

## The Biltmore Forest School: Poking Back into an Extraordinary Time

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### ABSTRACT

Our nation's first school of forestry operated in the early 1900s, when states were still being admitted to the union, and the motor car and typewriter had just been introduced to the American public. In the previous century, timber operations had slashed their way through forests with the simple policy of "cut and get out." To farmers, trees were obstacles to plows. The popular writings of Aldo Leopold describing the concepts of forest stewardship and the organization of natural communities would not appear for another four decades.

**Key Words:** Forestry; history; education; economics; ecology; North Carolina.

Julian Weatherbee was my grandfather on my mother's side. When he died in the mid-1970s, I inherited his old roll-top desk (Figure 1), hand crafted to his specifications when he was a forester in the state of Washington. It was well built, and the western oak withstood both the escapades of grandchildren and the moves from Spokane to New Hampshire to Baltimore to Raleigh. To my surprise, on arrival it still held its original contents. I examined the sundry objects as I sorted them into appropriate drawers. The upper roll-up work space was to become mine, compartments to stash unanswered letters, unpaid bills, envelopes, and checkbooks, with the small drawers for pencils, dysfunctional pens, paper clips, stamps, rubber bands, and all the other things that are accustomed to living in desks. The top of the desk, above the roll-up compartment, became a display area for various memorabilia from three, perhaps four family generations: mostly old photos, interesting hand-me-down artifacts, and an old brass lamp from God knows where. The six larger drawers in the lower half of the desk would remain the domain of my grandfather's clutter: space for his World War II ration books, several well-smoked pipes, family genealogy charts, protractors, slide rules and compasses, pens that you actually filled from inkwells, a number of black-and-white photographs, degree and award certificates, and class notes from when he attended forestry school in western North Carolina. Noticeably lacking was anything that was photocopied or made from plastic. I felt a little guilty when I drilled a hole through the back for my laptop cables, but it is a solid piece of furniture, and what is one little hole? Geez!

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One of the items I discovered among his piles of papers was a printed copy of his school's standards for admission. The Biltmore Forest School, the first forestry school in the nation, was open to men who were high school graduates in good standing and at least 20 years of age (Figure 2). High school studies were to include "algebra to quadratic equations, the first five books of plane geometry, and plane trigonometry." It was recommended that applicants have at least 3 months' experience in lumbering or in the government service prior to enrolling. There was a probationary period, and enrollment was limited to 25 students. The admission fees were of interest too, particularly by today's standards: Tuition \$200, Board and Room \$330, Incidentals (including railway fare, clothing, club dues, study excursions) \$200, Care and feed of horse \$160, Books \$20. Yes, a horse – each student was required to have a horse. The cost of the horse itself (\$100–150) was not included because departing students usually sold them to incoming students for what they had cost. Thus, the total cost, minus the horse rental, was \$1000 in 1908, the year my grandfather enrolled.

My grandfather's handwritten class notes from his days at Biltmore were the most informative item. Although I had the desk and its contents in my possession for over 30 years, last month I decided it was time to read through them. A hundred years seemed an adequate time for the contents to have properly aged. There were four bound notebooks: two from class lectures and what appears to be class assignments and two for field notes from class excursions (Figure 3). I could immediately see from these notes that the lessons were well advanced for their time. For example, the notebooks contained explanations of the principles of ecological succession, a topic that was not described formally until 1916.

In addition to class notes, the books contained my grandfather's detailed sketches of native trees – not just the leaves and twigs, but also enlarged likenesses of their seed pods and sometimes of the individual seeds (Figure 4). What quickly caught my eye were four illustrations of winter twigs of poplars and one willow. The twigs, of course, had no leaves in November, and my grandfather's pencil sketches carefully illustrated each species' distinct placement of buds. I laughed. This was

both ironic and haunting. Was this the ghost of classrooms past? My first graduate-level botany class opened on a cold night, when we went outside on our professor's farm and learned to identify several dozen woody plants by their bud placement. I could actually identify these trees in the drawings. Was I the victim of an ongoing educational plot handed down through the generations from my grandfather's schooling?

Besides the actual forestry lessons, the notebooks contained information about various wildlife encountered on field excursions. There were lists of birds seen at specific sites with comments about their behavior. Here and there were remnants of plant specimens that had been taped to the pages, and sketches and names of wildflowers that he came across. It was a hodgepodge of information, but, as I read on,



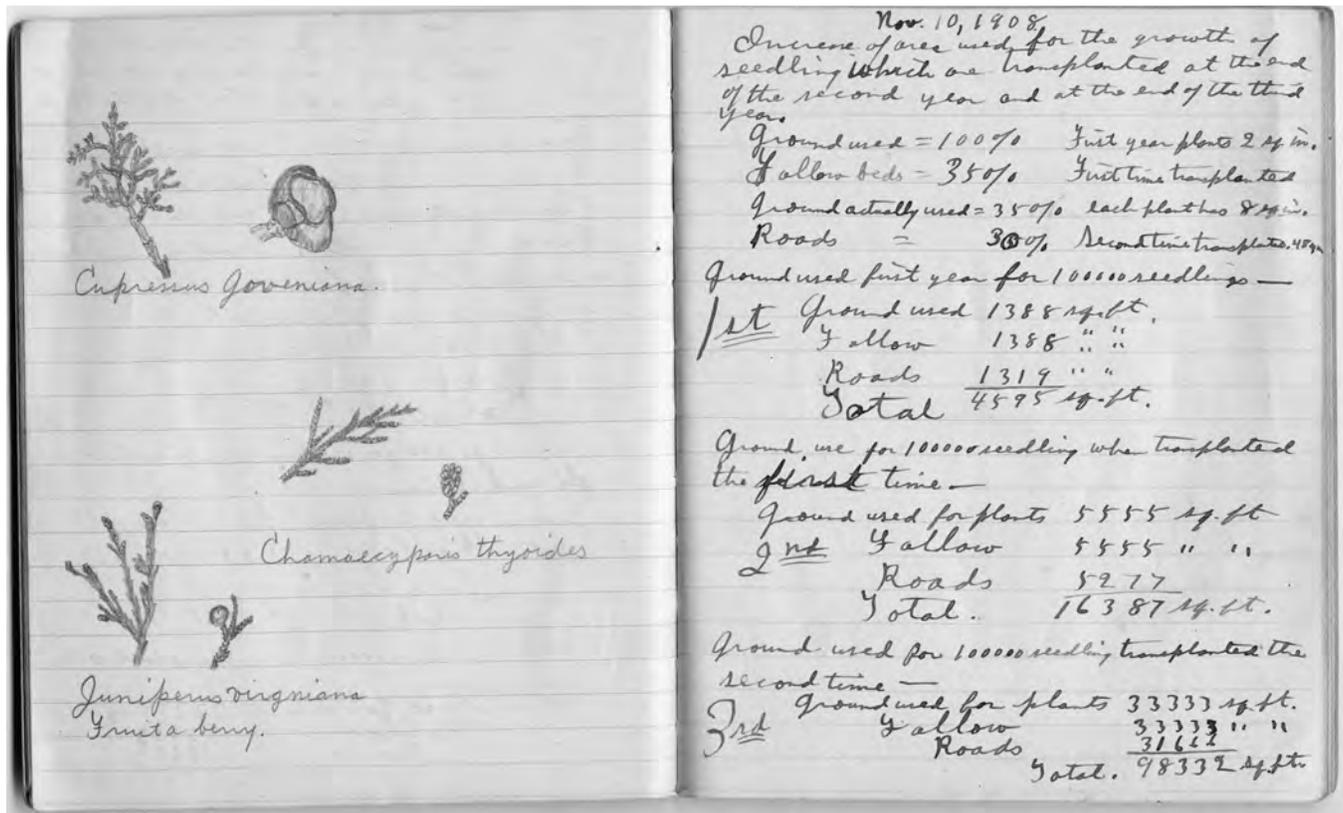
**Figure 1.** This antique roll-top desk held the original class notebooks of the author's grandfather, Julian Weatherbee. Dating back over a century, they provide insight into what was taught at the nation's first school of forestry. (Photo by M. McGall, NC Wildlife Resources Commission.)



**Figure 3.** The class notebooks of Julian Weatherbee, found secured in a lower drawer of the desk, provided a highly detailed understanding of the varied content of the school's program. (Photo by M. McGall, NC Wildlife Resources Commission.)



**Figure 2.** The Biltmore Forest School's class of 1910, near Asheville, North Carolina. Julian Weatherbee is in the second row, first on the right.



**Figure 4.** This school operated long before there were field guides. Students made sketches of the actual plants in their personal notebooks, allowing later use of their illustrations for plant identification.

collectively it became a rather good overview of the region's natural history.

With even a quick skimming of their contents I could understand the need for the math prerequisites. Pages were filled with formulae and geometric drawings illustrating theoretical solutions to the transport of timber down steep mountain gradients. Then there were the field problems. "Weight of the locomotive is 35 tons, grade 4%, frictional resistance on curves 2%. How many board feet of hemlock can be pulled up hill if the weight of the cars is 4 tons each?" I will skip the algebraic calculations, because I don't actually understand them, but the answer was 81.66 tons (I guess you just somehow knew how many board feet that would be?). There were also notations for determining the amounts of wood that could be hauled by yoked oxen.

And there were descriptions of strip transects through various wood lots where the students were apparently required to identify and count all the trees, calculate the number of logs for each type of wood, and then come up with the total number of board feet of lumber and its value. Between the pages were folded pieces of graph paper where students had mapped tree stands and, by pacing, determined their exact areas down to hundredths of an acre. There were lessons in projecting the cost of getting a cord of wood to market (\$0.60 for cutting a cord of firewood, \$1.50 for hauling it to the Biltmore mill. \$1.50 for sawing and delivery to Asheville, and a \$5.85 selling price in Asheville. Profit \$2.25). And there was much attention to detail: "Monday April, 26, 1909. The buds of *Magnolia fraseri* are now opening. As each bud scale comes off it leaves a scar around the twig. The first two or so scales from the outside are not attached to the leaves, but all of the inner ones are." From what I was

reading it appeared that the combination of course expectations and field experience was much more demanding than today's college curriculum.

The information appeared in no logical sequence – one paragraph would describe a milling operation and the next sentence would be about the horse running off. But the scattered information could be pieced together and drawn into the historical context. "Dr. S showed us the last plantation he had made with chestnut. It is a failure and Dr. S said that chestnut will always be a failure until it is of enough value so that more money can be spent on its cultivation." At that time, chestnuts at the school were cut primarily for the production of tannin used by the local hide industry. The Biltmore estate, in addition to 1000 cords of bark, was under contract to harvest 1500 cords of chestnut a year to sell to the fur market for tanning pelts. This was prior to the disappearance of the American chestnut from the landscape. The chestnut blight, first observed at the Bronx Zoo in 1904, took 40 years to spread through the total range of the tree, killing off one of the major components of our middle-latitude deciduous forest.

The class really traveled – heaven knows the actual number of frequent-saddle miles they accumulated – but there were trips throughout the southern Appalachians, some as far as to northern Georgia to visit various examples of experimental forestry plots and natural forest at different elevations. I found that the notebooks were filled with place names and descriptions of exact sites, many of which I had visited 80 years later while doing breeding-bird surveys in the North Carolina mountains. This was a little eerie. There were other places I wondered about; where exactly did the "lower" ferry cross the French Broad? And this implies there was also an upper one. Then there was the large pilot snake (black

rat snake) found on 16 July 1909 at Pink Beds, a site the school moved to between May and November; my grandfather used three-quarters of a page to describe its defensive behavior. Was this a relative of one I found there in the early 1990s? Humans are not the only beings with a heritage.

Among the desk's secrets were a number of pamphlets and similar publications about the school and its classes. Looking through the school's curriculum, I was impressed with the course of study: silviculture, forest mensuration, forest surveying, forest working plans, lumbering and technology, forest finance, forest production, forest policy, forest work of the federal government, forest planting in the prairie states, physiological anatomy of plants, general morphology and classification of plants, wood structure, identification of woods, classification and distribution of the forest trees of the United States, field identification of trees, herbarium of woody plants, fungus diseases of trees, preservation of timber, forest entomology, forest zoology, propagation of game and fish, forest geology, elementary climatology, forest geography, elementary law, and economics. Most of these were 3- and 4-week courses, but many were longer, and the students were given an individual grade for each. There were visiting instructors, most well-known naturalists and foresters of their time. They came from the U.S. Biological Survey, the Bureau of Entomology, the New York Botanical Garden, and the U.S. Forest Service. Professors from various universities and representatives of commercial timber companies also assisted with the instruction. Mixed among various papers was a brown-covered publication "for the use of students at the Biltmore Forest School" titled *Outlines of Lectures on Zoology*, by none other than C. S. Brimley, who founded the natural-history museum where I worked for 30 years. He and his brother started the North Carolina bird collection that I curated, and it was literally his original files, and actual office desk and chair, that I used throughout my career. The connections were becoming intertwined and a little weird.

The school's overall curriculum was far ahead of its time. For example, Brimley's concluding lecture in his booklet was on evolution, a concept that we were forbidden to use in museum exhibits and public education programs in the mid-1970s. The basics of ecology were not yet thought out, yet the school's strength was in a series of mini-courses that tied together not only what drove the forest ecosystem, but all the associated economic considerations regarding the production and harvest of timber and need for planning and public policy necessary for long-term forest management.

This all began in 1895, when George W. Vanderbilt brought Dr. Carl A. Schenck from Germany to manage the vast forested lands of Vanderbilt's North Carolina Biltmore Estate. The 30-year-old Schenck replaced Gifford Pinchot as the estate's forester. Pinchot was another pioneer of modern-day forestry techniques, who after 3 years at Biltmore went on to become the first chief forester for the U.S. Department of Agriculture. Schenck immediately began introducing new sound and practical forest-management techniques. Over time, Schenck realized that he was constantly explaining to his workers and others in the community what he was doing and how his methods would result in long-term healthy forests. This eventually evolved into an on-site forestry education program.

With Vanderbilt's blessings, the Biltmore Forest School was opened in 1898, becoming the first school of its kind in the New World. It was a good deal all around. At the time, the Vanderbilt estate represented 200 square miles of mostly forested lands that needed attention. Because of its extremes in elevation, the tract, which today is mostly national forest, supported a variety of types of southern Appalachian forests and

was the ideal study site. The school itself was little more than several of the estate's abandoned farm buildings, but it offered an intensive 1-year course of study. The key aspect was hands-on work in all aspects of forestry supplemented with classroom lectures in modern silvicultural theory. The concept was learning while doing practical forest management, applying what was taught in the classroom.

A 1908 booklet prepared for prospective students states that

a forest school cannot make a fully fledged forester: it can only lay the foundation and point the way out. Mastership in any profession comes only after long experience in practical work. It is as true in the woods as it is in the hospital or in the railroad shop that a man of merely theoretical training is utterly useless.

This statement seems to sum up rather well Schenck's philosophy of education. The students learned not by watching but by doing. One of the class assignments was laying out an additional 10 to 12 miles of logging roads through the Biltmore estate each year. To drive home the expected work ethic, the booklet advised the would-be students that in addition to the 8-hour days, they were expected to prepare their own meals, care for their horses, and look after their own bedding. As part of their training, Schenck wanted each student to experience the life of a forester (Figure 5). The students learned, and Vanderbilt's lands were properly managed.

Schenck was a demanding but highly respected teacher; as his students took to their studies, they recognized the importance of his innovative ideas about forestry. He followed the progress of each student closely. Many of the pages in the notebooks were graded, and Schenck did not fail to boldly strike through and clarify notations that were not exactly correct. Often his comments, which appeared now and again over my grandfather's notes, were simple, brief, and straightforward, like "NO!" There were no forestry textbooks available for his students to use as reference material, so Schenck had a number of his lectures on forest policy and forest protection published in 1904, followed by another series of them 5 years later. Copies of these were also among my grandfather's belongings, their margins filled with penciled notes.

From my grandfather's notebooks it appears that he started at the school at age 20, in early October of 1908. In November of that year, the Forest School hosted the Biltmore Forest Fair. The students all helped in presenting the school's accomplishments and the needs for practical and scientific forest management to the visitors. The notebooks tell us that in the days before the event, the students spent all their time labeling trees. The 3-day festival celebrated the 10th anniversary of Schenck's and Vanderbilt's school. The event exhibited to the public the new concepts of forestry that were being taught as the visitors took tours of the various forest plantations on the Biltmore estate. Schenck, in typical form, was the guide, giving detailed information on soil composition, seed regeneration, planting techniques, and innovative logging operations. The fair clearly demonstrated the actual results of the new forestry practices to the region's lumbermen, foresters, furniture manufacturers, and even professional botanists and university professors. Newspapers picked up on the event, and their articles and editorials publicized the importance of the school's contributions.

Photographs of the students and their horses that I found in the desk depicted bare landscapes, treeless mountain ridges denuded by decades



**Figure 5.** In order to experience the life of a forester, the class camped in the mountains of southwestern North Carolina between May and November. The students learned forestry from both class lectures and first-hand experience in the field. Julian Weatherbee stand third from the right.

of commercial lumbering operations. The American frontier had pushed through the region about 1790; the land had been largely logged in the century that followed, and erosion was a major problem. Once the steam engine came into wide use in the late 1800s, commercial logging at high elevations increased, with the most destructive cutting of the region's forest occurring not much later, during World War I.

By 1909, Schenck and Vanderbilt had several major disagreements, the Forestry School was closed, and Schenck returned to Germany, taking a number of his students, including my grandfather, with him. In the desk were two additional notebooks from my grandfather's studies with Schenck in Germany between 24 October 1910 and 21 February 1911. (This apprenticeship explains the origin of the Black Forest cuckoo clock that hangs in silent disrepair over the roll-top desk.) The school continued to operate, primarily in the famed Black Forest, through 1913. During its 15-year existence, the school graduated over 350 students. My grandfather returned to the States and later became a forester for a large Indian reservation in Spokane, Washington. He worked there for a number of years as one of the first rangers for the newly formed Department of the Interior's Office of Indian Affairs.

In 1916, before completing his term of office, Teddy Roosevelt had kick-started the conservation movement with his creation of national parks. At this time all the national forests and parks were in the western states, but they already comprised over 147 million acres of public land, lands needing men to oversee their stewardship with modern forestry programs. In the Biltmore school's relatively brief history, it provided the foundation for both forestry education and modern-day forestry practices. The school's graduates were the first generation of professional American foresters. The teachings of sustainable forestry at Biltmore

have continued to influence forestry practices on both private and public lands. Since the Biltmore days, schools of forestry have sprung up all over the nation. Top-of-the-line ones like those at North Carolina State and Duke universities are widely recognized for producing state-of-the-art foresters. The academic forestry curricula of these and other universities were at first largely modeled on the successful program initiated by Schenck.

In the late 1800s and early 1900s, the assets of our forests and their management needs began to come into focus as civil servants in Raleigh overseeing the state's economy looked for ways to promote North Carolina. Large slabs of wood of commercially important trees from the Appalachians and other parts of the state formed one of the major components of a traveling exhibit that made its way to various international expositions and fairs. They were sent from Raleigh to Chicago, Paris, St. Louis, and other prominent cities. The large cross sections of wood from 130 native trees collected by foresters Gifford Pinchot and W. W. Ashe formed an exhibit showing off the commercial potential of the state's forests. These traveling exhibits attracted companies interested in large-scale furniture production to the state. When not on exhibit elsewhere, the rock, mineral, and wood specimens became the focal pieces for exhibits at the newly founded State Museum of Natural History. State geologist W. C. Kerr, who was responsible for first assembling the display, wrote that "The people of the state have been accustomed to regard and to treat the forest as natural enemy, to be extirpated...by all means with any cost." With the coming of the new science of forestry "all that has been changed." The exhibits offered people a new appreciation of North Carolina's natural resources. The need for the Forest School had been established just prior to Schenck's arrival at Biltmore, and the state's

promotional campaign was still in progress as the Chicago and Paris world's fairs were both conducted during Schenck's tenure.

Even though this goes back only two generations in time, it is hard to imagine that early-1900s world. Pioneering naturalists like Asa Gray and Audubon had recorded their major discoveries in the southern Appalachians only half a century before the founding of the school. The fundamentals of game management in North America had yet to be understood, yet aspects of this too can be seen in Schenck's teaching. It was a period when our early naturalists were still exploring the mountains' secrets; brooks full of salamanders, and woodland shrews and other small mammals, still awaited discovery.

I was aware, even from a young age, of my grandfather's knowledge of forests and their composition of various trees. Often when we were driving about, he would interrupt my grandmother's constant babbling to name the trees in a forest or to estimate the number of board feet of lumber in an isolated grove of white pines. He was the only one in the family who took an interest in the sundry collections of toads, snakes, and turtles that I kept in the basement, and one weekend he helped me build an outdoor cage for my pet skunk. Because of this, I was not surprised when my grandfather took considerable interest in my freshman college botany course. I had come home for spring break to find that my grandparents were visiting. He studied my botany text with great attention. A day or so later, when I mentioned that I was expected to collect, mount, and name 50 native plants as part of the course, he was eager to help. At the time, I was unaware that he had been through the same drill 54 years earlier. With his help, by that weekend I had identified and collected 150 different plants. Even though it was mid-April, I waited till the end of the semester to turn them in. A little extra credit always helps, or so I thought. The professor graded the assignment by subtracting points for anything that was wrong. Misspelled scientific names and names for plant families, capital letters in the wrong place, and species my professor did not realize were native, were each worth a minus one. My end grade was OK, but it would have been far better if I had

limited myself to just 50 common plants. (I see from his papers that my grandfather got 100% on his plant herbarium.) In addition to the botany, I learned that this was a grading method I clearly did not want to duplicate in my teaching career. And ever since that one course, I have seen no point in doing anything ahead of time.

I recall one summer when, after I had just been put to bed, my grandfather was in my room telling me to get up. We were visiting my grandparents, and I was probably only five; I have no idea what time it was, but the summer sun stays up late in New Hampshire. I was taken to the backyard garden and shown a wood turtle as she laid her eggs. I watched for close to an hour as she carefully covered up her completed nest and in the dimming light headed off into the woods. I retain few memories from that early age, but this is one that stuck. To this day, I am not clear whether that was a life-defining moment, or if my grandfather had simply figured out that my-life long interest was predisposed. Either way, somehow Schenck's total-immersion teaching techniques were passed on, and decades later I felt obligated to make use of them when I was teaching.

Much to the disappointment of my father, like my grandfather who must have equally disappointed his parents, I chose not to enter the business world. My grandfather walked away from a lucrative Ohio-based business, the first chain of five-and-dime stores in the nation. His grandfather had done the same, turning his interest to whaling. While it was a totally different undergraduate course, I suspect that the genetics stuff taught to me in college actually works. My cousin was lucky; he just got my grandfather's curly hair and was able to have a successful life-long career designing airplanes. I still find myself outdoors watching bugs and lizards.

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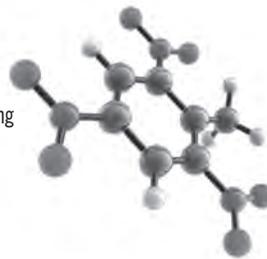
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