Biographical Portrait

EDMUND P. SCHULMAN

(1908–1958)

By Thomas J. Straka

The Ancient Bristlecone Pine Forest is located in the Inyo National Forest at an elevation of about 10,000 feet in a remote part of eastern California. The best place to view the bristlecone pines (*Pinus longaeva*) is at the Schulman Memorial Grove, in the White Mountains. It is here that Edmund Schulman, bristlecone pine, and dendrochronology all came together in a fascinating forest history story.

Edmund Schulman was born in 1908 and raised in Brooklyn; he attended New York University and Brooklyn College before moving to Arizona and attending Arizona State Teachers College. In 1932, he was hired as an assistant to Dr. Andrew E. Douglass, an astronomer at the University of Arizona who was studying the relationship between sunspot cycles and climate change by examining tree rings. Douglass is the founder of modern dendrochronology, the study of tree rings to determine past climatic conditions.[1] His use of dendrochronology in the 1920s to determine the age of the ancient Pueblo Bonito settlement in New Mexico helped rewrite the history of the Southwest and generated enough funding for Douglass to establish the Laboratory of Tree-Ring Research at the university in 1937.[2] After Schulman's hiring, the two collaborated on the development of tree-ring analysis methods.

COURTESY OF THE LABORATORY OF TREE-RING RESEARCH, UNIVERSITY OF ARIZONA

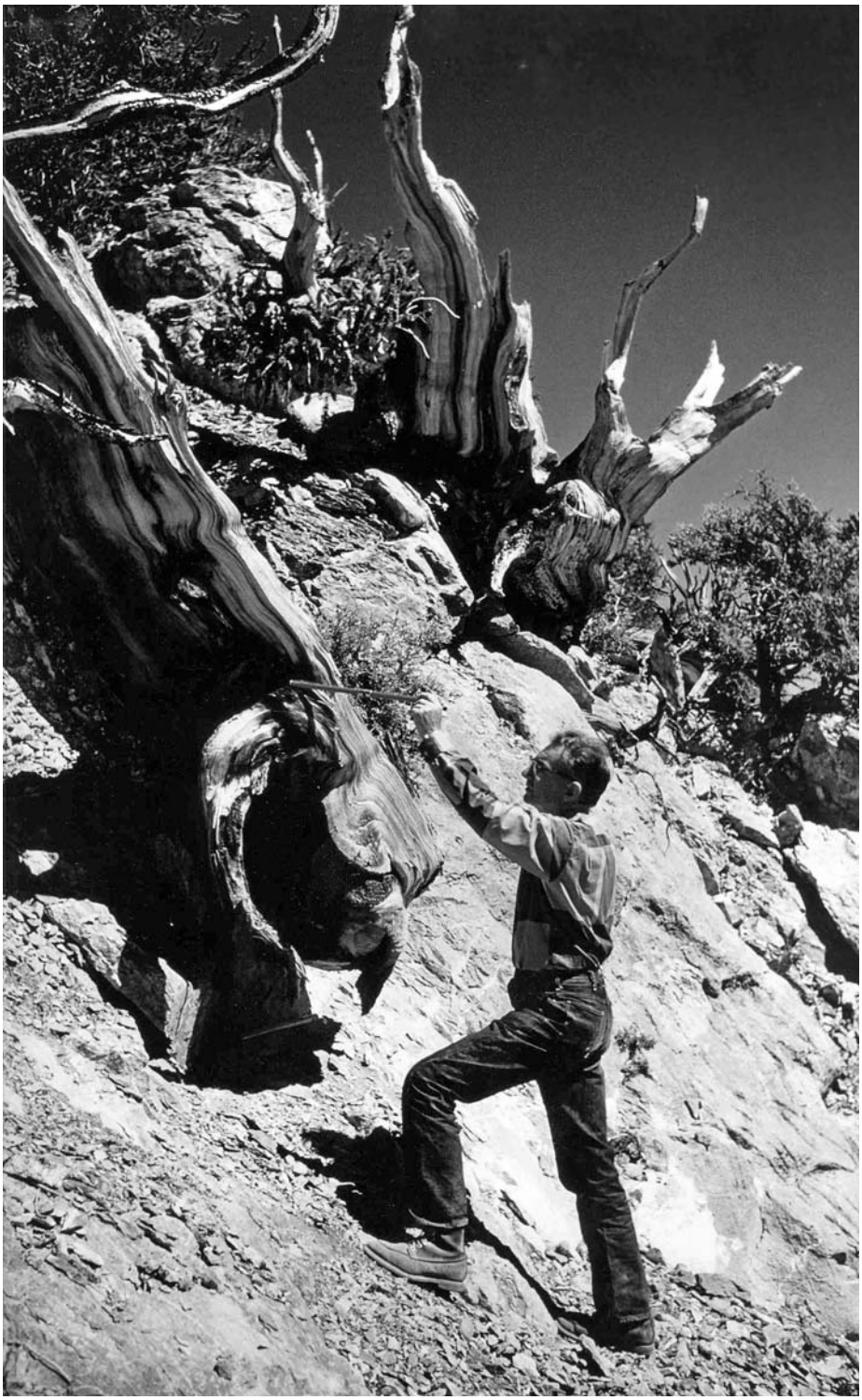
Edmund Schulman, holding a bristlecone pine core sample from a 4,200-year-plus tree. Behind him sits a cross-section of a bristlecone pine tree. This photo was taken just a few months before he died in January 1958.

EARLY CAREER

After Schulman earned his B.S. at the University of Arizona in 1933, Douglass made him an assistant astronomer at the Steward Observatory. Schulman received an M.S. from Arizona two years later. To enhance his academic and research backgrounds, in 1939 he earned an M.A. in climatology at Harvard, then returned to the University of Arizona as the Laboratory of Tree-Ring Research's dendrochronologist and took over as editor of *Tree-Ring Bulletin*. After earning his Ph.D. from Harvard in 1945, he joined Arizona's faculty as a professor and resumed his duties in the lab.[3]

Schulman represented "Douglass's best hope to carry on the work of climate and tree-rings, seeking the elusive cycle of astroclimatology." Where Douglass was Victorian and intuitive, Schulman was modern and quantitative. Schulman brought rigor to their analyses and made the new science of dendrochronology more exacting.[4]

Schulman's early publications centered on astronomy, mathematics, statistics, tree rings, cyclograms, and—of increasing interest to him—climate. These early publications were a good indication of where his research would lead. In 1936, Schulman summarized the focus of his research: "The fundamental problem of tree-ring analysis may be formulated as follows, in three phases: (1) Are these recurrence phenomena in past climate? (2) What are the elements of such recurrence phenomena? and (3) Is there sufficient law and order in these elements to enable accurate long-range prediction of future climate?"[5] By addressing these questions, he became the first to apply dendrochronological analysis with climatic reconstruction as a direct goal.



COURTESY OF THE USDA FOREST SERVICE—INYO NATIONAL FOREST

Edmund Schulman preparing to take an increment bore from an ancient bristlecone pine. Bristlecone pines grow in isolated groves at or just below the tree line on the California-Nevada border, an area subjected to cold temperatures, dry soils, high winds, and short growing seasons.

Schulman began searching for the trees with the longest life spans, focusing first on sequoias. To that end, he advised researchers to avoid trees in "highly exposed places" because "strain and desiccation due to wind often introduce much irregularity into growth," and that the most likely candidates would "possess cylindrical boles [trunks]."[6] He would later find the opposite was true for both: trees achieved longevity under adversity, and he could work with twisting, turning trunks. Sequoias, it turned out, could not be used because they grow in semihumid areas and are not sufficiently sensitive to climatic changes.

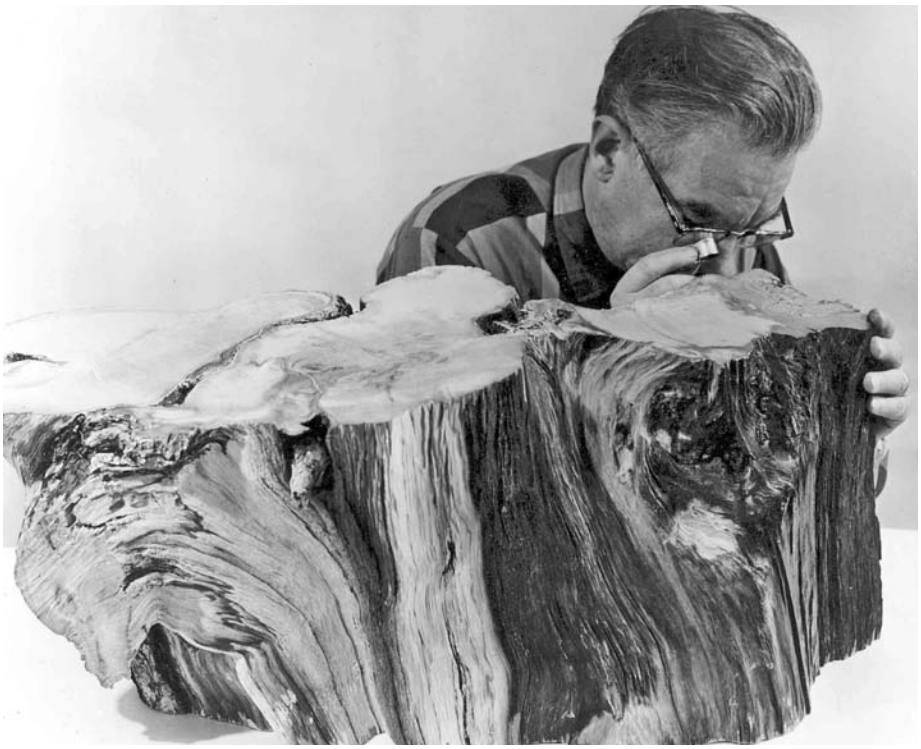
Schulman's efforts to make dendrochronology a pure science did not prevent him from taking his funding where he could get it. During World War II, he worked for the Scripps Institute of Oceanography, studying flows of the Colorado River. From those data, Scripps developed a flow model of the Colorado River basin that proved useful in increasing power production at the (Boulder) Hoover Dam.[7] The methods of cross-dating Schulman devised for this job would help him with his most important work.

FIELDWORK

Beginning in 1939 and for the rest of his life, Schulman spent every summer in the field looking for the oldest living trees. He started by sampling mainly low-elevation trees like 860-year-old ponderosa pine in Bryce Canyon and 975-year-old pinyon pine in central Utah. But in 1953, he discovered "the dazzling possibilities of new and fantastically long records of year-by-year rainfall in alpine trees."[8] Reporting his findings the following year in *Science*, he suggested that maximum tree ages as high as 1,500 to 2,000 years were possible, noting that high-altitude bristlecone pines found on the Inyo National Forest were rumored to reach unusual ages.[9]

At the end of the summer of 1953, Schulman left Sun Valley, Idaho, where he had located a 1,650-year-old limber pine (*Pinus flexilis*) the prior year. On his way home, he detoured to the White Mountains to view the rumored old pines. "Often such rumors had turned out to be unfounded," he later observed. "But not this time!"[10]

A few years before his arrival, Forest Ranger Alvin Noren had identified a multistemmed bristlecone pine with an overall circumference of 37 feet at the base, which he named the Patriarch, and sent samples from the tree to the University of California.[11] Eventually word of the findings reached Schulman and prompted his trip to the White Mountains in 1953. Though the Patriarch turned out to be "only" 1,500 years old, core samples taken that summer persuaded Schulman to obtain measurements from representative bristlecone pine stands from California to Colorado. By 1956, he knew that bristlecone pines represented an opportunity to



COURTESY OF THE USDA FOREST SERVICE—INYO NATIONAL FOREST

Edmund Schulman with a section of Great Basin bristlecone pine cut from the Methuselah Walk. The surface of this section, from a pickaback tree, shows an unbroken series of rings.

sample trees in the 4,000-year-plus class, "incredible though it seemed," and that the highest ages and greatest growth sensitivity occurred at the western edge of the range.[12] Until then, researchers were still at what they called the "B.C. Barrier." That is, no tree predated the birth of Christ.

BREAKING THE BARRIER

Schulman spent the summer of 1957 in the driest parts of the bristlecone pine forest, where he discovered what would become known as Methuselah Walk.[13] He had found the ideal conditions to break the B.C. Barrier: the farthest limit of the dry forest edge, calcareous rock outcroppings, and minimal rainfall. In short order, he discovered Pine Alpha, the first tree to measure more than 4,000 years of age.[14]

His team classified the pines into three forms or types: the "massive slab," with one great mass of wood, like Pine Alpha; the "eagle's aerie," with numerous diverging snags, like Prometheus; and the "pickaback," with several separate and sequential stems. The pickaback (or piggyback) type could be sampled straight to its heart from the small strip of remaining bark low on its living stem. But at eye level there might be several separate stems joined in a pickaback fashion. The tree seemed to produce what he and his team called a Junior-Dad-Granddad sequence, each stem of a different age. One evening, when Schulman examined the long cores from what they had been calling Great-granddad Pickaback under the microscope lens and started counting the rings, he quickly realized this was a 4,000-year-plus tree. He later estimated it was more than 4,600 years old, then the oldest known living tree, and called it Methuselah.[15] It was not long before researchers found even older trees, such as Prometheus, which was about 4,900 years old when it was felled in 1964.[16]

At Ranger Noren's urging, the Forest Service declared the 2,330 acres of bristlecone forest on the Inyo National Forest a protected area in November 1953. The designation increased awareness of the area, but it was Schulman's discovery of more than twenty 4,000-year-old trees and the publication of an article in *National Geographic* in March 1958 that garnered broad public interest in the locality and its trees.[17]

Schulman, however, did not live to see that happen. The article was published about two months after his death from a heart attack at age 49. It was an irony suffered by several bristlecone pine researchers: scientists examining ancient trees tended to die young.[18] Schulman's successors on the bristlecone project would eventually take the pines' chronology back another 4,000 years by examining dead trees. Not long after his death, the White Mountains Natural Area was expanded to 27,160 acres and named the Ancient Bristlecone Pine Forest. It included the Schulman Memorial Grove.[19]

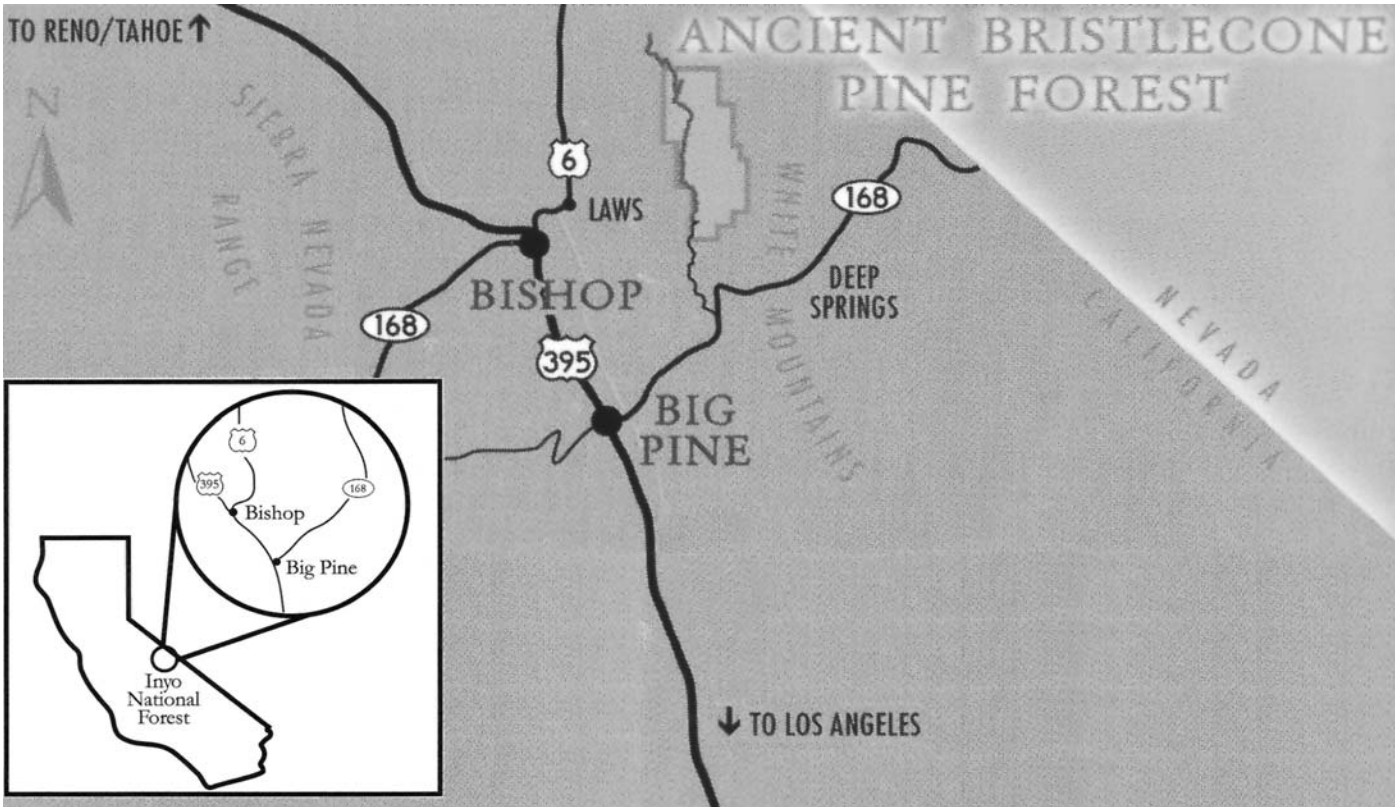
LEGACY

Schulman's work accomplished many things. Some results were simple, like establishing the Great Basin bristlecone pine (*Pinus longaeva*) as a separate species, distinct from the similar Rocky Mountain bristlecone pine (*P. aristata*) and foxtail pine (*P. balfouriana*). His research on the long-lived tree generated the scientific and public interest that led to greater awareness of the White Mountains and the creation of the Ancient Bristlecone Pine Forest. Donald McGraw summarized Schulman's real value to the bristlecone pines: "Not that they were 'record' trees, not that they displaced the sequoias in longevity, not that they were extraordinarily beautiful in their appearance, not even that he was the most important discoverer of this fact of their age, but rather that they could do what he cared most about: function as the best proxies for Earth's climatic history."[20]

Other accomplishments were more multifaceted. Schulman's "longevity under adversity" concept completely changed the direction of dendrochronology, both the aims of the research and its geographic focus. His scientific rigor made it a pure modern science, elevated and strengthened its standing within the scientific community, and further bolstered the reputation of the Laboratory of Tree-Ring Research. His work, along with Douglass's, "provided a firm foundation in data, methods, and analyses that still forms the basis for dendrochronology in western North America."[21]

WALK AMONG THE ANCIENTS

The Schulman Memorial Grove in the Inyo National Forest is about five hours' travel time from Reno or Las Vegas, Nevada, and about the same driving time from Fresno, California. The Schulman Grove Visitor Center is open mid-May to mid-November, weather dependent. Near the visitor's center are the Discovery Trail,



COURTESY OF THE USDA FOREST SERVICE—INYO NATIONAL FOREST

The Schulman Memorial Grove sits at the southern end of the Ancient Bristlecone Pine Forest in the White Mountains, the Patriarch Grove on the northern end. The remote area is accessible by car only about six months a year because of snowfall.

which leads to Schulman Grove, and Methuselah Trail, which leads to Methuselah Grove. The Patriarch Grove, with the Patriarch Tree, is another 12 miles up a well-maintained dirt road and features a self-guided trail. If you want to walk in the steps of Edmund Schulman, these trails will give you the opportunity. □

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NOTES

1. Anonymous, "Edmund Schulman, 1908–1958 (Obituary)," *Tree-Ring Bulletin* 22 (December 1958): 2–6.
2. Edmund Schulman, "Bristlecone Pine, Oldest Known Living Thing," *National Geographic* 113 (1958): 354–372.
3. "Edmund Schulman, 1908–1958 (Obituary)."
4. Michael P. Cohen, *A Garden of Bristlecones: Tales of Change in the Great Basin* (Reno: University of Nevada Press, 1998), 34.
5. Edmund Schulman, "Tree-Rings and Cycle Analysis," *Tree-Ring Bulletin* 2 (January 1936): 19–22. Clonal plants like aspen might be the oldest living things by several centuries. However, Great Basin bristlecone pines are the oldest nonclonal tree species.
6. Edmund Schulman, "Selection of Trees for Climatic Study," *Tree-Ring Bulletin* 3 (January 1937): 22–23.
7. Ibid. This research was done for his dissertation and involved work in two other river basins.
8. Schulman, "Bristlecone Pine, Oldest Known Living Thing," 358.
9. Edmund Schulman, "Longevity under Adversity in Conifers," *Science* 119(3091) (1954): 396–399.
10. Schulman, "Bristlecone Pine, Oldest Known Living Thing," 358.
11. Donald J. McGraw, *Edmund Schulman and the "Living Ruins": Bristlecone Pines, Tree Rings, and Radiocarbon Dating* (Bishop, California: Community Printing and Publishing, 2007), 97–98.
12. Schulman, "Bristlecone Pine, Oldest Known Living Thing," 361.
13. In 2001, PBS broadcast a *NOVA* episode, "Methuselah Tree," that highlighted Schulman's discovery. A companion website is located at http://www.pbs.org/wgbh/nova/methuselah. It offers four beautiful panoramas of the Methuselah Grove. It also explains tree-ring analysis, describes how the exact year of climatic events is determined, and explains how Methuselah managed to adapt to its harsh environment. A transcript of the episode is included.
14. McGraw, *Edmund Schulman and the "Living Ruins,"* 91–96.
15. Schulman, "Bristlecone Pine, Oldest Known Living Thing," 361–366. Methuselah has three trunks, but only one is living, the Junior stem. The living trunk is 50 feet tall, and a single bark strip feeds the crown.
16. Ronald M. Lanner, *The Bristlecone Pine Book: A Natural History of the World's Oldest Trees* (Missoula, Montana: Mountain Press Publishing Company, 2007), 84–89. Methuselah is still the oldest living tree.
17. Schulman, "Bristlecone Pine, Oldest Known Living Thing," 354–372.
18. Cohen, *A Garden of Bristlecones*, 45–46. Working at higher elevations over several years is assumed to have contributed to their deaths.
19. McGraw, *Edmund Schulman and the "Living Ruins,"* 111–121.
20. Ibid, 117.
21. W. J. Robinson, "Dendrochronology in Western North America: The Early Years," in *Methods of Dendrochronology: Applications in the Environmental Sciences*, ed. E.R. Cook and L.A. Kairiukstis (New York: Springer-Verlag, 1990), 6.