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IOWA STATE UNIVERSITY
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FOREWORD

It has been the goal of the 1961 Ames Forester staff to assimilate material that will make the 1961 Ames Forester interesting, informative, and educational to all its readers.

ACKNOWLEDGMENT

The staff of the 1961 Ames Forester would like to thank everyone who worked on and contributed to the 1961 Ames Forester. Without the generous and conscientious aid of the students, faculty, writers, alumni, and advertisers an annual publication of this type would be impossible. Our special thanks are to Professor L. F. Kellogg, Ames Forester faculty advisor, and Mr. William Holmes, Iowa State Press, for their constructive suggestions and advice.
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## The Cover

The staff of the 1961 Ames Forester would like to thank the **UNION PACIFIC RAILROAD** who made possible the cover of Mt. Hood reflected in the waters of Lost Lake.
### In Memoriam

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(KNOWN DECEASED ALUMNI)
Gilmour B. MacDonald
1883–1960
By Dr. J. A. Larsen

Gilmour Beyers MacDonald was born in Carleton, Nebraska, March 9, 1883, the fourth son of a Scotch Presbyterian minister. His parents were John M. and Janet Piercy MacDonald. His living brothers are Kenneth of Missoula, Mont. and Rosmond of Nahant, Mass. Another brother, George, lived from 1875 until 1953. In the course of changing pastorates the parents moved from Hubbell to Hopewell, then Unadilla and finally to Lincoln, Nebraska in 1887, where the boys completed their schooling. While a high school student in Lincoln and later in the University of Nebraska, Gilmour was active in basketball, football, and pole vaulting.

At the suggestion of Dr. G. E. Condra, the Nebraska conservationist and geologist, Gilmour majored in forestry, which was then a new field and much to his liking. Upon the completion of his course work in 1907 he gained an appointment with U.S. Forest Service and was for a season employed in Wyo. & Mont. He soon returned to the University of Nebraska to earn a master’s degree (1910) in forestry. This was the year of his marriage to Edith Lillian Craig of Lincoln, Nebr., and the call to fill a teaching position in forestry at Iowa State College in Ames, Iowa, where he soon earned a permanent position and became the first technically trained forester.

During their early years in Ames, four children were born: Gilmour Craig, 1911; Donald Craig, 1914; Mary Janet (Dunlap), 1916; and Ruth Eloise (Lamoureux), 1925. There are now 12 grandchildren and 1 great-grandchild.

It is given to few people to make a greater contribution to the family, the community, and the profession of forestry, than G. B. MacDonald; and the service of Gilmour and Edith together rank high in achievement. It would be difficult to name a forester in this country who, throughout his entire professional life-span has so completely, wholeheartedly and successfully devoted his energy and wisdom to the advancement of forestry education and conservation movement in this state. Dr. G. B. MacDonald was elected to rank with Pammel, Shimek, MacBride, and others who labored unceasingly for the establishment of a sane and well-balanced program for the husbanding and wise utilization of Iowa’s natural resources. He gave strong support to the organization of the Iowa Conservation Commission and the state park movement. He served as Deputy State Forester 1912–1933, and State Forester 1933–1955. It fell naturally to him with his ability and knowledge of the state resources, to organize and direct the State Civilian Conservation Corps program from 1934 until 1938. He also planned and developed the State Forest Nursery at Ames.

Throughout his long residence in Ames, he actively and generously supported many groups. He served as life elder in the Collegiate Presbyterian church. He was a Rotarian for 38 years. He actively supported the Boy Scout Movement for 45 years, frequently on advisory committees. He served 28 years on the Ames City Council and for 50 years he maintained close contact with the College Y.M.C.A.

Prof. MacDonald was elected member of Alpha Zeta and Gamma Sigma Delta, both honorary societies in agriculture and to honorary membership in Cardinal Guild at Ames. He was part time president of the Iowa Forestry and Conservation Association; in 1930 he received the Silver Beaver Award from the Boy Scout organization; in 1947 his Alma Mater conferred upon him the Honorary degree of Doctor of Agriculture; the same year he became a Fellow of the Society of American Foresters and he has been a member of the Council of the Society. In 1953 at the annual meeting of the American Forestry Association in Florida he was honored with the Award for Distinguished Service in Education; in 1958, at the 100th Anniversary celebration of the Iowa State College at Ames, he was honored by having his name read as one who had received the Distinguished Service Award in 1958. The Iowa Journal of Science also conferred on him a notable honor in dedicating its July 1948 issue, (Vol. 22, No. 4) to "Gilmour Beyers MacDonald in Recognition of his Service in the Department of Forestry at Iowa State College 1910-1948". As a fitting, lasting and appropriate memorial to their teacher and friend the Iowa State forestry students and graduates bought a timbered tract (of 7½ acres) near Ames and named it the "MacDonald Woods". Immediately upon his retirement from his administrative duties at the Iowa State College in 1948 he was appointed by the U.S. Secretary of Agriculture to National Advisory Council, serving until 1954. From this time until 1958 he served the U.S. Forest Service on the project of Access Road locations in the western states.

No statement about the life, character and work of Prof. MacDonald would be complete without mention of his pride and love for his family. He was a much beloved and devoted husband and father, an able and friendly teacher, a warm and sympathetic friend and a wise administrator.
George B. Hartman
1894–1960
By L. F. Kellogg

GEORGE B. HARTMAN was a Hawkeye, born at Valley Junction, Iowa, Nov. 28, 1894. However he grew up at Eddyville, Mahaska County, Iowa. His father was a locomotive engineer and George had a continuing enthusiasm for steam railroading all his life. After early schooling he came to Iowa State College graduating in forestry with a B.S. degree in 1917, a classmate of “Bugs” Firkins, Wm. A. Stacey, and others here in Ames. In 1941 he received the M.S. degree from Iowa State.

Like so many others, he was caught in the whirl of World War I, where he served in France in the famous Twentieth Engineers Battalion under Col. Wm. B. Greeley. This was the group assigned to cutting and milling timber from French forests for trenches and dugouts at the front. After the Armistice for a short time he taught dendrology at the A.E.F. University at Beaune in eastern France.

Returning in 1919 he was employed by the Long-Bell Lumber Company, Wood Preserving Division, at DeRidder, La. He served in several capacities and in 1921 he became Supt. of that plant. He continued there until 1935 at which time he joined the Iowa State College as an assistant professor, later Associate Professor and Professor in the Department of Forestry. In 1947 he returned to the Long-Bell Co. at DeRidder as Asst. General Manager; but not for long. His teaching ability had been noted and valued so that, with Prof. G. B. MacDonald stepping aside as head of the Department until he stepped aside last July 1, 1960, under the age limitations.

An unusually strong interest in athletics was present in this man. During college he played baseball. Later in Louisiana he played more baseball as a semi-professional. At Iowa State he was a strong supporter of the teams and represented the Agricultural Division on the Athletic Council for five years, from about 1951-1956. This responsibility was no slight burden.

George Hartman became a member of the Society of American Foresters in 1939. He has served almost exclusively in its educational work. He was secretary of the Division of Education in 1950, vice chairman in 1951, and chairman in 1952. Since 1948 he has been a member of the Society’s Committee for Advancement of Forestry Education in 1956 and served here until his death. In 1959, he was elected to the status of Fellow in the Society.

In recognition of his success with students he received election to hold a traveling walnut plaque in 1959. He was the fourth recipient of this honor which reads “Wilson Chapter, Alpha Zeta, Tall Corn Award to the Outstanding Division Faculty Member in the Division of Agriculture 1959-60.”

In 1953 he was appointed by the Governor of Iowa as a member of the Iowa Natural Resources Council. Because of reappointments he, continued this work for these last seven years and was to have served until 1965.

For many years he has been active in the American Wood Preservers’ Association. In this he was widely known through membership in its commodities committee and its testing and records of treated posts.

Other affiliations have been Sigma Pi social fraternity; Gamma Sigma Delta — honorary in Agriculture; Phi Kappa Phi and Alpha Zeta honorary fraternities. He was a member of the Iowa Hoo-Hoo Club No. 102 of Des Moines, a lumbermen’s group; and through this affiliation and friendship we have a sophomore scholarship in forestry supported by No. 102 of Des Moines.

In a very special way, George was an outstanding churchman and Baptist. Over the years he has poured out vast effort and time to serve his church. For years he taught a Sunday school class; he served as chairman of the building committee when the new edifice was erected since the War; when they needed a pipe organ he helped truck one home and place it in the balcony to save the church extra expense; he served both the American and the Iowa Baptist Conventions on committees and commissions; he served as trustee, finance officer and advisor. Only those working there know the full extent of his service.

He became a Kiwanian March 8, 1946. Over the years he had excellent attendance which is difficult with a teaching and a field-going schedule. He was chairman of the Agriculture and Conservation Committee in 1951. He served on many if not all of the club committees over the years, and was finishing up a year as Member of the Board.

George left us November 25, 1960, three days before his 66th birthday with a record of long and kindly service. In his years at Iowa State he became well known and his life and philosophy touched the lives of about 80 percent of the graduates in forestry to date. After services here he was removed to DeRidder, Louisiana, for burial.
Goals For Professional Progress

by

CARL H. STOLTENBERG

Wider recognition of forestry as a profession is currently a popular subject among foresters. Some foresters recommend publicity as a promising means of achieving this recognition. Licensing is proposed by others. Higher educational requirements are suggested. Shunning undignified duties would help... uniforms might improve the public image... and so on.

Many of these methods may indeed be helpful. But when all is said and done, landowners, mill owners, and public agencies seek the services of foresters because of our ability to help them. Therefore, will not our professional stature be determined quite largely by our success in using forestry practices to solve these clients' problems — helping them achieve their individual objectives?

If so, perhaps the most promising route to recognition is technological progress. This paper suggests four areas in which such progress is particularly needed. The author believes that achievements in these areas would enable us simultaneously to serve our clients more effectively and to achieve professional stature which we would (then) deserve.

Goal 1: Progress in Communicating More Effectively With Our Clients

Too often we foresters expect landowners and other clients to intellectually "come to us" — to talk forestry and indeed this is too much to expect. We foresters must accept the responsibility for bridging this gap more effectively ourselves.

For example, we frequently need a much better understanding of what our clients' are really after in owning and managing forest land — for only when we have a clear understanding of their objectives will we be able to select the particular forest management practices that will be most helpful to them.

Similarly, we should be able to discuss a client's problems in terms of his interests and knowledge, and then, after selecting relevant management practices, discuss them with him in terms he will understand.

To do this, the forester's know-how must extend beyond trees. It must include a better understanding of people; their objectives, and the problems they encounter in achieving them; and the social, legal, and economic framework within which these problems must be solved.

We must be both willing and able to share the responsibility for finding effective solutions to our client's problems.

Educators can contribute to eventual progress in this area by including social as well as physical sciences in forestry curricula; by orienting management and other terminal forestry courses toward people's objectives, rather than stand structure, regulated yield, pathological rotations, and similar intermediate, biological objectives; and by helping students understand that although forestry is based upon plants and plant relationships, the function of both foresters and forestry is to serve people — not plants.

Researchers can also contribute. Carefully designed studies might help clarify our understanding of the objectives and actions of forest owners. They might also indicate what incentives would be effective in altering landowners' actions to coincide with those preferred by local forest industries, or society.

Goal 2: Progress in Selecting the Most Productive Investments

If the forester is truly interested primarily in his client's welfare, he will be concerned with the prudent use of his funds. Each client will have limited funds to achieve his objectives. Even large compa-
nies and federal and state agencies have definite limits to the financial resources available for various purposes, including forestry. The forester is responsible for using these forestry funds wisely.

In a sense, the forester is an investment counsellor for his client. His specialty is investments in forests and in forest-management and forest-product-utilization practices. His usefulness depends largely upon his ability to direct his clients' capital into those investments that will yield the greatest return relative to the cost involved — with return measured in whatever benefits his client is interested in. Thus, returns could be additional stumpage value to one owner, tons of cellulose to another, and additional acre-feet of clean water to another.

Two or three examples may help to illustrate the importance of "progress in selecting the most productive investments."

A recent study1 in Pennsylvania revealed a wide range in the merits of the forestry-practice investment opportunities of one landowner. Most of the practices evaluated showed promising returns. However, the analysis indicated ways of making considerably more effective use of the limited forestry funds that were available. For example, little advantage was being taken of thinning opportunities in certain hardwood stands, because of inadequate funds — yet forestry funds were being spent on other forestry practices that promised to yield less than one-sixth as much per dollar invested. If a forester could divert funds from the lower to the higher-yielding opportunities, he would increase his client's returns six-fold!

Another recent study suggested guides for foresters to use in making the most productive use of funds available for white-pine-weevil control on public lands in New York State.2 This study estimated that the dollar value of control benefits ranged from $3 to $61 per acre, depending on stand conditions. As might be expected, there were not nearly enough pest-control funds to protect all vulnerable white pine stands; therefore this is another illustration of the importance and potential contribution of foresters' selecting the most productive investments.

Unpublished analyses of white pine management opportunities on the Harvard Forest indicate that contrary to common opinion, the very best managerial investment opportunities appear to occur on the poorer sites. Specifically the most promising appears to be a very modest investment in seedbed preparation on the lighter soils.

A study3 in the Lake States indicates a wide range of blister-rust-control investment opportunities. In Wisconsin, for example, control costs were lowest in the South — but the benefits were greater farther North. In fact, the benefits were so much greater that the returns per control-dollar on the most promising stands in Northern Wisconsin were more than 10 times greater than those on the most promising stands in Central Wisconsin. And the comparison with Southern Wisconsin was even more striking. Effective use of limited rust-control funds demands a control program that recognizes such differences. (Appropriate adjustments are being made as a result of this study.)

Goal 3: Progress in Quantifying the Effects of Specific Forestry Practices

These illustrations show the importance of adopting the most productive practices first. But to do this we must make specific estimates of both the costs and the benefits of suitable management alternatives. How well are we able to do this? Quite frankly, at present, our technological know-how usually is inadequate.

For example, to compare alternative planting investments, we must be able to estimate planting costs, survival rates for various species, probable future cultural practices, and the volume and value of the eventual harvest, for all potential sites and planting conditions. A moment of reflection indicates that even with the relatively simple case of planting, our present knowledge falls short of providing the needed information — at least on a very reliable basis.

Another example: In evaluating the response of stands to thinning, cleaning, or improvement cuts, we know that the residual trees will generally grow in diameter more rapidly than they did before — but we don't know how much more rapidly.

We know that trees with clear boles are more valuable than trees with knotty stems; but we don't know how much more valuable. We also know that clear-boled trees cost more to "produce" — but we don't know how much more.

We are in a somewhat better position in evaluating harvesting practices and manufacturing techniques. But with labor costs changing so fast and newer equipment becoming available continuously, the operation which is efficient today may be outmoded tomorrow. Thus knowledge in this area needs frequent revision.

We know that forest insect and disease losses are great. For example, we know of large losses from Fomes annosus in some red pine stands, and from dwarf mistletoe in ponderosa pine stands; but we

are unable to predict the amount of loss that an owner could expect from such diseases in other stands. Thus we are unable to evaluate the merits of investments to control these diseases.

We know that dense stands withdraw large volumes of water from the soil by transpiration. But as yet we cannot specify the \textit{quantitative} effect of changing stand density or species composition on the volume, quality, and timing of water yields.

In Iowa, we know that white pine will grow faster than hardwoods on many sites — but we don’t know how much faster. And we don’t yet have reliable estimates of the cost of converting hardwood stands to pine. Thus we are unable to compare stand-conversion with thinning, disease-control, and other forestry investment opportunities in Iowa.

Actually, we do know quite a bit about the response we can anticipate from various forestry practices. The problem is that we usually know only the \textit{direction} of the response, and not its \textit{magnitude}. But knowledge of magnitude is essential for comparing opportunities. If foresters are to perform their function effectively, researchers, educators, and practitioners must combine efforts to quantify what we now know only in general terms.

**Goal 4: Progress in Anticipating Future Needs for Knowledge**

One more important goal should be mentioned. Knowledge cannot be obtained and assimilated by the profession overnight. For this reason, we must anticipate our technological needs before they actually exist. We can not afford to wait until a critical water shortage exists before we start working on possible forestry solutions to the problem. The very nature of forestry demands exceptional foresight.

The professional stature of foresters is growing. This growth will be accelerated if we forestry educators, practitioners, and researchers can become more effective in communicating with clients, learn more about the quantitative effects of specific forestry practices, and as soon as this knowledge becomes available, use it in selecting our clients’ most productive forestry investments.

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**About the Author**

Carl H. Stoltenberg is Professor and Head of the Forestry Department at Iowa State University. He came to Ames in August, 1960, after serving as Chief of the Division of Forest Economics Research at the Northeastern Forest Experiment Station, Upper Darby, Pa.

Dr. Stoltenberg’s primary interest in research has been in the area of managerial economics. His research and writings while at the Northeastern Station reflect that interest. His experience also includes teaching and research in forestry in the Southeast (Duke University) and in the Lake States. He is a “native son” of California, and a forestry alumnus of the University of California. His graduate degrees are in forestry and in economics and were received from the Universities of California and Minnesota.
New Trees
For
The North Central States

by
JONATHAN W. WRIGHT

Our present forest trees are good. They are not perfect, though. They developed as the result of natural selection to fit various ecological niches in pre-white man forests. Our forest sites have changed and wild type trees are no longer in perfect equilibrium with their environment. Also, natural selection favored types which survived and reproduced best, not the types which would produce the best sawlogs or the best pulpwood.

There is every reason to believe that the tree breeder can accomplish as much improvement in trees as the corn breeder did in corn. The theoretical foundations of hybrid corn were laid in the 1880's. It was introduced as a practical farm crop in the 1920's and a decade later had almost pushed the older open-pollinated varieties off the market. As of 1961 the excess annual corn yields due to the advent of the hybrid varieties are more than sufficient to pay for all American plant and animal breeding work for all time.

The Time Element in Tree Breeding

When will these improved varieties of forest trees be available? A few have already been developed and could be made available to commercial forest nurserymen on two or three seasons' notice. The Shimek aspen hybrid (Populus alba L. XP. grandidentata Michx.) recently discovered in Iowa could be economically mass produced by seed next season. A recent provenance study of jack pine (Pinus banksiana Lamb.) furnishes good evidence that Lower Michigan origins are the fastest growing and that foresters in the southern part of the Upper Peninsula could advantageously order Lower Peninsula seed. The hybrid Japanese-European larch (Larix leptolepis Gord. X L. decidua Mill.) has excelled its parents in dozens of European tests and can be tentatively recommended in place of its parents in this country. Provenance trials of Scotch pine (Pinus sylvestris L.) have showed which geographic origins furnish the deep green, short-needled trees so desired by Christmas tree growers.

These examples are a small fraction of the improved varieties yet to come. Serious forest genetics in this region started only 6 years ago. The tempo of the work increased rapidly and nine experiment stations are now involved. It is their future results in which we are most interested.

It is possible to build a model showing that new tree varieties will come into being 30 times slower than new corn varieties because a tree generation is 30 times as long as a corn generation. It is possible also to build a model showing that new tree varieties can be developed as fast as new corn varieties. The truth is somewhere in between. I feel that a tree breeder can probably get his new products on the market at least half as fast as a corn breeder.

This feeling of optimism is based partly on the fossil record. It shows that evolution actually proceeded faster in long-lived elephants and horses than in many short-lived animals. The optimism is based partly on the fact that the tree breeder is working with wild, unimproved species. Some of these are so variable genetically that significant advances can come from rapid "cream-skimming" studies. And part of the optimism is based on the output of the most productive tree breeders of the past. For example, a few workers at Institute of Forest Genetics in California assembled a very large amount of information on species crossability patterns, growth of F1 hybrids, and mass production methods in the comparatively short space of 35 years. Their output would be a credit to any plant breeding agency.
One of the ways by which a tree breeder can keep pace with his counterpart on wheat or corn is to work on several species simultaneously. An experiment on jack pine may be started in 1961 and near completion in 1971. An experiment on Scotch pine may be started in 1962 and near completion in 1972. By this shotgun approach there need be only one time lag. By 1971 the breeder can be assured of a significant new result every year.

The study of the correlations between nursery and mature performance is another way of hastening the tree breeders’ work. A Swedish worker recently found a strong correlation in growth from between old Scotch pine trees and their young seedling progeny. He can now use this correlation to establish the effectiveness of selection for growth form in young plantings.

The most unfortunate aspect of the long-term nature of forest genetics research is the tendency to excuse ourselves from precise experimental work. Many tests of species hybrids do not include the parents. Older provenance trials were not replicated. Grafted seed orchards are being established with no information on heritability. These poorly designed experiments are not shortcuts because their results do not bear close scrutiny. Well-designed experiments could be performed just as easily — sometimes more so.

Today's and Tomorrow's Larches

Today's larches in the Lake States are the native tamaracks (Larix laricina (Du Roi) K. Koch) of the swamps. They are not planted to any great extent because of the difficulties of swamp reforestation. Tomorrow's larches will probably be very fast growing hybrids adapted to upland soils. Whether there will be one new variety adaptable to the whole region or several new varieties, each adapted to a specific locality remains to be seen.

I have already mentioned hybrid Japanese-European larch as being available for planting if anybody wishes to make the artificial controlled pollinations, which are relatively easy. I would like to carry this hybrid back into its parents and forward into the future to show how the prototype hybrids now available can be improved.

The first hybrids of this combination arose as the result of natural crossing between Japanese larch trees and European larches planted on the Duke of Atholl's estate in Scotland. That was in 1907. By the 1930's the Danes were repeating the cross and Spanish and Turkey on the south, to Scotland and Siberia on the east. Within these areas it is highly esteemed, filling all the industrial roles supplied. The seedsman will have only to collect hybrid cones from the clonal parent. English research on fruit production shows another possibility. This work consisted of pegging lateral branches to the ground. They fruited heavily, and enable artificial pollinations to be made easily. Seed set data are such as to indicate that the use of hybrid seed would be economical if one man could pollinate more than a few hundred flowers per day.

Scotch Pines for Timber and Christmas Trees

Scotch pine is Europe's most common and widespread timber tree. Its natural range extends from Spain and Turkey on the south, to Scotland and northern Norway on the north, and to eastern Siberia on the east. Within these areas it is highly esteemed, filling all the industrial roles supplied in this country by a number of pine species.

American experience with Scotch pine was disheartening. It was planted extensively in the Northeast in the 1920's and 1930's. There was no attention to seed origin and most of the plantations are of such poor form as to be unmerchantable.
That need not be the case. Henry Baldwin's 17-year-old provenance study in southern New Hampshire shows that 90 percent of the trees grown from Latvian seed are as straight as the best American pines. That experiments puts the finger on southern Germany as the probable source of most of the poor-formed plantations of the past.

Scotch pine is now being planted in northern United States more than ever before. Michigan's nurseries alone produce 30 million trees per year. Most of the plantings are intended for Christmas trees. But production is so much higher than the Christmas tree cut that 90 percent of the Scotch pine seem destined to live to pulpwood or sawlog size.

This situation is the No. 1 challenge to the region's tree breeders. If the millions of trees now being planted are of improper origin, we shall have thousands of acres of worthless plantings. If the proper origins are used, those thousands of acres will produce as high quality timber as our best native stands. The 17-year New Hampshire study furnishes some of the answers to this seed source problem. But it is in New Hampshire and its results may not be applicable in the North Central states.

To satisfy the need for information applicable to Michigan's planting problem we started a new series of provenance tests in the summer of 1958. The first step was the writing of dozens of letters to European tree breeders, asking them to send small samples of seed from native stands in their vicinity. The response was good. We have received 320 different seedlots from about 200 different localities, well scattered over the natural range. Nearly all seedlots were accompanied by adequate descriptions of the locality of collection, of the qualities of the parent trees, and other useful types of information. The Russians were especially cooperative and sent 13 categories of information about each seedlot.

In the spring of 1959 we sowed 253 of the seedlots (all that had been received at the time) in the Bogue Research Nursery at East Lansing. We used a 4-replicated, randomized block design, in order to eliminate soil-caused differences from consideration. At the time the sowing job seemed like a large undertaking. So we "ran scared" — planned the details ahead of time. With this planning, the experiment was established in only 50 man-hours.

In the two years in which this experiment has been in the ground, we studied a total of 31 different characteristics. Not an occasional note, but a complete record of all 31 traits for all 1,012 plots, with complete statistical analyses of all data. This necessitated a radical departure from orthodox measuring and recording techniques. New ones had to be tried. Many were not only faster than the orthodox techniques but gave better quality data. The experiment has turned out to be almost routine — it has required only about 1/2 man-day per week during the growing season to do all necessary measurement and analytical work.

Next spring comes the hard part — the establishment of well-replicated test plantings in some 30 or 40 localities. Without these permanent tests, much of the nursery work would be wasted. Again we must "run scared". Most of the labelling work has already been done during the nice summer and fall days. Next spring it will be necessary only to lift the trees, tie them into several thousand bundles of four trees each, shuffle them by replication and outplanting, and deliver them to planting crews. If all goes well with the bundle-tying, the outplantings will proceed as fast as commercial plantings, even though they follow a precise statistical design.

These 2-year data give a good insight into the variation pattern within the species. It can be split into about 20 different geographic ecotypes. There is the Spanish ecotype, which is blue-green, short-needled, moderately fast growing, and produces a great many Lammas shoots. It differs very slightly from the southern France ecotype, which is a little slower growing and produces few Lammas shoots. The southern France and northern France ecotypes are separated in nature by only about 150 miles. But they are so different that visitors to the nursery wonder why they are called the same species. The trees from northern France are long-needled, green, very fast growing, and mature their buds appreciably earlier in the summer. These are a few examples of the different types which can be recognized.

In all 31 traits differences (statistically significant at the 1 percent level or less) were observed. The average 2-year heights ranged from 3 inches (northern Finland) to 14 inches (northern France). Fall color ranged from blue-green (Spain and France) to gold (Ural Mountains). Time of first-year bud set ranged from July 15 (northern Siberia) to early October (Spain and Turkey). There were even discernible differences in the ease with operations — trees from Spain, Turkey, and northern Finland pulled the hardest.

The various ecotypes show evident adaptations to the growing conditions at their places of origin. For example, the northern ecotypes are slow growing, set their buds early, have intense fall coloration, and are moderately short-needled. The German-Czechoslovakian ecotype has rapid growth and long needles adapted to the favorable growing conditions in Germany and Czechoslovakia.

This adaptation to climate at the place of origin is by no means complete. The German-Czechoslovakian population is more or less continuous. Constant pollen-flow and seed-flow have maintained it as a more or less uniform ecotype in spite of the fact that climates in various parts of the region differ. But between that population and the Vosges Mountains of northern France is a small range gap, across which there is no gene-flow. This permitted selection to work on the Vosges population as a unit,
causing it to be 15 to 20 percent faster growing than any of the German origins.

What do these 2-year data mean? They are as useful for determining the pattern of variation within the species as data from other trees. Perhaps more useful, if we consider the fact that a day spent in nursery measurement gives as much data as does 10 days spent measuring large trees.

The 2-year height and color data correlate very well with a similar 17-year data from the earlier New Hampshire study where similar provenances were represented in both tests. In other characters we must leave it to the future to determine the importance of the early measurements. Our successors will measure the 25- and 50-year-old trees and correlate their measurements with our early results. They will be able to make use of the information in planning their work.

The permanent test plantings will start to give reliable information on the best seed sources for a particular locality in a short time — 5 or 6 years for Christmas tree growers and 10 or 15 years for foresters. That information will be only a part of the results of the experiment. Studies of single-tree progenies have shown that every one of the Scotch pine stands which was sampled was genetically variable. Hence, as soon as a planting has shown which geographic origins are best, it will graduate from a test to a breeding aboretum. Selective breeding to attain another 10 or 15 percent improvement will start.

Nine of the 2-year-old trees flowered at the start of their second year. Hence, it will be only a short time before the outplantings can be used in hybridization experiments. Eastern studies showed that Scotch pine crosses with Japanese red pine (Pinus densiflora Sieb. & Zucc.). The seed sets were low but the hybrids were extremely vigorous. It is reasonable to expect that a more fertile combination can be found by crossing several origins of one species with several origins of the other.

Other Possibilities for the North Central States

The white pines present several hybridization possibilities. Eastern white pine (Pinus strobus L.), western white pine (P. monticola D. Don), Himalayan white pine (P. griffithii McClel.), and the Mexican white pine (P. ayacahuite Ehrenb.) cross in all possible combinations. The seed sets are high and the hybrids are vigorous.

Jack pine and lodgepole pine (P. contorta Dougl.) also cross very easily. Some of the hybrids are growing in Michigan. They have about the same growth rate as the native jack pine but they are greatly superior in growth form. Both species fruit early and a large-scale improvement project would proceed rapidly.

I hate to single out any single exotic but a little work on the ginkgo (Ginkgo biloba L.) might return very large dividends. It is hardy in the warmer parts of the region, grows rapidly, and produces a very desirable white pine-type wood. Best of all, it is a monotypic species, and like most monotypes is free from insect and disease pests.

There is now a sizeable group of tree-improvement specialists in the region and a considerable amount of background information on tree genetics. Hence, we can expect the examples quoted here and a great many more to become available for actual forest planting within the next few years.

About the Author

Jonathan W. Wright is Associate Professor of Forestry at Michigan State University. He joined the staff at East Lansing in 1957, after 11 years as geneticist with the Northeastern Forest Experiment Station.

Dr. Wright's research has been devoted largely to species hybridization and to geographic origin studies. His current work is devoted to extensive provenance tests of those species which are best adapted to Michigan's conditions.

Approximately 50 percent of Dr. Wright's university time is spent in teaching. This includes direction of graduate students in forest genetics, one undergraduate course in forest genetics, and one graduate course in tree breeding.
The attempted beginnings of technical forestry education and one of the very first applications of good forestry in America were associated with an unexpected and unavoidable chain of circumstances. In 1890 the wealthy George Vanderbilt, the grandson of Cornelius Vanderbilt, who amassed a fortune in railroad development, bought a large tract of land in the mountainous section near Asheville, North Carolina, built a French castle, developed and landscaped the environs and invited Dr. Carl Alwin Schenck, a German forester, to come to America and direct the management and improvement of the forested portion. Out of the first purchase of nearly 12,000 acre unit a net area of 7,280 (4) acres was to become a demonstration to all near and far that the harvesting of forest crops in this country could be conducted and controlled in such a way as to secure perpetuation of the forest, prevent unguided exploitation and devastation, and stave off the threatened timber famine.

It is said that George Vanderbilt had searched far and wide over the world to find the most beautiful spot to erect his dream-palace, and that when he at last stood and looked out over the towering ridges of distant Mount Pisgah in North Carolina, he decided this was the place, and he proceeded to buy land to form an estate which would eventually comprise about 100,000 acres. Actual construction began in 1891, as he built a railroad stub thither from the Southern Railroad, imported hand-tooled Indiana limestone and slate roofing, engaged Richard Morris Hunt as designer and Frederick Law Olmstead as landscape architect. The plan called for a 780-foot wide imposing chateau, modeled chiefly after those of Blois and Chambord in France.

Mr. Vanderbilt brought skilled craftsmen from all over Europe and America and hundreds of laborers and artisans from the Carolinas, who in the period from 1891-96 produced the magnificent Biltmore House, containing 365 rooms, many of these embellished with rare and choice paintings, tapestry and furniture.
Because of his desire to manage the forested area Vanderbilt hired, (2) Carl Alwin Schenck, who was a tall and erect young German of military bearing, sharp of eye, a prominent nose and an elegant mustache, all of which made him resemble Kaiser Wilhelm II — the students thus habitually referred to him. He was born at Lindenfels near Darmstadt 1867; graduated from Darmstadt Institute of Technology; entered the forestry school at Tubingen at 18 years of age, but was forced to spend a year or more in a sanitarium because of a pulmonary ailment. He made a fresh start at the University of Giesen, but his poor health caused interruption of his studies and delayed his acceptance in the German Forest Service and the German Army. It was then he turned to the study of law, believing that if he could not be a forester, the less arduous physical aspects of a law practice might enable him to earn a living. However, as the years passed his health improved so much that he returned to forestry. Schenck often remarked that his knowledge of law was a great and useful asset.

In June 1889, at Giesen, (3) when Sir Dietrich Brandis was leading a group of the English Chapel Hill forestry students through the German forests, Schenck met this distinguished international forester, who was German born, and who had played a large part in the introduction of forestry to the British and to India in particular. Since Schenck had knowledge of the English language, Sir Brandis asked him to become his assistant for the remainder of the trip, and the succeeding summer Schenck traveled widely with him through the German forests. Later on after the retirement of Sir Brandis, Schenck was similarly employed by his successor, Sir William Schlick. It was during the winter months that Schenck attended and completed his requirements at the University and the military training service.

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1 Maunder, Elwood R. 'Carl Alwin Schenck'.

2 Schenck, Carl Alwin; The Biltmore Story.
When he finished with the army he was a lieutenant of the Grand Ducal Horse Artillery. In this capacity his service was brief, for early in 1895 when sojourning with his wealthy uncle at the French Riviera there came a telegram from Vanderbilt with the offer to become director of the Biltmore forest. Dr. Schenck assumed that he had been recommended by Gifford Pinchot who also had met Sir Brandis in Germany and who was the first forest consultant at Biltmore. It is remarked by Maunder that Schenck saw in Sir Dietrich a pattern for his own life. The two men continued correspondence and Sir Dietrich frequently wrote to Schenck about the methods and chances of development for American forestry.

During the first few years of his endeavors Dr. Schenck had many opportunities to confer with Gifford Pinchot in matters pertaining to forestry both at Biltmore and in the United States generally. He learned about the technical work begun by Henry S. Graves and Gifford Pinchot on the Whitney estate in the Adirondacks of New York. However, at that time there were very few technically trained foresters in this country. At times, during the first trying years, Schenck received assistance from two foresters, Overton Price and E. Y. Griffith of the U.S. Forest Service.

The Biltmore forest itself contained 7,280 acres, containing 50 decrepit farms, ten 'country places' hitherto owned by southerners who had extracted the last dollar of value from the forest and left few if any trees fit for merchantable saw timber. There remained only one uncut stand of virgin timber on Big Creek watershed. In order to make a beginning in scientific forestry operations it would be necessary to obtain accurate information on basic values such as: types and stands of timber, kinds of species and their distribution, extent of injuries or deterioration; chances for road building or stream improvement, marketable species, and best locations for immediate operations, etc., and other questions.

Dr. Schenck was soon shown through the forest by Charles L. Whitney, a logger whom Pinchot had brought from New York state. This man was in charge of the woods end of timber cutting and logging. However, hitherto such work had been entirely that of harvesting and salvaging the dead and dying tree, notably the diseased chestnut.

In the first operations the products could fall in the following classes; — fuel wood, poles, posts, ties, bark, acid wood and stave bolts.

Transportation of ties and cordwood, etc., over the poorly surfaced and tortuous roads on the Biltmore forest was always slow and difficult; there were at that time no gas-powered vehicles. Even in the case of bark, which was harvested for the tanning factories, contract deliveries failed because of molding during the wet and humid summer months. The bark peeled easily only in that season. Thus the cost increased and the profit shrank, but in spite of all difficulties and much skepticism, technical and scientific forestry was off to a start, and would have continued forward had it not been stymied by the 1907 depression.

Dr. Schenck soon set to work preparing a working plan for the unit. In this, the first of its kind on the continent of North America, he estimated that a gross income for a 12 year period from all sources might approach $126,000, and that the total expenses for the first 12 years might be $175,000. This could only be a shot in the dark. When efforts were made to market high grade lumber and cash-in at a profit, eyes turned to the untapped virgin stand in the Big Creek valley, but for bringing down the logs there were neither road, flume nor a drivable stream. The water course had to be cleaned of rocks and fallen trees; the sharp bends must be eased and protected from under-cutting. To cut the Gordian knot, Pinchot, who had Vanderbilt's approval, proposed to construct a splash dam and build up a sufficient head of water to flush the big logs down. Before this work began Schenck was surprised to learn from Mr. Vanderbilt that Gifford Pinchot's connection with the Biltmore estate had ended. Vanderbilt, however, thought it would be wise to carry out the logging plans and the sawmill operations on the French Broad River as Pinchot had planned. As a consequence, Whitney was ordered to go ahead with the building of the dam.

It was this Big Creek area which brought Schenck and Pinchot into their first great disagreement. Pinchot had shown Schenck the beautiful stand of mature tulip trees, chestnut, red oak, basswood and ash, etc. Pinchot believed that this forest was ripe for cutting with promise of much profit to the estate and the cause of good forestry. Schenck tells that he thought the project ill advised, but said nothing against it at the time. In the end the estate suffered a great financial loss. Schenck comments as a post mortem, "We acted without due consideration of means and ends; lacking knowledge of local conditions, lumbering markets, freight rates; and we disregarded the financial as well as the forestry interest of our employer; and, if yellow poplar seedlings were what we wanted, we could have had millions by removing the litter, or scratching the soil, or observed what had taken place on many exposed, denuded and abandoned fields." The creek after the cleaning and driving of logs was completely ruined for fishing, and its beauty destroyed; thus another wall of grief came from the local people and sportsmen. Worst of all, the banks of the creek, arched with rhododendrons, greened with moss and replete with brook trout was made a ruin, a veritable arroyo of torn shores and skimmed stones. The logs below the dam often got stranded, resulting in much labor and law suits. The same vandalism had taken place on the Murz River in Germany and all under the label of forestry.
The Biltmore Plantations

While all the heretofore recorded forest activities were in progress, a nursery for the production of suitable planting stock of trees had been prepared and actual field installations were under way. Plantings had begun, even before Schenck arrived, as early as 1890 using stock bought from Illinois nurseries. The work was naturally intensified under Dr. Schenck's direction. Much of this was done by the assistance of apprentices, rangers, and laborers. Areas to be covered were those denuded of timber and depleted farmland, especially the badly eroded areas. In some cases brush fences lodged against posts were built contour-wise at different levels. Both conifers and hardwoods were set out, sometimes pure, but most often in mixtures. (4) Haasis lists 77 different plantations varying from 1/10 to 60 acres, with a total of close to 300 acres and of 40 different species of trees. In some cases Dr. Schenck imported white pine planting stock from Germany. By far the greater number were northern white pine: pure, about 111 acres and mixed with other conifers or with hardwoods interspersed on 139 acres. Other evergreens were Norway spruce, shortleaf pine, pitch pine and Douglas fir. Among the leading hardwoods were sugar maple, black walnut, black cherry, white oak and white ash. In general the conifers have developed much more rapidly and attained better form than the hardwoods, because the latter, if planted on depleted top soil, gravelly or rapidly drying terrain, usually stagnated and showed poor form. Only black locust and a very few other hardwood trees would grow on such areas. Aside from failure by drought, we know that the hardwoods are more subject to rodent damage, or frost injury than the conifers. In regard to the efforts at erosion control, Dr. Schenck stated that within five years the worn out fields were covered with a thicket of white pine.

The Biltmore School of Forestry

It would seem that the idea of starting a school for the instruction of the many young men who desired to know more about the practice of forestry was a matter of natural consequence. It is possible that the idea had sprouted in Dr. Schenck's mind some time earlier. How it came to be a down-to-earth vocational affair rather than an ordinary academic curriculum seems logical enough, for it followed the precedent of the first such schools in Germany. In order to provide the laboratory phases, especially after work cessation at Biltmore in 1907, it was necessary that the student body travel, and travel much it did — to Europe and to the Pacific Coast! When this school was well on the way it gave rise to considerable skepticism and not a little criticism among the few technically trained foresters in this country. Mr. Pinchot by a letter to Vanderbilt suggested or even asked that the school be discontinued. By sponsoring the Yale forest school, which began the year 1900, Pinchot had his doubts about the advisability of training men who were lacking in basic knowledge. There was, however, a vast difference between a graduate school at Yale for the one at Biltmore required no stiff entrance requirements or college degree. Was Pinchot afraid that Schenck's kind of training, would lower the standard of forestry education in the whole country? Not many years later Henry S. Graves, Director of the Yale forest school went on record to recommend such training, and the New York College of Forestry has for years staffed and maintained a Ranger School in the Adirondacks.
making, the Biltmore House which cost $6,000 a year to keep in operation, closed. Vanderbilt lost heavily, nonpaying farms were discontinued. Markets could not absorb the forest products, and both the manager and the financial controller with allied personnel lost employment. Vanderbilt spent the entire year 1903 abroad, and it was time for Dr. Schenck to do another round in the German army. When he returned he had no official connection with Biltmore estate, but he continued the school which became a traveling concern until 1913. Soon afterwards Schenck returned to Germany. Since he was at home in Lindenfels when the World War I broke out he promptly joined his regiment for service in East Prussia where he was wounded. He wrote this truism in his book — "If forestry at Biltmore was to be a pattern for other private owners to follow, it was necessary to prove that it could be done without the wealth of the Vanderbilts."

The Biltmore School of Forestry which began in 1909 was finally closed in 1913; George Vanderbilt died in 1917; after that the Biltmore forest acres were deeded to and became a part of the Pisgah National Forest.

**Lasting Benefits from the Biltmore Operations**

The impact and lasting results of value to American forestry from Schenck's contact with an unregulated and depleted North Carolina forest may be summed up as follows:

1. The invention of the Biltmore Stick for cruising timber.
2. Control of slope erosion by planting and by brush fences.
3. Necessity of coordinating logging and stream driving with all other (Multiple) uses of the forest.
4. Record of growth, success or failure of planted stock on different sites and in varying mixtures, at Biltmore.
5. Demand for very close checks on all income and expenses in connection with the harvesting of timber.
6. Value of maintaining strict but friendly supervision of all personnel engaged in the operations.
7. Evidence brought to light under what soil, light and surface condition to expect natural reproduction after cutting.
8. Highly technical silvicultural systems now employed in Germany's normal or near normal commercial forest must be greatly modified when used in America at the start of management.
9. Revealing in a measure the curricula and methods most suited for instruction and teaching methods in forestry education.
10. Beginning as early as 1895, Dr. Schenck published his lectures on technical forestry on the subjects of forestry practice under the headings of: history, policy, measurements, finance, silviculture, protection, management, utilization and the art of second growth, — a mine of good information for those who wanted to practice good forestry.

Dr. Carl Alwin Schenck's earthly remains were interred at Lindenfels in May 1955, but "His soul is marching on."

**Note:** With grateful acknowledgment to the American History Foundation and the Minnesota Historical Society, of St. Paul, Minnesota, for permission to use information from the book, "Carl Alwin Schenck," 224 pp. illus. 1955, and for use of the front page photo of Dr. Schenck by 'Karsh' of Ottawa. Also with thanks to Mr. Elwood R. Mauder of the Forest History Society, Inc. of Saint Paul, Minnesota, for use of the reprint "Carl Alwin Schenck," issued by The Hercules Powder Company of Wilmington, Delaware, 1955. The details about the chateau by Lou Harshaw were kindly provided by the Asheville, North Carolina Chamber of Commerce.

**About the Author**

Dr. J. A. Larsen is the departmental librarian and in partial retirement. For more details about Dr. Larsen see page 41.
Many people are enthusiastic advocates of having forest landowners grow "high-quality" timber. They feel that short-sightedness and ignorance are the principal reasons why silviculture aimed at such timber is not more popular. The purpose of this paper is to point out that timber quality is not a variable measured on a single scale ranging from low to high, but instead is a collective term for numerous attributes and variables affecting either end-product serviceability or manufacturing cost. An attribute of timber considered desirable by manufacturers of certain end-products may be considered unimportant or even undesirable by manufacturers of others. Before landowners incur the added silvicultural costs required to produce timber with certain attributes, they naturally wish to be assured that these costs will be repaid with interest when stumpage is sold or manufactured. Such repayment depends on whether cheaper processing of more costly wood produces a more serviceable or a cheaper end-product than can be produced by more costly processing of cheaper wood, or by using materials other than wood.

Some of the attributes or variables known to affect different timber end-products differently are size (or age), rate of growth, species (or genus), linearity, amount and distribution of unsound wood (or holes), and knottiness. Forest management of existing stands (i.e., not considering the possibility of controlled breeding, planting, or direct seeding) is based largely on deferring harvest of promising individual trees until they have attained desired size and on shortening the time needed to attain that size (1) by harvest or elimination of less desirable stems and concentration of spatial growth-potential on more desirable stems; (2) by amendment of sites, through fertilizer, drainage, irrigation, cultivation, or fire; and (3) by physiological stimulation of individual tree growth through hormones or auxins. In addition, the amount of knot-free bole surface can be increased by pruning limbs.

Within limits, composition of the residual stand is influenced by deadening and harvest operations, especially with respect to visibly recognizable genotypic attributes such as genus or species (often called "stand composition"), and with respect to phenotypic variables or attributes such as vigor, size, straightness, and freedom from knots and other defects. These facts are well known. In most cases, influencing the future stand in a desirable direction requires investment—in the form either of direct input or of deferred returns. Consequently, the decision of a forest manager to modify the future quality of a stand depends on economic considerations: the comparative returns from alternative uses of time, growing space, and funds, along with the penalty or gain incurred in deferment of returns.

There are really two kinds of attributes or variables included in the term "quality." One kind affects the utility or serviceability of the end-product. The other kind affects the cost of manufacturing a unit of end-product of specified quality. Knotty logs generally yield construction lumber somewhat less serviceable than lumber from clear logs, because knots may develop into holes which leak, because knots do not paint well, because knots decrease strength, and because knots cannot be worked smoothly with certain tools. Certain other end-products are equally as serviceable whether made from knotty logs or from clear logs, from small logs or from large logs, but use of small and knotty logs usually involves a higher cost per unit of end-product. It is quite obvious, then, that there are thresholds for some variables or attributes below which utility for certain end-products disappears, while other variables merely affect end-product yields or costs of manufacture. As derived chemicals or reconstituted fibers become increasingly important products of the forest, threshold utility levels of a given attribute or variable are much less often encountered, and marginal or threshold costs are much more often the criteria on which quality assessment is based.

Other things being equal, costs of manufacture decrease and product yields of all end-products improve as tree size increases (up to equipment capacity) and as proportion of knot-free, non-defective wood increases. However, 6 major groups of end-
products are affected somewhat differently by type and distribution of defects, including knots. These
groups are: poles and piling, yard and structural
lumber, factory lumber and dimension stock, veneer
and staves, fiber, and chemicals.

Species, diameter, taper, and length to some cut-off point are attributes or variables which can be
determined for any tree or portion of a tree. Major
imperfections should each be expressed quantitatively
and separately because the different end-product
groups may be affected quite differently by a given
defect. Thus:

(1) Curvature or sweep decreases utility of poles, piling,
yard, and structural lumber. To quantify, measure
middle ordinate of affected arc.

(2) Internal rot or hollow decreases utility of poles,
piling, and fiber bolts.

(3) Aggregate diameter and character of knots or knot-
indicators per unit of surface decrease utility of
yard and structural lumber.

(4) Circumferential distribution of surface defects in-
cluding knot-indications affects costs of short-length
products such as veneer and staves.

(5) Combined longitudinal and circumferential distri-
bution of surface defects including knot-indications affect costs of factory lumber and dimension stock.
To quantify circumferential and longitudinal distri-
bution separately, take systematic sampling points
along the bole and determine at each point the propor-
tion of circumferential strip which is continuously
clear in a band 3 feet wide and also determine the length of longitudinal strip which is continuously clear on the single face on which the sampling point appears. Weighted mean proportion clear and weighted mean length clear with co-
efficients of variation will be the most important
parameters of spatial distribution of imperfections.

(6) Externally inferable fiber defects such as char, rot,
pitch soak, lean decrease utility of fiber bolts.

(7) Other expense-increasing factors such as crook,
breakage, burls, extreme limbiness may increase
costs beyond economic limits even for chemical
wood.

If these 7 variables were each quantified or ex-
pressed as ranks or grades, with the most useful or
desirable rank denoted “1” in each case, a cow oak
24 inches in d.b.h. and 48 feet from stump to a
14-inch cut-off point might be described as
1:2:1:1:3:1:1. This could be interpreted as mean-
ing that it was the best 24-inch cow oak class with
respect to freedom from sweep, low aggregate knot
diameter, freedom from circumferential defect, free-
dom from external fiber defect, and freedom from
miscellaneous defects, but that internal rot was bad
enough to put it in the second-best class, and it was
in the third-best class with respect to longitudinal
distance between defects. Because of slight internal
rot which would have to be junk-butted, such a tree
would probably make marginal short piling. Because
of uniform close longitudinal and circumferential
spacing of defects, such a tree would not make high
grade factory lumber or dimension stock. It might,
however, yield some choice short stave bolts or
veneer blocks. Such a multiple-digit characterization
within a species and size class would give a far
better picture of quality than any single set of grades.
Other variables involving internal wood characteristics can be added to the 7 listed variables, if desir-
ed.

Now that pulping, laminating, gluing, patching, and
paper-facing have become feasible even for
structural uses, we are faced with some new ques-
tions. Is it more profitable to grow near-perfect but
expensive wood that can be processed at low cost,
or is it more profitable to grow wood at maximum
rates for a given level of investment, and then to
spend more money processing it (during the course
of which we can give it properties which even a
“high” grade of lumber or veneer does not naturally
possess)? Now that wood must bear the costs of
growing, can it still be produced cheaply enough to
compete (as sawn boards) with structural materials
technologically more desirable and currently only
slightly more expensive? Will we not have to build
into wood (through processing) attributes we can
never hope to create through silviculture? People
who believe in quality for quality’s sake avoid these
questions.

TIME AND SPACE

Let us consider the two easily controllable major
factors affecting characteristics of a growing tree.
They are time and space (or density if space be
regarded as fixed). Desirable genotypes or pheno-
types should be allocated additional time and as
much space they can efficiently use in the interval
between harvests until they reach the desirable size.
Less desirable phenotypes or genotypes are harvested
or deadened if close enough to desirable trees so that
their growing space can be used by those trees, or
if it is desired to create space for regeneration. Ulti-
mately, this process results in allocating longer time
and more space to the better trees, and shorter time
and less space to the poorer trees.

Except where tree regeneration is desired and
secured, too low a density of trees is wasteful of
space. In the South, for example, the lower limits of
desirable growing stock density probably lie
between 50 and 70 square feet of basal area per acre
(regardless of species, site, and tree size). Below this
level, growing stock cannot fully utilize the site and
loses control of it to other vegetation without special
cultivation, prescribed burning, or chemical appli-
cations.

The upper limits of density are not determined
solely by biological behavior. Owner objectives, inter-

est rates, and premiums paid for large trees all help
set the limits. However, when densities are permitted
to exceed 100-120 square feet per acre (regardless of
species, site, and tree size), low interest rates and
excessive mortality tend to render the prospect un-
attractive to most southern forest owners.
Hence, the desirable basal area density limits within which the southern silviculturist will try to maintain his stands are 50-120 square feet at the extremes, but are more commonly 70-100 square feet. Lower limbs are shed more quickly at high densities than at low densities, but large diameters are obtained more quickly at low densities than at high densities, and capital investment is less.

The other important silvicultural variable is time. The major question is: How long are we willing to defer individual tree harvest in order to increase tree size and the quantity of knot-free wood. At this point it is convenient to consider an 18-year period, and to remember that 2 percent compound interest multiplies original costs or returns in that time by 1.5, 4 percent doubles them, 6 percent triples them, and 8 percent quadruples them (all multipliers are approximate). Doubling the time interval means squaring each multiplier, halving the time interval means taking the square root of each multiplier.

Growing a tree for an additional 18 years means that final tree value (minus a regeneration cost of roughly 25 cents per square foot of basal area) must be 1.5, 2, 3, or 4 times as much as initial tree value (minus a regeneration cost of 25 cents per square foot of basal area). Although it is easy for small trees to double, triple, or quadruple their value in 18 years, it would require biologically impossible growth rates for very large trees to do this. An alternate approximation, based on Schneider’s useful growth-percent formula, would prescribe the harvest of any tree whose rate of current growth was as slow as that implied by a product (rings per inch times inches of d.b.h.) exceeding 200 for 2 percent growth, 100 for 4 percent, 67 for 6 percent, and 50 for 8 percent growth. If 6 rings per inch is accepted as about the most rapid volume growth to be expected from well-managed stands, then 33 inches, 17 inches, and 8 inches are the tree sizes at which volume growth would drop below the specified interest rates (disregarding regeneration costs). Quality increment and increment in merchantable height might reasonably be expected to balance moderate risk or insurance rates.

The biological ramifications of economic space-time functions have not been fully explored. Irrigation, cultivation, and fertilization in particular may become economic forest practices. Local stand-structure studies, to correlate growth with quantitative variables describing stand distribution in space and size, are badly needed to permit more refined calculations. A few generalizations about trees, space, and time seem reasonably safe, however, space affects diameter growth principally, time affects both height and diameter growth, and site quality affects mainly height growth.

KNOTS

And now for knots. In the South (to keep in the same region from which our earlier example was chosen), it will take about 36 years of very rapid growth to add 10 inches to a 6- or an 8-inch pine tree. If money is spent for pruning, harvesting the tree prior to attaining a 10-inch diameter increment will hardly be worthwhile. Pruning one 16-foot log on a hundred 6-inch trees per acre might cost about $10 per acre. After 36 years, the difference in stump-age price per acre between a pruned and an unpruned stand would have to be $20, $40, $90, or $160 at interest rates of 2, 4, 6, or 8 percent. If crop-tree yield were 10,000 board feet (40 trees averaging 3 logs in height and 16 inches in d.b.h.), the stumpage price premium for the 40 pruned final crop trees would have to be $2, $4, $9, or $16 per MBM to earn 2, 4, 6, or 8 percent on the original investment. Currently, it is doubtful whether more than 6 or 8 percent could be earned, in view of the well-known difficulty of maintaining an average growth rate of 3 inches in 10 years over a 36-year period on a stand with a terminal volume of 10,000 board feet (basal area 56 square feet per acre), and in view of the trend toward a narrower gap between prices pair for “high” and “low” quality stumpage of medium size.

Consequently, the returns from increasing the amount of knot-free wood through pruning are attractive in the South only where landowners have taken advantage of all high-return, low-risk, short-term investment opportunities such as planting or releasing potential crop trees from weed- or wolf-tree competition.

In southern hardwoods, three additional factors operate to make pruning even less attractive. First, the danger of rot or insect infestation is increased by the exposure of branch stub cross-sections. Second, many species such as oak and sweetgum featherout with epicormic or adventitious branches after pruning and thinning. Third, since most hardwood products can utilize short clear lengths, the difference in value between long clear lengths secured by pruning and short clear lengths obtained in the absence of pruning would not justify pruning expense for many products.

To put it bluntly, these are some of the reasons why southern forest land managers are spending most of their limited silvicultural budget on artificial or natural regeneration and culm tree control. The recent Timber Resources Review of the U.S. Forest Service indicated that far more funds are needed for highly profitable planting and culm-tree control alone than are in prospect.

Two things might just possibly make pruning more attractive in the future. One is an unlikely increase in the spread between pruned and unpruned stumpage. The other is greatly improved mechanization so that standing trees can be limbed nearly as cheaply as felled trees can or as knots can be excised or screened out in manufacture. Tractorborne hydraulic
lic lifts and electric or hydraulic saws could make 2, 3, or 4-log pruning almost as cheap as 1-log pruning. Research on this phase of pruning is long overdue.

In summary, it would seem that the silviculturist in the South has economic inducements to maintain densities of from 70 to 100 square feet of desirable well-distributed basal area. This statement applies regardless of species, site, size, or age. Fluctuation within that range will not cause notable changes in wood quality, yield, or biological behavior.

The major influence that the silviculturist can bring to bear on wood quality is the elimination of less desirable phenotypes or genotypes by early harvest cuts or deadening, to the end that more space can be made available to and more growth concentrated on the better phenotypes or genotypes. His other important influence is in deferring harvest of crop trees to allow them to gain in size and in amount of knot-free wood. The extent to which he will continue to thus defer returns depends on the premium paid for large clear trees, and this in turn depends on how much more cheaply the desired end-products can be manufactured from large, clear trees. It is hard to see any economic justification for deferring returns so that southern trees might be grown larger than 16 to 30 inches in diameter. Where fiber or chemical yields are the end-product, sizes somewhat smaller than that may be more profitable unless regeneration costs or risks are exceptionally high, or mechanized harvesting of pulpwod develops in the direction of handling large single stems (as in harvesting sawtimber) instead of numerous small stems (as in harvesting sugarcane).

Pruning will not be as economically attractive as alternative forestry measures unless pruning costs are lowered, unless the premium paid for pruned stumpage is increased, or unless alternative opportunities for planting and cull-tree control are exhausted.

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About the Author

Lewis R. Grosenbaugh has been active in forest management research at the U.S. Forest Service Southern Forest Experiment Station in New Orleans for over 14 years. Prior to that, he worked in timber management on the Florida, Ozark, and Quachita National Forests. He received a B. A. from Dartmouth in 1934, an M. F. from Yale in 1936, and while at school was elected to Phi Beta Kappa and Sigma Xi. Since then, he has been continuously employed by the U.S. Forest Service except for a 4-year hitch on destroyers in the Pacific during World War Two. Some of his better known publications have involved methods for determining tree volume; development of log grades; plot-sampling efficiency with various spatial arrangements; point- and line-sampling theory and application; diagnostic tallies for silvicultural prescription; growth and allowable cut formulae; and electronic data processing programs with forestry applications.
JOHN C. AEGERTER, Forest Management, calls Ames, Iowa home and attended the 1958 summer camp at Apache Creek, New Mexico. He has worked on inventory crew on the Siskiyou National Forest in Oregon and on sales layout on the Umpqua National Forest in Oregon. John likes hunting and fishing and is a member of Sigma Theta Epsilon Methodist men’s fraternity. John has no definite plans after graduation.

EDWARD E. ALLEN, Forest Management, calls Mason City, Iowa, his home, and he is married. He went to the 1959 summer camp. Ed has worked two summers in Minnesota; one with the Forest Service and one with a private operator; also a summer with the Forest Service in Utah. He was photographer on the 1959 Ames Forester and chairman of Christmas tree sales in 1959. He likes hunting, antique guns, and photography. Ed wants to go north to Alaska after graduation and work for the Forest Service.

ROBERT S. APPENZELLER, Forest Management, hails from Boone, Iowa. He attended the 1958 summer camp and has worked in the Gunnison National Forest and for Halifax Paper Co. in North Carolina. Bob likes to golf, hunt and fish and is a member of the varsity golf team. Bob plans to work in private industry after graduation.
HAROLD A. BORCHERS, Forest Management, from Chicago, Illinois, is married and attended the 1958 summer camp. He has worked as a forestry recreation aid on the Arapaho National Forest in Colorado. He emceed the 1960 Game Banquet, was social chairman in Caine House in 1959, and is a member of the Iowa State Singers. Harold's many interests include banjo and harmonica playing, listing to music, fishing, gardening, archery, and photography. Harold plans to attend graduate school in zoology upon graduation.

ROBERT BRISBIN, Forest Management, from Eagle Grove, Iowa, is married. He was a 1958 summer camper and claims photography, fishing, and camping as hobbies. Bob has worked in the Pacific Northwest with C.F.I. plot location and measurement. Bob was president of Forestry Club, Agricultural Council Representative, belongs to Farm House fraternity and Society of American Military Engineers. Bob plans military service and then Forest Service after graduation.

JOHN COON, Forest Management, is from Forest City, Iowa, is married and attended the 1957 North Carolina summer camp. He has worked on the Stanislaus National Forest in California, Shoshone and Bighorn National Forests in Wyoming, and Grant Mesa and Uncompaghre National Forests in Colorado. John likes to hunt and fish and is a member of the Forestry Club. John plans to work for the Forest Service after graduation.

JAMES L. CHERRY, Forest Management, from Waterloo, Iowa, is married and went to the New Mexico summer camp. He worked with the Clearwater Timber Protective Assoc. and for two summers was a smokejumper at Missoula, Montana. Jim was co-chairman for the 1959 Game Banquet and likes bow and rifle hunting and fishing. After graduation, Jim plans to go into the U.S. Air Force and then private business after more school in horticulture and landscaping.

JOHN GORDON, Forest Management, is from Clarion, Iowa, and attended 1958 New Mexico summer camp. He has worked two summers with the Pacific Northwest Forest and Range Experiment Station. John has been secretary of Forestry Club and associate editor for the Ames Forester, and a member of the Writer's Roundtable. John is going to graduate school after graduation.

JAMES R. GREEN, Forest Management, calls Le Mars, Iowa, home. He attended the 1958 New Mexico summer camp and has worked for the Forest Service in Montana. Jim's hobbies are hunting, fishing, and water skiing. Jim plans to go into the armed forces and then the Forest Service.
DAVID CARL HANSON, Forest Management, from Villisca, Iowa, attended the 1959 summer camp. He has worked on the Injo National Forest in California and the State Board of Forestry in Oregon. Dave likes to participate in most sports. Dave's plans include a tour of duty with the army.

LUBON A. HISZCZYNSKYJ, Forest Management, is from Fort Dodge, Iowa, and attended the 1959 summer camp. He has worked at the Santa Fe tie treating plant and likes dancing, singing, and meeting new people. Lubon was a member of the Iowa State Singers, Men's Glee Club, and Festival Chorus and club officer in the Newman Club. Lubon plans further schooling after he graduates.

BENJAMIN D. HOWELLS, Forest Management, is from Lake­wood, Ohio, and is married. He attended the 1958 summer camp. His experience includes forest inventory in Oregon and recreation inventory in Colorado. Ben claims sports and photography as hobbies. Ben was vice-president in Pearson House, Main Cabinet Representative in the M.R.A., and on the Conclave Committee. Ben plans to go into the army after graduation and then work for the Forest Service.

VIRGIL D. HUFF, Forest Management, is from Donahue, Iowa. He is married and went to the 1959 summer camp held in Minnesota. He has worked on road and clearcut layout on the Lakes Ranger District, Estacada, Oregon. Camping, fishing, hunting, and bowling are his hobbies. Virgil plans to work for the Bureau of Land Management in California after graduation.

JAY L. JESSEN, Forest Management, from Marshalltown, Iowa, is married and attended the 1959 summer camp at Wirt, Minnesota. He has one summer's experience at Manitou Experimental Forest in Colorado. Jay likes hunting, reading, gardening, and fishing and was a member of the Forestry Club. Jay plans to work in some phase of forest management upon graduation.

DAVID W. KANEY, Forest Management, is from Forreston, Illinois, and is married. He was a 1958 New Mexico summer camper. He has worked on timber inventory in the Siskyou National Forest. He has been social chairman, president, and advisor in Alumni Hall and on the Veishea Canoe Races Committee. His plans include a couple of years in the army and then the Forest Service.
H. DAVID KENT, Forest Management, calls Winterset, Iowa, his home and he is another 1957 North Carolina camper. Dave has had insect and timber survey and timber sales experience on the Wasatch National Forest and as a forestry aid with the B.L.M. at Roseburg, Oregon. His hobbies are photography, amateur radio, and bowling. He worked on the 1960 spring campfire, "Forester's Day," and Veishea display. After graduation, Dave plans either to attend graduate school in watershed management or work in government service.

JOHN PHILIP KLINE, Forest Management, from Carlisle, Iowa, was a member of the New Mexico summer camp in 1958. He has worked on a suppression crew in Oregon with the Forest Service and claims hunting, fishing and baseball as his hobbies. John has been social chairman and intramural chairman in his house and has been active in the Forestry Club. John's plans include fulfillment of his military obligation and then either the Forest Service or private industry.

ROBERT MAEGLIN, Forest Products, is from Muscatine, Iowa. He is married and went to 1959 summer camp. Bob has worked for Potlatch Forests Incorporated at Lewiston, Idaho. He has been on the Veishea Open House Committee and Game Banquet Committee and is feature editor for the Ames Forester. His hobbies include hunting, fishing, and photography. Bob plans to attend graduate school and then work for private industry.

FLOYD MANWILLER, Forest Management, is from Cedar Rapids, Iowa, and is married. He attended the 1959 summer camp. Floyd has worked as a survey aid out at Estacada, Oregon. He is a member of the Gamma Sigma Delta agricultural honor society. Floyd likes hunting and has his sights set on graduate work in wood technology after graduation.

DAVID G. MARTENS, Forest Products, from Persia, Iowa, is married and attended the 1959 summer camp at Wirt, Minnesota. Dave has a couple summer's experience in quality control and new product development at Wood Mosiac Corp. in Louisville, Kentucky. He is a member of the Phi Kappa Tau social fraternity, and he likes hunting, swimming, horseback riding, and dancing. Dave plans to take graduate work after graduation.

DONALD B. OSTERMANN, Forest Products, hails from Ames, Iowa. He was with the 1957 gang in the North Carolina summer camp. Don has worked for the Ames Lumber Company. He has been in the I.S.U. Band for two years. Don lists fishing and auto mechanics as his hobbies. His plans after graduation consist of a tour in the United States Army and then a job in retail or wholesale lumber.
DENNIS RENKEN, Forest Management, hails from Manson, Iowa, and attended the 1959 summer camp at Wirt, Minnesota. He cruised timber for the Forest Service on the Arapaho National Forest in Colorado. Dennis has been a member of the Forestry Club and the M.R.A. Weight-lifting Club and enjoys the great outdoors by hunting and fishing. Dennis' plans upon graduation include fulfilling his military obligation and working for the Forest Service.

ROGER REVES, Forest Products, is from Minburn, Iowa, and attended the 1959 summer camp. He has worked for a pulpwood dealer in North Carolina and was Forestry Club vice-president in 1960-61. Roger's activities include Veishea Open House, Festival Chorus, guitar playing and listening to music. He is a member of the Theta Xi social fraternity. Roger plans a stretch in the army after graduation.

EDWARD SCHLACHTENHAUFEN, Forest Management, hails from Waterloo, Iowa, and was a 1958 summer camper. He has worked for Clearwater Timber Protective Assoc. in Idaho and at the Lake States Experimental Station in North Dakota. Ed likes philosophy and hunting. Ed has been co-chairman of Veishea Open House, vice-president of Caine House, M.R.A., Main Cabinet Representative, chairman of Halls Committee of M.R.A., Church Council of Lutheran Student Assoc., and chairman of Education Committee. Ed plans further study in philosophy and ethnology after graduation.

FREDRICK O. WALK, Forest and Range Management, is from South English, Iowa, and was a 1957 summer camper. He has worked on a lookout, timber management crew, and engineering crew on the Gifford Pinchot National in Washington. Fred's hobbies are hunting and sports, and he was vice-president of the Fraternity Intramural Council, member of Sigma Pi fraternity, Forestry Club, and Conclave Committee. Fred has received his permanent appointment and is on leave of absence, and plans to go back to Washington after graduation.

CARL DWAYNE WARRICK, Forest Management, from Grand River, Iowa, is married. He attended the 1957 summer camp and has done timber marking on Coeur d'Alene National Forest in Idaho, and K.V. selector and timber management work in the Plumas National Forest in California. He was a freshman wrestler, Forestry Club member, and a Theta Xi social fraternity member and is interested in horses and purebred Hereford cattle. Carl plans graduate study after graduation.

EDWARD WHITMORE, Forest Management, from Coin, Iowa, is married and was a 1958 summer camper. He has worked in the Apache and Sitgreaves National Forests in Arizona, marking timber, and log scaling on the Medicine Bow National Forest in Wyoming, and initial attack fireman on the Inyo National Forest in California. Ed claims fishing, reading, and classical music as interests and was a member of the Forestry Club and Conclave Committee. Ed plans to work for the Forest Service after graduation.
MARTIN J. ZIMMER, Forest Management, from North Clinton, Iowa, is married. He attended the 1959 summer camp in Minnesota and has worked at the Rocky Mountain Forest and Range Experiment Station in Colorado. Joe transferred from St. Ambrose College after receiving some liberal arts background. He likes hunting, fishing, and reading and was associate editor of Ames Forester, member of the Newman Club and Forestry Club. Joe's plans after graduation are indefinite.

MAX D. BARKER, Forest Management, from Boone, Iowa, is married and is blessed with three daughters. He attended the 1947 summer camp held in North Carolina. Max has worked for the Forest Service in Colorado and lumber yard work. He likes camping, fishing, and horses and is a member of the Forestry Club. Max's plans after graduation are indefinite.

CLINTON BIRD, Forest Management, from Malvern, Iowa, is married. He attended the 1959 summer camp. He has worked for the Forest Service at Crescent, Oregon, and his hobby is coin collecting. He plans to work for the Forest Service after graduation.

WAYNE L. BUCKNER, Forest Management, hails from Mount Ayr, Iowa. He attended the 1957 summer camp in North Carolina. He has worked 15 months on the Clearwater National Forest in Idaho. Wayne claims hunting, fishing, and photography as hobbies. Wayne plans to work for the Forest Service after graduation.

RICHARD CONE, Forest Management, hails from Fort Madison, Iowa. Dick is single, and he attended the 1957 summer camp in North Carolina. His summer experience consists of working for Crandon Paper Mills and on his father's tree farm. He is a member of Acacia social fraternity and president of the Y.M.C.A. Upon graduation Dick plans to obtain schooling for work with the Y.M.C.A.

JACK DILLMAN, Forest Management.

GENE A. FAILOR, Forest Products, is from Rhodes, Iowa, and is married. He attended the 1959 summer camp in Minnesota and has had a summer with the Forest Service. Gene likes outdoor sports. Gene plans to work in private industry after graduation.

RAYMOND EARL GINGERICH, Forest Management, from Manson, Iowa, is married and attended the 1959 summer camp in Minnesota. He has worked in a forest nursery and his hobbies are horticulture, home construction and design, and model railroading. Earl has worked on the Ames Forester as a reporter and Alumni Editor, Holst Tract, Sweetheart Ball Committee, and was a member of the Forestry Club. Earl is planning forest nursery and reforestation work after graduation.

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JACK KRUSE, Forest Management.

JERRY LESLIE, Forest Products, from Cedar Falls, Iowa, is married and attended the 1958 New Mexico summer camp. His experience includes work with the Forest Service and lumber company work. Jerry's hobbies are hunting, fishing and woodworking. His activities include I.S.U. Band, ward system bowling team, and activity chairman of East Ward. Jerry has no definite plans after graduation.

RON MORDHORST, Forest Management.

ROGER SHEPARD, Forest Management, is from Glenwood, Iowa, and is married. He attended the 1959 summer camp in Minnesota. Roger has worked on forest inventory at Mt. Hood, Oregon. Roger's plans after graduation are indefinite.

RONALD EDWARD TROCHUCK, Forest Products, from Des Moines, Iowa, is married. He was with the gang up at Wirt, Minnesota, in 1959 summer camp. Ron likes to fish and hunt and is a member of the Forestry Club. Ron plans to work in retail lumber or production after graduation.
Row 1: Maeglin, Christ, Howard, Gingerich, Doolittle, Smith.
Row 2: Kruse, Johnson, Tripp.

1961 Ames Forester Staff

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Forestry Club membership has been steadily increasing since the beginning of fall quarter. As of now almost two-thirds of the forestry students are active members. Membership in the freshman class is near one-hundred percent.

Last fall the second annual Foresters’ Day was held. Everyone enjoyed the competitive events, the dinner, and the dancing.

Because of an increase in wholesale prices, our profit from Christmas tree sales was a little lower than the year before, but the general public was very well pleased with the quality of trees that we had to offer. We are looking forward to the year when our own trees will be ready for sale.

Dr. Carl Goebel, our new faculty advisor, took over at the beginning of fall quarter. We are very grateful to Dr. George Thomson, the previous advisor, for his many years of service to the Forestry Club.
"Advancement by Education" was the theme for the 1960 Forestry Open House. The purpose of the display was to demonstrate to the public some of the advancements that have been made in forestry because of education. There were four general fields used to accomplish this goal. These four fields were reforestation, protection, wood preservation, and wood waste.

The methods used to show the advancements were first, to show some of the old methods used in the past and second, the new, present day methods.

The reforestation display consisted of an actual model plus a pictorial display of the old and new methods of reproduction cuttings. The pictorial portion of the display showed the results obtained from one of the present day practices carried out on a Douglas-fir area.

In the field of protection insect damage was stressed. There were displays of many of the forest insects with a sample of the damage they inflict to forest trees. Some of the present day means of controlling these invaders of the forest were also displayed to stress the theme.

The wood waste display was built around many of the by-products which can now be used. Many of the wastes, which were previously destroyed, were shown in the form of the products which advanced education and research have found for them.

In the area of wood preservation, the great advancements made through education were shown by a series of examples of the methods used through the years to preserve wood. These included the use of salt in the older days by shipmaster up to the modern, present day methods of pressure treating wood.

As a climax to the display, an educational pyramid was shown, indicating the development of the professional forester from the time he enters college until he graduates.

Prof. Hartman Dinner

The recognition dinner for the late Prof. G. B. Hartman was held on May 18, 1960 to honor Prof. Hartman for 25 years of service to Iowa State University.

Approximately 300 friends, students and associates of Prof. Hartman attended the dinner and saw him receive testimonial letters, an alumni purse, the S.A.F. Fellow award, the Iowa State Journal of Science issue dedicated to him, and other gifts and awards.

Mr. DeWitt Nelson was the featured speaker for the banquet.
**Driftwood**

The Driftwood is the ISU Forestry Club’s answer to Playboy Magazine. It is a non-periodical periodical published about once a quarter by the club.

While containing some articles of educational importance, the Driftwood is aimed primarily at entertainment. Articles ranging from personal interviews with staff members to satires on various instructors are published. During spring quarter of 1960, the Driftwood compiled a listing of summer locations of the ISU foresters to help plan summer get togethers and to secure rides. One of the most popular articles appearing each year, is the summer camp coverage. This year Jim Schwartz did a fine write up on it although a few of the instructors were shot out of the saddle. The Driftwood is also receiving wide acclaim as an art magazine, mainly through the efforts of our cartoonist John Gordon, and as usual, the instructors seem to suffer a bit. Although the Driftwood does not publish articles on technical forestry, it does publish articles of direct concern to the ISU forestry students as evidenced this fall in Jim Boyle’s interview with our new department head. The Driftwood also functions to keep the students informed of club and departmental activities.

**Assignment Indonesia**

Honolulu, Tokyo, Hong Kong, Singapore, Bogor, Java via jet flight over the Pacific. Sounds like a nice trip, doesn’t it? At the time of this writing the family of Dr. Dwight Bensend is eagerly preparing for just such a trip that will become a reality for them in March of this year. Dr. Bensend has been assigned to a position at the University of Indonesia at Bogor, Java, and he and his family will leave for their new home on March 1. Iowa State University has granted Dr. Bensend an 18-month leave of absence from his duties as professor of forestry so that he can take this Far-East assignment.

The University of Indonesia has a cooperative program with the University of Kentucky, and Dr. Bensend will be the fourteenth American professor to go to Bogor, Java through this program. His assignment came through the University of Kentucky Research Foundation which is financed by the International Cooperation Administration.

Dr. Bensend will be employed as a professor of forestry at the University of Indonesia where he will help to organize the curriculum in forestry, teach wood technology, basic properties of wood, and forest products courses. A number of native Indonesian men have already received their masters degrees in forestry and will work toward their Ph.D. degrees under the graduate research program that Dr. Bensend will help initiate.

As a major step in their expanded educational program, the Indonesian government is building a new university campus at Bogor, and the first buildings to be constructed will be three forestry buildings that will house wood technology and silviculture labs. Part of Dr. Bensend’s work will be to advise the university officials as to what equipment to purchase for these buildings and to help set up the new forestry school facilities.

The Indonesian people are very interested in exploiting their vast forest resources, and Dr. Bensend’s first job on arrival in Indonesia will be to travel about the country with native foresters to make a survey of the forests and forest products. This general survey of Indonesian forest resources will help Dr. Bensend in directing his work toward the needs of the native forestry students.

Teaching forestry to Indonesian students will present a great challenge to Dr. Bensend, and life in a tropical city in the mountains of Java will be an experience that few American foresters can ever match.

**Wives Club**

The Forestry Student Wives Club of Iowa State University was organized in the fall of 1948 with the help of the forestry staff wives. Presently, the club has 40 members and holds regular meetings once a month in the lounge of the Women’s Gym with special programs planned for each meeting. This year’s programs have included a film, *Democracy’s College*, a demonstration of Christmas wrappings and decorations, and a talk by Mr. Dietchman on “the Forest Service as a Profession.”

Every Christmas, candy and cookies are sent to the Polk County Home and toys are sent to the Woodward Home for retarded children. With the cooperation of the Men’s Forestry Club, diplomas are given to the wives of the graduating seniors. Last spring these diplomas, known as “P. H. T.’s” (Putting Hubby Through) were given to the wives at a breakfast get-together.

The purpose of the Club is to bring the wives of the forestry students closer together through social activities. A few social meetings such as the pot luck supper and the annual spring picnic are held throughout the year. One of the highlights of the Club’s social activities is the tea given the forestry faculty wives each spring.

This year’s officers are: Ann Barker, president; Mona Bird, vice-president; Lynette Norton, secretary-treasurer; Joan Basset, historian; and Mrs. Carl Goebel, faculty advisor.
Forester's Day—1960

The first annual Forester's Day was held at the 4-H Camp on April 23, 1960.

Forester's Day combines Paul Bunyan Day, which was held during Veishea, spring campfire, recognition day, and hoe-down.

Prizes were awarded to the winners of individual events as follows: Jim Boyle, tree climbing; Dick Pierce, match splitting; Clint Bird, log throwing and log chopping; and Dave Smith and Jim Gottsacker, 2 man bucking.

After a meal of bratwurst, presentations were awarded. Prof. Hartman was presented an engraved ax by the Forestry Club for 25 years of service to the department. Jim Gottsacker received the "Son of Paul" award, and Keith Jensen was announced as the top student of the Class of 1960.

Conclave

The Proud Lake Recreational Area, Ann Arbor, Michigan, was the site for the 7th Annual Midwestern Foresters Conclave on April 29-May 1, 1960. The Conclave is held each year to promote good relations between the six accredited forestry schools in the Midwest. Listed in order of total points accumulated in the various competitive events, these schools are: the University of Michigan, Purdue University, Michigan State University, Michigan College of Mining and Technology, the University of Minnesota and Iowa State University.

The contests began early on Saturday morning, April 30, and consisted of dendrology, traverse running, log throwing, chain throwing, bait casting, two man bucking, one man bucking, match splitting, log chopping, log rolling, and, of course, tobacco spitting.

Iowa State competed valiantly in all contests, earning a total of $\frac{1}{2}$ point and the admiration of all, but our 6-man crew was unable to match the 30 men that the University of Michigan used to accumulate their winning total of 45. Michigan University's close rival, Purdue, was next with a score of 18.

Our team consisted of Dave Smith, Howard Halverson, Kent MacDonald, Ken Kocina, and Ed Allen, with Bob Joens as chairman.

At the close of the Conclave, Iowa State was selected as the host school for 1961. This will be the big event on our spring agenda and should prove the Iowa State foresters capable of conducting the conclave in the same top-notch manner evident when they sponsored it back in 1956.
Forester's Day—1961

The second annual Forester's Day was held on October 13, 1961 with individual competition being the high spot of the day. Two sophomores, Joe Bena and John Shepard, were victorious in the two man bucking event, while Bena won the one man bucking and Shepard took honors in log chopping. Other event winners were: Jim Boyle, pole climbing; Don Dittmar, tree felling; Fred Walk, log throwing; and Denny Vermillion, match splitting.

A dinner of pork chops and trimmings was served, and singing and dancing was the featured entertainment for the evening.
1960 Summer Camp

Regeneration Problems

Determining Age
70 cubic feet seems like a good guess.

The 1960 summer camp of the ISU Forestry Department took place at Wirt, Minnesota, for the second year. The land of ten-thousand lakes welcomed us with the memories of the 1959 camp fresh in its mind.

The first week or so was spent teaching us the uses of the tools of forestry, the old standbys of the double-bit and the cross-cut saw. After the first week the race against time was on. While one section was learning the silviculture of the region the rest of the camp started a contour map of the "Lost Forty." After the first week the sections shifted in subject matter, and followed in each other's footsteps.

The many and diversified field trips spaced throughout camp served to show us the main forestry industries of the northern Minnesota area. The rangers on the nearby districts were very helpful in scheduling trips to coincide with the subject matter. The trip to Mando Paper Company, International Falls, Minnesota, was once again the highlight of the entire camp.

Once again the volley-ball net was kept hot after classes with the instructors on opposite teams so that only one at a time would be defeated. After all we had to think of our grades. Our soft-ball teams didn't do as well as the fellows last year. The 1959 boys beat the teams so badly that the local teams were laying for us. They even imported a few pitchers and we must admit that they beat us once in a while.

In contrast to the 1959 session the fishing around camp was very good. The 1961 camp will move from Wirt, but the 1960 veterans hope the 1961 camp is as successful as the last.
STOLTENBERG, CARL H., Ph.D. — Head of Forestry Department; General Forestry, Advanced Forest Economics Research

The head of the Forestry Department at ISU, Dr. Carl Stoltenberg joined our staff August 1, 1960. Dr. Stoltenberg, born in Monterey, California in 1924, received his forestry schooling at the Universities of California and Minnesota, and holds B.S., M.F., and Ph.D. degrees. Just prior to accepting his position at ISU, Dr. Stoltenberg was chief of the Division of Forest Economics Research for the Northeastern Forest Experiment Station. Research, students, and learning more about Iowa are Dr. Stoltenberg's hobbies. He is married and has five children, Bruce, Gail, Susan, Paul, and Shirley.

BENSEND, DWIGHT W., Ph.D. — Professor of Forestry; Wood Technology, Seasoning and Bonding of Wood, Forest Products, Special Problems in Wood Ut., Graduate Courses in Courses in Wood Ut.

Indonesia, the new home of Dr. Dwight Bensend, is a long distance from Turtle Lake, Wisconsin where ISU's "wood Ut. man" was born in 1913. Dr. Bensend attended the University of Minnesota where he received his B.S. in 1947, his Ph. D. in 1942, and where he taught after his graduation. Dr. Bensend worked at the Forest Products Lab at Madison, Wisconsin, and served as Chairman of the Midwest Section of the Forest Products Research Society and is presently a member of the seven-man joint National Lumber Manufacturers Association—Forest Products Research Society Education Committee. Dr. Bensend's hobbies are community service, hunting, fishing, and, very appropriately, travel. Dr. Bensend is married and is the father of three daughters.
GATHERUM, GORDON E., Ph.D. — Associate Professor of Forestry; Silviculture, Forest Influences, Half-time Research in Silviculture

Dr. Gordon Gatherum before coming to Iowa State in 1953 had a wide variety of professional forestry experience. He was cruiser and topographer for Rayonier Lumber Company at Hoquiam, Washington, research aid in the Utah State fish and game department, teaching assistant in the Department of Range Management at Utah State University, research aid at the Central Plains Experimental Range at Nunn, Colorado, range conservationist for the S.C.S. at Tremonton, Utah, Assistant Professor of Agronomy at Texas Technical College at Lubbock, and Instructor of Range Management at Colorado State University at Ft. Collins. Dr. Gatherum, born in Salt Lake City, Utah, studied at the Universities of Utah and Washington, Utah State and Iowa State Universities and holds a B.S. degree in forest management, M.S. in range management, and Ph.D. in plant physiology-silviculture. Jazz and classical music, skiing, and gardening are Dr. Gatherum’s hobbies, and he is present Holst Tract Advisor. He and Mrs. Gatherum have three children, Laurie, 11, Mark, 8, and Kristin, 2.

THOMSON, GEORGE W., Ph.D. — Professor of Forestry; Mensuration, Photogrammetry, Farm Forestry, Mapping (Summer Camp)

Iowa State’s Forestry Department is “home” to Dr. George Thomson, who received his B.S. here in 1943, his M.S. in 1947, and his Ph.D. in 1956. Dr. Thomson, born at Seward, Illinois in 1921, spent three years, 1943 to 1946, in the Army then returned to do his graduate work and teach at his alma mater. His family, wife and three sons aged 8, 5, and 1½, and his hobbies of reading and photography keep Dr. Thompson busy when he isn’t teaching or lining up summer jobs for the forestry students.

KELLOGG, LEONARD F., M.F. — Professor of Forestry; General Forestry, Silviculture (Summer Camp), Forest Protection, Logging and Milling, Forest Management

Leonard F. Kellogg joined the staff of the Forestry Department at Iowa State twelve years ago after experience as junior forester on the Shasta National Forest and at the Appalachian Forest Experiment Station and work for the Central States Forest Experiment Station. Prof. Kellogg studied at the University of Chicago, University of California, and Yale University and holds B.S. and M.F. degrees. Along with his duties as professor at ISU Prof. Kellogg is active in membership work with S.A.F. and serves as staff advisor to the Ames Forester. His hobbies are wood-working, nature study, travel, and forest history. Professor Kellogg and his wife, Edith, have a daughter, Virginia, and son Perry.
ETHINGTON, ROBERT L., M.S. — Instructor of Forestry; Wood Technology, Seasoning and Bonding of Wood, Forest Products, Mechanical and Physical Properties of Wood

The youngest member of the forestry staff at ISU, Bob Ethington, is teaching and working toward his Ph.D. in the combined fields of wood utilization and theoretical and applied mechanics. Bob was born at State Center, Iowa in 1932 and earned his B.S. in wood utilization and M. S. in T & AM at ISU. Bob is married and has two daughters, Teresa and Sheryl. Before joining the teaching staff at ISU, Bob worked at the Forest Products Lab at Madison, Wisconsin.

HOPKINS, FRED S., Ph.D. — Assistant Professor of Forestry; Forest Economics, Forest Policy and Administration, One-fourth time Research in Economics.

The “eastern influence” in the forestry faculty at ISU is Dr. Fred Hopkins, who was born in Springfield, Massachusetts in 1922. Dr. Hopkins studied at Massachusetts State College, then at the University of Michigan where he received B.S.F., B.B.A., and M.F. degrees, and at the New York State University, College of Forestry at Syracuse where he earned his Ph.D. degree in 1959. Prior to joining the ISU faculty in September, 1959 Dr. Hopkins had worked as a forester for the New England Forestry Foundation at Warner, New Hampshire, Manager of Clearing Construction Company, Ltd. at Mackay, Ontario, timber buyer for True Temper corporation at St. Johnsbury, Vermont, and instructor of forest economics at the Forestry College at Syracuse. Dr. Hopkins is married and has four children, Ricky, Marti, Sally, and Steve. He enjoys travel, camping, hiking, and mountain climbing as his hobbies.

GOEBEL, CARL J., Ph.D. — Assistant Professor of Forestry; Range Management, Silviculture, Forest Conservation

Dr. Carl Goebel, who came to Iowa State two years ago, received his forestry education at Universities of Wisconsin and Idaho and at Utah State University. He holds a B.S. in forestry and a Ph.D. in range management. Dr. Goebel has worked as range surveyor for B.L.M., as research assistant at the Forest Service Experimental Station at Le Grande, Oregon, and as forester on the Cache National Forest near Logan, Utah. His hobbies, skiing, tennis, photography, plant collection, and hunting, and his work as advisor to the Forestry Club occupy many of Dr. Goebel’s “off duty” hours. Dr. Goebel is married has two sons aged four and six.
AIKMAN, J. M., PhD. — Professor of Botany; Dendrology, Plant Ecology

Dr. J. M. Aikman has been teaching foresters at Iowa State for thirty-three years and still greatly enjoys helping his students learn and remember more trees than they thought they could. Born at Mason City, Nebraska in 1893, Dr. Aikman received his A.B. degree from Nebraska Wesleyan University in 1917, his Ph.D. from the University of Nebraska in 1928, and an Honorary Dr. of Science Degree from his alma mater in 1951. Prior to joining the staff at Iowa State in 1927 Dr. Aikman was Professor of Botany at Nebraska Wesleyan. During the year 1934-35 he took a leave of absence from his duties at Iowa State to serve as Senior Botanist for the Forest Service, and from 1951 to 1953 he was gone again, this time as Principal Research Advisor for the Foreign Agriculture Service in Ecuador. Dr. Aikman and his wife have a daughter, Marjorie, and son, Jim. The Aikmans enjoy traveling about the U.S. while Dr. Aikman pursues his hobbies of collecting dendro specimens, doing research in ecology, and fishing.

McNABB, HAROLD S., Ph.D. — Associate Professor of Forest Pathology; Forest Pathology, Wood Deterioration

Dr. Harold McNabb, who teaches the forest pathology courses at ISU was born in Lincoln, Nebraska in 1927. He received his B.S. in botany-chemistry at the University of Nebraska and after studying at Yale University with a forest pathology major and plant physiology-forestry minor, Dr. McNabb received his M.S. and Ph.D. degrees. He spent the summers of 1944 through 1949 on the Kanisku National Forest in Idaho working as lookout-fireman and district dispatcher. From 1945 to 1952 Dr. McNabb was a teaching assistant at Yale, and from 1949 to 1952 he was engaged in wood deterioration research on a Navy project there. Dr. McNabb joined the ISU faculty in February, 1953. His hobbies are stamp collecting and Boy Scout work in which he has been active for 21 years and is presently serving as Scoutmaster of the G. B. MacDonald Memorial Troop 158 in Ames. Dr. McNabb was married in 1949 and has a ten-year old son, Peter, and a six-year old daughter, Geneve.

LARSEN, J. A. Ph.D. — Associate Professor of Forestry, Librarian, Partial Retirement

Dr. J. A. Larsen who was born in Drammen, Norway in 1877 is the "old timer" on the I.S.U. forestry staff. Dr. Larsen studied forestry at Yale University where he received his B.S. in 1908 and his M.F. in 1910 then at Iowa State where he received his Ph.D. in 1936. He worked for the U.S. Forest Service from 1910 until 1924 when he came to Iowa State. Silviculture and forest research are Dr. Larsen's main interests, and he enjoys art and philosophy as hobbies. Dr. Larsen has a married daughter living in Omaha and a son Einar Ansgar in Newton, Iowa.
SCHOLTES, WAYNE H., Ph.D. — Professor of Soils; Elementary Soils, Forest Soils, Soil Conservation, Soil Classification

One of the most colorful personalities on the ISU faculty and chief “knocker” among the professors of forestry students is Dr. Wayne Scholtes of the Agronomy Department. Dr. Scholtes was born in Clinton, Iowa in 1917. He received his B.S. in forestry from Iowa State College and did graduate work at Duke University, receiving M.F. and Ph.D. degrees. Before joining the ISU Staff in 1951 Dr. Scholtes had worked for the U. S. Forest Service, U. S. Indian Service, Soil Conservation Service, and Bureau of Plant Industry. His hobbies are camping, hunting, and fishing. Dr. Scholtes is married and is the father of two daughters and one son.

MARIAN BENDER, Departmental Secretary

Marian came to the I.S.U. Forestry Department in 1950 after working for the Iowa State Highway Commission for 5 years. Besides her varied duties as departmental secretary, she is Dr. Stoltenberg’s personal secretary, and secretary of the College Credit Union.
Five Years Later  (Class of 1956)

Graeme Berlyn is presently an instructor in wood anatomy at Yale University in New Haven, Connecticut. He and his wife Mary Kay have one boy John. Graeme received his Ph. D. from Iowa State in 1960 and is now doing mostly research and teaching.

Duane Breon writes from Pinedale Arizona, where he is District Forest Ranger, Pinedale Ranger District, Sitgreaves Natl. For. John and his wife Mary have three children Susan, Belinda, and Mark. He is active in Natl. Forest Admin. Duane also informs us that presently two of the four Ranger Districts have Iowa State grads as District Rangers-Jack Crellin and himself.

From Munroe Falls, Ohio writes Richard Brown. He is a forester working with the Ohio Edison Electric Co. in Akron. His work is supervising line clearance for new lines, tree trimming and landscaping substations. Richard and his wife Kathryn have two children Kenneth 2 and Nancy 4 months. He is also active in "Mens Galeden Forum of Akron."


Richard Crowther received his M.S. in 1956 from Iowa State, and is presently an assistant professor, Forestry Department at Michigan College of Mining and Technology, Houghton, Michigan. Richard is married to the former Dorothy Boardman and they have three children Nancy Boardman, Alan and Jean Crowther. His activities are faculty advisor to the Michigan Tech Forester and Michigan Tech Young Republican Club.

Franklin DeVaul is with the International Paper Company, Long-Bell Division, initiating a cost accounting system into their plywood plants. This work is being done in the states of Calif., Oregon, and Washington. Franklin and his wife Joyce have two children; Debra 3 and Franklin Jr., 4 months.

From Custer, South Dakota we hear from Kathleen Fritch. Mrs. Fritch and her husband Don have three girls; Mary 3½ born in Stuttgart, Germany, Robin 2, Darla 10 months. Her husband is a Recreation Forester for the Black Hills National Forest. Mrs. Fritch has become quite a hunter and has bagged an antelope and a 6 point mule deer.

Ronald Gill is presently completing work on a M. A. in Marketing at the State University of Iowa. He and his wife Rose have been married for two years and have no children. Ron tells us that his work will probably be in the Chicago area when he is graduated in Feb. 1961, but was not to certain of this.

Henry Haskell writes from Madison, Wisconsin, where he is presently with the Forest Products Laboratory. He is married and his wife Jeanette is expecting a baby in February.

David How is a land examiner (forester) with U. S. D. I., Bureau of Land Management. His work is in northern California. David and his wife Shirley have a girl Lindsey Jean, 2½ years.

From Des Moines, Iowa we hear from James McIntyre where he is presently employed by Jewett Lumber Company as Manager of their Ft. Des Moines Yard. He and his wife Ruth have two children. Sandra Lynn will be five in Jan. and James Jay will be one in Jan. James is also a member of the International Concatenated Order of Hoo Hoo, Iowa Club No. 102 and is an Associate member of Des Moines Home Builder Association.

Leonard A. Lindquist (Andy) has been moving recently is presently a District Forest Ranger, Cuba District, Santa Fe National Forest in Cuba, New Mexico. Andy and his wife Roberta are expecting their first child in May.

John Quirk is keeping busy as a research forester at the Forest Products Laboratory in Madison, Wis. and is going to school part time working on a doctorate program. John and his wife Barbara have a girl Amy Marie, age 1. Other than school all his work is strictly research in microscopy and electron microscope. John received his M. S. in 1959 from Syracuse, writing his thesis on rheological properties of particleboard.

1953 Summer Camp

Medicine Bow National Forest

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1957

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