

# THREE DAYS' FOREST FESTIVAL ON THE BILTMORE ESTATE.

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**Extraordinary Outing of Representatives of All Concerned With Timber From the Tree to the Trade—Biltmore Estate, the Property of George W. Vanderbilt, Used Educationally in a Unique Celebration Under the Direction of C. A. Schenck, Ph. D.—Authorities Invade the Woods for Lectures by the Master Forester—Openhanded, Open Air Hospitality—Anniversaries Signalized in an Unprecedented Way—Beautiful Biltmore in Story and Verse.**  
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## BILTMORE.

We are but borrowers of God's good soil,  
 Free tenants of His field and vale and hill;  
 We are but workmen 'mid his vines to toil  
 To serve his purpose and obey His will.

How shall we use His bounty unto men?  
 For private aims alone, His spreading lands?  
 Or shall we render service back again  
 For wealth he places in our eager hands?

Biltmore, the answer ringeth from thy slopes;  
 Biltmore, they forest voices answer raise—  
 The public good the first of private hopes;  
 A future race the ward of present days.

Here use and future use have equal thought.  
 For time that is and time that is to be,  
 Here Nature's grandest handiwork is wrought  
 In this, the planted and the guarded tree.

Biltmore, thy name shall stand for many a year—  
 Not for the wealth that you perpetuate,  
 But for the lesson that is written here  
 For individual and for the state.

To him, possessor of these ample miles,  
 Shall come an equal and undying fame  
 And other woods shall echo with his name  
 Wherever forests rise and Nature smiles.

## CHAPTER I—THE BILTMORE ESTATE.

From any one of the many picturesque eminences of Asheville, western North Carolina, the eye can encompass a generally western area approximately twenty miles north and twenty miles south within which, due to an extraordinary range of altitude in mountainous country, are to be found, in great numbers, specimens of every known variety of tree growth native to the sweep of country from Nova Scotia on the north to the Carolina-Georgia state line on the south. Obviously, a region so rich in sylviculture is extraordinarily attractive to lumbermen generally and to those interested in forestry particularly, affording within comparatively compact area object lessons in variety and scope rarely if ever elsewhere to be encountered in so restricted a territory.

Approximately twenty years ago this region was abandoned by timber cutters as one practically denuded of the resources which they sought. A wealthy New Yorker of aesthetic taste and fondness for outdoor life found this a wonderfully opulent section in all that appeals to the lover of the beautiful scenically, in all that satisfies a nicely appreciative appetite for the beautiful in nature, in all that caters to healthful outdoor life. This man, George W. Vanderbilt, bought the section, a principality in size, in larger or smaller tracts until he was owner of a domain of 200 square miles. Then he transformed it into the most beautiful single estate in America.

Contemporaneously with his ownership of this magnificent domain Mr. Vanderbilt was impressed with the necessity for its preservation and perpetuation as a region of natural beauty and as a game preserve, and incidentally with the possibilities of its development as a commercial proposition without interference with its aesthetic value. He brought to his aid the most noted foresters of their day and finally, ten years ago, secured the services of possibly the best known and concededly one of the most thorough exponents, technically, artistically and practically, of conservative forestry—Carl Alwin Schenck, Ph.D., formerly an officer, on leave, of the Prussian army and its forest service.

Dr. Schenck, forester of the Biltmore estate, established upon it in 1898 a school of forestry which has a worldwide reputation for efficiency, whose graduates are reputed to be, and are sought, as the most thoroughly grounded in their profession of any in the lumber world. In the last week of November last, to signalize the twentieth anniversary of the inauguration of practical forestry on the Biltmore estate and the tenth anniversary of the Biltmore Forest School, was inaugurated a celebration the like of which has not occurred before in forest history and will not be repeated, it is safe to say, before the lapse of another decade.

Within recent weeks a favored few received invitations to attend at Biltmore, N.C., a "forest festival," to be held November 26, 27 and 28, the scene of the festival that most beautiful exposition of wood, mountain, valley and stream

known as the Biltmore estate. The invitations, eagerly accepted, brought to Asheville, N.C., of which Biltmore is a suburb, many of the country's best known to professional and business life as directly or indirectly interested in any phase of timber growth, from its inauguration and preservation to its commercial utilization. These and the multitude of others who will be interested in these chronicles of the recent forest festival will be glad to learn something of the Biltmore estate and, prefatorily, of the Biltmore Forest School. The story of the Biltmore estate will occupy the greater part of these pages; a story of the Biltmore Forest School follows:

## CHAPTER II—THE BILTMORE FOREST SCHOOL.

The Biltmore Forest School was established in the summer of 1898 by its present head, Dr. C. A. Schenck, who was inspired by his devotion to the science of practical forestry and his desire to push it along and by a knowledge that the demand for practical foresters was increasing and would still further increase with the passage of the years. Its faculty consists of seventeen lecturers, headed by Dr. Schenck, all in the van of the best known authorities on subjects with embrace forestry, botany, forest policy, timber preservation, prairie planting, geology, economics, law, fungus diseases of trees, zoology, forest insects, sylvicultural problems, lumber inspection, farming and stock raising — a nicely adjusted combination of the theoretical and the practical.

The school is located on the Biltmore estate from November to April of each year, when the working field is the Biltmore forest, a tract of 8,000 acres managed for the production of firewood for the markets of Asheville and neighboring towns. In this timber the students are taught practical forestry in every aspect afforded by their environment. On the abandoned fields, of which the Biltmore estate holds nearly 2,000, the students are taught reforestation from the making of seed beds to the planting of the seeds, the care of the seedlings and the preservation of the maturing growth. They are taught at the Pisgah forest station and at the planing mill on the estate sawing, manufacturing, inspecting and the general phases necessary to the education of practical lumbermen.

Early in April of each year the school is moved to the mountains, with headquarters at the edge of Pisgah forest, an 80,000-acre tract of virgin timberland. Field work is pursued here for six weeks, particularly in tan bark operations, from which the estate supplies 1,000 cords of chestnut oak bark to neighboring tannic acid factories. The students are taught all phases of the disposition of wood used in the production of tannic acid.

A region in Pisgah forest is known as the "pink beds," so called from the prevailing color furnished by rhododendron and laurel, which grow in profusion in that vicinity, and, in fact, throughout the estate. To this point in May the students are moved and enter into field work in the estimating of standing timber, logging operations,

milling operations and surveying. They enter practically into the various methods of timber estimating, including the strip method, the "forty" method and Schenck's method, and for ten continuous days they estimate on some tract to be cut for an estate mill. Here they endure all the hardships of a timber estimator's life; working eight hours a day, cooking their own meals and sleeping in the open rolled up in blankets. Logging operations are part of the curriculum, and the students are taught the manipulation of logs on the deck and on the carriage in all theoretical and practical ways, the latter including the piling of the lumber and the arrangement of the piles, study of the machines in the mills and the placing of them in new positions.

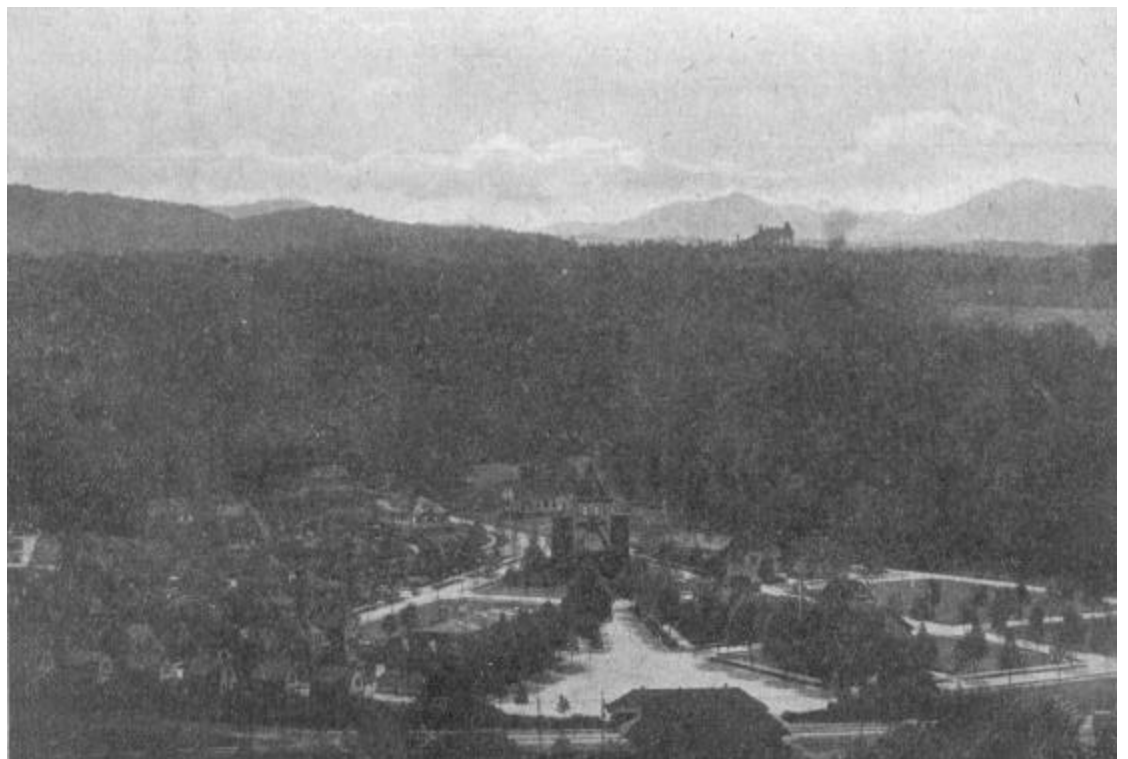
Road engineering is a part of the instruction afforded the Biltmore students. They survey and lay out the roads and build bridges and tram roads, make log chutes, run compass lines, establish boundaries and plane table surveys. Many of the wood roads now on the Biltmore estate, all of which have been constructed under the supervision of Dr. Schenck, are the work of his students.

In a sense the Biltmore Forest School is a finishing school, for the candidate must have some practical knowledge of lumbering and be well grounded in the higher mathematics and surveying. Pupils must be at least 20 years of age and graduates of a high school or a relatively similar institution in good standing, and must have a knowledge of algebra to quadratic equations, the first five books of plane geometry and plane trigonometry. Good health, of course, is an absolute requisite, as hard physical labor faces the students, and he must understand that he will devote all of his time and all of his energy to study in the class room, in the field and in his own room. One year is the full course in the Biltmore Forest School and the number of students to be admitted is limited to twenty-five. Dr. Schenck would prefer a larger number were it possible to give personal attention to more than twenty-five, but upon this point he is insistent, as he desires to confer upon each pupil some of the advantages of his own personality. In lecturing he would prefer a much larger class, but believes that in actual instruction he could not do far justice to more than the number designated as the limit of the school force.

Diligence and gentlemanly conduct are about the only phases of discipline upon which the school insists. All lectures and field work must be attended and no vacations are given during the year. The school graduates are awarded diplomas, granting the degrees of Bachelor of Forestry and Forest Engineer.

Quoting from a publication issued by the Biltmore Forest School:

The instruction is limited to those subjects closely associated with technical forestry. Horticulture and landscape gardening are not included in the curriculum. The instruction in the aux-



Biltmore forests. Biltmore village. Biltmore house.  
 THE BEAUTIFUL VILLAGE BILTMORE, N.C., ON THE FAMOUS BILTMORE ESTATE, A SUBURB OF ASHEVILLE  
 AND ONE OF THE MOST PICTURESQUE HAMLETS IN THE "LAND OF THE SKY."

tion in the auxiliary sciences as far as possible to topics pertaining to practical forestry.

The botanical laboratory is equipped with compound microscopes and with collections of woods. So far as possible, however, the usual laboratory work and experimental studies are conducted out of doors. The famous Biltmore herbarium and its library are open to the students.

Divisions of the general science of forestry upon which instruction is given at the Biltmore Forest School include silviculture, forest mensuration, forest surveying, forest working plans, lumbering and technology, forest finance, forest protection, forest policy, forest work of the federal government, forest planting in the prairie states, which are supplemented by instructions in the auxiliary sciences, including seventeen general subjects, all closely related to forestry.

The tuition fee required by the school is \$200, payable in advance. Students are held responsible for breakage of instruments and are supplied at nominal cost with the requisite text books. Each student is required to keep a horse, a sound animal suitable for the work, which may be obtained at a price ranging from \$100 to \$150. The students pay their own board and lodging, which are obtainable in Biltmore or nearby Asheville at prices ranging from \$6 a week upward. They conduct a club of their own in a club house at Biltmore, the cost of which is borne by the students solely and amounts to approximately \$10 annually for each student. Exclusive of the cost of his horse, which the student usually sells on leaving the school, the approximate net cost for one year's enrollment at the Biltmore Forest School is \$1,000 as a maximum, and it may be obtained without too rigid economy for \$750.

The above is but an outline of the main features of the Biltmore Forest School. It graduates annually robust, thoroughly well equipped, practical young lumbermen and foresters who are naturally regarded as the pick of their kind for those desiring efficient services of this character.

#### Practical Aspects as Seen by a Student.

Supplementing the record of conditions imposed upon students of this school, hear the testimony, given conversationally, by a prospective graduate, C. H. Amadon, the president of his class in the school and whose term of instruction will cease with the present year:

"It is Dr. Schenck's idea primarily to give the young fellows a working knowledge of forestry. He does not pretend to be at variance with Pinchot or Graves, though upon the one hand Mr. Graves says that he wants his foresters to be scientific men, but Dr. Schenck wants them to be practical lumbermen from start to finish and he regards other things than that as side issues. So while we get everything practical of any use in the scientific line, for instance in allied sciences like botany, he gives us practical instruction in conservative but not destructive lumbering. He teaches us to put in a tree where one has been torn out. he does not indorse the idea that forestry is mere planting where timber has been cut off or where it never has grown, but desires to get the public to understand that forestry in this county is conservation and not new forestry or new planting; and that is one of the objects, as I have gained it in my talks with him, of the present celebration. He wants the public, particularly those in influence, to have a chance to grasp this intelligently; to have the celebration written about and published so that the idea of conservative forestry as he understands it can be circulated.

"Dr. Schenck requires ordinarily some knowledge by new students of lumbering. He required me to work in the woods and on the yard before he would entertain my application. I found a job in New York state and worked six months for hardwood manufactures there but handling spruce. My first work was on the yard. I tallied lumber as it went into the car and then went into the woods as clerk, and after two months of that I went into the woods with an ax. I built corduroy roads in the swamps in the coldest weather, when my clothes froze to me.

"After that work was over I went to a relative who ran a little portable saw mill in Massachusetts and did everything but run the saw, and I think I could do that. I even skidded lumber, supplying the mill with logs from peeled hemlock timber. I stayed six months in that work and then came down here.

"I have had a year's experience in the woods down here and now I am ready to 'tackle' anything I can get hold of. The doctor has put us through quite a course of sprouts down here, in the woods, at the mill, on the yard and in inspecting.

"Last spring the doctor wanted to make an experiment in planting hardwoods in the primeval forests, comparing the results with other woods. He set a lot of us at work in Pisgah forest. We had to take the plants out of the nursery, packing them for shipment; then they were sent to the forest and we planted them through the woods. That was a rough experience; not hard work but it taxed our engineering skill or common sense to figure where this and that little tree should be put to get all the overhead light it needed, to determine the situation etc. We had to make the holes, plant the trees 350 a day, and it was no fun to use an old grub hoe in tough ground and several played out at it, but others of us got our plants in in good shape and I put in 1,000 and have 990 left. Some of those little pines, not over six inches high, are now three feet high and in fine condition. We put in on that all the time we considered necessary and where we thought the plantation needed weeding we weeded; I weeded my plantation five times last summer and then, in September, the doctor went over all the plantations to judge which was the best of the lot. He gave a set of Schlich's works for the best plantation."

Young Amadon's observations are quoted at length as illustrative of the spirit of the students of the Biltmore school. These young men impressed the visitors as without exception a fine lot of enthusiastic, wideawake, intelligent, cleancut, embryotic foresters, superb horsemen, well grounded and practical woodsmen, well equipped as surveyors, engineers, inspectors, mentally and physically fit, technically and practically, to enter tirelessly and intelligently into the handling of wooded estates — the finished product of a thoroughly practical course of comprehensive instruction and experience.

#### CHAPTER III—THOSE WHO PARTICIPATED.

In this kind of atmosphere, in environment superbly fitted for the occasion, hosts and guests included the following:

H. W. Barre, botanist, Clemson College, S.C.  
 Ralph G. Burton, forest engineer, Pittsfield, Mass.  
 Robert S. Conklin, commissioner of forestry, Harrisburg, Pa.  
 W. N. Cooper, Asheville Lumber Co., Asheville, N. C.  
 H. C. Crawford, Lidgerwood Manufacturing Co., New York, N.Y.  
 J. Elwood Cox, lumber manufacturer, High Point, N.C.  
 Harry L. Eichelberger, H. L. Eichelberger Lumber Co., Staunton, Va.  
 J. L. English, English Lumber Co., Asheville, N.C.  
 John Foley, first assistant forester Pennsylvania railroad, Philadelphia, Pa.  
 Miles A. Goodyear, secretary C. A. Goodyear Lumber Co., Tomah, Wis.  
 L. L. Harris, Harris & Cole Bros., Inc., Cedar Falls, Iowa.  
 Rutherford P. Hayes, vice president American Forestry Association, Asheville, N.C.  
 C. H. Hechler, manager Harbor Hill Farms, Roslyn, L.I.  
 Homer D. House, faculty Biltmore Forest School, Biltmore, N.C.  
 B. F. Keith, B. F. Keith Lumber Co., Wilmington, N.C.  
 John W. Logan, Wood Iron & Steel Co., Coshohocken, Pa.  
 J. R. Manson, Jr., Petersburg, Va.  
 W. B. McEwan, McEwan Lumber Co., Asheville, N.C.  
 M. W. Otis, Clear Lake, N.Y.  
 C. R. Pettis, State Forester, Albany, N.Y.  
 Dr. M. Ray Powers, state veterinarian, Clemson College, S. C.  
 F. W. Rane, Massachusetts state forester, Boston, Mass.  
 Charles A. Scott, professor of forestry, Ames, Iowa.  
 Edmund Secrest, Ohio department of forestry, Wooster, Ohio.  
 Hon. James H. Stout, president Stout-Greer Lumber Co., Menomonee, Wis.  
 Frederick N. Tate, Continental Furniture Co., High Point, N.C.  
 W. B. Townsend, Little River Lumber Co., Townsend, Tenn.  
 Lamont Rowlands, vice president C. A. Goodyear Lumber Co., Tomah, Wis.  
 J. W. Allen, C. M. Betts & Co., Philadelphia, Pa.  
 Charles F. Whiting, Boston, Mass.  
 Elwood Wilson, Laurentide Paper Co., Grand Mere, P. Q.  
 George Cahoon, Laurentide Paper Co., Grand Mere, P. Q.  
 L.D. Small, Laurentide Paper Co., Grand Mere, P. Q.

H. H. Harrington, Agricultural and Mechanical College, College Station Tex.

Charles L. Tarbert, C. A. Smith Teimber Co., Minneapolis, Minn.

Richard G. Wood, Wood Iron & Steel Co., Conshohocken, Pa.

Charles A. Keffer, University of Tennessee, Knoxville, Tenn.

Prof. John G. Jack, Harvard University, Cambridge, Mass.

Otto Armleder, O. Armleder Co., Cincinnati, O.

A. K. Orr, Southern Railway, Asheville, N.C.

J. E. Defebaugh, editor AMERICAN LUMBERMEN, Chicago.

Judge J. W. Judd, Vanderbilt University, Nashville, Tenn.

Carl Jentz, Champion Fiber Co., Canton, N.C.

E. D. Broadhurst, faculty Biltmore School, Greensboro, N.C.

E. M. Moffett, Moffett Lumber Co., Canton, N.C.

W. F. Decker, Brevard Tannin Co., Brevard, N.C.

Gen. T. F. Davidson, Davidson, Bourne & parker, Asheville, N.C.

W. M. Johnston, Jr., Asheville, N. C.

Clinton Crane, C. Crane & Co., Cincinnati, Ohio.

S. P. Ravanel, Biltmore, N.C.

Charles E. Waddell, faculty Biltmore School, Biltmore, N.C.

J. M. Burns, William Brownell Pl. Co., Biltmore, N.C.

G. W. Griswold, Biltmore, N.C.

Collier Cobb, University of North Carolina, Chapel Hill, N.C.

In addition to the above listed as connected with the Biltmore Forest School, the following, graduates or pupils, were in attendance:

T. J. McDonald, Biltmore.	W. H. Armstrong, Biltmore.
S. C. Eaton, Biltmore.	V. Rhodes, Biltmore.
Jeff C. Richardson, Biltmore.	G. A. Schulze, La Crosse, Wis.
C. H. Amadon, North Adams, Mass.	R. C. Nash, Buffalo, N.Y.
A. H. King, Montclair, N.J.	H. C. Johnston, Washington, D.C.
A. C. Silvius, Sunbury, Pa.	W. H. Dunn, Weston, Mass.
Louis Bolderweck, Chicago, Ill.	P. H. Gearhart, Buffalo, N.Y.
J. H. Voge, Jr., Oconomowoc, Fla.	E. W. Meeker, East Orange, N.J.
L. F. Pratt, Buffalo, N.Y.	J. H. Potts, Sheperdstown, W. Va.
R. I. Mount, Halesite, N.Y.	C. W. Dunning, Buffalo, N.Y.
W. H. Euchner, Lime Lake, N.Y.	R. W. Orr, Michigan City, Ind.
E. B. Dunning, Buffalo, N.Y.	G. T. Withington, Painesville, Ohio.
Hughes Lindsay, Richmond, Va.	
T. J. Weatherbee, Painesville, Ohio.	
H. G. Black, Houston, Tex.	
C. T. Rankin, Biltmore.	
L. N. Palmer, Stonington, Conn.	

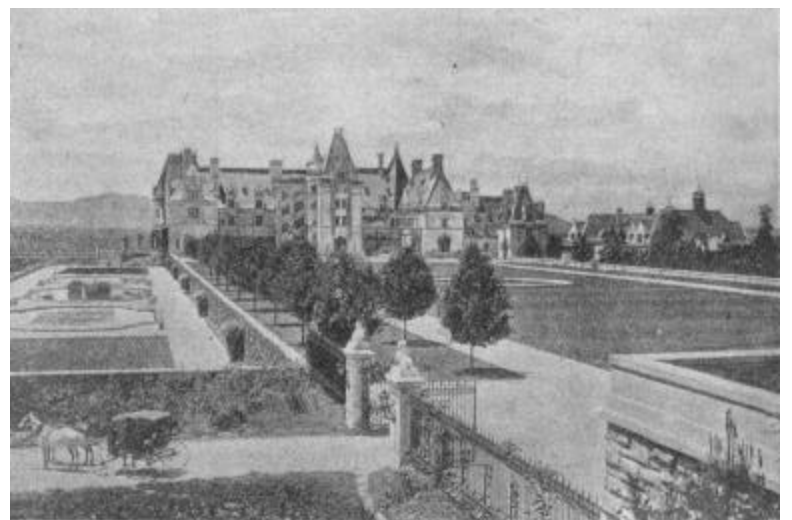
#### CHAPTER IV—THE START FOR THREE DAYS' ENJOYMENT.

An aggregation more in direct sympathy with the purposes of the festival would have been hard to select. It will be noted that the list included the names of members of the faculties of various agricultural and forest schools and those connected with related institutions, of officers of state and national forest reservations, engineers, lumbermen and others directly interested. The Battery Park Hotel had been made headquarters for the visitors and here Dr. Schenck had thoughtfully arranged in advance for comfort and convenience. Aside from attending carefully to their material needs, he had formulated, had printed in neat form and distributed to all of the appreciative a program of the three days' festival, which was exhaustively explanatory and incidentally was characteristic of its compiler. Prior to the inauguration of the festival, otherwise designated the Biltmore Forest Fair, a fair wherein the exhibits were the wares that Nature had produced in exquisite form amid scenic beauty unrivalled on the American continent, Dr. Schenck had caused to be marked various stations on the vast Biltmore estate, denominating these "tips" and numbering then from 1 to 63, the stations encompassing the greater part of the estate and of the features likely to be of educational interest to the visitors. The program was clearly explanatory of each.

In the bright sunshine and perfect weather which prevailed without interruption throughout the entire three days, with eager anticipation of enlightenment on conservative forestry procurable in no other way, a gay procession started from the Battery Park hotel at 8 o'clock on the morning of November 27. It consisted of fifteen open carriages, horses and equipage decorated with the Biltmore Forest School colors, green and white,



CHARACTERISTIC SCENERY ON THE BILTMORE ESTATE.



BILTMORE HOUSE, NORTH CAROLINA HOME OF GEORGE W. VANDERBILT.

and several more on horseback, the latter mostly students of the Biltmore Forest School who had been appointed couriers and outriders for the visitors and who throughout the three days of unalloyed enjoyment and educational plentitude were constantly and courteously attentive to every need of the party. Arrived at beautiful Biltmore village, a replica of thig class English rural life, a half hour was spent in arranging the procession and at 9 o'clock it started on its first day's outing.

#### CHAPTER V – LECTURES BY A FOREST EXPERT.

Dr. Schenck's main purpose in this forest fair was the delivery of a series of lectures upon conservative forestry appropriate to and as illustrated at each of the individual "tips." Through the handsome eastern gateway of the Biltmore estate, their host in the lead, the party drove over the first of the hundreds of macadamized roads winding throughout the estate, past Dr. Schenck's office and school building and the estate's truck farm to a point about two miles from Biltmore, on a steep hillside. Here all dismounted and Dr. Schenck delivered his first of many lectures.

It is to be regretted that under the circumstances accompanying the delivery of these lectures as exactly faithful stenographic report of the lectures and of the innumerable questions and answers with which they were punctured was not obtainable. This was made a mechanical impossibility by Dr. Schenck's rapid movements over hillsides and narrow mountain trails, the rustling of innumerable fallen leaves, the crowding of eager listeners and other causes, but the report which will follow is a fairly faithful reproduction of the lecturer's discourses.

Dr. Schenck's activity in the field is discouraging to the tenderfoot, as it must have been in their earlier days on the Biltmore estate to his students, who now, however, reflect the tirelessness of their leader. Up and down mountain trails, over heartrending barriers, brushing aside apparently impassable thickets, with unwaried mountaineer's stride, Dr. Schenck was always in the van of the party. At Tip no. 1, on a stiff hillside, he said to the eagerly attentive listeners crowded about him:

"This is an old cattle pasture of about twenty-two acres. The whole tract was very badly eroded and there was not a blade of grass on the place. The erosion was frightful and something had to be done. I did not think at that time that I could plant it successfully with a few white pines; I was quite sure that it would be eroded out, but I drove stakes and interwove the ground at considerable expense, the little white pines took hold quickly and the erosion was stopped absolutely. We planted the little pines in spade-made holes and there was no cultivation of the tract. The pines planted then were four years old, sturdy plants. They were planted close to prevent the formation of lower branches.

"I am sure that here in time lumber will be more high priced than anywhere else in the world. We are figuring now for white pine plantations like this at \$15 an acre, under normal conditions. On poor ground, stony and the like, the expense might be \$20. The growth in a plantation like this will average about 500 feet board measure. When the plantation is twenty years old I will have the investment back, without interest. I do not want to wait a thousand years but want early returns.

"We handle the forest tree which pays best, and at Biltmore intensive forestry pays best. The fixed charges are the same and our investment is actually only \$15 and our loss of interest is from 4 to 6 percent. This plantation is, I would say, as good as the best that I know of in this or in foreign countries. From eighty to ninety years will be the longest period when any of the trees will stand.

"The trees are the greatest water consumers in the world. They drink more water than a North Carolina lumberjack drinks whiskey."

#### Human Foes of the Forest.

The speaker called attention to the thick layer of humus underfoot, a blessing to the forest and coppice – "until some fool comes along with a match and destroys everything. You can not prevent fires absolutely, because there is always sure to be some fool in the south, especially the pot hunter. These set fires right and left to prevent my rangers reaching them, keeping the rangers busy fighting the fire. Though I am not a southerner by birth it hurts me to hear so much of the lawlessness of the south, yet as illustrated here it is lawless.

"We do not clear off the lower branches on the little trees, finding that the close planting will clear them up of itself. Yellow pine is more persistent in this respect than white pine.

"Being close to the market I have conditions here which you do not find anywhere else except in Europe, and the system you see here is very largely German, especially in the matter of transportation.

"The best idea in pruning would be to prune off a branch immediately after it dies; otherwise you get a dead knot in the timber, and if you want to prevent that you should go into the woods every year and prune off every branch as it dies, which is impossible financially. I would prune the best trees—the trees of the future—expending 3 cents on each tree for, say, 200 trees to the acre. On the others it would not be worth the while."

#### Lessons for the Lecturer.

At this point the lecturer urged his audience on to higher ground, at Tip No. 2, overlooking the fertile truck farm of the Biltmore estate, to the east. Here he said:

"This plantation is in hardwoods of white oak, chestnut oak, of ash, of white walnut, butternut and black walnut, black cherry and maple. I planted on this slip to grow ten

bushels of nuts and acorns. The plants began to come up fairly well and I would have succeeded in raising what I wanted, a hardwood forest, had it not been for a little devil in the shape of rabbits, and they are still here. My attempt here to raise hardwoods has been frustrated entirely by rabbits. We have been battling with them continually, but it seems impossible to oust them. The weeds also covered the hill and choked out the walnuts and the oaks, depriving them of their foods. There were here many millions of sprouts of sage grass.

"I thought it was easy to raise hardwoods here because nature told me that on the adjoining slope there must have been a hardwood forest originally. I looked up to nature and determined to plant hardwoods. But it would not work. If I had had more sense I would have looked to nature on the abandoned fields and found out that there is no regeneration of hardwoods. Yellow pine everywhere takes possession of the abandoned fields and I should have planted pine to begin with.

"One thing proved very interesting to me right here: when the hardwood plantation proved a failure I doctored it up with pine and that made a good growth from their fourth year and then the hardwoods took a spurt and their life has been made easier apparently by the admixture with the pines. We know very little of the life in the soil. We need a genius like Burbank or Edison to tell us of the biology of the soil, because on this soil depends the life of the trees. Someone has counted the bacteria in a gramme of soil, estimating them at 200,000 to the gramme. Of this life we know nothing except that it is interwoven with the life of the trees.

#### Interdependence of Different Species.

"In my opinion the pines are influenced favorably in growth by the ushering in of the hardwoods. I began to plant the hardwoods in 1898 and doctored the woods up from that time until 1900. The work has been done from time to time and hence you find a great irregularity, and the expense bill has been much greater than if I had started with the pines, which could have been done at \$10 an acre



ONE METHOD OF HAULING LOGS IN THE NORTH CAROLINA MOUNTAIN COUNTRY.

but the expense has been more than \$25 an acre. If I get 30 percent of hardwoods and 70 percent of pine I shall be glad."

Dr. Schenck here led his pupils farther up the hill, to an obviously different growth of trees, and said:

"This is a black cherry plantation. Some of the first planting which I did here was trees four feet high. The pine has a splendid effect on the black cherry. I find very often that black cherry, after the pine has had a start of about ten feet, begins to shoot up. In the old plantations that is wonderfully well demonstrated. I have never seen pure forests of black cherry; it requires apparently the companionship of other species. I believe in a scattering of the pine and oak and a good proportion of black cherry. Black cherry goes very well also with hard maple."

At a nearby point, illustrating by uncovering some of the lower part of the trees, the lecturer said:

"We have lost fully 50 percent of our locust plants by mice chewing below the ground. The seeding of locust is about the cheapest that we have. We want here a variety of species."

Moving farther and stopping to apologize for what he called his "oratorical barrel organ," in which denomination of his educational efforts he was in a lonesome minority. Dr. Schenck continued:

"These little oaks were planted when about one year old and about two feet high. They have done much better because the slope is better. It costs us practically nothing for oak seed."

After which Dr. Schenck illustrated the method of planting small oaks and proceeded to another point on Tip 2.

#### Western Woods in the East.

"This," said Dr. Schenck, "is Douglas fir from Colorado, the Rocky mountain variety. The fir from the state of Washington does well, but Douglas fir from Colorado has not done as well. This is the yellow variety and was planted in 1896 when 4 years old, so it is 16 years old from the seed, and none of it is higher than six feet.

"The best Douglas fir I have ever seen was in Germany and it comes from Washington. They out-grow the spruce in rapid development, yet at Biltmore when 16 years old they are only of very small size. The treekind is like mankind; some boys do not develop well in their first sixteen years, but afterward one may develop into a president of the United States. If a species does poorly locally to begin with it is wrong to assume that it will do badly all its life. Frequently after they get a fairly good start, particularly if they have plenty of good water, they start up well. I gave these the best slopes that I could find – northern slopes are the best for the trees – yet they have not done well at all. Some of them are only a foot high now; the highest is about seven feet.

"What we are doing here is experimental. I have no patterns by which I can work, and the experiment is somewhat expensive. From the investor's standpoint it is somewhat unwise to be the first experimenter.

"I planted here white pine with black cherries and the trees have done remarkably well. After the pines catch up I am sure the black cherries will be safe.

"Here are sugar maples planted in 1898 when 3 years old. The sugar maples in the bottom of the cover, where there is more moisture, have done best, showing their dependence on moisture in the soil. It is a pure plantation in sugar maple and it does well in pure stands.

"Here is where I planted bushels of chestnuts on top of the hill, and they are all gone. I was induced to plant chestnut there because the original stand was chestnut. Professor Sargent induced me to make that experiment at considerable expense, but it is the worst kind of experiment on abandoned fields. Of chestnut wood we sell by retail 3,000 cords annually.

"I planted here white pine, ash, magnolia, leaving them entirely to nature. This is experimental, to show that we need not endure the wholesale destruction of the forests."

With his Dr. Schenck led his party to Tip No. 4, passing Tip No. 3, which was a demonstration in "thinning." Several of the "tips" were passed in this way as relatively unimportant, especially in view of the time at the command of Dr. Schenck and his party.

Further installments of this report will tell of additional lectures by Dr. Schenck, of luncheons eaten with zest in the open air, of the climbing of stiff mountain sides, of the fording of rivers, of enlightenment for the most erudite foresters, botanists and lumbermen in this well informed party, of numerous other features of a picturesque, educational outing the like of which is unprecedented in American forestall and lumbering history.

(To Be Continued Next Week.)