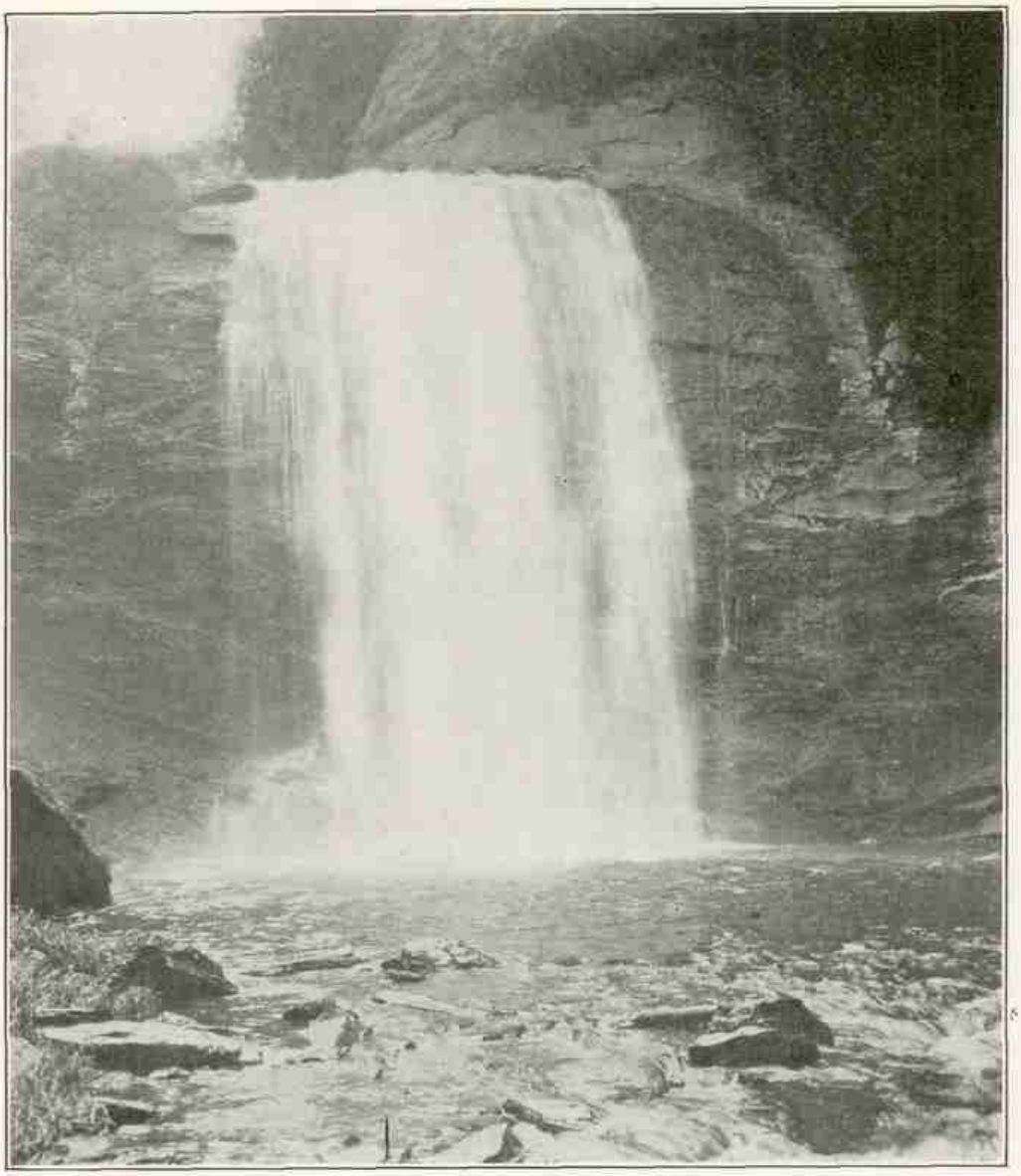
This tree, a loblolly pine (Pinus taeda Linnaeus), actually measures sixty-six (66) inches D. B. H. with a much larger base. Other large pines are found in the Poole Woods, near Raleigh, Blue's Forest, Scotland County, and on the Johnson Farm, Alexander County, where three and four foot trees are common.

The lowly dogwood (Cornus florida Linnaeus) a forest weed in many places, becomes a timber tree of commercial importance in North Carolina. While a twelve inch tree is above the average, I have found on the Perry Farm in Chowan County a dogwood measuring slightly more than twenty-two (22) inches D. B. H.

To bring these notes to a fitting close it is well to speak of the dead, and mention the sassafras (Sassafras variifolium Kuntze) of the sandhills. These trees said to have been dead for a hundred years are represented by standing snags and decaying logs, with both sap and centers gone, leaving shells of what once were trees evidently thirty (30) inches or more in diameter. The texture, odor and flavor of the sassafras are still present. So here's to North Carolina and her trees both numerous and large.

Let those find fault whose wit's so very small,
They've need to show that they can think at all;
Errors like straws upon the surface flow;
He who would search for pearls must dive below.

—Dryden.



Looking Glass Falls near Brevard, N. C.

I would climb to brooding summits
With their old untarnished dreams,
Cool my heart in forest shadows
To the lull of falling streams.
—From *The Cry of the Hillborn*, by Bliss Carman.

THE LUMBERJACK

Tom Gill

From out America's yesterdays emerges one of the most colorful characters in all our history—the lumberjack. He stands apart. His home and life were the untrodden forest. He was an outpost of civilization, a conqueror of the wilderness, a pioneer. And he was wholly American.

To provide a nation's wood—that was the work of the lumberjack. So through the Lake States' brief heyday of timber sovereignty he reigned, cutting the great logs of pine and spruce, driving them down the white waters of forest streams in flood time. His martial music was the ring of the axe and the saw's hum. Forests, centuries old, bowed at his coming. Before him the wilderness melted. Through cold, desolate winters he hewed the tall, straight trees. Each spring he rode the great logs down swirling waters to the world of men. He diced with death among falling timber. He defied the storms. He toiled in the very face of destruction, beneath the grinding menace of many a log jam, and he did it all with a careless laugh and a song.

Those songs still linger and have become a part of our tradition. That story of his long, bitter fight against snow and flood is one with the saga of America. His turbulent reign was short, yet he has left an enduring imprint in the history of a pioneer nation.

But he himself has passed. From the Lake States he has vanished as completely as the fragrant forests that were once his life. The roads he built are choked with brush and weeds. His camps are mounds of crumbling logs. Deer stalk silently among forgotten skidways and the long rafts of pine and fir float no longer down the rivers that once resounded to his shouts. The hungry mills he fed so faithfully are no more.

And with his passing too have vanished those age-old forests of white pine and red that for a brief time made the Lake States preeminent among the timberlands of all America. The forests that men called inexhaustible are forever gone. They are a memory that fades. They belong to yesterday.

The day of the planter has come. Among charred stumps and on many a wind-swept sand dune, men are planting the forests of tomorrow. Row after row of tiny seedlings—pine and spruce and fir. Slowly and with infinite toil they are creating man-made forests to take the place of those vanished forests of yesterday.

To the yesterday of the nation belongs the passing figure of the lumberjack. Tomorrow is the day of the forest planter. For he it is, secure in his vision of the future, who dedicates his toil and his trust to a greater America yet to come.—*From Nature Magazine.*

"WHY A C. C. C.?"

C. Harold Shafer, '31

The dreams of the Forester have begun to materialize in the work of the Civilian Conservation Corps in our National Parks and Forests.

Possibly never before has any country had an opportunity to put into effect practices accomplishing in a few short months that which ordinarily takes years. Never before has the National Park Service been able to carry on its work on so large a scale. From a protective standpoint work has been accomplished which could never have been done in any other way without necessitating prohibitive expense.

The work as carried on in our National Parks may be roughly divided into two major fields, namely; that of forest protection and that of cultural stand improvement.

The Great Smoky Mountain National Park exemplifies the work along protective lines probably better than any other National Park in the East. Vast areas are being made accessible by an extensive system of roads and trails. Men and equipment to fight fires can now be taken into places where formerly it was impossible. Stands of dead chestnut are being removed and along with them the danger of fire and insect ravages. Places once unsightly now delight the eye of a critical public.

One may now view stands of virgin timber, a paradise of wild flowers and a haven of forest life where before inaccessibility forbade it. All of the wild, haunting beauty has been preserved and protected. Man may see it, enjoy it, even partake of it but now may not abuse it.

The Colonial National Monument at Yorktown and Matoaka State Park at Williamsburg, Virginia, are probably the outstanding examples of cultural practices in forests in conjunction with the restoration and preservation of the birthplace of our nation.

At Yorktown over six hundred young men are being employed in the various phases of the work. The entire area is being cleaned and all diseased, dying and dead trees are being removed. General principles of stand improvement such as thinning and pruning have been adopted. A five hundred-foot Parkway is to be built from Yorktown to Williamsburg and from thence to Jamestown. Excavation has brought to light numerous relics of unusual interest and much of original Yorktown is to be restored. It promises to be one of the show places of the United States.

At Williamsburg a forest park and practice forest are being built upon a delightful tract of timber which is bisected by Lake Matoaka.

Nearly every phase of forestry finds application there in some shape or form. From the removal of fire hazards through stand improvement to the finer points of landscaping the forester finds opportunity to apply practical forestry.

Such widespread improvements have been made that the work has received the commendation of many sections of the country. It is natural that mistakes have been made and will be made where such a gigantic undertaking is in progress. Fundamentally, however, the work has been declared good and well worth the expenditure it necessitated.

The would-be critic should not lose sight of the wholesome effect upon so many of the youth of our United States. True it is that instances can be cited where conditions were not as they should have been. A perfect record is not to be expected.

—*Turn to page* 43

INDIAN FIRE PUMPS VALUABLE IN FIGHTING FOREST FIRES

Ready for action with the Indian Fire Pump. Note freedom of arms.

Conservation is more vital today than at any time since the World War. Every energy must be directed toward the control of waste —90 per cent of which is attributable to Fire! For over five years Indian Fire Pumps, manufactured by D. B. Smith & Co., of Utica, N. Y., have played a prominent part in the protection of wooded areas. Indians are regarded as standard equipment by many forest rangers and fire wardens. Individual campers, woodsmen and estate owners also testify to the effectiveness of Indian Fire Pumps.

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BUNYAN'S FIRST FLIGHT

B. H. Corpening, '34

For the first time in his life *Paul Bunyan* was worried. He had a couple of million board feet of logs to skid to the river that day and his old blue ox, *Babe,* had refused to work. Bunyan had tried all the methods he knew to bring *Babe* out of the balk, but to no avail. It appeared that the ox had gone on a strike to loaf indefinitely. Such an act, from his faithful logging companion, was disheartening and very serious; for Bunyan had given his word of honor to have the logs in the water that day, therefore his reputation was at stake.

Suddenly Bunyan lost his temper, and grasping the ox by the tail he twisted with all his strength. *Babe* looked around, closed one eye to better his aim, and let fly both hoofs directly into his master's stomach.

By the time Bunyan realized what had happened, he was traveling through space at a rapid speed. On looking downward he recognized the Black Hills of South Dakota. This had no sooner dawned on him when he sighted a great city in the distance. "That must be Chicago," thought Bunyan, as he hit with a splash in the middle of Lake Michigan.

Bunyan dug himself out from under thirty feet of silt on the lake bottom and took off for the surface. On reaching the open air he realized what a distance lay between him and his logging job that had to be completed that day. "I can't possibly walk back to Oregon before sun down," he mused, as he treaded water. While taxing his brain for a quicker way, his wandering eye observed a whale sunning on the surface, and immediately an idea struck him. Swimming over to the sleeping mammoth, he grabbed the monster amidship and, lifting him perpendicular, stuck him head-first into the bottom of the lake. This stunned the mighty whale for a moment and Bunyan, taking advantage of the time out, pulled his posterior end over and climbed aboard. When the whale came back to life he straightened his tail with a tremendous flip and Bunyan was sent high into the air in the general direction of Oregon.

In a short time he sighted the Pacific Ocean in the distance and feared that he was going to over-ride his goal. But then he felt himself losing altitude. Much to the surprise of the ox, Bunyan landed astride his back. A crab that had lodged in Bunyan's pocket while he was in the water fell out at the jolt and in the excitement grabbed the beast by the tail. Suddenly *Babe* lost all interest in loafing and Bunyan got his logging finished by sundown, his reputation still unblemished.

WHAT—A NEW SPECIE?

Bishop (studying Silvics): "Say, 'Cope,' what kind of a pine tree is a subalpine?"

"Cope": (Couldn't answer; he had passed out with mirth.)

ON MENSURATION FIELD TRIP

Prof. Slocum (with half the class in corn field): "What are those fellows doing down there?"

Stingley: "They are still working on the stem analysis of that pine."

Prof. Slocum: "Cripes, they hadn't oughter work so hard. Get some corn stalks' butts and let's chase them into the woods."

HOW'S THIS FOR LUCK

Smith, working near a steep bluff overlooking a mountain lake in North Carolina was suddenly startled by a rattler's warning buzz. In an earnest effort to put ground between the reptile and himself, he backed into a hornet's nest, dropped to keep from being stung, lost his footing and fell over the cliff into the water thirty feet below. Smith couldn't swim a lick, but a log near where he fell sustained him while he made for shore, all wet (as usual) but none the worse for wear.

WHY A. C. C. C.?

(Continued from page 41)

But if of the three hundred thousand young men taken from all walks of city and country life, we turn a mere ten thousand back from despair and uselessness to normal, wholesome living, the work will have been justified. As it is, the ruffian and unworthy young men are represented by a very small minority in the C. C. C. Camps. How much greater then is the worth of such work when the men themselves have said they were obtaining a new hold on life and forgetting the blankness of an existence without hope?

After the public has considered all of these vital points it is invited to take the Guyot Trail from the Cosby entrance to the Great Smokies and view the splendors of a mountain sunrise and sunset. It is invited to walk through the shaded and hallowed grounds of our National Monuments and recall, through the eye of memory, those gallant figures who gave this country to us. It is invited to witness all the natural beauties of our National Parks and Forests. The word shall then pass along the length and breadth of our country that the work—the result of a President's far-sightedness—has been well done.

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I cannot soon forget a wooded trail,
Each shadow blending into patterns rare;
The memory of the birch, the twisted oak,
The tall, straight pine, the beech that greets
me there.

When life, in sterner mood, brings troub
hours,
The peace of trees along a shaded way,
Is mine to call to heart when'er I will,
Is promise of a calmer, gentler day.