Ecology from the Treetops:  
School Builds a Forest Canopy Walkway  
BY SCIENCE DEPARTMENT CHAIR H. BRUCE RINKER

Alexander F. Skutch, in his *A Naturalist in Costa Rica* (1971), wrote the following encouragement for his readers: “To know the forest, we must study it in all aspects, as birds soaring above its roof, as earth-bound bipeds creeping slowly over its roots.” Until recently, our perspective on forest ecology was ground-based and clueless about canopy processes. Only during the past fifteen years has our understanding of treetop ecology expanded substantially beyond this bipedal bias – due, in large part, to the dauntless efforts of a handful of tropical biologists working from ropes, walkways, airships, cranes and towers sometimes 120 feet or more off the forest floor. Why study the canopy ecosystem? It is an unexplored frontier for scientific research and education. It is a living outdoor laboratory. It is in the treetops where most of the world’s estimated thirty million species live. Relatively, the canopy is also that layer of forest containing most of its productive tissue.

The metaphors in the scientific literature for the forest canopy are resplendent, atypically poetic, and capture some of our childlike intrigue with this borderland of science. Tropical air castles, canopy oceans, hanging gardens, leafy mansions, aerial continents, highways in the trees. Up there we are explorers in the roof of the world’s

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forests and - until we can quantify, replicate, observe, and collect in this leafy realm - we wax romantic, unsure about the outcomes of our enquiry but convinced about its merits. Often quoted in recent canopy texts is an observation from William Beebe's *Tropical Wild Life in British Guiana* (1917): “Yet another continent of life remains to be discovered, not upon the earth, but one or two hundred feet above it, extending over thousands of square miles .... There awaits a rich harvest for the naturalist who overcomes the obstacles - gravitation, ants, thorns, rotten trunks - and mounts to the summits of the ... trees.” A rallying cry for canopy scientists, Beebe’s prose compresses all the reasons for canopy research into a single poignant word, *discovery*. The word registers on the heart strings of every biologist, teacher, and student lucky enough to enter the forest canopy.

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The canopy is a New World for us - or, more accurately, an Old World that our remote ancestors left behind millions of years ago. It is a siren song for our genetic memory.

In November 1991 I was one of three American biologists on the French-sponsored Radeau des Cimes mission in Cameroon in the dense lowland rain forests of Réserve de Campo near the border with Equatorial Guinea. Our team was invited to study insect herbivory in the forest canopy via a colorful dirigible, a tree-top raft, and a newly-designed airship sled. As preparation for this breathtaking mission, longtime friend and team leader Margaret Lowman, then a visiting professor of tropical ecology at Williams College, showed me climbing and sampling techniques from the college’s Hopkins Forest Walkway. (This walkway was the first of its kind in the United States, a simple system of two study platforms and a connecting aerial bridge about eighty feet from the ground, used by Williams ecologists to study canopy processes in a temperate forest.) For the African expedition, there were sixty biologists from all over the world, researching twenty-five to thirty projects on bioclimatology, forest ecology, genetics and evolution, parasitology and medicine, and zoology. There had never been such a scale of exploration in this part of West Africa, and discovery was unquelled. In fact, our small team discovered two new species of arthropods within a few meters of our expedition campsite.

When I returned to the States, I began working on a detailed proposal to construct a canopy walkway on Millbrook School’s campus. The 500-acre campus has a rich variety of habitats including extensive wetlands, forests and fields, streams and ponds, and a self-guided nature trail. The school was founded in 1931 with one of its philosophic cornerstones to develop “a fundamental ecological awareness, which includes the understanding that we are at once a part of, dependent upon and stewards of the natural world.” Out of the science department’s strong sixty-year history have emerged widely recognized resources such as the AZA-accredited Trevor Zoo, the Howard Observatory, the school’s biological collections, a NOAA weather station, and its bird-banding operations licensed by both the U.S. Fish and Wildlife Service and the New York State Department of Environmental Conservation. A canopy walkway would be a visible continuation of that tradition of excellence and creativity in the sciences. Dozens of grant proposals were submitted to appropriate funding organizations but, disappointingly, polite replies came back with no monies available for the project.

In the meantime, my Cameroon colleagues and I were preparing a curriculum package on tree-top ecology for students in secondary schools. Consequently, I was invited to speak about this topic at the first international symposium on canopy ecology in November 1994 at the Marie Selby Botanical Gardens in Sarasota, Florida. Meg Lowman, now director of research at Selby, organized this extraordinary gathering - some 200 speakers, representing nearly the entire world network of treetops biologists.

Thirty states, twenty countries, and all the intellectual luminaries of canopy science were present - Donald Perry, Andrew Mitchell, Francis Hallé, Nalini Nadkarni, Meg Lowman, Mark Moffett (our third team member in Cameroon), Phil DeVries, Terry Erwin, Tim Laman, Darlyne Murawski, Takakazu Yumoto, and others. The symposium proceedings clearly showed a broad view of canopy ecology, species richness, and conservation, but I was the only secondary school educator present at the conference. A lingering question for some of the conference participants concerned the appropriateness of such an esoteric scientific field for high school students. My retort highlighted the short period of time remaining to solve global ecological troubles (including human overpopulation and declining biodiversity) and the energetic contributions that young people can make toward solutions when properly prepared. If, as Terry Erwin suspects, there are thirty million species on the planet, mostly insects, mostly tropical, and mostly canopy-loving, then engaging the help of young people now in forest conservation is paramount for global biointegrity. We cannot afford to wait for them to become postdocs in some under-funded laboratory. They will be responsible citizens and voters - well before that.

An inkling of hope for funding the Millbrook project came unexpectedly from a telephone conversation with Walter Gates, a research scientist and philanthropist with Texaco Corporation in Poughkeepsie, who happened to read an article on Meg and me in a December 1993 issue of Science News. The article concerned canopy research in temperate forests wherein I mentioned my hope to introduce this frontier science into the Millbrook curriculum. This would add a new, exciting dimension to the school’s bird-banding and weather station services and enhance the biology program. Gates and his wife made a generous donation to the project that was immediately matched 2:1 by Texaco. This was followed by a meeting with the school’s headmaster who announced that all donations from the 1995 spring auction would go toward constructing and equipping the walkway. Cost of the total package: $25,000. Millbrook School was enthusiastically committed to canopy research and education.

For our walkway, the school hired Canopy Construction Associates based in Amherst, MA. It is a small company staffed by scientists and construction experts who build low-impact access systems for research, education, and eco-tourism in temperate and tropical settings. Millbrook School now has the fourth such system in the United States (after Williams College, Hampshire College, and Cowceta Hydrological Lab in North Carolina). Four healthy red oaks (Quercus rubra) support the walkway and grow on an east-facing hillsode with a 30° slope. The site is near the school’s nature trails, Highley Wetlands Sanctuary, and ecology hut, all open to the public year-round. Students and faculty members already use the area for bird banding, camping and hiking, and conducting field work in ecology, biology, and chemistry courses. The walkway is a T-shaped arrangement of study...
platforms and aerial bridges suspended from the large oaks. The bridges are made of grooved wooden ties bolted to stainless steel cables. The platforms consist of wood timbers supported by wire ropes. Cable handrails and safety webbing are appropriately located. Unauthorized access is prevented by a counterweight on a rathen can be raised and lowered from a horizontal launch platform at the base of one of the trees. With regular maintenance the walkway should last twenty-five to thirty years.

Already it has been christened our “Ewok Village.” Its construction in mid-May 1995 required just one week with three or four workers in the treetops choreographing a ballet of materials and men and with one or two workers on the ground playing “dirt.” It was more practical to have people stationed permanently on the ground (thus the “dirt” epithet) throughout the construction than to have workers ascending and descending continuously for tools and materials. Hundreds of pounds of materials were hauled up and down the steep hillside by construction workers, students, and faculty members throughout the week. The walkways were assembled on the ground and then hoisted into the treetops by the “dirt” team and by visitors who fortuitously stopped by to eyeball the progress. The platforms were installed picnique up in the branches with the economy of a surgeon. When the installation was completed, one of the students exclaimed “It’s the Ewok Village from Star Wars!” Even George Lucas would be spellbound!

From scientific and educational points of view, this project has unparalleled potential. With the walkway, Millbrook School will provide a model research tool and will help set a standard for ecological studies and observations among high schools and universities. Through workshops and on-site training, students and science teachers will acquire insights and skills in the canopy, a vital layer of forest ecosystems neglected until recently because of its inaccessibility. The outcomes of this elegantly simple project may help influence the direction of ecology and science education in the United States and elsewhere. The school will also offer a tool of access for researchers studying temperate forest biodiversity and energetics (including the Institute of Ecosystem Studies, Rockefeller University Field Station, and USFWS Patuxent Wildlife Research Center which have used our property in the recent past). Data from our bird-banding and weather station efforts will influence our own studies and provide new information to the U.S. Fish and Wildlife Service and the National Oceanic and Atmospheric Administration. Projects focused on forest dynamics and biodiversity will shed light on the differences between temperate and tropical forests. The walkway is already one of four study sites in a grant proposal to the National Science Foundation to study canopy effects on forest floor processes. If approved, Millbrook, Coweta Hydrological Lab, El Verde Field Station in Puerto Rico, and Blue Creek Preserve in Belize will be sites of comparison over a 36-month period beginning in April 1996. The collaborative nature of the school’s walkway project will insure ongoing interaction among scientists, educators, and students with local, national, and international attention.

Thomas E. Lovejoy, renowned tropical ecologist and author at the Smithsonian Institution and graduate of Millbrook School, recently wrote in his foreword to Lowman and Nadkarni’s Forest Canopies (1995) that “There is no better evidence than canopy biology that the age of exploration is not over.” There is no better reason to foster a collaborative effort between scientific research and education. There is no better reason to invite young people to enter the treetops. A New World, ropes and climbing gear, aerial walkways in a borderland of science. Each student is a Columbus, a Jacques Cousteau, a William Beebe suspended in a vertical moment of discovery. What better ingredients for learning about a global treasure that needs the energies and enthusiasm of the young to survive?
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Calling All Sports-Minded Alumni

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Editor: Jill Kane

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Millbrook School is published twice a year. Postage paid by Millbrook School, Millbrook, NY 12546 where any change of address should be sent.

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