Guest Blog

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The Moth Hunters

By Susan Swanberg | May 29, 2013 | 2

John Palting, a Ph.D. candidate in entomology at the University of Arizona, has collected moths with Ray Nagle for over 30 years. In March of 2013, Palting and Nagle collected moths at Biosphere 2 near Oracle, Ariz. Photograph by Susan E. Swanberg

Bathed in violet light, two men search the white expanse of cloth, oblivious to their surroundings. Disoriented insects of various shapes and sizes swoop around the men's heads. Many of the insects eventually land on the sheet. With a deft motion, one of the men captures a specimen and examines the vial in which a pale-colored moth flutters.

Ray Nagle and John Palting have collected moths together for more than 30 years. As a young boy, Palting developed an interest in entomology. His mother, a biochemist

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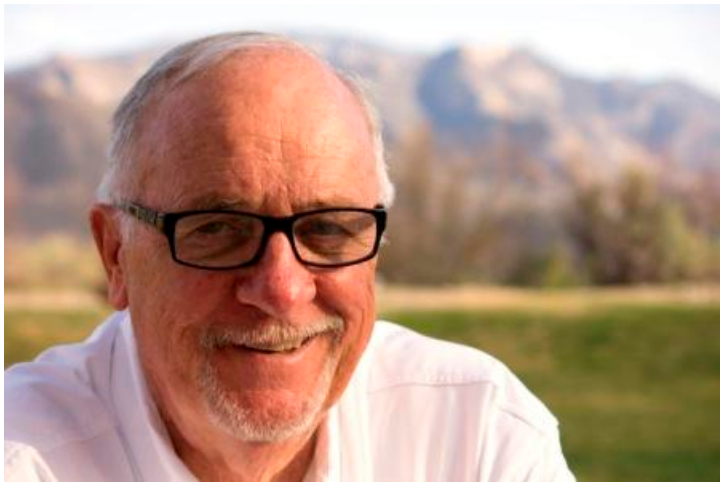
in the University of Arizona's Pharmacology Department, was determined to nurture her son's budding hobby. She heard through the university grapevine that Nagle, a highly respected pathologist at the School of Medicine, collected insects as a hobby.

Palting's mother arranged for her 11-year-old son to meet Nagle. The 30-year-old professor and the young boy hit it off. They have been collecting together ever since.



Ray Nagle, M.D., Ph.D., is a Professor Emeritus at the University of Arizona as well as a medical director at Ventana Medical Systems in Tucson, Ariz. Nagle is also a highly respected amateur entomologist. Photograph by Susan E. Swanberg

Now in his 50s, Palting works for Roche Pharmaceuticals in Oro Valley, Ariz. He recently returned to school to study for a Ph.D. in entomology. Nagle, in his 70s, is still active in his profession.

Nagle and Palting are particularly interested in moths—the largely nocturnal, seemingly drab cousins of the butterfly. "It's really fun," Palting says, "because there's such a diversity of moths that even after 30 years of collecting, you can still go out and see new things."

According to Palting, moths are not necessarily drab. Their wings can be white, brown, yellow, pink, blue or even clear. The patterns on bodies and wings are fascinating in their detail, and the antennae are feathery marvels.

An unusual experiment

In March 2013 the two collectors set up shop on the grounds of Biosphere 2, near Oracle, Ariz. They were there to conduct an unusual experiment.

Biosphere 2 has been a laboratory for many unusual experiments. Built to accommodate groups of scientists and explorers learning how to survive in a closed, self-supporting ecosystem such as would be experienced by space travelers, Biosphere 2 is now a center for scientific research and public outreach.

Under the glass dome of Biosphere 2 are five biomes, many containing the exotic plants imported and planted years ago by the original Biospherians and their colleagues. Palting and Nagle are curious about the insect life in Biosphere 2. They think it might be possible that moths hitchhiked a ride with the plants, shrubs and trees brought from faraway places so many years ago. The descendants of these hitchhikers might still live under the dome.

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Nagle and Palting install insect traps inside Biosphere 2 and set up collection sites outside as scientific comparisons or controls. After a night of collecting, they'll compare the specimens trapped under the dome with the specimens caught outside.

Biosphere 2 is home to many exotic plants. In March of 2013, John Palting and Ray Nagle set up traps to determine whether any exotic moths fed on the plants living within the Biosphere 2 dome. Photograph by Susan E. Swanberg

Dr. Dragos Zaharescu, a postdoctoral researcher, spends many hours every week at Biosphere 2. He has observed small caterpillars, ants and a few moths under the dome. Mostly, though, he sees cockroaches. The cockroaches "seem to have taken over the whole Biosphere," he says. "There's not much [insect] diversity in the Biosphere."

Mutual admiration

Back at the collection sites, Nagle and Palting move in unison as they assemble their equipment. They've become very close over the years.

Nagle takes a few minutes to examine a framed display of insects that Palting collected. With a smile, Nagle acknowledges the beauty of Palting's work. Nagle and Palting are a mutual admiration society, reveling in each other's entomological accomplishments

Ray Nagle examines one of John Palting's insect collections. Nagle mentored the young Palting and taught him how to collect and preserve insects. Photograph by Susan E. Swanberg

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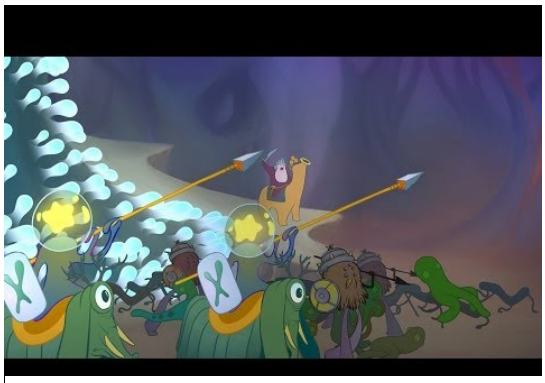

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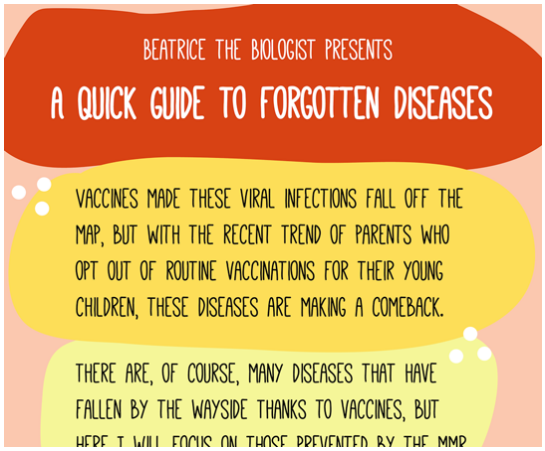


Nagle is recognized by collectors all over the world for his expertise as an amateur entomologist. He once had an impressive collection of moths and other insects that he kept in his cabin in Summerhaven on Mount Lemmon, just north of Tucson, Ariz. Some of those moths had not previously been identified.

John Palting collected moths in Oro Valley and Tucson, Ariz. in 2012. His collection illustrates the subtle beauty of moths. Photograph by Susan E. Swanberg

In June 2003, the Aspen Fire burned hundreds of homes in Summerhaven. From a distance, Palting saw the fire engulf the top of the mountain. "It was an explosion like a mushroom cloud of smoke," he says. "I knew that collection was in there." Palting drove up the mountain, but was turned away by fire officials. To this day, Palting regrets not being able to save his friend's collection. "It's very much like losing a library when one of these collections gets destroyed."

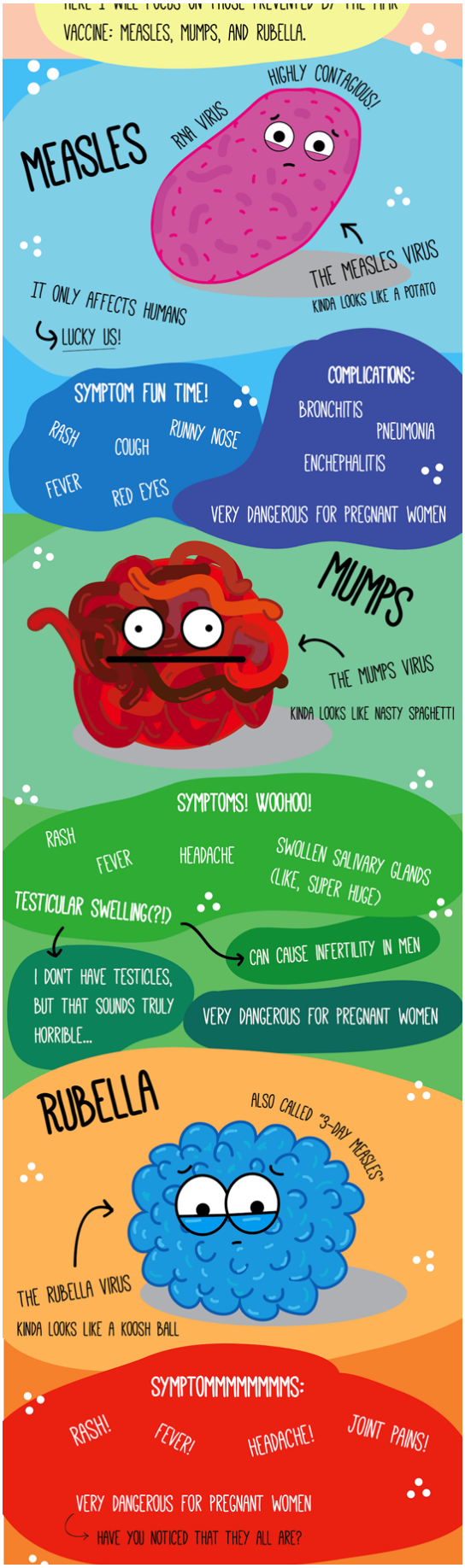
At the time Nagle was in Ireland with his wife. For a while he kept a memento of what he'd lost. The memento was a melted pile of metal and glass, all that remained of the old microscope he kept in the cabin.

Undaunted, Nagle soon began to collect again. He has almost replicated his old collection. There are a few species he might not find again, but he is eager to continue his hobby.

A night of collecting

Back at the Biosphere, Palting carries two bucket-traps. The traps are simple: a bucket containing ammonia, a UV light to hang above the trap and attract unsuspecting insects and a funnel to direct the creatures into the bucket. He places one trap in the rainforest biome and the other in the savanna biome. He'll return at dusk to turn on the lights.

Just outside the Biosphere's entrance, Nagle and Palting begin to assemble their outdoor collecting stations. It's daylight, so they can see the surrounding vegetation. Nagle chooses a spot on the edge of the parking lot. He's scheduled for orthopedic surgery in a few days, but that doesn't stop him from collecting. His only accommodation is to find a flat spot on the pavement for a chair. Nagle spreads a white sheet and hangs a UV light close by. He'll run the light off a battery.



A hundred feet away, Palting assembles his equipment. He'll use a mercury light, running it off a generator. He hopes to collect moths from the shrubs and trees surrounding the parking lot as well as from the mesquite-covered hills across the valley.

A close-up of John Palting's moth collection shows the colorful orange of moths that feed on the desert marigold. Palting collected these moths in 2012 in Oro Valley, Ariz. Photograph by Susan E. Swanberg

John Palting sets up a bucket trap within Biosphere 2, hoping to collect moth species feeding on exotic plants under the dome. A UV light attracts insects, which then fall through a funnel into the bucket. Photograph by Susan E. Swanberg

After dinner, Nagle and Palting return to the sheets and fire up their light sources. Nagle's UV light is soundless, while the generator driving Palting's mercury lamp putt-putts like an anemic lawnmower. The moths don't seem to mind, though. It only takes a few minutes for insects to be drawn to each "flame."

Then the collecting starts in earnest. Nagle and Palting work at their own stations for a while, then Palting joins Nagle.

Vials are filled and labeled carefully. Nagle and Palting speak about past collecting trips, their favorite specimens and what they're finding on the sheet. Latin names trip off their tongues—Sphingidae, Noctuidae and others.

Nagle and Palting collect representatives of about 30 moth taxa living outside the Biosphere dome. Eventually they shut down their lamps and call it a night.

Adventures ahead

After breakfast the next morning, Palting returns to the dome to collect the two

indoor traps. The rainforest trap is empty. “I was really surprised,” he says. “There’s this profusion of plants, and I thought something has to be eating those plants. But oddly, in the jungle I didn’t have a single insect. Not even a leafhopper or anything came in.”

Ray Nagle and John Palting examine moths at their collection site outside Biosphere 2 near Oracle, Ariz. in March of 2013. A UV light attracted moths to a sheet where the two men collected the specimens. Photograph by Susan E. Swanberg

The trap in the savanna contains a number of insects that Palting will preserve and identify.

Within Biosphere 2, John Palting found representatives of 9 moth taxa native to Arizona, but he found no exotic moths feeding on the exotic plants under the dome. Photograph by Susan E. Swanberg

Several weeks later, he shows us these moths, mounted in a small box. He found nine separate taxa of moths in the savanna, all of them local species, mostly legume feeders. “It looks like they secondarily colonized that savanna habitat,” he says. “There’s a lot of acacia trees in there from Africa and South America, and [the moths] are probably using those just like they use the native acacia trees…. It seems like Biosphere 2, after 20 years, has reached equilibrium with the environment.”

This might not be the end of the story, however. This is just preliminary data. For the study to be definitive, more collecting is necessary.

Maybe Nagle and Palting’s pilot study will inspire future graduate student to follow up with more research. Then again, maybe the two friends will return to Biosphere 2

themselves. Nagle is recovering from his surgery, and hopefully he'll be back on his feet soon. When that day comes, Palting and Nagle will be off again on a new adventure.

5.16.13 The Moth Hunters

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About the Author: Susan Swanberg is a freelance journalist and photographer from Tucson, Ariz., and a lifelong learner. Not content with a J.D. from the University of Oregon, an M.S. in biological science from California State University Sacramento and a Ph.D. in genetics from the University of California, Davis, she is now completing an M.S. in journalism at the University of Arizona. Swanberg lives at the foot of the Santa Catalina Mountains, a picturesque mountain range surrounding Tucson. "As I explore the world of science writing," she says, "I always keep in mind the words of geneticist William Bateson: 'Treasure your exceptions.'" Follow on Twitter @seswanberg.

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1. rjnjr
1:06 pm 05/29/2013

I have had the great privilege of meeting and working with Dr. Bruce Walsh and my son Robert has field collected with Dr. Ray Nagle. We are both research associates at Jarvis Christian College in Lepidoptera at the East Texas Natural History Collection and I am proud to see such an insightful article on Moth Hunters. Dr. Nagle is an amazing and generous man with an unbelievable wealth of knowledge and insight especially on Micro Lepidoptera. Great article about some amazing people and of course Arizona is the Moth Mecca of the USA. I wish Dr. Nagle and soon to Be Dr. Pauling great success. Come on out to East Texas and we will show how we moth Texas style. – http://easttexasnaturalhistory.blogspot.com/

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2. Liti99
1:49 pm 05/30/2013

During the last week of July people all over the world will go on moth hunts as part of National Moth Week. NMW is a global citizen science project focusing on moths and biodiversity. Everyone, Everywhere can participate. During the first NMW, in 2012, mothing events were held in downtown Manhattan, in the forests of Costa Rica and in many other ecosystems. Check out the website for more information – http://www.nationalmothweek.org. Join a public moth night, start you own in your backyard or local park. Be part of this citizen science project and contribute to our knowledge and understanding of this important and amazing group of insects. Contact us through the website or write to info [at] nationalmothweek.org.

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