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Biology in the Big Apple: Surveying the Wildlife of Central Park

By Olaf Woldan | September 28, 2013

As the summer came to a close, sophomores from Macaulay Honors College of the City University of New York grabbed their hand lenses and field glasses and joined a world-renowned slate of scientists to turn Central Park into an 843-acre classroom. Macaulay partnered with the Central Park Conservancy for the Central Park BioBlitz 2013—a mission to identify and count every living thing in the park. The school's sophomore class teamed up with an team of working scientists for an historic 24-hour mission on August 26th and 27th. Participating scientists came from a wide range of institutions, including American Museum of Natural History, Brooklyn College, City College, Columbia University, Hofstra University, Kingsborough Community College, The New York Botanical Garden, New York City Audubon Society, Queens College, SUNY Stony Brook, Universidad Nacional Autonoma de Mexico and the Wildlife Conservation Society.

ADVERTISEMENT

Rodrigo with a Bird

This hands-on seminar designed to thoroughly measure and catalog Central Park's biodiversity is just one of the unique program of seminars offered to Macaulay students. Macaulay's Associate Dean of Academic Affairs, Dr. Mary Pearl, says "The BioBlitz has both a scientific and an educational purpose. It's been designed to celebrate science as a way of knowing. Most of our students are city kids. It's vital for our students and the general public to understand that Central Park is a refuge for creatures, from beetles and spiders to bats and owls.

We're fortunate to have the participation of some of the most distinguished biologists and leading scientists, who are sharing their time and expertise. Today, these noted researchers will be assisted by many intelligent and observant pairs of young eyes dispersed throughout the park."

As a 2013 graduate of Macaulay and an accomplished filmmaker who created his own major while an undergraduate, "Science and Media," I followed the BioBlitz for the entire 24 hours. Below, I have provided my own impressions of the event, as well as interviews with some of the participating scientists:

I. BATS

Rodrigo Medellin, Professor of Ecology at the National University of Mexico, has been a bat expert for most of his life. "Ever since I've been able to speak or to think, my life has been about animals. All my life I've always loved animals. My first word was not Mama or Daddy. It was *flamingo*."

He continues, "When I was 11, I was Mexico's expert on African wildlife. I knew everything about African wildlife. There was a TV

contest called the *64,000 Peso Contest* in which you would choose a topic on which people would ask you questions.

Red Bat

And I told my mom that I wanted to be on that contest. At the time the show only featured adults, and the producers told her, "Your son's too young. This is not a game. This is for people who have good information, real information."

So my mom said, "Well, Ask him." And they started asking me questions. Question after question after question. And I responded and responded and responded. So finally they said, "Congratulations. You're the first kid on the show."

Medellin appeared on the show for six consecutive weeks, drawing the attention of bat researchers at the University of Mexico, who offered to take him on as an assistant. "I started going to the University of Mexico when I was 11 as the assistant of the assistant of the assistant. My first trip into the field was to a bat cave, and I just fell in love."

For our interview, Medellin takes us outside to unravel one of the mist nets he'll be erecting in Central Park. He's concerned we'll be unable to photograph the net's fine black polyester mesh after dark. Like many other bat experts, Medellin is part researcher, part advocate for the nocturnal order of mammals that we've come to associate with macabre myths and legends. He pulls open a six-foot net, the smallest in his arsenal, and explains to the process of catching a bat, "The mist net hangs between two poles. The mesh hangs between them and makes a pocket that the bats fall in. After that, the first parts of the bat that fall into the net are the last parts we pull out."

I ask Medellin about the bat population in Central Park. "Bats are among the very few wildlife that can really adapt to human encroachment. They may have roosts in high-rises or in trees or in crevices in the park. A park like this is heaven for the bats." It's surprising to discover bats in New York City, but sure enough, once Medellin's team sets up mist nets, it doesn't take long for multiple bats—and one unlucky bird—to be captured. "Because we are diurnal and we are visual," Medellin says, "And bats are nocturnal and acoustic, we don't cross paths very easily. We don't see them very easily. We like to be outdoors during the day, and see all the birds which are also diurnal and visual, but bats are nocturnal and acoustic."

Bat Lecture with Rodrigo

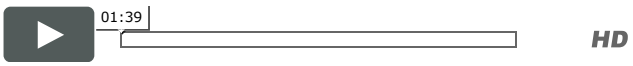
The mist nets are set up over shallow bodies of water across the park. Medellin's team picks spots where bats are likely to be traveling down familiar paths. There, the bats are less reliant on echolocation and more reliant on memory, making them more likely to fly into an unexpected trap. "There's a mixture of things here. There are resident bats, big browns, little browns, and tricolor bats. There are also hoary bats, and reds, and silver haired bats that are going to be migrating away in the fall." Medellin addresses white nose syndrome, the devastating disease currently preying on North American bats. "The resident bats are going to spend the winter in torpor, hibernating. Right now, their hearts are beating a hundred times a minute, but when hibernating, their heart rate will drop to one time per minute. They become very cold. White nose syndrome hits bats when they're hibernating. The fungus affects their membranes, they itch and irritate, so they wake up and use up brown fat. Brown fat is a series of rapidly burning fat deposits. If the bat wakes up three or four times during the winter, they use up their fat and grow sick and weak. And of course the fungus destroys the wing membrane in no time so if the bat tries to fly, it can't."

As the sky turns blue, the outlines of some of Central Park's bats become apparent in the sky. Some of the students use bat detectors to listen in on the bats. A bat detector is a small recording device with an ultrasound microphone. It records and slows down bat calls to make them audible to the human ear. Different bat species call at different frequencies, so researchers can use the device to recognize which bat species are present in the area. One of the researchers explains, "This is very new because ten years ago, for recording bats you'd need two computers, a huge audio interface, and a huge microphone, and you'd need three people to carry everything."

Medellin takes a captured eastern red bat (*Lasiurus borealis)*, and deposits it gently in a white cloth bag. He explains that the bat will be studied and released. He holds the bat in his hands while explaining, "We've been looking at thousands of bats for the past six years and less than one percent has any trace of rabies activity. But we have to be immunized." The bat is tiny, smaller than many of the other species of bats in the area, with thin-membraned wings that he explains are better suited for flight than feathered wings. Medellin presents the bat to a group of Macaulay students, who, like myself, have never seen a bat up close before.

"In this part of the world, bat colonies are not spectacularly big. There are maybe a thousand bats here, a thousand bats there. If you go further South, in Texas, there's a cave, Bracken Cave, that has about 2.5 million Mexican free tail bats. Every million of those bats destroy ten tons of insects every night. 70% of those are major agricultural pests for corn, cotton, squash, and many other crops. Those bats are never going to be endangered, but the ecological services they provide are at risk if we don't care for these colonies. Here, in this area, the big brown bats are probably the biggest insect eaters in the area, and there's an old study, 15 years old by now, that showed that one big brown bat eats about 1000 mosquitos in one hour. That's an incredible service."

The sky is dark. Medellin waits to hear news from the other mist nets. He recounts his story of the *64,000 Peso Contest* to a new group of listeners by flashlight. His advocacy side presents itself, "The bat looks a bit scary right now, but if we feed it, it'll look better." Before we part ways, we film Medellin carefully feeding the bat a larva. He continues speaking to the spellbound students as a light rain begins to fall.



II. INSECTS

Bee

"People think of bugs in terms of good bugs and bad bags," says Dr. Berkov Berkov, an expert on the Cerambycidae family of wood beetles, and leader of the BioBlitz's insect taxon teams. "Bad bugs bite, carry, disease, and eat our food, and good bugs eat bad bugs. But there are all these other guilds of insects that are also performing important ecosystem services. Imagine if nothing dead ever got broken down into components. You'd have no new materials for life!"

I ask Berkov how her interest in entomology started. Like for many other scientists, it came at the suggestion of her Ph.D thesis advisor. "I was underwhelmed by the suggestion until I took an entomology class at the American Museum of Natural history. I after I finished that class, I started a tutorial through the *Cerambycidae* collection at the AMNH. Because I was working on my thesis in French Guiana, I made a *Cerambycidae* field guide using the AMNH collection." She quickly adds, "This was before the Internet!"

As someone who once took a tutorial using the bird collection the AMNH, I'm instantly impressed. There are more beetle species in Berkov's beetle family than in any bird family. Berkov responds, "There are more beetles in my one family than all the birds in the

world!"

One of the reasons Dr. Berkov signed up for the Bioblitz was to investigate whether her beetle family is present in Central Park. Because park services usually eliminate dead wood in the park, wood decomposers like her beetles wouldn't be expected to be prominent in the park. Even if a tree is left to rot in the park, it faces the problem of fragmented habitats. "You have this huge diversity of beetles and insects associated with dead wood, but dead wood tends to be quickly eliminated in urban environments. We eliminate a whole guild of interesting animals in our urban environment."

Dr. Berkov explains further, "I'm a member of a community garden in the East Village. When I first started getting interested in plant-insect interactions, I turned my garden over to the insects. I planted goldenrod and milkweed to attract my beetle family. The milkweed did well but I never saw the milkweed beetles until 15 years after I planted milkweed. Then, one day, I saw one milkweed beetle. By next year, I was loaded with milkweed beetles. When you have a fragmented habitat like in an urban environment, even something that is very common can become rare because source populations can't reach the ideal habitat."

She presents the classic case of mountain habitats. A small mountain species will respond to a warmer climate by going up the mountain. As temperatures continue to rise, the species runs out of suitable habitat. Even if there's another suitable habitat on another mountain, it can't pass through the inhospitable valley to reach it. "We're in the middle of a huge biome but that doesn't mean that a species will be able to get to the next appropriate area in a fragmented environment. If I cut a branch from a tree in a tropical rainforest, the beetles will find it in a week, but I did it in the middle of New York and it took 15 years."

Preserved Bee Specimen

"For the BioBlitz, my taxon team did 3 kinds of sampling: aerial netting, litter sifting, and under-bark. We preserved our collected samples in alcohol and had them sorted by available specialists, but it will take some time to go through all the collected samples. Even if every Macaulay sophomore was turned into a different insect specialists we still wouldn't have enough specialists to cover all insect groups!"

I have to ask, "Did you end up finding your family?"

"One of the students found some larva that looked promising, but they were from another wood-boring beetle family, *Buprestidae*. Most *Buprestidae* beetles attack dead wood, but some of them attack live wood, so I'd like to make sure the larva didn't come from one of the pest species. Although we can't be sure unless we get some adults."

"I hope that, in documenting the diverse insects of Central Park, we can demonstrate that some of the less "charismatic" habitats like dead wood and leaf litter are important refuges for poorly known, fascinating insects that contribute valuable ecosystem services."

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III. TURTLES

Dr. Russell Burke is a wildlife ecologist specializing in reptiles. He is a professor of biology at Hofstra University who studies turtle and lizard populations in and around New York City. Burke led the turtle taxon team during the 2013 Central Park BioBlitz.

Turtle Pond Turtles

Visit Central Park's Turtle Pond and you can find its namesake basking in the sun and swimming under the duckweed. As Burke explains, turtles have a unique history in Central Park. "Central Park is a popular place for people to release pet turtles." Turtle Pond, he explains, was a name given to the body of water by locals after the released red-eared sliders and other pet turtles took over the pond. "Red-eared sliders are the most widespread reptiles in the world and can be found on all continents except Antarctica. I was interested in how widespread they are what other species are there in the park."

Dr. Burke's has had a passion for reptiles since childhood. "As a kid, probably 10, I walked into neighbors yard and he showed me a female garter snake that had just given birth. There were all these tiny snakes moving away from the female and struggling to get out of the embryonic sacks. I was mesmerized by these very small snakes, each entirely independent and each struggling to survive and collect food. Each knew exactly what to do, and I was amazed that such small organisms could be so self-contained and directed."

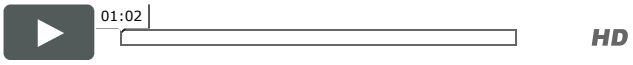
"Even I was surprised by the number of turtle species in Turtle Pond. They would swarm up to the surface, begging for food. We found species that you wouldn't expect to see if you weren't in an urban area. Most of them are animals released as pets – red-eared sliders, yellow-bellied sliders, river cooters, Florida cooters, and a diamondback terrapin, which is native to the area but not Central Park. It also means that some of the native species are not there because the habitat changed in a way that they can't tolerate." The diamondback terrapin is a particular curiosity, native to coastal brackish water rather than the freshwater found in Central Park water.

Reservoir Turtle

For turtle enthusiasts, Burke recommends visiting the zoo. "People generally don't like reptiles, but people like turtles. And that's great, but unfortunately all too often turtles make terrible pets. They grow and live long and require space. Because people like them, they buy

them as pets and then release them. I would encourage people to see them at a zoo or park but most people shouldn't get them as pets."

"Central park is an iconic urban green space. Every urban planner in the world knows New York City, and many urban green spaces have been based on Central Park. People talk about Central Park as a green space for play and rest, but it's important to expose people to the wildlife there and show them that the green space is important to other organisms too."



IV. FISH

Dr. John Waldman is an aquatic conservation biologist. He's the author of several popular books on the subject and a lifelong New Yorker. He led the fish taxon team during the 2013 Central Park BioBlitz.

"It's hard to know what arouses a person's passions, but something clicked when I was very young. I was exposed to the water frequently. My uncle would build boats when he was younger and would take me fishing. I didn't catch anything my first time, but it captivated me and drew me in. I have other passions, but this is the driving force of my life. I was exposed to it at the right time and it was the fishing that pulled me into the science."

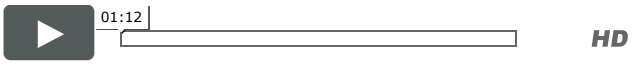
"Central Park is home to vast aquatic environments, none of which formed naturally, so I was surprised to discover they're teeming with un-surveyed life. I attempted to further investigate the topic, but most of the articles I found pertained to a snakehead spotting at the Harlem Meer. Snakeheads are members of a predatory invasive family of fish, native to Asia and Africa, which can outcompete local fish species and cause chaos in an aquatic food network.

"There was a supposed snakehead spotting at the Meer. There's a got chance it was a carp that was mistaken for a snakehead. I won't believe it without evidence. Snakeheads were found in Flushing Meadows, Queens, but there's no body to go along with the claim at the Meer, so it may be a story that got out of hand."

I ask Waldman about the aquatic survey. "We like our environment to be healthy. A good signal of environmental health is biodiversity. Places that are badly contaminated or disturbed tend to have low biodiversity. A BioBlitz is a way to take the pulse of a location's environmental health and introduce people to nature in a place where nature might not be obvious. It provides a reminder that humans have imposed themselves on this natural environment. We have this remnant left that's a touchstone for people to visit. It provides people the refreshment that nature can provide. Exploring that nature with students provides a good baseline of data and opens their eyes to nature that is in their midst so that they might go enjoy it themselves."

Waldman's team surveyed the Meer, the Pond, and the Lake, wading into the water with a large net to collect fish and crustaceans to be examined, photographed, and then returned. Crowds of bystanders gathered as he pulled out pumpkinseed sunfish, bullhead catfish, and bluegills.

"The different bodies of water have very distinct personalities. The Pool is crystal clear and has a lot of submerged vegetation. The Meer is in between. It has murkier water, but featured more fish life than the pool. The lake has an algal bloom problem. The Meer and the Pool seemed quite healthy for water-bodies ringed by skyscrapers. These ponds would not be out of place in the Catskills."



V. PLANTS

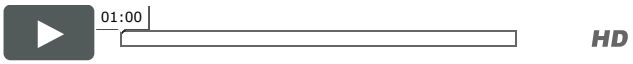
Daniel Atha is a research associate at the New York Botanical Garden. His office is filled with maps, plant specimens, and treasures from expeditions around the globe. He led the plant survey team during the 2013 Central Park BioBlitz.

In response to a question about the purpose of the BioBlitz, Atha muses,

"Imagine if Peter Stuyvesant, the Dutch mayor of New York, had directed some of his subordinates to do a botanical inventory of the island of Manhattan. We would know very well what plants grew here, what the environment looked like, and we could hopefully recreate some of that in our parks and study what might be coming in the future. But he didn't do that, so we have no real physical evidence what Manhattan looked like two or three hundred years ago. With botanists creating records and preserving plant specimens, we have a physical record of what plants grow and in what places around the world."

Atha explains the significance of this biological record with an example, "Native Americans would pay attention to the plants found along shorelines. They knew plants that can tolerate salt water. Those plants are a recording device of past flooding because saltwater will kill plants that are not adapted to it. This margin of saltwater plants along a shore is a sign that it's not a good place to build a home or town because it'll be flooded sooner or later. Now, we've forgotten that wisdom. We bulldoze the saltwater plants and build there anyway. Plants really do have a lot to tell us about the climate and environment, but we have to pay attention. Part of what we do as botanists is we provide physical evidence of that."

He continues, "It's frustrating being a professional botanist, a biologist, to think about the fact that we know more about the surface of the moon than we do about planet Earth. We're still working on a flora inventory of North America. Our own country, the richest country on earth still doesn't have a complete inventory of all plant species in North America. There are still vast areas of the terrestrial environment where no botanist has ever been. There are species to be discovered and species going extinct that we don't even know about. We don't know what's being lost."



"It's through events like the BioBlitz and other biological inventories that we chip away at that disparity. We learn more about the

surface of the Earth and all of the creatures that live on it. A BioBlitz is not a rigorous survey of a particular area, but it's an event that brings people and other biological organisms together in the same place in a spirit of sharing and of raising the profile of all the organisms that live in Central Park."

"Until the last Bioblitz, people didn't know that these little insect-like organisms called tardigrades existed in Central Park. They're little tiny organisms and it was through the Bioblitz that someone who studies tardigrades said 'Oh, well I'd like to come and look for them in the park,' and sure enough they were there. It's through the Bioblitz that we learn more about the park and also more about the biodiversity that we share the planet with and hopefully become engaged with that biodiversity and appreciate it and try to preserve it."

Photos: Jensen Rong

About the Author: Olaf Woldan is a mild-mannered graduate of the Macaulay Honors College. He studied Biology and Film and now works as a freelance writer and film editor. He runs a blog with Jensen Rong at http://helioblog.tumblr.com/ Follow on Twitter @BeepingSound.

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