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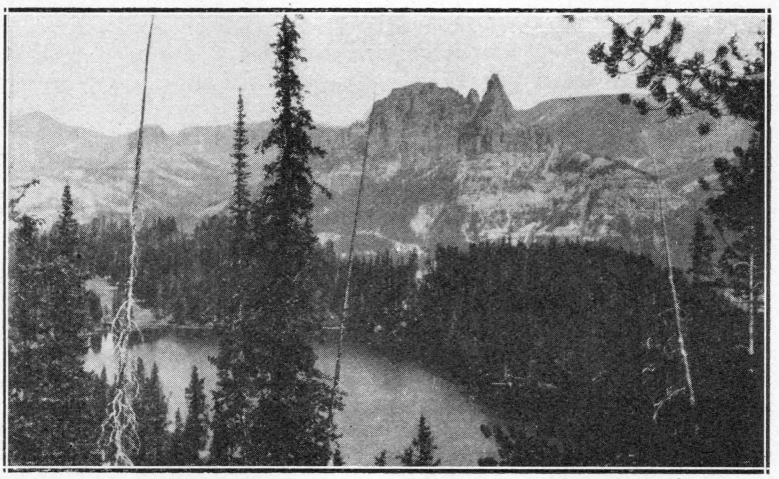

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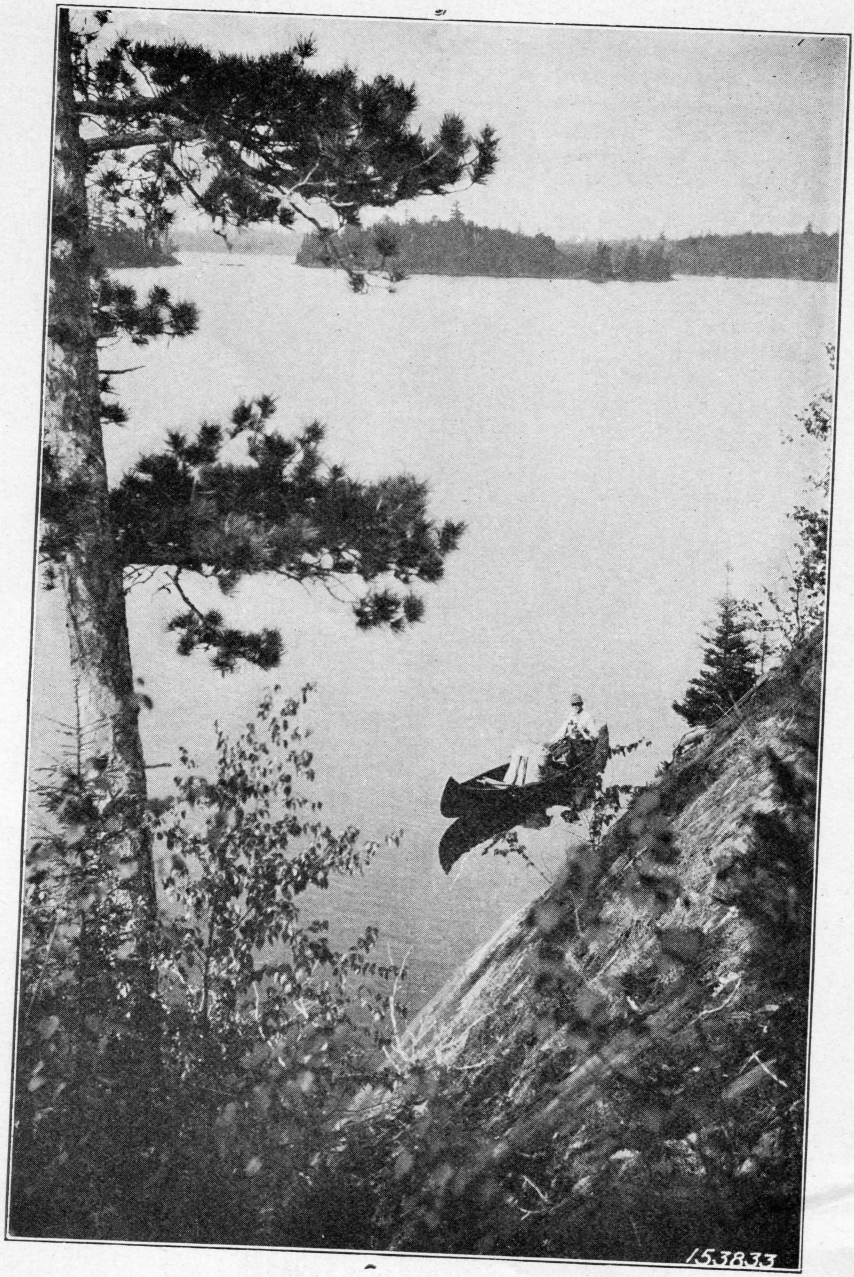
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FOREWORD

Our purpose in publishing this book is to provide a medium of contact between our school, our alumni and all those interested in the profession of forestry.

The publication of this annual is made possible by those whose names appear on the honor roll of patrons; our advertisers; and those who contributed articles. We wish to take this time to thank the above mentioned for their assistance.

The Editors.

VOL. XIX CONTENTS 1931

TO THE ALUMNI,

to express our appreciation of their loyal support which has made this volume possible and for their helpful interests, we dedicate this volume of the Ames Forester.

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Possible Applications of Genetics to Forestry

KENNETH KOPF

Research Assistant, Genetics Dept., Iowa State College

CLEAR, straight-grained, merchantable pine lumber produced in fifteen years; burl walnut, bird's-eye maple, curly birch grown without difficulty wherever and whenever desired; pinon pine seeds of a size to be readily marketable in competition with other nuts developed; pines with doubled and trebled yields of heptanes, terpenes, oleoresins, and pitch isolated; high grade pulpwoods grown in an eight year rotation. This isn't Paul Bunyan's Utopia; these are merely some of the practical possibilities which may be anticipated if genetics, the science of plant breeding, is applied to forestry.

In reviewing a number of recent papers on forest genetics, the outstanding feature noted was the seeming sparsity of the genetics background of the workers in forestry. Only a few, such as Hartley and Coville, seem to have an appreciation of the possibilities and the limitations accruing from the application of scientific breeding principles to forestry.

Undoubtedly the most important and most practical improvement to be made is a more rapid growth of timber. Any such increase means a more rapid turnover in the rotation as well as increased profit. In fact, in work on the breeding of forest trees for pulpwood reported by Stout *et al*, rapid growth and freedom from disease are considered to be characters of first importance.

Other improvements to be expected might be: the climatic adaptation of tropical trees to the southern United States or the adaptation of a normal mesophytic tree to a more xerophytic habitat; the selection of trees bearing more bird's-eye, burled, or curly wood and trees bearing wood adapted to special uses such as the willow hybrid in England (2), which is used exclusively for cricket bats and thereby commands an almost fabulous price when compared to the average willow; the breeding of quality and quantity producing strains of the various nut bearing species; and the development of strains which yield larger amounts of oleoresins, heptanes, terpenes, pitch, balsam and cedar oils, tannin, and so on. From the genetics standpoint

these improvements are normal expectations when controlled breeding principles are applied.

For the benefit of those readers not acquainted with genetic terminology, a few terms to be used in this paper are defined. A *cross* or *hybrid* is the term referring to the progeny from seed developed by the fertilization of the ovule of one individual with pollen from another individual. Usually this is a cross of two individuals having marked differences.

In chemistry every substance has a formula which gives the initiate the clue to the make-up of that substance. Likewise in genetics the constitution of any individual is denoted by a formula. However, for every character that is expressed in a plant's formula, a pair of symbols is used. This is to show the part of the plant contributed by the female parent as well as the portion contributed by the male parent at the time of fertilization. These parts are the *genes* that are borne on the different chromosomes, and these genes are the so far unknown somethings which cause the expression of various characters in the plant such as: type of growth, thickness of bark, presence of chlorophyl or other color pigments, etc. Often the two members of a pair of genes do not carry the same potentiality. They both condition the expression of a particular character in the plant, but they may tend to cause different forms of expression.

If both of a pair of genes in an individual are of the same kind, the tree is said to be *homozygous* for the pair. However, if the genes are different, then the tree is said to be *heterozygous*. It is in this heterozygous condition that the term *hybrid* is usually applied in a genetic sense.

Increased growth of trees through breeding will very probably come as a result of *hybrid vigor*. Theoretically, this is the enhanced growth rate following the crossing of two individuals which are not carrying all the same homozygous pairs of genes. Ordinarly, a more uniform degree of hybrid vigor comes from the crossing of homozygous individuals than from the crossing of heterozygous individuals. Homozygous individuals come from self fertilization rather than from cross fertilization. This fact will make it difficult to get homozygous individuals among the forest trees. Usually, at least four generations of self fertilizing a normally cross fertilized species is necessary to produce any appreciable degree of homozygosity. While this is apparently futile in forest breeding owing to the length of generation, it will have to be done eventually to make maximum improvement. For this reason some of this type of work should be started very soon.

In the meantime, however, taking shots in the dark will do no harm and may accomplish enough improvement to keep pro-

ducers of forest products in the game of competition with synthetic products. One of the easiest and quickest tests would be the controlled crossing of large numbers of individuals. By controlling the crosses, records can be kept of the parents of each individual cross so that whenever a desirable cross is found, more seed can be produced from the same source.

From three to five year nursery tests of the seeds procured in this way would be sufficient to locate the more vigorous growing progenies, after which more seed could be produced from the same parents. This experiment might be expected to give particularly good results if the pollen parent could be chosen from small stands which are isolated one-half a mile from other stands of the same species and which are fairly uniform for rate of growth. This isolation and uniformity in a second growth stand would tend to indicate that those trees were more homozygous, provided the stand is not too thickly planted and the conditions of growth have been uniform throughout the stand.

A gradual selection of better individuals from the progeny tests of these crosses will give some degree of improvement until more useful homozygous strains can be developed for future breeding. Methods similar to the selection of cattle breeders can be used with the additional advantage that a vegetative reproduction technique can be worked out for many trees whenever particularly desirable individuals appear. Selection methods will need to be used cautiously; for, in many instances, an apparently desirable individual will be heterozygous in genetic makeup and therefore not a prepotent parent. The reasons for this are too technical to be presented here. Because of this a technique of vegetative reproduction to propagate a desirable individual needs to be developed. Then, too, good progeny of a desirable cross may be propagated vegetatively more economically and satisfactorily if this particular cross is difficult to make.

Vegetative propagation methods which have been used successfully with forest trees include propagation by: cuttings, layerage and various types of grafting. Henry states (10) that the elm grown universally in Holland and Belgium is propagated by layerage and has been reproduced this way for two or three centuries. He also mentions the propagation of the famous Lucombe oak by grafting as having been used successfully since its discovery in 1765. The cricket bat willow has been propagated by sets or cuttings, and a vigorous hybrid poplar at Metz has also been multiplied by cuttings from this original tree. Henry has propagated walnuts successfully by grafting. The renowned Huntingdon elm has been reproduced by cuttings, according to the same author (12).

Austin (1) is working on methods of propagating pines and walnuts, and Hartley (9) reports that the Boyce Thompson Institute for Plant Research and Johns Hopkins University are carrying on research on vegetative propagation of forest trees. Stout *et al* reports (18) successful propogation of numerous *Populus* species crosses by cuttings at the New York Botanical Garden.

With this work already done it seems very probable that other trees can be propagated vegetatively if the proper method is found. From our present knowledge there is nothing impossible standing in the way of developing this technique.

The random crosses previously discussed should produce desirable results because, in the first place, occasional natural crosses have been noted in trees which were outstanding in rapidity of growth, healthiness and general vigor, and, in the second place, crosses of various species and strains made recently have shown remarkable hybrid vigor. The oldest recorded natural cross of trees (10) is that of the elm grown in Holland and Belgium. It has been continued by vegetative propagation since its discovery almost three centuries ago. It is prized for its type of growth and foliage color, which make it a popular shade tree in those countries. It has been named *Ulmus latifolia* Poederlé. Seedling tests have shown it to be a hybrid tree.

Another old hybrid is the Lucombe oak (10) discovered in an English nursery in 1765. Seedling tests of the acorns from this tree were planted in 1792, and this oak was found to be a cross of the Turkey oak, *Quercus cerris,* and the cork oak, *Q. suber.*

Henry (10) also lists the London plane tree, *Platanus acerifolia* W., as a hybrid of the European and American species of sycamore. This tree is a favorite for city planting because of vigor, drouth resistance, and resistance to a fungus commonly found on the American sycamore, *P. occidentalis.*

The cricket bat willow is considered by Barker (2) to be one of the most valuable crops which can be grown in England on otherwise unproductive ground. Henry (10) records the instance of one cricket bat willow that at 55 years was 101 feet tall and 18 feet in girth. He further states that these usually grow to be 50 to 60 feet tall and 3½ to 4 feet in girth at 14 or 15 years from the planting of sets.

Henry (10) cites a hybrid poplar near Metz which at 81 years measured 150 feet in height and 25 feet in girth 5 feet from the ground. A cutting from this tree measured at 43 years was 140 feet tall and 16 feet in girth and contained about 700 cubic feet of timber.

In an earlier paper Henry (12) mentions the Huntingdon elm growing in Victoria Park, Bath, England. It was twice as

large as 40 other kinds of elms growing in the park. A cutting from this tree grew to a height of 35 feet in 10 years. From progeny tests the parents of this hybrid tree have been determined as *Ulmus glabra* and *U. montana.*

A hybrid catalpa, supposedly a natural cross of *Catalpa kaempferi* and *C. bignonioides,* was found by J. C. Teas while he was living in Indiana in 1864. In Jones' report of this (13) it is described as an erect, vigorous and rapid-growing tree having the thin scaly bark of the American species and leaves and inflorescence much larger than either of its parents. The fruits are described as intermediate in size between the fruits of the parents.

Chapman (5) reports the finding of a natural hybrid between the longleaf pine, *Pinus palustris,* and loblolly pine, *P. taeda,* in Louisiana. After nine years' growth the hybrid was compared with a typical longleaf pine. The hybrid was 13 feet 4 inches tall and 2.3 inches in diameter inside the bark one foot above the ground, while the longleaf was 2 feet 11 inches tall and only 0.6 inches in diameter.

A walnut tree, called the James River walnut, is cited by Bisset (4). It appears to be a hybrid of *Juglans cinerea* and *J. regia.* In 1914 it measured 100 feet tall with a diameter of 10 feet B. H., and a spread of 134 feet.

Leopold and Luxford (15) found an interesting variation in redwoods in California which may not, however, be due to hybrid vigor of the one tree. They found two trees growing three feet apart which were about 60 years old and 120 feet high. One was 21 inches D. B. H., crooked, thick barked, and clear of dead limbs only in the first log; while the other was 15½ inches D. B. H., straight, thin barked, and clear of dead limbs for three logs. The latter is putting on clear lumber now, but the first is not expected to do this for another decade. Leopold and Luxford estimate that a 60-year-old stand of the second type is worth about twice that of the first type.

The earliest known attempts to artificially cross fertilize forest trees were made by Klotzsch (14). In 1845 he crossed four pairs of species: *Pinus austriaca* and *P. sylvestris, Quercus pedunculata* and *Q. sessiliflora, Alnus incana* and *A. glutinosa,* and *Ulnus nitens* and *U. pedunculata.* Seeds of these crosses were grown with seeds of both parents. Eight years later the hybrids averaged ⅓ taller than the parents. From these results Klotzsch claims that rapidity of growth and durability of timber can be augmented by hybridization.

In 1921 Burbank (20) crossed the English walnut with the California black walnut and planted six of these crosses in front of his house. Three had to be cut down later because of crowd-

ing due to rapid growth. De Vries visited Burbank in 1906 and reports that the three remaining trees were 80 feet tall and 2 feet in diameter. Sections of the cut trees were shown to De Vries and he notes that the wood was of a fine grain, very compact, and of silky appearance. The annual layers measured 2 inches in thickness. Further recrossing of these trees improved the quality, and selection produced a wide variety of hard and soft, coarse and fine, plain and beautifully marked, and straight and wavy grains.

In 1911, Dr. E. M. East (13) of the Connecticut Agricultural Experiment Station crossed two species of catalpa, *Catalpa kaempferi* and *C. bignonioides*. Seven-year-old progenies of this cross were 13.1 feet tall, while the parent, *C. bignonioides*, was 11.4 feet and the other parent, *C. kaempferi,* was only 9.1 feet tall. The variation in spread was in the same proportions. Ness (16) in reporting hybrids of the live oak and overcup oak, comments upon the ease of crossing various species of oak and the remarkable success of the crosses. Seven progeny of the above cross growing at the Texas Agricultural Experiment Station are reported in 1918 as being very vigorous and uniform, although no definite comparisons are made to the parent trees. Three of these were planted in 1912 and 4 were planted in 1913.

Some interesting facts about hybrid chestnuts have been noted by Detlefson and Ruth (7). In 1899, G. W. Endicott of Illinois crossed *Castanea japonica* by *C. americana*. Three trees were raised from the seed of this cross. One bore fruit in 17 months from date of planting, a second bore fruit in 4 years, and the third bore in 5 years. The Japanese chestnut normally bears at about 6 years and the American species at about 12 years. This early maturity is another common occurrence among hybrids.

Henry concludes (11) from a number of crossing experiments that hybridization increases growth rate, size, early and free flowering, ease of multiplication, and probably disease resistance or immunity. Henry's work is of especial interest because he used such a wide range of materials. His first work was on elms (12). He found that alternate and opposite leaf arrangement was inherited and was fairly sure that variations in leaf size were inherited. He used crosses of *Ulmus montana* and *U. glabra* because the seedlings of these two parents were uniform in many respects and were therefore assumed to be fairly homozygous. From self fertilized progeny of these crosses, he reports finding about 64 distinct types of individuals.

From 1909 to 1914 he made a great many crosses of various species and attempted some generic crosses. His successful crosses included species crosses of ash, alder, poplar, larch, wal-

nut, and elm. He found walnut and elm crosses difficult to make, but in all successful crosses hybrid vigor was found. A seedling of one of these crosses, *Populus angulata* ♀ x *P. trichocarpa* ♂, grew to a height of 7½ feet in 27 months from seeding. One of the most interesting crosses reported (10) in this series of experiments was a cross of *Fraxinus excelsior* var. *pendula* ♀ x *F. angustifolia* ♂. The pollen of the male parent was shed in England in January and the female parent did not bloom until April. The pollen was stored in glass vials stoppered with either corks or cotton, and the cross was made successfully in April. Henry also reports successful crosses from pollen shipped to him in England from Spain, France, Portugal, and the United States.

Another interesting observation which he made was that rapid growth of some hybrids improved the quality of wood. He says, "It is a popular belief that fast-grown timber is necessarily soft and comparatively worthless. This is a fact in most conifers; but in one class of broad leaf trees, the wood of which is characterized by large pores in the inner part of the annual ring, the contrary is true, as the faster the timber of these trees is grown the stronger and denser it becomes. This class includes oak, ash, chestnut, hickory, and walnut, the species in fact that *par excellence* produce the most valuable timber."

Van Fleet reported (19) finding a hybrid chestnut which produced flowers and burs 23 months from seeding. This was a hybrid of the native American chinquapin and the Japanese chestnut. The nuts from this hybrid are from four to six times as large as the native chinquapin, ripen earlier in the season, and have the flavor of the native varieties; while the tree itself has a resistance to blight equal to the Japanese parent.

This group of reviews gives some idea of what has been attempted and accomplished in past work on hybrid vigor. Only two projects have been reported recently on work that is being done at present on this subject. Stout *et al* are carrying on a cooperative project under the auspices of Columbia University, the Oxford Paper Co., and the New York Botanical Garden. Inbreeding and hybridization of a number of poplar species are being performed in the effort to locate a rapid growing poplar tree suitable for the pulpwood industry. They report (18) a hybrid of *Populus alba* and *P. tremula davidiana* which grew 7 feet by the second summer from seed. A hybrid of *P. balsamifera virginiana* and *P. trichocarpa* grew 6½ feet by the second summer from seed.

A very interesting project is being carried on by the Eddy Tree Breeding Station in California. All of the known species, races, and geographical strains of pine are being collected and studied. Selection and breeding methods have been outlined for

the improvement of various pine characters. As a sideline to this work another project on walnut (*Juglans sp.*) species has been started. The preliminary write-up and outline of methods used has been reported by Austin (1).

The other important character in tree breeding, disease and insect resistance, has been the goal of recent workers. Bates (3) cites the occurrence of the Cembran pine as being resistant to blister rust. Roeser (17) cites the Dunkeld larch, a natural hybrid of the Japanese larch, *Larix leptolepis*, and the European larch, *L. europeae*, which is a vigorous grower and resistant to larch canker. He also mentions the cross of Virginia chinquapin *Castanea pumila*, and Japanese chestnut, *C. crenata*, which produces a strain resistant to chestnut blight.

Hartley (9) gives a summary of the variations which have been found in forest trees and also a detailed outline of one project to determine disease resistance. He believes that surveys should be made immediately in an effort to locate individual trees which are resistant to chestnut blight, sycamore anthracnose, poplar cankers, and white pine blister rust.

The only work reported recently on resistance to insect injury is that of Graham and Baumhofer (8). They tested the five species of pine—Western yellow, Norway, Jack, Scotch and Austrian—for susceptibility to tip moth injury in the Nebraska National Forest. Austrian pine was found to be the least susceptible, followed by Scotch, Jack, Norway and Western yellow in increasing order of susceptibility. For that region, however, Western yellow pine is the most desirable species, and selection and breeding are recommended to locate a resistant strain of Western yellow pine.

A few surveys have been made recently on some other characacters which might be worth studying from a genetic standpoint. Luxford (15), in making a survey of redwoods, found striking differences in durability, paintability, strength, tendency to spiral, thickness of bark, and ease of pruning. The indications were that at least the last four were due to hereditary causes. Pillow (15) noted interesting variations in amount of curl in walnut. These variations in both radial and tangential curl could be detected by cutting a small blaze in the inner bark. Surveys are under way determining differences in heptane yields in Jeffrey pine, terpene yields in Western yellow pine, and oleoresin yields of the pine species found in the South. Pillow and Bates (15) have started work on the breeding of bird's-eye maple, but no definite report is available as yet.

These ideas should give the reader some concept of the practicability of making use of genetics in forestry. The ideas expressed have been selected at random from recent work, and it

should not be forgotten that these are the surface scrapings. This is a virgin field for foresters and can hardly fail to produce satifying results when tackled in earnest.

Quotations from two of the present workers in this field give a clear idea of the attitude being taken and form a good conclusion for this paper, which can do no more than introduce the subject. Coville (6) states, "Intelligent breeding *plus* selection would probably accomplish or exceed the results of pure selection and do it in a shorter period of time."

Leopold (15) says that research should be instituted at once, but the practical side need not be neglected because "in the first place, the final untangling of environmental from genetic influences in trees is very far ahead," and "secondly, while certainty is very far ahead, probability is, at least with some characters, merely a matter of observation as seems to be indicated in the case of redwood."

There is a real challenge in these quotations to all foresters. How long will it be before they, as a group, realize the significance?

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Mapping of Forest Soils

HAROLD F. SCHOLZ

Junior Forester, Lake States Forest Experiment Station

THE variability of soil profiles[1] causes difficulty in the preparation of a soils map for forestry purposes. The differences from profile to profile are apt to bewilder the beginner unless he understands the reasons for them. A very nice example of this class of soils problem was encountered about a year ago in the subdivision of the Dukes Experimental Forest of the Lake States Forest Experiment Station.

This forest is located near Marquette, Michigan, and is in the so-called Podsol soil zone of the United States. "Podsol" is a Russian word meaning ash-like, and is a term applied to a certain group of soils in cool, moist climates which have a white or gray layer in the upper part of the profile. This white or gray horizon is more or less characteristic of soils in temperate regions where precipitation is greater than evaporation, resulting in a downward percolation of much ground water and the translocation of soluble minerals from the upper soil layers to lower ones. The white or gray horizon is insoluble quartz sand and hence its color. It should be explained, however, that all podsol soils do not have a light colored upper horizon.

Although the Dukes Experimental Forest is located in a zone of well-developed podsol, there are several soil types found on the area. In some cases these types are variations of true podsol, and in others distinctly separate from it. Since the correctness and usefulness of the forest subdivision depended upon the general accuracy of the soil map, it was necessary to determine the cause and the limits of the variations not only between different soil types but also within the same one.

Field investigations showed that the variability of the soil profile is quite often traceable to local climate, which, in most cases, means differences in topography, less commonly to the differences in the mineral constitutents of the soil or to the effect of the forest vegetation. This information furnished the starting place for the division of the area into soil types. Random lines were run through the woods so as to separate the hills from the creek bottoms, the swamps from the flats, etc. In

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[1] "By the term profile is designated everything that is presented to the eye of the observer in a vertical cut through the soil exposing its various horizons." (From C. F. Marbut's translation of "The Great Soil Groups of the World and Their Development," from the German. 1927)

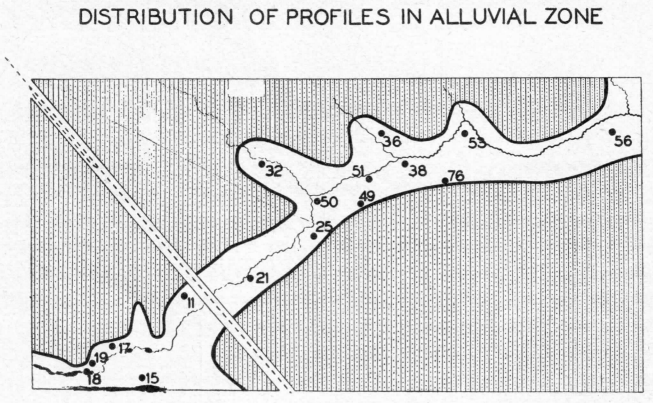

Figure 1. Distribution of soil profiles in the Alluvial Zone (unshaded area). Virgin forest portion of the Upper Peninsula Experiment Forest, Dukes, Michigan.

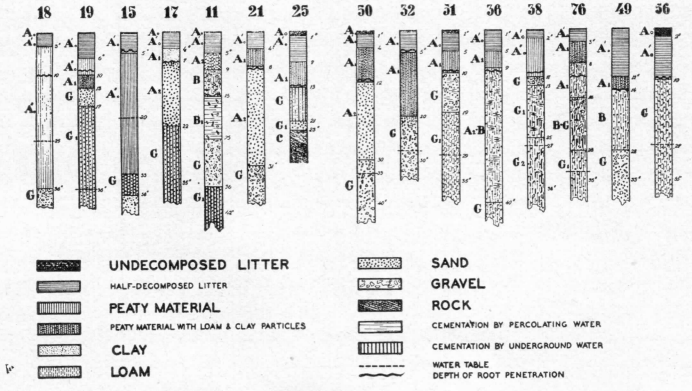

Figure 2. Variations in the physical-chemical character of the Alluvial Zone.

other words, the initial step in the preparation of a soils map for forest management consisted of subdividing the topography. Once this had been done the problem was to determine whether the same soil type occurred in areas having similar topography.

Observations demonstrated that areas having essentially the same topography were not always characterized by the same soil type. Thus, DARK FOREST SOIL, a podsol with a well-developed gray horizon, and PODSOL with a gray or white leached upper layer both occurred in the upland portions of the forest. Similarly, two types of WOODY PEAT were mapped in the swamps. One type was characterized by WOODY PEAT resting directly upon glacial till. The other was underlain by older deposits of fibrous remains of plants (FIBROUS PEAT). A comparison of typical profiles for DARK FOREST SOIL, PODSOL, and WOODY PEAT showed striking dissimilarities. In contrast, a comparison of a series of profiles for any one of the three brought out the lack of striking variations. It was of interest to discover that the average height of dominant sugar maple trees growing upon PODSOL with a pronounced gray layer was from 8 to 10 feet less than for trees growing upon DARK FOREST SOIL.

A real problem was encountered when an attempt was made to map the soils in the part of the forest occupying creek valleys and flats. Here it was found that profiles varied greatly within relatively short distances. The task of mapping these areas became one of grouping soils with similar but not identical profiles.

No better illustration of the variation of soil profiles within the same topographic unit can be had than in the so-called Alluvial Zone of the Dukes Forest (Figure 1). This zone occupies an area which is seasonally flooded by the large creek draining it and is characterized by a year-round high-water table.

A series of profiles were dug along this narrow flood plain and such features as the depth of humus layers, the color, texture, and structure of the mineral horizons, root penetration of trees, height of water table, and character of the unweathered substrata were noted. The lack of uniformity of the profiles raised the question of how the differences between them should be indicated on the soil map. It was apparent that all the variations could not be shown unless a map was drawn having about the same scale as the ground itself. As a matter of fact, the entire Alluvial Zone was mapped as PEATY CLAY or MUCK. The justification for this typing will be made clear by an analysis of the conditions attending the formation of PEATY CLAY soils.

In the first place, field examinations revealed that MUCK or PEATY CLAY soils occupy the low, poorly drained portions of the experimental forest, such as sunken plains, basins, and valleys. Using this information as a starting place, several other

fundamental facts were evolved. It was found, for example, that the composition of the parent substrata played a very small part in the development of PEATY CLAY soils which were primarily a result of excessive moisture conditions. Similarly, by the comparison of numerous profile descriptions, it was demonstrated that most of the PEATY CLAY soils of the forest were characterized by a half-organic-half-inorganic A_1[2] horizon of always moist, steel, or bluish gray admixture of peat and clay particles. This peculiarity served as the basis for the name of the soil. It was also interesting to note that PEATY CLAY soils of the experimental tract were formed either upon morainic substratus or upon pure alluvial sand, although in one case PEATY CLAY soil was found resting upon bedrock or calcareous sandstone. This profile could be distinguished as a definite morphological variation of ordinary MUCK by the presence of much calcium in all mineral horizons which reacted violently with hydrochloric acid when the soil was in a dry condition.

Insofar that the Alluvial Zone of the Dukes Forest occupied a low, poorly drained valley and many of the profiles dug within its limits answered the description of typical PEATY CLAY soils, it was decided to map the entire area as a single soil type providing the presence of small areas of other soil types could be made to fit into the classification scheme. This necessitated proof of the genetic relationship of the various profiles dug in the Alluvial Belt.

The justification for grouping all the soils of the Alluvial Zone into a single type is found in the basic similarities of profiles (Figure 2).

Take, for example, the depth of superficial dead organic or A_0 horizons. One profile (Profile 76) has a humus layer aggregating 3 inches; three more (Profiles 17, 21, and 50) each have a total accumulation of 4 inches of humus; another four (Profiles 11, 32, 36, and 51) an A_0 5 inches deep; and finally, another set of five (Profiles 19, 25, 38, 49, and 56) approach the realm of true peats in that they have superficial dead organic horizons varying from 7 to 11 inches in thickness. The extremes in the

[2] One of the more conventional systems of describing the various layers or horizons of the soil profile is their designation by letters. A common method is to letter the horizons A, B, and C. As used here, superficial dead organic horizons are referred to as the A_0; horizons in which there is an admixture of organic and inorganic particles, the A_1; and the white or gray leached horizon of a PODSOL profile, the A_2. The B horizons of a PODSOL soil are those in which the materials leached out from the upper layers by either chemical or physical processes are redeposited. They are designated here by the letters B and B_1, depending upon their depth, color, structure, and texture. Unweathered substrata are symbolized by the letter C. Horizons formed by the seasonal fluctuations of the water table are indicated by the letters G, G_1, and G_2. The morphology of these horizons is explained in the text.

progressive deepening of the humus horizons are seen in Profiles 15 and 18, which represent true peats in which organic remains of plants and trees have piled up to a depth of 33 and 36 inches respectively. All other profiles (Figure 2) fall somewhere between these two in regard to depth of the A_0 layers. Here, then, is a common characteristic of all the profiles of the Alluvial belt which serves to assign them to a single group. The correctness of this grouping becomes obvious when the cause for the accumulation of humus is sought and found to be slow decomposition under the conditions of excessive moisture.

By continuing this analysis other fundamental qualities of MUCK soils may be accounted for. It is stated, for instance, that the PEATY CLAY soils of the forest are underlain by substrata of either glacial till, alluvial sand, or bed rock. Each of the fifteen profiles under discussion (Figure 2) fall into one of these three groups. It is also stated that true PEATY CLAY soils usually are characterized by a well-defined plastic, moist, half-organic-half-inorganic, steel, or bluish gray A_1 horizon. Ten out of a total of fifteen profiles in the Alluvial Zone meet this requirement. Three of those which do not are distinctively separate from MUCK soil genetically, two being WOODY PEAT and the third SWAMPY PODSOL. The remaining two are the exceptions which disprove the rule, both answering all the requirements of MUCK excepting the physical-chemical nature of the A_1 horizon.

The final and most complete argument for mapping the soils of the Alluvial belt as a single type can be traced to the so-called "Glei" horizons. Glei is another term borrowed from Russian soil science.

Glei horizons are formed by the rise and fall of the water table in semi-swampy areas. The relative height of the water table in these areas depends upon the season of the year. After rainy spells, it is near the surface (depth of root penetration as shown in Figure 2 marks the upper limits). During the drier seasons of the year, on the other hand, the water table falls and more normal moisture conditions prevail. These seasonal trends, going on year after year, result in a definite morphology of the soil. Morphologically, these variations assume different forms. Sometimes clay and silt particles are carried up by the water at its highest ebb and precipitated upon its recession during the drier seasons. A layer of almost pure clay is formed in this way. In other cases, the movement of the water table results in a concentration of mineral salts which sometimes causes the soil separates to cement into a hardpan mass. Again, the horizons may be characterized by numerous rust-red, brownish, greenish, and bluish flakes or agglutinations, colors, commonly found in soils of insufficient aeration, resulting in reduction pro-

cesses and the formation of ferrous instead of the more usual ferric compounds. Profile 51 illustrates this point.

Profile 51. PEATY CLAY soil formed upon a substratum of morainic drift. The forest stand consists of an admixture of northern white cedar, yellow birch, and balsam fir.

A^1_0—1.0 inch of undecomposed leaves and litter.

A^2_0—4.0 inches of half-decomposed, dark brown organic matter having a granular structure.

A_1—5.0 inches of plastic reddish-gray, sometimes steel or bluish half-organic-half-inorganic clayey horizon. Always moist.

G_1—9.0 inches of compact yellowish loamy sand containing gravel. Clay particles are present. Painted black with humus compounds. In some places reddish, brownish, or greenish agglutinations can be seen. Wet.

G_2—17.0 inches of slightly compacted loamy sand. Water table at depth of 29 inches.

Without a single exception, all of the profiles (Figure 2) of the Alluvial Zone are characterized by one or more G horizons and are, therefore, morphological variations of Glei soils. Consequently, these profiles may be included within the same soil type without any great transgression of the basic fundamentals of separating soils into groups of closely related genetic types.

Before passing over the technical discussion of the soils of the Alluvial Zone, it should be pointed out that the A_2 horizon of Profiles 17, 21, and 50 is not the white or gray layer of a Podsol Profile but is instead the first strictly mineral horizon of the genetically undeveloped profile of alluvial sand. In the way of a general summary the following thing may be said of the soils of the Alluvial Belt.

PEATY CLAY soil very rarely occupies a large, contiguous area, but, as a rule, its, distribution is broken by island-like formations of SWAMPY PODSOL[3] or WOODY PEAT, resulting from small changes in relief and drainage. The Alluvial Zone of the virgin forest portion of the Dukes Experimental Foret serves as a concrete illustration of this variability. Upon the basis of the distribution of the soil profiles in this zone and the variability which these profiles show, it is possible to say that: (1) PEATY CLAY soil formed upon pure alluvial sand occupies low places along the banks of the watercourses, and

[3] Sometimes PODSOL soil is found in areas of insufficient drainage. This soil is like ordinary PODSOL in that it has a gray leached A_2 layer, but differs from it by the presence of water-formed or Glei horizons in the lower part of the profile. A soil of this general description is referred to here as SWAMPY PODSOL.

usually confines itself to a narrow strip, at the most not more than 100 to 150 feet wide. (2) PEATY CLAY soil formed upon skeleton glacial drift covers about three-fourths of the total area in places of insufficient drainage. (3) WOODY PEAT forms tongues or small lakes in those places where drainage is completely absent. (4) SWAMPY PODSOL replaces PEATY CLAY soil upon raised, island-like hummocks formed from the accumulation of morainic drift. (5) The abnormal depth of the superficial dead organic layer and the presence of Glei horizons is a common feature of all the soils in the belt. (6) In ten cases out of a total of twelve MUCK soil was identified by the similarity of the A_1 horizon.

Due to the variations in soil, the forest types upon PEATY CLAY also vary widely from almost pure hardwoods, hardwood to mixed coniferous stands of northern white cedar, black spruce, and balsam fir. In those places where there is a constant movement of the water table, as along streams, most tree species are replaced by alder.

The thick layer of water-logged organic and half-organic-half inorganic material forming the A_0 and A_1 horizons of PEATY CLAY soil discourages the establishment of natural reproduction of the more valuable upland tree species, such as sugar maple, and prevents rapid growth of all species.

A a general rule, these soils support an abundance of water-loving vegetation.

There is, perhaps, no other problem in forest research that is quite so fascinating as the study of soil and its relation to the growth and composition of the forest. The charm of the work lies in the intricacy of the thing itself. It is not always so easy to fit a puzzle together piece by piece, but usually it can be done and the unassembled units always remain as an open challenge to the man with an investigative type of mind. Therein lies the magnetic appeal of the study and classification of the soil.[4]

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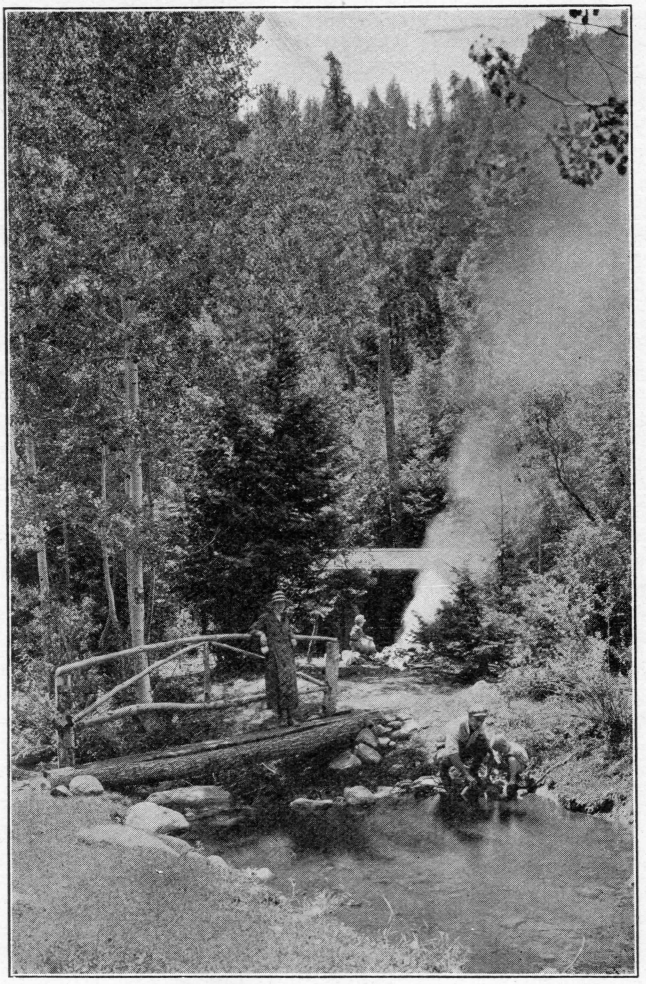
[4] The writer owes much to Dr. S. A. Wilde who supervised the field work and the preparation of the manuscript from which this article was prepared.



The Forest Ranger

DE WITT NELSON

Assistant Supervisor Shasta Nat'l Forest

"HUNT, Fish and Trap." Who invented that wheeze? Some quack forestry teacher trying to get rich by misrepresenting a great profession and a great Service. I'd like to have that man on a ranger district for one season. He'd forget about hunting, fishing and trapping, and take to rubbing liniment on his sore muscles and change his tune to a true description of the job.

The forest ranger's job is one of the most interesting, most versatile and most constructive positions to be found today.

He must manage a district made up of from two to five hundred thousand acres of natural resources. To accomplish this, he must be able to withstand hardship and exposure. He must be able to handle men, for during the summer his force is made up of from ten to twenty-five guards, lookouts, road and trail men, and during fire emergencies he may have to organize and handle as many as five hundred fire fighters working on a fire front of many miles. All of this requires executive ability.

He must be able to lay out, construct, and maintain telephone lines, roads, trails, bridges and buildings. This requires engineering ability. He must have a knowledge of silviculture to make and supervise timber sales. He may be required to determine the type of management on a sheep or cattle range, or settle a dispute between stockmen where judgment and experience are necessary for the best interest of the public.

He is often required to lay out a recreational area of summer home sites and public camp grounds, always bearing in mind the Forest Service policy of "The most good to the most people in the long run."

Each of the above mentioned jobs requires skill and a great diversity of knowledge which can be gained only through training, experience and hard work.

The work of a ranger is divided into five main classes:

1. Improvement.—Under this heading are the construction and maintenance of roads and trails. After determining the projects to be worked during a given year by their priorities, the ranger must survey the routes to be taken and supervise the work. There is always a foreman in charge of each crew who is responsible to the ranger for the quality and quantity of work done and value received per dollar expended. On forests having large road programs there is often an assistant supervisor who relieves the ranger of road construction work.

Each ranger district has its own communication system, which may consist of several hundred miles of telephone lines. Each spring these must be gone over and put into standard condition for the ensuing fire season.

The ranger is also responsible for the construction and maintenance of ranger quarters, lookout and guard buildings. In connection with this and all other work he must keep a system of accounts so that all of his money is spent effectively and no allotments are overdrawn.

2. Timber Management.—The ranger handles all small sales within his district. Large sales are usually handled by project timber sale men. Small sales must be so located that they will not interfere with future timber management plans and large major sales. He must survey, map and cruise the area, mark the trees to be cut, scale the timber and supervise the logging and brush disposal.

3. Range Management.—Every ranger district is divided into a number of range allotments, depending on the type of feed, the period of use and topography. The ranger must see that the proper class of stock, seasonal use and method of feeding is adhered to by the grazing permittees. In this he is usually assisted by some member of the supervisor's staff.

4. Recreation.—Each year thousands of vacationists visit the forests of California. One of the ranger's big jobs is to contact as many of these as possible and sell them forestry and fire protection. These recreationists constitute one of our greatest fire risks, but by proper contacts they can be made an asset instead of a liability to the forests.

In order to handle the needs of the summer pleasure seekers the forests develop free public camp grounds for their use and enjoyment. Summer home sites are also laid out for those who wish to build and return to the same spot each year. These home sites are rented at a nominal figure per year.

5. Protection.—Protection is the greatest problem of forestry today. It involves the coordination of practically all activities and consumes the major portion of the ranger's time. Each year he carries on a fire prevention campaign within his district, enlists the cooperation of industrial and civic organizatons, fire proofs camp grounds and burns brush and snags along roads, trails, ridges and other natural fire breaks. His transportation and communication systems are vitally important factors in the effectiveness of his own work and that of his personnel. His men must be so located as to cover the areas of high risk and hazard in a minimum length of time.

He must build about himself a personnel of dependable and physically fit men to man his various stations. Upon these men he usually has to depend for the initial action on a fire, therefore they must be thoroughly trained in modern ways and

means of fire prevention and suppression. This training must be followed up by monthly inspections and additional training and all unsatisfactory men culled out. The failure of any one of them may mean the difference between a one-acre fire and a conflagration of thousands of acres.

Fire carries priority over all other activities. No matter what a ranger might be doing when a fire is reported it goes by the board until the fire is out. Every fire presents a different problem and therefore requires keen judgment and knowledge of fire strategy in order to control it with a minimum loss of acreage and cost.

Often, a forest ranger is required to live in remote places far from the glare of bright lights and the convenience of what we call "civilization." This has its compensating factors. However situated, he always has plenty of interesting work to do. He is usually looked upon as a leader in local activities and plays a big part in the life of his district, other than purely official. Rangers have been known to do everything from helping with Christmas celebrations to conducting a funeral. But when all is said and done, very little time is left to "Hunt, Fish and Trap."

After passing the junior forester examination most men are placed on project timber sale work or as assistant rangers on a district, under a year's probationary appointment. At the end of this period they are either retained or removed from the Service. A man's future in the Service depends upon his ability, his judgment, his decisiveness, his initiative and other personal traits. To a man suited for the work and liking it, the Forest Service holds unlimited opportunities for a life rich in experience, usefulness and fine fellowship.

It is hard work—with worthwhile results. It is often grief—with compensating joys. It is glamour—romance, intangible as tomorrow, but as surely there. It is a knowledge of service well done— this preservation of the Forests of Today and Tomorrow.

Dear Unanimous

By SAM BATTELL

Muskrat Creek, Idaho,
July third.

My dear Unanimous:

I got your letter about two weeks ago but since you wanted something you could read I hesitated to answer it until I could get the assistance of Mr. Underwood. As the fella says, "Why don't you get a typewriter so we can interpret your effort?"

I have been having a wonderful time. First I was repairing and rehanging telephone line, then I took a small trail crew out and ran them about three weeks until the regular boss got in, after that I took a pack string out and have been doing office duty the last week. Then the end of the fiscal year came around and you have to have a good head in the office at least once in a while. Had $6.33 yet to spend and it took two days to figure where to use it.

I'm going back to Two Mouth some time today, if it stops raining. Last night I wanted to go to town to celebrate but a lightning storm was forecasted so Uncle says you better stick, so I done it. All that I could have done was get a little tight. A dance was being thrown but all that I have is corked boots and I couldn't have got within gunshot of the floor.

I'm getting to be quite a timber beast. Wear a hickory shirt, copper riveted pants, wide belt, black galluses, corked boots, heavy wool sox, pants turned up 10 in. above the sidewalk, a little black Garibaldi hat and a short black pipe. You would not suspect me of being the Pride of Onawa.

Wish you were here. We have a pool here quite unlike the college pool. You can take a light into it, don't have to use a case knife or spatula to pick the lock, don't have to let a man down from the balcony on the soft end of a belt to enter or anything. It is about 25 miles long and 6 or 8 miles wide in places. The office assistant has a wife which cramps the style of us back to nature swimmers. They went for a boat ride last night so we dove off the dock and got all wet.

Guess I'll ring off.

Horatio.

* * *

Muskrat Creek, Idaho,
August third.

Dear Anny:

Reference is made to your letter of July 25. I wish I could master the art of writing a long letter without saying anything

like you have. Don't think I'll get out of this country till Christmas. I think I can get a job with Uncle as a scaler or something to keep me busy.

To correct some false impressions, I am a Smoke Chaser. My specialty is hitting brush and hopping hills in quest of that devastating smokemaker, Fire. This summer I have been trail crew foreman, packer, boatman (but not vulgar), office fellow and so forth—ad infinitum.

I also go out and string the lady visitors along when they stay in the boat while the high and mighty males come ashore to transact business and other things. The packer says, "Ray, why in Hell do you stay out here in the sticks? Why don't you go to town where you can exercise that talent?" You see I took his girl away from him. I love me, I love me, not?

I got set back the other day tho. An elderly lady says, "It's such a nice outing for you boys."

I bought me a pack frame to take the sharp corners off the cans when I run the hills. Even the three days rations gets as rough as a true forester's whiskers. Also I now have a smokechaser's saw. It is only good when another man is along because it's a two man falling fake. It is a regular 5 ft. saw that rolls up into a bundle 18 in. across, has wood handles and a heavy leather case to carry it in.

Oh, yes, I almost forgot. The other day I was expecting a sudden and violent death. You see her old man is mean with a shotgun. I brought her over here, put two outboards on the back of a skiff, got out the surf board and we went aquaplaning. It was almost supper time when we took the girls home. As they were in bathing suits it looked bad I suppose, walking in at supper and at a hotel. Anyway after supper she went for a walk and the first I heard, the cook, who is also young, though married and awaiting divorce, called up and wanted to know if the young lady had been here. Then she wanted to know if any of the boys were out. Of course we were all innocent, so we took a few pictures of a lightning storm, answered the phone and then went to bed. The next morning when the boat went up there was the old man, looking like he wanted a pint of blood. He didn't get any from me.

I wish you were here. We could more than double the profits with half the ante. Every time I even think of doing something I say to myself, "I wish the Perfect Gentleman was here." Of course I would be reduced to second fiddle but it would be worth it. I could manage. I have before. (Editor.—Unanimous claims the above is ficticious, deceptive, false, exaggerated, extravagant and defamation of character.)

At that I'm not doing so badly. This girl's mother over at the hotel wanted me canned because I couldn't find the boat they were on one Sunday and they had to go hungry all day. The

next Saturday night they threw a birthday party over there and at the close of the festivities, no other hostess being in sight, I stepped up to her and announced, "Well, I've had a very pleasurable evening."

She had been sitting like a sandbag all evening watching me smoke cigarettes and eat candy, with a scowl on her face like an Alaska Indian Totem Pole. Afraid to leave the room for fear I would steal the wall paper I guess. Anyway she snapped out of it, jumped up and said, "Iwonderwherethehostessis. I'll golookforher," and then she beat it out into the other room.

Well, it was a great night. I had four or five days of wiskers on, a hickory shirt, my denim overalls and a wide belt. A great fellow! However, I had washed my hands and face (which same was a concession) and had taken off my corked boots. Also I had contributed a box of candy (the only other box was contributed by my friend the packer) and you know that all helps.

Having no more foolishness to indict and having disclosed nothing containing truth or importance, I will proceed to close.

Horatio.

* * *

Camp Five, Dublin Lbr. Co.
October Fifteenth.

The Perfect Gentlemen,
The Eldora Argonaut, ad infinitum:

See, I have retained me Latin. Reminds me of a story. One of the local products went into a drug store to buy a fountain pen. The soda jerker puts down the copy of True Confections he's all wrapped up in and condescends to display some sales psychology. The local product sees one he likes and tries the point out by writing "Tempus Fugit." The soda jerker takes a squint, throws out another pen and says, "Here, try this Mr. Fugit." End of story, you may laugh now.

Oh, yes. I received an honorable discharge from Uncle and am now with the Dublin Lumber Co. Needless to say I am now buying my own stationery and literary supplies. My official capacity is Saw Scaler. That is, each day I go over the areas the sawyers are working and count the number of logs they have their number on. They are worth 5c per log per man or 10c per log per crew.

That sounds delicately simple but I occasionally have to scratch around to find a tree they have felled several others over. Some times the log I walk rolls suddenly or the bark slips off and so do I. The sawyers are all makes and breeds. French, Irish, German, State-o'-Maine and Mountain Negroes. Before I came up here an old boy said to me. "Too many Mountain Negroes up there." When I got up here I look around, not a negro in sight but I do find several Montenegrins.

This is a government timber sale of fire killed timber. Practically 100 percent white pine. Trees up to 30 in. D. B. H. Must have been great before the fire. Since the fire the stuff has developed a layer of blue sap stain.

One of the last things I did for Uncle before leaving his employ was to take a pack string over to another ranger station. About the time I was supposed to start with the string a 1.08 in. rain developed and stalled me off. Then the saddle horse got sick. Exactly in the same manner as the lady in the Lydia Pinkham advertisements. However having none of Lydia's pills handy we had to prescribe different treatment. Among other things we made her eat about half a pound of salt and applied a generous dose of Cayenne pepper. She recovered. If I can't get a job as assistant to Major Stuart I'll hire out as veterinary.

Had one happy experience just previous to the big rain. Was up near the head of the lake without a boat for a short time. Had to go either around the head of the lake or borrow a boat to go cross to a fire. So I hiked down to the tourist camp and woke up a lady tourist and says, "Can I borrow your boat, the one with the motor on it?" She says, "There's a ranger's cabin over this way. Go ask the ranger. If he says all right, you can take it." I says, "Thank you. I'm it."

I went to the big city the other day and dropped into a hock shop. Bought myself a .32 Special for $6.50. Now I plan on spending a few Sundays at my lady friend's hangout and we are going to give the local deer a treat. I believe she told me she had a .22. Don't you kind of feel sorry for the deer? Think of them out there in the cold, dying, laughing themselves to death!

We have an old Frenchman in the camp here who will straighten up suddely and yell at the old German across the bunkhouse, "What you do when you don't do nossinks?"

Having started at the end and worked forwards like Perk Coville used to lecture—in the approved European manner—I will close.

Horatio.

* * *

Camp Five, Dublin Lbr. Co.
December Twentieth.

Dear Unanimous:

Expect this to be your last letter from me for the time being. Am coming. Will be in Ames about time to register for the winter quarter.

Went deer hunting one Sunday in November. Went over to the lake and rented a boat and motor and started up the lake. At least thought it was up. It was after dark. Anyway when I got to the wrong end of the lake I turned around and started

back up. Got to the head of the lake about 11:30 p. m. They were waiting for me—two girls all alone. It had been storming out and Idaho in November does not grow columbines. I was cold. After a little tho they got me hot—no, warm. What I mean is that I got warmed thru after I had inhaled a quart of hot coffee.

Needless to say I got no deer. I came down the lake next day and walked into camp, 8 miles over a slushy right of way. Right after that it got colder than—you name it. It was so cold you had to back up to spit. We have to keep a fire going so that the hookers can keep the spare ropes on it to thaw them out. The jammer gets so stiff that we have to run it in low gear to shift. The logs are all frozen in the decks and the loading crew is going broke buying powder to break them with. And when they break, the owner of the trucks looks worried, the loading crew looks sad, the only one that is at all happy is the scaler—and I'm paid by the month.

When I first came up here a pile of my mail went up to Muskrat on a slow boat, was unloaded, readdressed, went down the lake via the same slow boat. It hung around the postoffice until someone drifted over to get the occasional mail. I received 12 letters in one bunch. The fellow came into the office and asked, "Who's this Horatio?" I told him it was this and he said, "Mr! You have 400 letters!"

This is quite a camp. They never heard of Bryant out here. They do everything we were told isn't being done anymore, sleigh hauling in winter, drive the rivers in the summer and spring.

That puzzle peg you sent me is still a puzzle. Forty men in camp including this couldn't work it. When you sent it to me I wondered what kind of a game you were trying to put over on me. Anyway, I put it out in the open and tried it once or twice. Then somebody else would take a whack at it. The camp boss tried it, the head book keeper tried it, the walking boss tried it. They all had the same story which ran like this: "A couple winters ago when I got snowed in down on Goose Creek the old man there had one of these and showed me how to work so I could do it good. Now you do it this way." And then they'd sit down and wrestle with it a couple of times and go on with their story, "But damned if I can do it now."

Well, as I says I'm coming east. A big burley from the wide open West where men are men and women are all that they are expected to be.

Horatio.

Tales of Paul Bunyan

EVERETT JENSEN, '32

ANY logger who has ever worked under Paul Bunyan will tell you that when Paul worked, he worked. Nothing was done by halves. Napoleon and Edison copied Paul's methods of working with very little sleep but they could never stand working twenty-five hours a day for a period of months as was Paul's habit. And, of course, the men that worked in Paul's camps couldn't expect to do much loafing.

In spite of being such a driver of men Paul believed in the old saying, "All work and no play makes the lumber-jack a dull boy." He made a practice of giving the men a day off every two or three years. Now the lumber-jack has a well earned reputation and Paul's men were no exception to the rule. It was his custom to notify neighboring towns three or four months in advance of the holiday so that the authorities would have sufficient time to get ambulances, an army of doctors and nurses, and also to erect a hundred or so temporary hospitals.

As this was rather an expensive proceeding Paul decided he would have to think of something that would keep his men out of the towns. That seemed to be an impossibility but Paul had solved harder problems. He decided after considerable thinking that some kind of a game in which his camps could compete against each other was the answer. It would have to be a rough game where his jacks could wear corked boots and could do considerable rough and tumble fighting. And so Paul invented the first football and formulated the first set of rules.

There were only two simple rules: first; in case of dispute between a team and a referee, no axes, peaveys, or canthooks could be used on the referee. (This rule was later amended to read—In case of disputs the referee must at all times be given a half mile start.) Secondly; since it was practically suicide for a small man to play, no man weighing less than fifteen hundred pounds could play. This eliminated the little chore boy who wanted to play but weighed only eight hundred pounds.

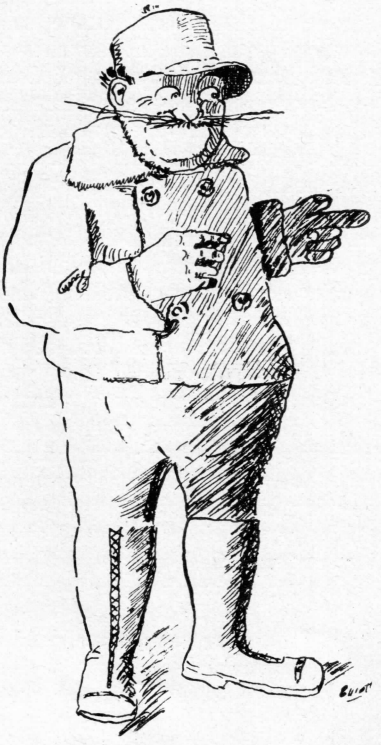
It required the hides from one hundred and forty-three steers and a yearling heifer to make the football. Two guy ropes taken from a two hundred-foot spar tree were used to lace the ball. Even Paul himself was unable to blow up the ball so he used a special device of his own which directed the wind of Kansas tornadoes into the ball.

North Dakota, which Paul had logged for the King of Sweden, was selected as the scene of operations. The Black Hills were

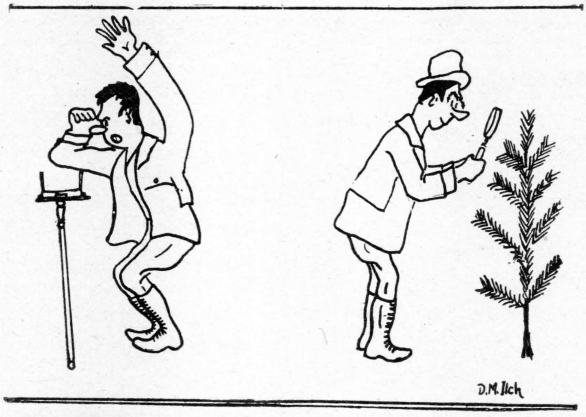
erected as a grandstand for any spectators. Johnny Inkslinger was chosen to keep score.

The men were skeptical about this new game of Paul's but the old logger was boss in his own camps and if he said they were to try the game why they were to try it and that was all. After the first thirty-three minutes of play two hundred and four men were carried off the field. One hundred and fifty of them would never wield an axe again. The game was slowed down considerably due to the lack of a large reserve of referees. The men finally gave up in disgust because they claimed that it was too much of a lady's game and they would have nothing to do with it.

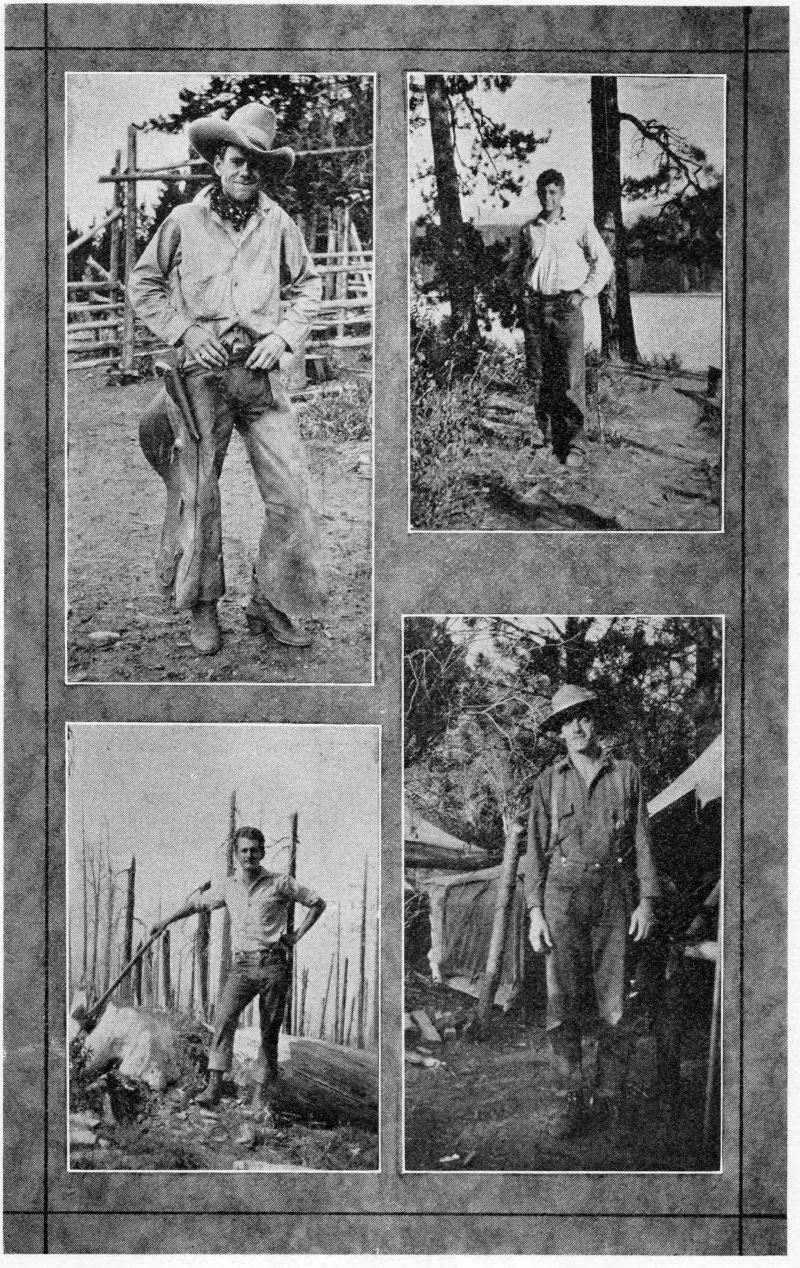
Time has proved the statement of these grizzled old loggers that the game is too effeminate for he-men. The original game is degenerated and the rules have been modified until it is thought safe enough for college boys. Need more be said.



Campus



Reconnaissance



SENIORS

UPPER LEFT

Clyde T. Smith—"Wild Bill"
Milwaukee, Wisconsin
Camp—Au Train, Michigan '27
Experience—Trail crew, Coeur d'Alene Nat'l For. '28
Timber survey, Colorado Nat'l For. '29
Timber survey, Colorado Nat'l For '30

UPPER RIGHT

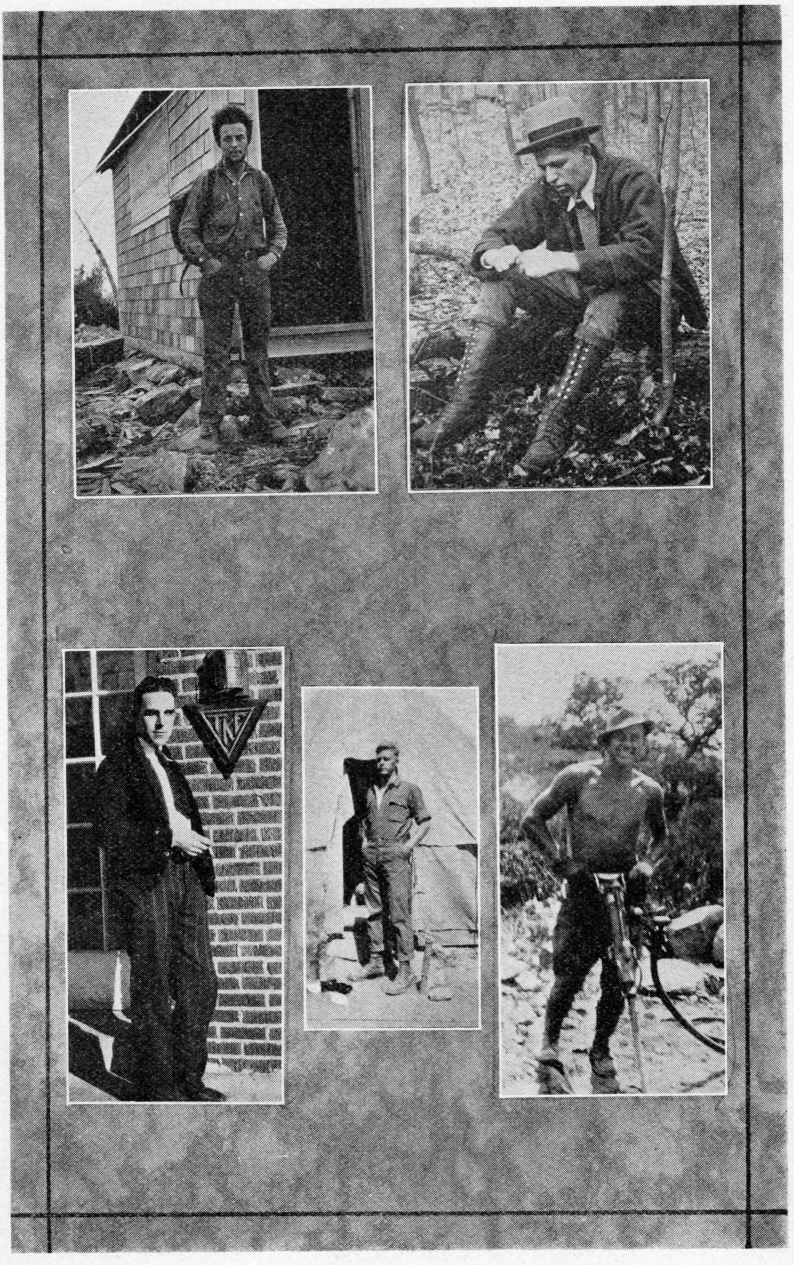
F. T. Priester—"Bud"
Avoca, Iowa
Camp—Hayden Lake, Idaho '28
Experience—Lookout, St. Joe Nat'l Forest '29
Shasta Nat'l Forest '30
Lamba Chi Alpha
Ag Council

LOWER LEFT

Gerald Kruse—"Jerry"
Monona, Iowa
Camp—Quincy, California '29
Experience—St. Joe Nat'l Forest '30
Delta Sigma Phi
National Collegiate Players

LOWER RIGHT

Harold Boeger—"Harold"
Lexington, Mo.
Camp—Hayden Lake, Idaho '28
Experience—Trail crew, Clearwater Nat'l Forest '29
Timber survey, Ochoco Nat'l Forest '30
Phi Mu Alpha



SENIORS

UPPER LEFT

John Hough—"Purvis"
Algona, Iowa
Camp—Kalispell, Montana, '30
Experience—Trail crew, St. Joe Nat'l Forest '28
Smoke-chaser, St. Joe Nat'l Forest '29

UPPER RIGHT

Harold C. Moser—"Mose"
Strawberry Point, Iowa
Camp—Ontonagon, Michigan '26
Experience—Lookout, Siskiyou Nat'l Forest '27
Appalachian Forest Exper. Station '28
Lake States Experiment Station '29, '30
Phi Kappa Phi

LOWER LEFT

Leighton McCormick—"Mac"
Bedford, Iowa
Camp—Au Train, Michigan '27
Experience—Planting on the Pike Nat'l For. 29
Nursery, Pike Nat'l For. '29
Survey, Montezuma Nat'l For. '29
Tau Kappa Epsilon

LOWER CENTER

Dave M. Ilch—"Dave"
St. Charles, Missouri
Camp—Hayden Lake, Idaho, '28
Experience—Timber survey, Deschutes Nat'l Forest '29
Timber survey, Olympic Nat'l Forest '30

LOWER RIGHT

R. Kurt Ziebarth—"Zeke"
Davenport, Iowa
Camp—Hayden Lake, Idaho '28
Experience—Cleveland Nat'l Forest '29
White Mountain Nat'l Forest '30
Adelante

SENIORS

UPPER LEFT

Andrew Brands—"Andy
Louisville, Kentucky
Camp—Quincy, California '29
Experience—Tree trimmer, Illinois, '30
Lambda Chi Alpha
Ag Council

UPPER RIGHT

E. W. Zimmermann—"Zim"
Davenport, Iowa
Camp—Quincy, California '29
Experience—Japanese Beetle Scout '30
Delta Sigma Phi

CENTER

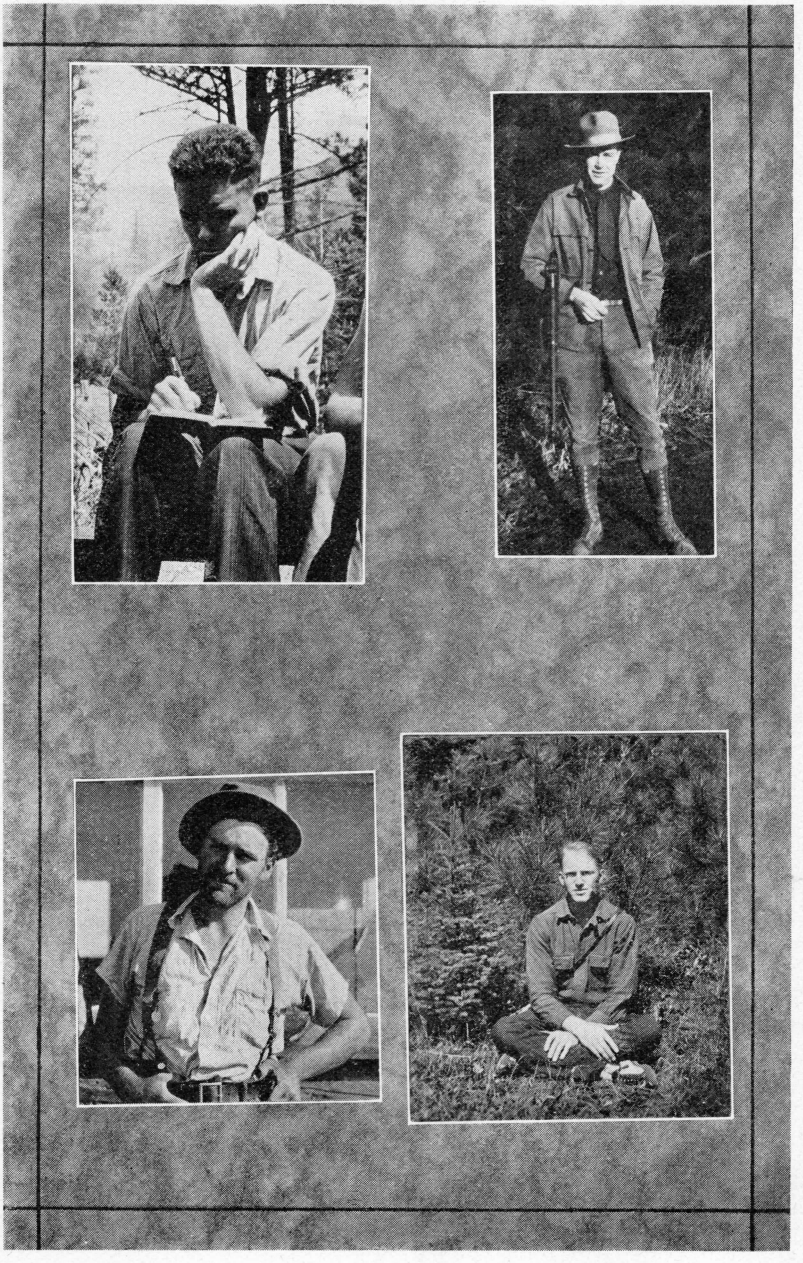
Maynard J. Smith—"M. J. of the Swimming Team"
Okoboji, Iowa
Camp—Au Train, Michigan, '27
Experience—Japanese Beetle Scout '29
Timber survey, Routt Nat'l Forest '30
"I" Club

LOWER LEFT

Webster W. Intermill—"Swede"
Fort Dodge, Iowa
Camp—Hayden Lake, Idaho '28
Sigma Chi
"I" Club

LOWER RIGHT

Albert F. Dodge—"Al"
La Grange, Illinois
Camp—Hayden Lake, Idaho '28
Experience—Central States Exp. Station '30
Alpha Tau Omega
Phi Mu Alpha



SENIORS

LOWER LEFT

Gerald Griswold—"Jerry"
Cleveland, Ohio
Camp—Cass Lake, Minn. '25
Experience—County Surveyor's Office, Chardon, Ohio, '29
Trail Traverse, Blackfeet Nat'l For. '30
Delta Sigma Phi

GRADUATES

UPPER LEFT

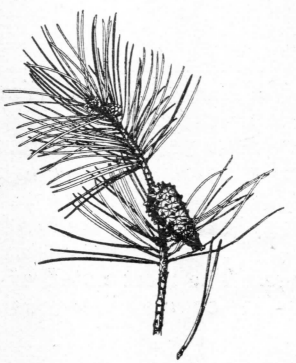
Floyd A. Nichols—"Nick"
Montrose, Colorado
Camp—Kalispell, Montana '30
Experience—Tomahawk Kraft Paper Co '28
Alpha Zeta
Sigma Upsilon
"I" Club

UPPER RIGHT

Irving Christensen—"Chris"
Eagle Grove, Iowa
Camp—Ontonagon, Michigan '26
Experience—Great Southern Lumber Co. '27
Timber survey, Wallowa Nat'l For. '28
M. J. Wallrich Land and Lumber Co. '29, '30

LOWER RIGHT

Clarence Chase
St. Paul, Minnesota
Experience—Lolo National Forest, '28
Stanislaus National Forest, '29
Lake States Forest Experiment Station, '30
University of Minnesota, B. S.
Xi Sigma Pi



AMES FORESTER

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VOL. XIX 1931

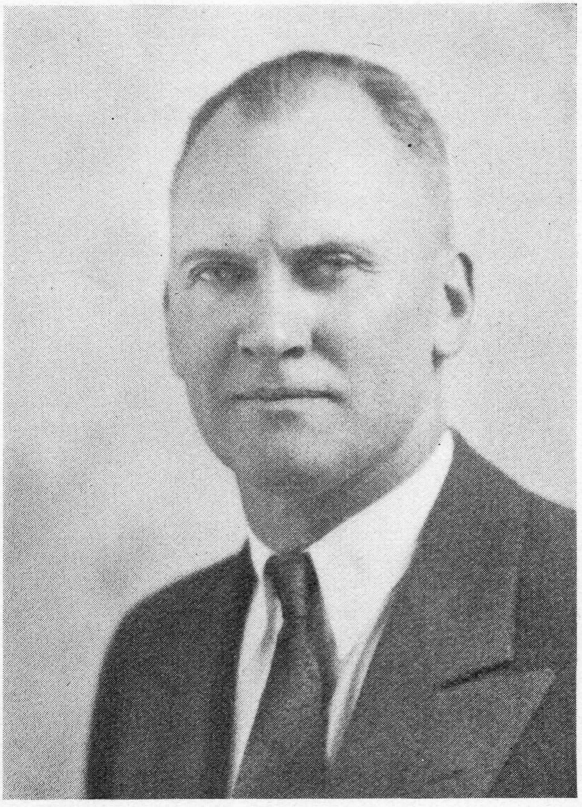
THE SUMMER CAMP OF 1931

THE 1931 Foresters' summer camp will be held on the Deschutes National Forest in Oregon. This forest has concentrated on it a greater variety of interesting forestry activities than any other in the northwest and probably more than any other in the whole United States. The most interesting features on the Deschutes are a large timber scale, large areas of cut-over land in various stages of production, land exchange activities and special grazing problems. Three mammoth sawmills are located in the town of Bend which will be about twenty miles away. A large timber sale in the Douglas fir type lies just west of the Cascade Range on the Cascade National Forest. This can be reached by a three or four-hour drive.

The camp site will probably be on Paulina Lake, which is one of a pair of lakes in what is known as the Newberry Crater. This location is in western yellow pine country, at an elevation of 5,000 feet, partially surrounded by a semi-circle of peaks, which tower far above the timber line to elevations of about 8,000 feet. It will look out toward the northwest upon a magnificent vista of snow clad sentinel peaks, standing along the crest of the Cascade Range. The most noted of these are the Three Sisters and Mount Jeffierson, standing nearby, and Mount Hood far to the north.

A number of interesting side trips can be made from this camp. One such trip is planned via Crater Lake and the Redwoods, thence northward, along the seashore to Portland. The world's largest sawmills and a great variety of wood-using industries can be visted in the region around Portland. The return to camp will be via the picturesque Columbia River highway to Mount Hood, where time out can be taken for a climb on the glaciers of this peak.

The numerous lakes and streams in the region around camp are expected to furnish good trout and salmon fishing, combined with boating, swimming and other sports. This year's camp offers almost every attractive feature that the forester and lover of the great out-doors can imagine in his fondest dreams.



Fay G. Clark

OUR NEW FACULTY MEMBER

Professor Fay G. Clark, of the Forestry School of the University of Montana, is temporarily filling the chair vacated by Professor D. S. Jeffers who has returned to Yale for some advanced work.

Professor Clark came to Iowa State last fall to begin his duties by taking Forest History, Policy and Law courses and since then he has succeeded in winning the confidence and good will of the students.

The Summer Camp of 1930

FRANK KOWSKI, '33

"SO THIS is Bitterroot!"

The foresters had arrived. The first four of the student woodchoppers stood on the bank of the clear blue lake and viewed their prospective home for the summer. It met their approval.

The lake mentioned was Little Bitterroot Lake hidden in the northwestern tip of Montana. This site had been chosen as the home of the Iowa State foresters for their 1930 summer camp. And a beautiful home it was. The five-mile lake was located in the foothills of the Bitterroot range and thruout the summer it provided the swimming, boating and fishing so necessary to a forester's camp.

On June 17, a check revealed the required number of noses present at the lake and work on the camp proper was begun. Shortly the camp took shape. The 10 army squad tents, pitched under a tall stand of larch-fir, faced southward over the lake from the top of a forty foot bluff—an ideal campsite.

After each forester had availed himself of all the personal household effects that he could summon to mind, work on the individual homes was abandoned for the time to take up the practical field work.

The first step necessary in the field study was to become acquainted with the vegetation of that region. Likewise the first day's practical work consisted of a thoro survey of all ground vegetation and timber species. Of the timber types the prevalent species were found to be larch, lodgepole pine, western yellow pine and Douglas fir. With this survey as a foundation the next work undertaken was the study of growing timber, i. e., stand growth, spacing, natural pruning, growth periods and growth classification. Practical work was also undertaken in clearing out and pruning dense stands to better observe how the remaining stock was affected.

In connection with this study data was gathered to be used in a course in forest mensuration. This study included the determination of tree heights, diameters, circumferences, board foot content and the composition of volume tables. The work proved very interesting until it was learned that the data collected was to be used on the return to school.

A detailed time study was made of the Conrad logging camp located near Marion, Montana. Here the summer campers had a chance to observe the operation of a modern lumber camp as well as the personal life of the modern lumberjack. Much more was learned from the latter study.

It was from this work that the foresters were called out to fight fire. Will they ever forget that night of terror spent fighting that blazing inferno of hell. It was rather disheartening after a day of self-imposed heroism to hear the chief say that two men could have handled the five acre burn but he just wanted to give the "boys" the experience. From then on the "boys" shied from anything that even hinted at experience.

The old adage of "all work and no play" was the gospel of the 1930 crop of barkeaters and throughout the entire camp they made it a point not to "make Jack a dull boy." The favorite recreation was the evening swim which later developed into the heralded regatta. This boat race was in every respect a big time affair even to the extent of one of the contestants sinking on the home stretch.

Weekly sojourns were made to Kalispell and Whitefish to indulge in the luxuries of civilization. To the car owners these trips meant a visit to the garage,—to the more fortunate it provided a time for inspirations—mostly feminine.

Hikes back into the foothills or climbs up to lookout peaks proved popular pastime for the more ambitious. Horseshoe, axe throwing and car repairing were the chief parlor sports for the less ambitious. Campfires and song fests frequently gathered the foresters in the evenings to give concert to the coyotes. It was always thought strange that on the nights of fireside singing the coyotes would never be heard. Jealousy? Probably.

Two trips were taken during the course of the summer. The first was to Coram, Montana, where an intensive study of the ranger station was made. A visit was also made to the Somers mill at Somers, Montana, where all working operations were studied thoroughly. From Coram the foresters took a sight seeing trip to Glacier National Park and spent a day rambling over various mountain peaks.

The second trip of the camp period was made to Spokane, Washington, and Lewiston, Idaho. In Spokane several lumber product industries were studied and at Lewiston the Clearwater Lumber Mill was thoroughly surveyed. At this point on the trip the camp was officially dismissed and nineteen travelworn foresters faced east and headed for Iowa—a summer, ever to be remembered, behind them.

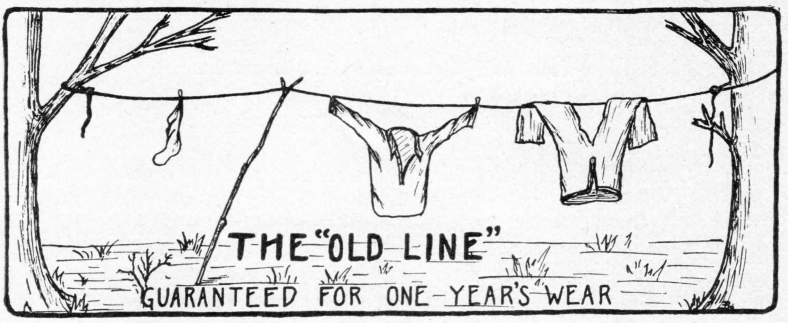
The Cruiser Staff

HARRY HINKLEY '32

"NECESSITY is the Mother of Invention," likewise necessity evolved the cruiser's staff. Last summer while cruising in second growth jack pine we found that an eight and one-fourth foot pole is very convenient in measuring the width of a strip. In dense stands of small trees a strip one quarter of a chain wide gives a very good sample. By measuring with the pole eight and one-fourth feet on either side of the chain, count can be made much more accurately than by estimating the width of the strip. It was for this purpose that the cruiser's staff was first used.

The staff was then marked off in one foot divisions and used for measuring the height of standing trees and reproduction. By holding the pole as high as we could reach we could measure trees up to 16 feet in height very accurately and quickly. Larger trees when felled could be measured much more rapidly with this staff than with the tape. In making taper curves and stem analysis, the staff was used for measuring distances along the bole of the tree.

Such a simple instrument which can be used for so many things is very convenient. If ever you are cruising dense stands of small trees, give this cruiser's staff a trial.



AGAIN this column has to be pulled out of the suds and run through the wringer. There is nothing new to offer, it's the same old line getting its annual renovating.

The first event to be chronicled is the Senior Banquet. The high points of the evening were three; Bunny Nichols' flow of clean wholesome humor, Joe, or "Citizen" Stoeckeler's lack of the same, and Prof. Horning's dendrological description of the pre-dominate species on the campus. The prize line of the evening was Stoeckeler's rendition of "The vital tragedy of human life is not physical poverty but whipped spirits!"

The spring campfire was scheduled to be held at the usual stand. The day arrived and brought the end of the spring fire season. The site was changed to Alumni Hall. For once the hamburgers were well cooked and the coffee was coffee.

The last meeting of the spring quarter resulted in a new batch of officers. Priester was elected president, Ilch, vice-president, and Boeger, secretary-treasurer.

The club started off last fall with a bang. October the second was the date of the fall campfire which was held north of Squaw Creek near the catalpa plantation. The bill-of-fare, furnished at cost by Bill Steele, cook of the 1926 summer camp, was plenty good and consisted of potato salad, hamburgers, dogs, buns, coffee, doughnuts, and ice cream. After the grub had disappeared the gang gathered around the fire, and as a result the old line was stretched more than ever before. Thus was the school year officially opened.

Prof. Fay G. Clark delivered a serious lecture on "Daze of the West" and "Personal Reminiscences" at the first meeting of the winter quarter.

Peter McLaren, Champion Wood Chopper of the World, visited us early in February, and gave demonstrations on how not to imitate a beaver. He conducted a chopping contest among the foresters and Lyle Chisholm, sophomore, emerged victor.

The annual hoedown was held February 14, at the Varsity Ballroom. Due to the ban on any activities by hardware toters, there was more dancing and less noise than ever before.

Once more we hang up the old wash and call it a day.

* * *

Last spring the department was visited by M. L. Merritt, '03, assistant regional forester of the Alaska Region. The changes on the campus were rather bewildering to Mr. Merritt and occasionally he had to take out his pocket compass to orient himself. Which leads up to the topic of changes on the campus.

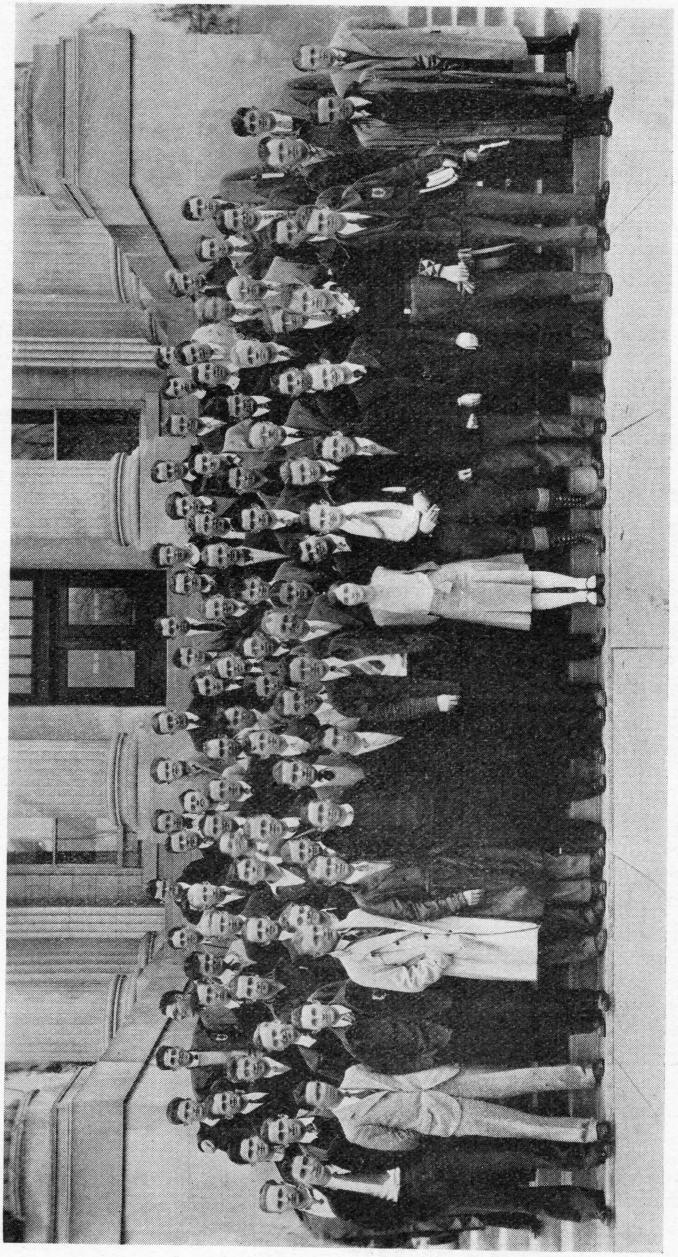
This scribe has only been here since 1924 and so can only enumerate the more recent changes. Probably the most striking is the size of Lake La Verne. From a fair size it has dwindled so much that polywogs can only with difficulty matriculate into full fledged frogs. When protozoa want to go swimming they can get only one foot wet at a time.

One of the most prominent buildings on the campus is the Memorial Union. It certainly is the most beautiful one and standing as it does on the site of the old Music Hall, rounds out the central campus. The old dairy building is now Ag Annex and a big new Dairy Building stands to the north of it. Old Ag Hall is now Botany Building and The Maples is Music Hall.

Other changes in the last seven years are: concrete bleachers on the east side of state field with handball courts, lockers and a wrestling room (stag only) beneath; a men's dormitory a few rods southeast of the new bleachers; the Chemical Engineering Building north of Engineering Annex and last but not least, Jalap had his barn taken away from him and given to the Landscape Architecture Department. Incidentally, Jalap, a famous Percheron, died shortly after—of a broken heart. He had so wanted to stay with those L.A.'s.

Christmas time brought an epidemic of visitors and non-visitors. The non-visitors were Gene Farnsworth, '26, and Orrin Latham, '27. Farnsworth journeyed from the Syracuse Ranger School to Ames to marry the lucky girl, Miss Frances Jones of Ames. Latham, also teaching at the Syracuse Ranger School, came along as best man—and to quote Prof. Mac, "I did not see hair or hide of them."

Among those that did visit the department were: Ray McKinley, '27; Don Ball, '28; Allen Miller, '24; Glenn Durrell, '25, DeWitt Nelson, '25; Mark Ratliff, '28; Nat Hanson, '29; C. P. Cormany, '21; Francis Barnoske, '26; Charles Rindt, '27; Lloyd Wambold, '30; Lester Marriage, '30; Bill Klug, '30; Roy Olson, '29; and Arthur Holding, '29.



Forestry Club

ROLL OF STUDENTS

GRADUATES

Chase, Clarence D. ..... Minneapolis, Minnesota
Christensen, Irving L. ..... Eagle Grove, Iowa
Lee, Edward N. ..... Drummond, Wisconsin
Nichols, Floyd A. ..... Montrose, Colorado
Stoeckeler, Joe H. ..... Dubuque, Iowa

SENIORS

Anderson, Helmer ..... Des Moines, Iowa
Benson, Ellsworth H. ..... Randolph, Nebraska
Boeger, Harold ..... Lexington, Missouri
Dodge, Albert F. ..... La Grange, Illinois
Griswold, Gerald ..... Cleveland, Ohio
Hough, John P. ..... Algona, Iowa
Ilch, Dave M. ..... St. Charles, Missouri
Intermill, Webster W. ..... Fort Dodge, Iowa
Lubberts, Don R. ..... Parkersburgh, Iowa
Kruse, Gerald W. ..... Monona, Iowa
McCormick, Leighton E. ..... Bedford, Iowa
Moser, Harold C. ..... Strawberry Point, Iowa
Newland, Harrod B. ..... Louisville, Kentucky
Potter, Ewart D. ..... Belmond, Iowa
Priester, F. T. ..... Avoca, Iowa
Roche, Lloyd ..... Alma, Iowa
Smith, Clyde T. ..... Milwaukee, Wisconsin
Smith, Maynard J. ..... Okoboji, Iowa
Thielking, Karl F. ..... Des Moines, Iowa
Unser, George L. ..... Bernardsville, New Jersey
Ziebarth, Kurt R. ..... Davenport, Iowa
Zimmerman, E. W. ..... Davenport, Iowa

JUNIORS

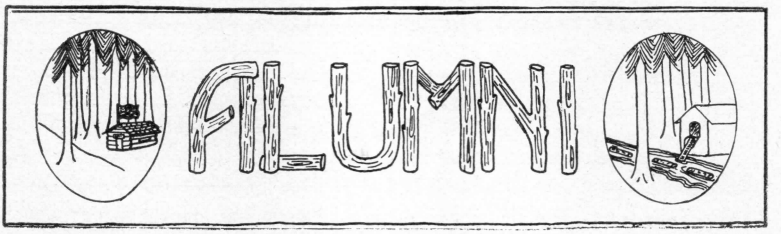
Brands, Andrew ..... Louisville, Kentucky
Coons, Harold ..... Ames, Iowa
Dysterhuis, E. J. ..... Hospers, Iowa
Elston, Lloyd M. ..... Okoboji, Iowa
Chipman, Russell ..... Burt, Iowa
Giffen, W. D. ..... Des Moines, Iowa
Harmon, Wendell H. ..... Waverly, Iowa
Hawk, Richard C. ..... Kansas City, Missouri
Hinkley, Harry S. ..... Cedar Rapids, Iowa
Jensen, Everett ..... West Branch, Iowa
Kowski, Frank F. ..... Burlington, Iowa
Muceus, Jack ..... Ames, Iowa
Nagel, Lloyd F. ..... Ames, Iowa
Oleson, Merle, C. ..... Forest City, Iowa
Sack, Ivan ..... Sack City, Iowa
Schafer, Opal A. ..... Farragut, Iowa
Steavenson, Hugh A. ..... Omaha, Nebraska
Suder, Robert G. ..... Chicago, Illinois
Swanson, Charles M. ..... Sioux City, Iowa

SOPHOMORES

Battell, Fred F. ..... Ames, Iowa
Brown, Edward ..... Farmington, Iowa
Brownfield, R. L. ..... Ames, Iowa
Clark, William H. ..... Cedar Rapids, Iowa
Curtis, Robert ..... Burlington, Iowa
Dannen, Dwight L. ..... St. Joseph, Missouri
Dorman, Keith W. ..... Perry, Iowa
Dunn, Milfred R. ..... Glenwood, Iowa
Ellerhoff, M. A. ..... Burlington, Iowa
Ferrin, J. W. ..... Denver, Colorado
Fuller, George ..... Muscatine, Iowa
Gottschalk, Fred ..... Davenport, Iowa
Grau, Edwin ..... St. Charles, Missouri
Graves, Walter L. ..... Washington, Iowa
Harvey, Ralph R. ..... Missouri Valley, Iowa
Hurd, Stanley ..... Ottumwa, Iowa
Jauch, J. ..... Chicago, Illinois
Melvin, C. R. ..... Parker, South Dakota
Newville, D. F. ..... Algona, Iowa
Ostermann, Delbert H. ..... Ocheyedan, Iowa
Stradt, Gilbert ..... Davenport, Iowa

FRESHMEN

Beyer, Jack ..... Des Moines, Iowa
Browne, Stanley ..... Putnam, Illinois
Campbell, Noel ..... Hawkeye, Iowa
Clemmons, William H. ..... Clemmons, Iowa
Dewell, Harold ..... Clarence, Iowa
England, Lloyd ..... Belle Plaine, Iowa
Ferguson, Louis K. ..... Algona, Iowa
Gaard, Emery K. ..... Marshalltown, Iowa
Gates, Paul ..... Clearmont, Missouri
Getty, Russell ..... Waterloo, Iowa
Goehring, Arthur G. ..... Glenwood, Iowa
Harlan, Howard F. ..... Stuart, Iowa
Hatch, Luther ..... Des Moines, Iowa
Hubbard, John W. ..... Sioux City, Iowa
Jacobsen, Reuben ..... Audubon, Iowa
Johnson, Otho M. ..... Omaha, Nebraska
Kerr, David ..... LaPorte City, Iowa
Kluever, Eugene ..... Atlantic, Iowa
Lehmann, Arthur F. ..... St. Charles, Missouri
McConnaughey, Harlon ..... **Dennison, Iowa**
Nissen, Paul ..... Cedar Rapids, Iowa
O'Neil, Gordon ..... Ames, Iowa
Peterson, C. R. ..... Dayton, Iowa
Porter, Bruce ..... Mystic, Iowa
Richman, H. W. ..... Lowden, Iowa
Rottmann, Russell ..... Detroit, Michigan
Schmidt, Ralph A. ..... Evanston, Illinois
Smith, H. M. ..... Casey, Iowa
Thayer, Marshall ..... Ida Grove, Iowa
Wiley, H. E. ..... Center Point, Iowa
Williams, Dwight ..... Coon Rapids, Iowa
Witmer, Carol R. ..... Maxwell, Iowa



February 17, 1931

Dear Ames Foresters: I would like to make this letter a personal one to each of the old Ames foresters but with the memories of two hundred "grads" before me, this would be some job. How much would we prize the opportunity to sit down with each one and talk over; with some, that first year out of college and with others, the problems and achievements that a decade or two has brought to them. Yes, we would have echoes from many corners of the land—echoes from the federal forests of North and South, East and West; from the states; from the private timber interests and from foreign fields. Each one with his special work, with his plans, his hopes and ambitions, striving for accomplishment in a niche in the profession of his choice.

Indeed it is surprising what the field for foresters embraces. It we had the space we might dwell upon Morris's and Beveridge's horned toad farm down in Arizona or Wall's attempts to product cacti resistant strains of range stock in the southwest; or better still Wiggin's versatility in South Africa in managing a native brick factory and sawmill, while serving as chief operator for appendicitis, running the Mission and serving as Chief Advisor to the Prince in his domestic affairs. An interesting chapter might be Merritt's tree farms on the Alaskan Glaciers or Ling's Agricultural School in the Orient. If time permitted we might hear from Hartman—and others in the creosoting game, in regard to the use of the pressure plants, during periods of depression, for sheep dipping.

It would be interesting to hear from the Madison Laboratory. The recently developed glues, we are told, will hold anything with the possible exception of foresters to their profession. Truax should continue his work.

We would like to report on our rather formidable list of forest supervisors. However, we seldom hear from them since we understand that when they are in from the field all their waking moments are spent on various and sundry reports.

Here at Ames another winter quarter will soon be drawing to a close. A dozen of the seniors (more or less) are beginning to wonder if the "exam," will be as hard, as long, or as obscure

as it is reported to have been last year. The freshmen are getting inquisitive about summer camp location. "Say, Prof., is it true that camp this summer is to be held in Alaska or is it in New Hampshire?" "I sure hope it will be in the West." "How many blankets should I take?" "Do they ever have any fishing?" "It the water cold?" "Are the snakes bad?", etc. Well anyway we are going to have a good camp of 25 to 30 men. We are considering possible locations on the Whitman, Deschutes, and Crater National Forests in Region 6 and also locations in West Virginia, Pennsylvania, New Hampshire and Vermont.

While Prof. Jeffers is at New Haven, Prof. Clark has the mensuration class. Well entertained or at least occupied. Prof. Larsen's class in "72b" also has a worried look as the quarter draws towards a close. Prof. Horning has about convinced his products class that there is still some hope of saving a small field for lumber against the inroads that the Iowa cornstalks have made in the building game. Bode is getting the farmers out in the state so much interested in planting shelterbelts and windbreaks that there is some fear for the acreage of corn, wheat and hogs.

Since last September we have had a number of special lecturers who have added much interest to the work of the Department. These included R. C. Hall of the Forest Taxation Inquiry; Dr. George R. Hopping of the Division of Entomology, Alberta, Canada; John C. Kuhns, Supervisor of the Whitman National Forest; Dr. H. L. Shirley of the Lake States Forest Experiment Station and in addition we are expecting Dr. C. A. Schenck of Darmstadt, Germany for a series of lectures in May.

During the present depression a number of the boys have been shifting around. When they stop rambling long enough for us to get a line on them again, we will get out a news letter and gives you the latest developments.

I suppose most all of the old gang will be looking for some of the "old line" advice before closing. Well, here it is: Eyes up; drive safely, but keep moving with the traffic; let the other fellow dangle the crepe. Then remember that the depression has not seriously affected the price of ink and paper.

Sincerely, G. B. MacDonald.

ALUMNI DIRECTORY

1896

Sherman, E. A.—At present he is Associate Chief of the U. S. Forest Service. He received a doctor of science degree from Iowa State College in 1928. Address: 4103 Military Road, Washington, D. C.

1903

Secor, A. J.—County Agricultural Agent for Van Buren County, Iowa. Address: Keosauqua, Iowa.

1904

Merritt, M. L.—Assistant Regional Forester of Alaska Region with headquarters at Juneau, Alaska.

1907

Balthis, R. F.—Engaged in extension work as county agent. Address: Cripple Creek, Colo.

Kupfer, Carl A.—Sales engineer for the North Coast Dry Kiln Co., 372 Bryce Ave., Portland, Ore.

1908

Baxter, W. F.—Farming at Galva, Iowa.

Haeffner, H. E.—Forest Service Resource Survey, Siskiyou Nat'l Forest, Grants Pass, Ore.

1909

Allen, Shirley W.—Professor of Forestry at theUniversity of Michigan. Address: School of Forestry and Conservation, Ann Arbor, Mich.

McCullough, Thomas E.—District agent for the Northwestern Mutual Life Insurance Co., at Flagstaff, Ariz.

1911

Barrett, Robert L.—Agricultural agent for the Kansas City Southern Railroad and is located at Neosho, Mo.

Freeman, F. G.—In the fruit business at Santa Ana, Cal.

Hoffman, A. F. C.—Supervisor of the Montezuma Nat'l Forest, Mancos, Colo.

Reynoldson, L. A.—Economist with the Bureau of Agricultural Economics, U. S. Department of Agriculture.

Smith, P. T.—County Agent at Redfield, South Dakota.

Whitman, J. C.—Supervisor of the Beaverhead Nat'l Forest, Dillon, Montana.

1912

Lessel, L. R.—Assistant supervisor on the Gila Nat'l Forest, Silver City, New Mexico.

O'Banion, A. C.—When last heard from he was county agent at Park Rapids, Minn.

Olmstead, R. A.—In charge of a large fruit ranch, Dundee, Ore.

Richmond, H. H.—Owner of a logging and mercantile business, Cass Lake, Minn.

Smith, W. A.—Whittier State School, Whittier, Calif.

Traux, T. R.—Engaged in investigative work at the U. S. Forest Products Laboratory, Madison, Wis.

1913

Baxter, L. J.—Located at Galva, Iowa, farming.

Clark, R. B.—President and manager of the Sioux-White Motor Co., Sioux City, Iowa.

Hensel, R. L.—Paint Contractor in Texas.

Ringheim, H. L.—When last heard from he was at Elrose, Saskatchewan, Canada.

Steffen, E. H.—Head of the Forestry Department, Washington State College, Pullman, Washington.

Watts, L. F.—Senior Silviculturist, U. S. F. S. Address: 2733 Jackson Ave., Ogden, Utah.

1914

Hassel, W. C.—Superintendent of Schools at Salem, Iowa.

Hayes, R. W.—Professor of Forestry at the North Carolina State College Station, Raleigh, N. C.

Nagel, W. M.—Forest Supervisor of the Blackfeet Nat'l forest, Kalispell, Montana.

Schreck, R. G.—Forest supervisor of the Huron Nat'l Forest, East Tawas, Mich.

Sterett, J. C.—Real estate dealer at Villa Park, Ill.

Van Boskirk, S. S.—Executive assistant, Manti Nat'l Forest, Ephriam, Utah.

Wolf, E. T.—Supervisor of the Pend Oreille Nat'l Forest, Sand Point, Idaho.

Wolven, R. M.—Salesman for the Standard Oil Co., Santa Ana, Calif.

1915

Bode, I. T.—Extension professor of forestry at Iowa State College, Ames, Iowa.

Hansel, H. E.—County Engineer and consulting drainage engineer at Bloomfield, Iowa.

Harley, Wm. P.—Department manager, J. C. Baldridge Lumber Co., 1145 West New York Ave., Alberquerque, New Mexico.

1916

Cassidy, H. O.—Assistant supervisor on the Apache Nat'l Forest, Springville, Arizona.

Cornell, Harvey H.—Landscape architect and vice-president of the Morell Nichols, Inc., 1200 2 nd Ave., South, Minneapolis, Minn.

Geisler, Max—Advertising manager of the Harry Alter Co., 1021 Ainslee Street, Chicago, Ill.

McCarthy, C. C.—Assistant City Engineer, Ames, Iowa.

Plagge, H. H.—With the Iowa Agricultural Experiment Station, 2215 Storm St., Ames, Iowa.

Plagge, N. O.—In private business. Address: 104 E. Main St., Barrington, Ill.

Rumbaugh, W. R.—According to last reports he is farming at Collins, Iowa.

Stokes, R. R.—Woods foreman with the Rutledge Timber Co., Coeur d' Alene, Idaho.

Hartman, G. B.—Plant superintendent, creosoting division, Long Bell Lumber Co., DeRidder, La.

Davis, E. M.—Wood technologist with the Forest Products Laboratory at Madison, Wis.

Donahoo, John F.—Salesman with the Valley Electrical Company at Fresno, Calif. Address: 3148 Iowa Ave.

Hadlock, F. D.—With the Western Electrical Co., of New Jersey in charge of dry kiln operations.

Poshusta, D. C.—With the Long Bell Lumber Co. at Enid, Okla.

Rehmann, T. W.—Engaged in real estate business. Address: 341 Flynn Bldg., Des Moines, Iowa.

1920

Deming, Milo H.—Assistant supervisor on the Wyoming Nat'l Forest, Kemmerer, Wyo.

Fletcher, R. A.—With the Foreman's Fund Insurance Co., Oakland, Calif.

Hoyer, V. B.—Principal of the high school at Battle Creek, Iowa.

Morrell, F. W.—(Professional degree) Assistant forester in charge of Public Relations. Address: U.S.F.S. Washington, D. C.

Wall, Lloyd A.—Assistant range examiner, Coconino Nat'l Forest, Flagstaff, Ariz.

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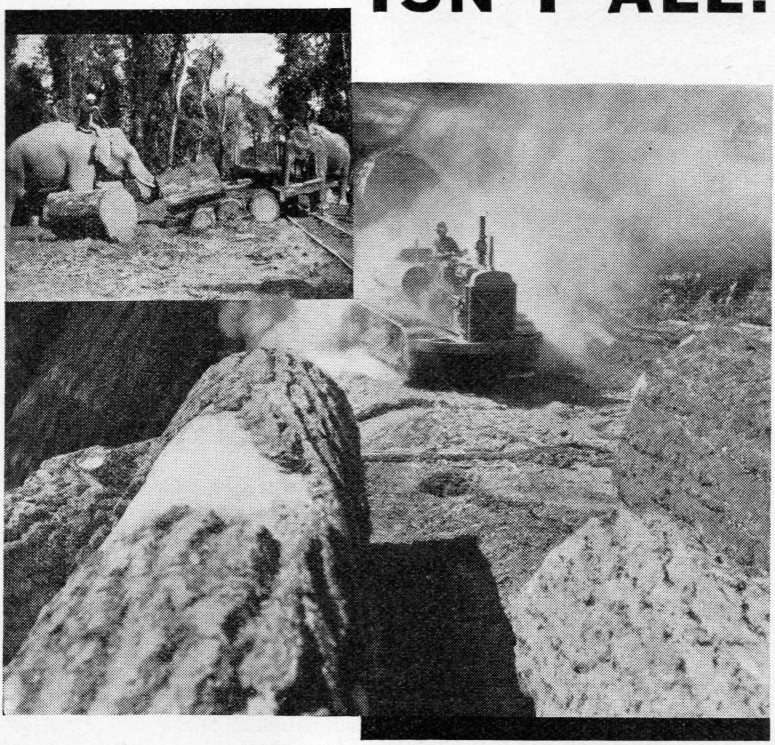

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1921

Avery, N. C.—Address unknown.

Cormany, C. P.—Vice-president of the Frank Porter Lumber Co., 1814 North Central Park Ave., Chicago, Ill.

Fiske, V. C.—Teaching botany at Utah University, Salt Lake City.

Helm, H. J.—Is in Ames with the Tilden Manufacturing Co.

Ling, Wen Ming—Principal of the Fukien School of Agriculture at West Lake, Foochow, China.

Patrick, O. K.—Has charge of creosoting work for the Long Bell Lumber Co., DeRidder, La.

Eggers, W. C.—With the sales department, Long Bell Lumber Co., Des Moines, Iowa.

Fennell, Robert E.—Employed by the Prudential Life Insurance Co., 4701 East Washington St., Indianapolis, Indiana.

Moravets, F. L.—Pacific Northwest Experiment Station. With the Forest Resource Survey, 514 Lewis Bldg., Portland, Ore.

Morris, R. D.—Assistant range examiner, Tusayan Nat'l Forest, Silver City, Ariz.

Pohle, E. W.—With the California Development Co., 863 Waller St., San Francisco, Calif.

1923

Dunn, Paul M.—District forester for the Missouri Forestry Department, Ellington, Mo.

Prout, Clarence—With the Minnesota Forest Service, Winkler Apts., Virginia, Minnesota.

Trenk, Fred B.—Extension Forester, University of Wisconsin, Madison, Wisconsin.

Watkins, E. W.—With the Los Angeles road department, 20012 Chase St., Owensmouth, Calif., R.R. No. 2.

1924

Martin, C. W.—In the Nursery business at Old Lyme, Conn.

Miller, A. F.—Technical assistant on the Marquette Nat'l Forest, Munising, Mich.

Rutter, Frank—With the Frank Porter Lumber Co., Chicago, Ill.

1925

Correll, Lynne—Ranger on the Cleveland Nat'l Forest, Aquanga, Calif.

Durrell, Glen R.—District forester, Oklahoma Forest Service, Box 153, Broken Bow, Okla.

Howell, Joseph—1815 Nebraska, Kansas City, Kan.

Lough, W. E.—Assistant manager of the Sun Lumber Co., Oxnard, Calif.

Nelson, DeWitt—Assistant supervisor on the Shasta Nat'l Forest, Mt. Shasta, Calif.

Towne, Chas. A.—Assistant forest supervisor on the Routt Nat'l Forest, Steamboat Springs, Colo.

1926

Barnoske, Francis M.—With the Moss Tie and Timber Co., Shreveport, La.

Clemmensen, N. K.—Chief warden for the Southern Kraft Corp., 518 Locuts St., Malvern, Ark.

Downey, E. J.—Woods superintendent of the Long Bell Lumber Co., Box 126, Coushatta, La.

Farnsworth, C. E.—Assistant professor of forestry, State Ranger School, Wanakena, New York.

Greef, C. H.—Salesman for Curtis Co., Inc., University Club, Canton, Ohio.

Harrison, C. L.—Forest ranger on the Black Hills Nat'l Forest, Savoy, S. D.

Hasek, Milvoj—With the S. S. Kresge Co., 3235 First St., Beloit, Wis.

Hogan, Jack B.—Junior Forester on the Colville Nat'l Forest, Republic, Washington.

Kouba, Theodore—Wisconsin Conservation Commission, Madison, Wis.

MacIntire, G. S.—Assistant State Forester of Michigan, Lansing, Mich.

McKennan, R. B.—Ranger, Supervisor Nat'l Forest, Ely, Minn.

Mollison, Allen—Forest supervisor, Indian Service, Red Lake, Minn.

Pickford, G. D.—Assistant Silviculturist with the Great Basin Experiment Station, Ogden, Utah.

Svendby, Clarence—In charge of the forest nursery at Washington State College, Pullman, Washington.

Tharp, Orlo E.—Forest Resource Survey, Mt. Hood Nat'l Forest, Portland, Ore.

West, Wm.—District ranger, Idaho Nat'l Forest, Roseberry, Ida.

1927

Fullerton, Neil—Junior forester, Kaniksu Nat'l Forest, Newport, Wash.

Gibbs, J. A.—Extension Forester and instructor in forestry at the Connecticut Agr. College, Storrs, Conn.

Hill, Edwin—With the Story City Butter Tub Co., Algona, Iowa.

Hutchins, Gordon C.—Has a rainbow trout farm, Route 1, Hendress, Colorado.

Jackson, Marion—Assistant City Manager at Iron River, Mich.

Latham, O. L.—Instructor, New York State Ranger School, Wanakena, New York.

McKinley, Ray—Ranger, Harney Nat'l Forest, Keystone, S. D.

McLaren, C. G.—Forester for the Tomahawk Kraft Paper Co., Tomahawk, Wis.

Rindt, Charles—Forester for the Nekoosa-Edwards Paper Co., Butternut, Wis.

Schipull, Walter L.—Technical assistant, Montezuma Nat'l Forest, Mancos, Colorado.

Turney, Geo.—Ranger, Wyoming Nat'l Forest, Bedford, Wyo.

Vinton, Everett—Taking graduate work at Yale Forest School, New Haven, Conn.

Wiggins, A. V.—Doing educational work at the Holy Cross Liberian Mission, Pendembu, Sierra Leone, Liberia, Africa.

1928

Ball, Don R.—Ranger in charge of the Moquah Purchase Unit in Wisconsin. Address. U. S. F. S. Washburn, Wis.

Battell, Sam—At present he is here at school preparing for the J. F. exam. Address: 2812 Leek St., Ames, Iowa.

Boeckh, F. E.—Forester and Timber Superintendent, Burlington Timber and Land Co., Burlington, Iowa.

Iverson, Ray C.—Senior ranger in charge of a purchase unit, Park Falls, Wis.

Kahler, L. H.—Farming at Lytton, Iowa.

Kreager, Paul—Address unknown.

Lau, Victor—Logging engineer for the Crossett Western Co., Kuppa, Ore.

Lepley, Wm.—Teaching psychology at Penn State.

Lester, Orville F.—Farming, Indianola, Iowa.

Lundberg, R. O.—With the Edwards Hines Western Pine Co., Burns, Ore.

McGlade, Jim—With the American Telephone and Telegraph Co., Downey Hotel, Oskaloosa, Iowa.

Meginnis, H. G.—With the Southern Forest Experiment Station, as Junior Forester. Address: 348 Baronne St., New Orleans, La.

Peters, Geo.—Salesman for a Chicago lumber company. Address: Hyde Park Y. M. C. A., 1400 E. 533rd St., Chicago, Ill.

Ratliff, Mark—Ranger on the Black Hills Nat'l Forest for the winter. Address: Deadwood, S. D.

Rotty, Roland—Ranger on the Nebraska Nat'l Forest, Halsey, Nebr.

Sonner, Orville—Farming at Hamburg, Iowa.

Sullivan, Walter F.—With the Associated Indemnity Corp., 351 Turk St., San Fransisco, Calif.

Wicks, Walter—With the Electrical Research Products Co., 1820 First Ave. South, Minneapolis, Minn.

1929

Battey, Lawrence—Shelby, Iowa.

Beveridge, W. M.—Junior Forester on timber surveys on the Lincoln Nat'l Forest, Alamogordo, New Mexico.

Chapman, A. G.—Teaching botany at Ohio State University, Columbus, Ohio.

Christensen, Irving—Graduate work, Iowa State College, Ames, Iowa.

Hanson, Nate B.—Junior Forester with the Indian Service, McNary, Ariz.

Holding, Art—Working on the Ouachita Nat'l Forest, Hot Springs National Park, Ark.

Howell, E. M.—Studying for the J. F. at O. A. C., Corvallis, Ore.

Kulp, J. W.—Davenport, Iowa.

McCutcheon, Allen—Ranger on the Uncompahgre Nat'l Forest, Ute, Colo.

Morey, H. F.—With the Alleghany Experiment Station, 3437 Woodland Ave., Philadelphia, Pa.

Scholz, H. F.—Graduate work on the Harvard Forest, Petersham, Mass.

1930

DeBower, Richard—With the Cook County Forest Reserve, Chicago, Ill.

Diemer, Jack—Graduate work at the School of Forestry, Berkeley, Calif.

Hawkins, V. T.—2010 Rabinwood St., Toledo, Ohio.

Heacox, Edwin—Weyerhauser Lumber Co., care of Longview Hotel, Longview, Wash.

Holtz, Dean—Graduate work at O. A. C., Corvallis, Ore.

Klug, Wm., Jr.—Wall Lumber and Creosoting Co., 3225 Prospect Ave., Kansas City, Mo.

Marriage, Lester—Junior Land Examiner, U. S. F. S. Alexandria, Miss.

Mickey, M. H.—With the Canada Creosoting Co., 11716 85th St., Edmonton, Alta., Canada.

Millard, Ned—Junior Forester on the Wyoming Nat'l Forest, Daniel, Wyo.

Nichols, Floyd A.—Fellowship, Iowa State College, Ames, Iowa.

Pecaro, Geo.—With the United States Gypsum Co., 407 Main St., Greenville, Miss.

Runkel, Sylvan T.—Story City, Iowa. Studying for the J. F.

Soderberg, Gordon—With the Queal Lumber Co., Des Moines, Iowa.

Stoeckeler, Joe H.—Graduate work at Iowa State College, Ames, Iowa.

EX-STUDENTS

Garrison, P. M.—With the Great Southern Lumber Co., Bogalusa, La.

Horton, F. V.—Assistant regional forester in charge of lands, Region 6, Portland, Ore.

Isch, D. H.—Forest ranger on purchase unit, Grand Marais, Minn.

Palmer, H. S.—On the Sitgreaves Nat'l Forest, McNary, Ariz.

Poch, F. J.—Technical assistant on the Black Hills Nat'l Forest, Deadwood, S. D.

Petheram, H. E.—Technical assistant on the Pike Nat'l Forest, Colorado Spring, Colorado.

Wilcox, H. F.—Senior ranger on the Plumas Nat'l Forest, Greenville, Calif.

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