BLACK ROCK FOREST NEWS

Fall 2015

Black Rock Forest Consortium

Research Symposium: Consortium Hosts Regional Scientists

cientists working at Black Rock Forest and around the Hudson Highlands presented their work at the Consortium's ninth Research Symposium, on June 22, 2015. Some 85 people attended the event, which included 34 talks as well as five posters. The symposium, co-sponsored by the Palisades Interstate Park Commission, was divided into three sessions: a plenary in the morning, and simultaneous afternoon programs on plant-related topics and animals/environmental topics. "The Highlands region is important in part because it provides ecosystem services for millions," noted Dr. William Schuster, the Consortium's executive director.

"Each study adds to our understanding of how these ecosystems function and how they are changing," he continued, "for example, populations of everything from bees to turtles, which are declining in many areas of the world, and failures of native tree populations to regenerate, which we've shown can threaten environmental quality. Our region's scientific community is now more aware of advances being made by others in fields that rarely exchange information. We have seen these meetings foster interdisciplinary research that has further advanced our knowledge, and we've supported young scientists learning to present their work in terms that are understandable to others. The great response by researchers confirms the need for us to continue hosting these symposia."

Consortium Research

Several of the talks featured signature Consortium research, including the Future of Oak Forests experiment and data from the long-term tree plots. Dr. Schus-*(continued on page 3)*



Natalie Bray collecting soil samples.

Summer Science Camp Features Exciting Classes

nce again, Black Rock Forest Consortium's summer science camp was a big hit with students. Middle school students came to the Forest from July 6 to 10 and high school students from July 13 to 17. The concept of the camp is understanding nature through observation and investigation. Students work directly with scientists, graduate students and faculty from college and university members of the Consortium, and others, who serve as content specialists and develop and teach the classes in collaboration with teachers from K-12 schools.

This year, the Consortium was able to broaden the scope of the classes offered by offering an Engineering from Nature course for both middle and high school students. It also renewed the most popular classes from previous years. Instructors came from the American Museum of Natural History, Barnard College, Columbia University, and the City University of New York, among other institutions.

Forty-nine of the 114 students were able to participate in the camp thanks to scholarships provided by the Dyson Foundation, Time Warner Cable, the Ralph E. Ogden Foundation, the Trades Council, and several schools, including Browning, the Urban Assembly School for Applied Math and Science, New York University's Wallerstein Collaborative for Urban Environmental Education, and the Writing Project at SUNY New Paltz. Students mostly came from schools in Newburgh and Cornwall and the Hudson Valley, but some came from New York City schools, including Browning, the Urban Assembly for Applied Math and Science, and the De La Salle Academy.

For sleepaway campers, there were exciting evening programs that com-(continued on page 4)





Advances in technology and in the way we share information continue to reverberate through our society. At Black Rock Forest, we have always emphasized the importance of fostering direct connections between people and the natural world around us. But even in this nature-dominated setting, technology and communications advances are leading to unmistakable enhancements in our study and understanding of the natural world. This was one facet of the dialogue we had with Dr. Neil DeGrasse Tyson at the Consortium's luncheon last May, but the advances and impacts continue at a rapid pace.

One very recent example at Black Rock Forest blended the power of old technology - represented by the microscope with the new technology of the smartphone. Earlier this fall, a high school class from the Calhoun School engaged via microscope with the astounding biodiversity in Forest ponds, discovering evidence of all six kingdoms of life in a single water sample. The following week, New York University undergraduates placed their smartphones against the microscope oculars and obtained surprisingly good photos of many of these same bizarre microscopic creatures, recording and sharing in a new way what they found. Then neuroscientist Dr. Rafael Yuste ran a similar lab/field class at our Fall Family Day focusing on the hydra, a pond organism with one of the simplest nervous systems on earth, yet with amazing features such as the ability to fire tiny harpoons at supersonic speeds at its prey. I began to mention that students could use their phones to capture photos, but then saw they were already using them, videotaping the behaviors they were studying and sharing them.

In our Summer Science Camp this year, Browning School's Science Chair and Dean of Students Sam Keany presented a new class titled Engineering from Nature (see "Summer Science Camp Features Exciting Classes," p. 1). And last spring Ben Raikes' class from the School at Columbia studied atmospheric currents and constructed a weather balloon complete with instruments and a GoPro camera, predicted where it would land, and launched it (with permits!) up to 104,000 feet from Black Rock Forest (see "Forest News in Brief," p. 7).

Technology is opening new lines of research as well. In the past year we received our first two applications to use low-flying drones to take images of the surface of the forest canopy. Professor Kevin Griffin has installed high-precision digital dendrometers on the trunks of forest trees, allowing for the first time much more detailed analyses of how they function and grow on a daily, weekly, and seasonal basis. And in our latest effort to make data and collections from the forest available online, a grant has allowed us to compile a digital database of all of the 700 or so samples of plant species in our herbarium. We will be entering these into a national electronic database named iDigBio (https://www.idigbio.org/) thus making them available to the world and facilitating floristic studies across a much larger geographic scale than was practical before.

Advances in computer modelling and the use of geospatial data are also increasing the effectiveness of regional conservation organizations' ability to respond to climate change. We can now download data developed by Mark Anderson of the Nature Conservancy for the entire eastern United States (https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/reportsdata/mapsdata/Pages/default.aspx) to identify places with features that will help them retain species diversity as climate continues to change, and to use this information to direct conservation efforts. We have been working in a partnership with Open Space Institute with support from the New York State Conservation Partnership Program to merge these newly available modelling projections with our own on-the-ground data to identify the most climate-resilient sites.

It is an exciting time to be interested in how nature functions, and its future, when the promises of technology are truly advancing our efforts. We aim to continue these efforts and make this the focus of our continuing dialogue at our luncheon next year on May 12. Hope to see you then!

— Dr. William Schuster

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Research Symposium

(continued from page 1)

ter led off the symposium with a presentation on the results of the oak research, a multi-year, multi-investigator project designed to identify the cascade of impacts following the loss of oaks, a foundation taxon in northeastern forests. He reviewed the history of the project, which involved mechanical girdling to mimic tree death by pathogen in experimental plots: some with all oaks girdled, some with all non-oaks girdled, some with half the oaks girdled, and some controls. Before girdling, scientists obtained baseline data, and have continued to examine biogeochemistry, microbial ecology, insects, small mammals, and more over the six years since the trees were girdled.

Dr. Schuster then turned to some of the key results from the study, in particular that the species and number of tree seedlings establishing in the plots depended on how many oaks died and on the level of deer browsing. Black birch (Betula lenta) grew abundantly in all the plots, while it and red maple (Acer rubrum) grew faster in plots in which half the oaks were killed compared to control plots, and both these trees and sugar maple (Acer saccharum) grew much faster on plots in which all the oaks were killed. On plots where all oak trees were girdled, seedlings were twice as abundant and grew exponentially faster compared to seedlings on control plots, and there were more tree species. With fencing to exclude deer on the fully oak-girdled plots, there were six times more seedlings between 1 and 3 m of the ground than in unfenced areas. Interestingly, Dr. Schuster noted that "there was very little evidence of non-native invasive trees" in the plots.

Other speakers addressed other aspects of the oak forest study, including Dr. Matthew Palmer, from Columbia University's Department of Ecology, Evolution, and Environmental Biology (E3B), who discussed understory responses to canopy changes and deer exclusion; Natalie Bray, a doctoral student in E3B, who presented research on the effects of tree girdling on soil and the microarthropods that live in the soil and leaf litter; and Katie Pavlis, the Consortium's Research Associate, who covered multiyear studies on small mammal responses to tree girdling carried out by biologists from Clemson University and Columbia.

Other researchers discussed studies using the Forest's long-term tree study



Kate Pavlis and Sarah Pace studying understory vegetation for Dr. Palmer.

plots established in the 1930s (see "Early Forest Data Digitized," Fall 2014). Dr. Peter Bower from Barnard College discussed ongoing research he has conducted to test the equations that have been used for years to predict above-ground biomass and carbon sequestration from measurements of tree diameter. Dr. Meng Xu from the University of New Haven presented research conducted with Dr. Joel Cohen of Rockefeller University and Dr. Schuster that used the Forest's long-term tree data to test a statistical law (see "New Use for Data," Fall 2012).

More Forest Research

Consortium researchers also presented studies on plant physiology. These included Dr. Kevin Griffin, of Columbia's Lamont-Doherty Earth Observatory (LDEO), who talked about whether late autumn leaf carbon gain provides a carbon subsidy to evergreen trees; Dr. Duncan Menge of E3B who reviewed his study of how nitrogen fixing works (see "Understanding the Distribution of Trees That Fix Nitrogen from the Air," Winter 2015); Angie Patterson, a Columbia doctoral student, who is analyzing the physiological response to temperature of northern-, central-, and southern-ranged tree species; Dr. Matthieu Levesque, of the Tree Ring Laboratory at LDEO, who reported on a dendochronological exploration of the response of tulip poplar to changing climatic conditions and rising CO₂ concentrations; Adefunke Sonaike and Alex Huddell, E3B students, who discussed the comparative physiological activity and chlorophyll content at the end of the growing season of a nitrogen-fixing tree and non-nitrogen fixers; and Rachel Arkebauer, a former student in E3B, who analyzed respiratory response to temperature of broadleaf trees.

Other researchers working in the Forest studied animals, including Dr. Vladimir Ovtsharenko from the American Museum of Natural History who discussed the spiders of the Forest; Dr. Caroline Devan from the New Jersey Institute of Technology who surveyed the bees; Dr. Terryanne Maenza-Gmelch, who presented the efforts behind the nomination of the Black Rock Forest—Schunemunk Mountain biological corridor to become an Audubon New York Important Bird Area; and John Brady, the Consortium's forest manager, who covered the status of whitetail deer in the Forest in 2015.

Also, Adriana Carvalho of Google presented her study of field station learning and engagement, carried out during the summer 2014 Science Camp and using the Baker-Rodrigo Observation Method Protocol (BROMP) (see "Another Successful Summer Science Camp," Fall 2014) and Dr. Christopher Lindner of Bard Collage discussed his archaeological (continued on page 4)



study along the Forest's new Visitor Pathway (see "New York Funds New Visitor Access Pathway," Winter 2015).

Other Research

Scientists from around the Hudson Highlands presented research on other topics, including the River and Estuary Network, seasonal extreme hydrological trends in the northeast, the Iona Marsh restoration and its ecological response to *Phragmites* reed control, the presence and impact of pharmaceutical and personal care products in aquatic ecosystems, the ecological and sociological aspects of white-tailed deer overabundance, the flora of the Ice Pond Conservation Area in Putnam County, the Legacy Landscapes Project of the Hudson Highlands Land Trust, public health concerns of harmful algal blooms, an ecological assessment of New York City's 6000 acres of natural forest, an evaluation of trends and regional initiatives starting in 1860 of ecosystem benefits of forests and trees, the dragonflies and damselflies of a pond in Harriman State Park, surveys and habitat management of golden-winged warblers, methods for acquiring rattlesnake demographic data, cutaneous bacteria on salamanders that inhibit a fungus causing a skin disease (presented by a high school student!), challenges facing the native New England cottontail rabbit, and eel surveys in Hudson River tributaries.

"It was exciting to again see the diversity and extent of research taking place in the Highlands region and to be able to provide a venue for these investigators to meet and share information," said Dr. Schuster. Abstracts of all the talks are available on the Consortium's web site.



Rachel Arkebauer (research technician for Dr. Duncan Menge) taking care of black locust tree seedlings.

Summer Science Camp

(continued from page 1)

bined fun with education, including karaoke, a Jeopardy-style quiz game, a water balloon fight, and a different live animal show each week. Lodge supervisors oversaw the students at night, complemented by a Consortium staffer certified as an Emergency Medical Technician.

Engineering from Nature

Sam Keany, the chair of the science department and a physics teacher at the Browning School (and a Consortium vice-president), taught a new course on engineering from nature. "Evolution on Earth has been in the business of engineering for 3.5 billion years," Mr. Keany explained. "Insects and other invertebrates, for example, have a vast array of strategic solutions to the problems of survival. They have highly evolved modes of locomotion on land, underground, through the air and water, and even on top of water. Some have extraordinary vision, others chemical defenses." The goal of the course was for students to design a vehicle using some of these invertebrate adaptations as inspiration.

The first step was to collect invertebrates in the Upper Reservoir and the creek down to the filtration plant and then to examine them closely in the lab to note what characteristics could be incorporated into vehicles. "Water skimmers, larvae of dragonflies, caddisflies, butterflies, caterpillars, and beetles all made for fascinating observations on motion, vision, sensing, and defenses," said Mr. Keany.

The students formed groups of about three to design their vehicles, which were supposed to function in a hostile environment. They first had to draw the vehicle, gradually becoming more specific in their designs. Then they had to choose construction materials: recycled food boxes, foam-core, cardboard, or even thin plywood. Mr. Keany introduced the students to Little Bits, a relatively new system of electronic circuit-building components that includes motors, servos, batteries, switches, LEDs, and other sensors that snap together magnetically and interface with Lego gears and axles.

The vehicles the students built included a tank-like volcano explorer that traveled slowly but had the gearing to carry full water bottles; a worm-like swamp explorer that employed a functioning screwing "mouth" to dig out soil samples; a squat, blocky, beetle-like ve-





(top) A team of students in the Engineering from Nature course. (above) Students in the Engineering from Nature course. Photos: Tom Bushey

hicle built for mountainous terrain; and a cylindrical craft with a giant operating claw that "was reminiscent of a daddy long-legs crossed with a crayfish."

"Some of the students had done some engineering design previously, but few of them recognized until this course the incredible range of engineering inspirations that humans have found in the natural world," Mr. Keany concluded. "Looking at creatures as engineering solutions and taking their own construction inspiration from them was quite new for them. For all, there were new design and tooling challenges, and they also brought artistic flourishes and whimsical humor to their creations. The group work necessitated respect for divergent ideas, opinions, and skills, all essential for a successful project. It was rewarding to see the confidence of the groups surge as their creations began to take form."

Students raved about the class. "I liked examining insect structure very closely and seeing the very surprising connections between natural structure in animals compared to machine aspects," said one student, while another said "I enjoyed the freedom of building in a small group," and a third said "I liked all of the work we had to do and challenges we had to overcome, like an actual engineering situation."

The Other Classes

Forty-four high school students participated in the program at the Forest, with 36 staying overnight in the Forest Lodge and eight day students. With the exception of the Biodiversity Blitz, a full-day course taught by Barnard College professor Dr. Terryanne Maenza-Gmelch, the students could choose one class in the morning and one in the afternoon. Their options included World of Insects, taught by Dr. Julian Stark, a research associate at the American Museum of Natural History and a professor at Queensborough Community College; Cold-Blooded Creatures, taught by Seth Woolney, a PhD candidate from City College of New York; Flying High Ornithology, taught by Sara Pace, who has a masters in conservation biology from Columbia University; The Art of Scientific Observation, offered in collaboration with the Storm King Art Center and taught there by Hara Woltz, a landscape architect and scientist from Columbia University, and Victoria Lichtendorf, the Art Center's education director; and Living Light: Studying Wildlife through a Photographic Lens, also taught by Sara Pace.

Science Camp was especially popular with middle school students; 70 of them participated, with 21 sleepaway campers and 49 day campers. Like the high school students, they had a choice of morning and afternoon classes, with the exception of the all-day Biodiversity Blitz, again taught by Dr. Maenza-Gmelch. All the other classes were the same, with two exceptions. Middle school students could take Nature Writing in the Forest and on the River, a course offered in collaboration with the SUNY New Paltz Hudson Valley Writing Project and taught by two English teachers, Dawn Vandervloed from Washingtonville and Rob Balch from Beacon, and the World of Insects course was not offered.

Another aspect of Summer Science Camp is involving classroom teachers in the classes as teaching assistants. This year, two teachers participated, both from the Newburgh Enlarged City School District: Jessica Benson, who teaches Living Environment and Field Biology at the Newburgh Free Academy, and Foster Portzline who is the Outdoor Education Specialist at Gardnertown School.

"We are fortunate to have such a wealth of scientists to develop and lead such a great selection of field courses for young students. We are especially grateful for the additional support from the fine classroom teachers from Newburgh, and the camp staff who helped ensure that it was an outstanding program from start to finish," said Dr. Schuster.

RESEARCH STUDIES IN THE BLACK ROCK FOREST 2015

The Black Rock Forest Consortium is committed to encouraging collaboration among member institutions and also between researchers and students.

Nitrogen Fixation and Nutrient Cycling Experiments in Black Rock Forest. Duncan Menge (Columbia University). *Contact: dm2972@columbia.edu*

Are Garlic Mustard Effects on Soil Processes and Microbial Communities Reversible? Kristina Stinson (Harvard Forest) and Serita Frey (University of New Hampshire). *Contact: Kristina Stinson (kstinson@harvard.edu)*

Mercury Concentrations and Exposure Levels in Terrestrial Foodwebs: Pathways for Mercury Bioaccumulation in Insectivorous Songbird Communities in New York State. David Evers (Biodiversity Research Institute). Contact: devers@bri.com

Analysis of Avian Diversity in Relation to Human Activity in Black Rock Forest. Marissa Wasmuth and Terryanne Maenza-Gmelch (Barnard College). Contact: Terryanne Maenza-Gmelch (tm263@columbia.edu)

Scaling of Variability in Populations, Individuals, and Ecosystems: Taylor's Law and Beyond. Joel E. Cohen and Meng Xu (Rockefeller University) and William Schuster (Black Rock Forest Consortium). *Contact: Joel Cohen* (*jcohen@rockefeller.edu*)

Physiological Response to Temperature across Nine Tree Species in a Northeastern Temperate Forest. Angelica Patterson and Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University). Contact: Kevin Griffin (griff@ldeo.columbia.edu)

The Future of Oak Forests. William Schuster (Black Rock Forest Consortium), Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), Shahid Naeem (Columbia University), Kathleen Weathers and Amanda Elliott Lindsey (Cary Institute for Ecosystem Studies), and Jerry Melillo (The Ecosystems Center, Marine Biological Laboratory). *Contact: William Schuster* (wschuster@blackrockforest.org)

Native Plant Performance along an Urbanization Gradient. Kevin Griffin (Lamont-Doherty Earth Observatory of Columbia University), William Schuster (Black Rock Forest Consortium). *Contact: Kevin Griffin* (griff@ldeo.columbia.edu)

Loss of Foundation Tree Species: Consequences for Small Mammal Assemblages in Forest Ecosystems. Katie Keck (USGS), Katie Pavlis and William Schuster (Black Rock Forest Consortium). *Contact: Katie Keck* (krh1985@gmail.com)

Effects of Tree Girdling and Herbivory on Mesofauna Communities in a Temperate Deciduous Forest. Natalie Bray (Columbia University) and Kevin Griffin (Lamont-Doherty Earth Observatory). *Contact: Natalie Bray* (nab2165@columbia.edu)

Ecophysiological Functions of Urban and Rural Forest Trees: Testing the "Urban Ecosystem Convergence" Hypothesis. Nancy Falxa Sonti (US Forest Service). Contact: Nancy Sonti (nsonti.fs@gmail.com).

Historical and Archeological studies on Whitehorse Mountain in Black Rock Forest. Christopher Lindner (Bard College). Contact: lndnerarch@gmail.com

Member Survey

ast spring, the Black Rock Forest Consortium conducted an online survey of its members, seeking information about needs for additional facilities, field and lab equipment, trip planning, online resources, staffing, and several other areas. Their responses were tabulated by public schools, independent schools, colleges and universities, and other institutions, and by educators, researchers, and administrators. Additional housing and additional staffing led the list of priorities.

The questions were first developed by Consortium staff, based on conversations with members, and then were turned over for further refinement to the Consortium's Science and Education Committee, chaired by Lisbeth Uribe from The School at Columbia. Responses to the survey were received from 31 research scientists, 109 educators, and 39 administrators.

Colleges and universities (43 respondents from five institutions) rated staffing the highest: staffing to support undergraduate and graduate classes, internships, research projects, and citizen science. They also rated research resources highly, focusing on more access to data online and greater and faster internet bandwidth at the Forest. They also wanted more housing for adults.

Independent schools (51 respondents from nine institutions) rated education staffing first, for leading classes and designing/co-designing curricula and field and lab activities, and for student research and citizen science programs, followed by a need for more than 60 beds for larger groups of students. Public schools and districts (39 respondents from three institutions) also rated education staffing first, followed by greater online access, housing for larger groups, professional development, and trip planning assistance.

Other scientific and cultural organizations (28 respondents from four institutions) rated facilities first, followed by research resources, including better online access to data, a new small grants program, and a staff scientist.

"We are grateful to have such a large volume of responses to guide our Consortium toward an outstandingly productive future in research and education," says Dr. William Schuster, the Consortium's executive director.

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Forest News in Brief

Visitor Access Pathway Update. Consortium staff have completed all preconstruction work, an archaeological review has been completed, and bids for a contractor to complete much of the Phase I work on the new Visitor Access Pathway were opened on October 1. School groups and others who would like to volunteer to help with the construction should contact John Brady at the Forest. A future newsletter will feature this topic. (See "New York Funds New Visitor Access Pathway," Winter 2015.)

Studying Student Engagement. The Bay & Paul Foundations generously provided a grant to support the Consortium's work with Adriano Carvalho, who is using the Baker-Rodgrigo Observation Method Protocol (BROMP) to study student engagement in a field station setting (see "Another Successful Summer Science Camp," Fall 2014). Ms. Carvalho's report documented very high student engagement levels in most of the Science Camp classes and quantified the valuable effects of several specific teaching techniques employed by the instructors.

Fall Family Days. The Consortium held very successful Fall Family Days on October 3 and 10. Children three and up could participate in age-appropriate activities, including family orienteering, constructing leaf animals, a biodiversity blitz, building a bird house and bird feeder, and — new this year — investigating neuroscience through observations of *Hydra*.

Neurobiology of Hydra at Fall Family Day. Accompanied by three other neuroscience researchers, Dr. Rafael Yuste led a workshop for children aged nine and up on the October 3 Fall Family Day. Although the teachers brought some Hydra with them, the students gathered Hydra and other microorganisms at the Upper Reservoir. Dr. Yuste presented Hydra as a model organism for studying how brains work. "We need something really small and transparent with a nervous system," he noted. Workshop participants learned what is known about how this Forest creature engages its 600 neurons in behaviors like feeding and locomotion (Hydra somersault to move). Dr. Yuste showed videos of these activities.

Balloon Launch in the Forest! Sixth graders from The School at Columbia successfully launched a weather balloon 20 miles into the air and parents retrieved it 100 miles away in a back yard in western Massachusetts. The balloon carried a video camera and a GPS tracker; part of its flight, as it rises to a height of 104,000 feet, where one can see the curvature of the earth, can be seen at www.youtube. com/watch?v=5DlEqHKa_Mg. Teacher Ben Raikes noted that they first registered with the Global Space Balloon Challenge and then looked at web sites that enabled them to plan their launch location, study winds at different altitudes, and research kits for building a balloon. The effort cost about \$2000, and students had to prepare PowerPoint presentations to convince the school to finance the project. "They made a very persuasive case," said Mr. Raikes. There were many other steps between getting the idea and the successful launch (including filing with the Federal Aviation Authority). But Mr. Raikes wrote, "[launching a balloon is] really not hard to achieve if you are relatively determined." 🏶



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Report from the Forest Manager

Much visual history has been preserved in the forested highlands of Black Rock Forest. Responsible land stewardship over the past century has preserved much evidence of earlier inhabitants. Forest has regrown over many of the dwelling sites. Recent findings of historical artifacts and structures have heightened interest in the stories of the past.

Students from Consortium schools have embraced this discovery of the past by unearthing, under guidance, relics from days long gone by. Last autumn, fourth and sixth graders from Metropolitan Montessori School followed standard archaeological practices to investigate what appeared to be a century-old dump. Glass and pottery dating back to the 1880s mixed with broken and well-worn metal tools were carefully removed. Catalogued and researched, the origins of these relics dated the site. Students' imaginations were stimulated by the lives and labors of the mountain farmers of the past.

The ongoing work on the new Visitor Access Pathway also resulted in rediscovered Forest history. The project's archaeological consultant, Dr. Christopher Lindner, confirmed that a carriage road from long ago, fragmented by intervening forest growth, is still retained in sections, trimmed with hand-placed stones. The old path apparently led to the same destination as the newly planned Pathway. The sought-after spot is a beautiful panoramic Hudson Valley vista. From this vantage point on the slope of Whitehorse Mountain, one can see Black Rock Mountain. Its prominent northwest slope gives way to Frog Hill and to Sackett Ridge and Schunnemunk Mountain beyond. The Moodna Railroad Aqueduct is seen leading into the sprawling Hudson Valley. At the far side of the valley, the long Shawangunk Ridge can be seen with the more distant Catskill Mountains rising behind. To the north the mighty Hudson River corridor completes this inspiring view.

The old roadway appears to be a fragment of a larger carriage road system stemming from the "Old West Point Road" which was the preferred route from Cornwall to West Point from 1880 to 1930. *Black Rock's Hidden Past*, by Dr. Neil Maher and available on our web site, explains the tourist era of Cornwall during the late 1800s. Pampered guests from large hotels, such as Storm King's Mountain House, could be driven to lofty heights and scenes of visual enchantment. The new Pathway's function is much the same. But there will be no horse-drawn carriages.

Recently, a modest new discovery has been made of a forest dwelling not recorded on any map or report. Along the 230-year-old Continental Road, a small stone oven alongside a brick-laid floor has been uncovered. Much excitement of discovery is now present at the site, which shows good promise and awaits Consortium investigators and students.

— John Brady