

THE MOTH BLITZ

Naturalists race to count up their taxonomic blessings



THE MERCURY VAPOR lamp cast an eerie glow in the gentle Tennessee night. Behind the bulb hung a white sheet adorned with a dozen rosy maple moths—two-inch French vanilla-and-strawberry silkmoths that clung to the cotton with pink furry legs. Then a really big moth spiraled in, striking lepidopterist Dale Schweitzer mid-back. “Well, I know it’s not a regal,” said Dale, “by the smell.” Lacking the pungent, nutty scent of an adult hickory horned devil, or regal moth, the intruder was instead an imperial moth—as big as a

small bird, its wings daffodil yellow spattered with heliotrope. I’d wanted to see these special moths of the eastern deciduous forest ever since I was a child poring over their portraits in the books of W. J. Holland and Gene Stratton Porter. But to Dale, the gathering array of brown, gray, and beige moths, many no larger than the imperial’s brushy antennae, commanded far greater interest. For we were taking part in the third Great Smoky Mountains National Park Lepidoptera Quest—the “moth blitz”—where variety is much more important than looks.

Biologists rue “the taxonomic impediment”—how little of the world’s diversity we really know. How can we conserve organisms that we can’t even identify? Yet molecular and biochemical science is eclipsing traditional systematics, the study of relationship among whole organisms. Enter the bio-blitz, where naturalists gather to document as many species as they can in a given area over a specified period. The first blitz was conducted by Smithsonian biologists right there in Washington, D.C. Discover Life in America amplified the idea in the Great Smokies park through its All Taxa Biodiversity Inventory, intended to inform park managers while encouraging the next generation of taxonomists. University of Connecticut professor David Wagner pioneered blitzes focused on moths—plus butterflies, which are essentially fancy moths that fly by day. As leader of this year’s butterfly TWIG (taxonomic working group), I spent forty-eight hours in mid-July recording as many species as possible in the half-million-acre national park.

More manic at their peak than any Christmas bird count or Fourth of July butterfly count, bio-blitzes nonetheless retain something of a gaming aspect. As the countdown got under way at Sugarlands Visitor Center, I was reminded of a military campaign, with Dave Wagner as field marshal. He dispatched some forty pros, students, and volunteers to different fronts (habitats and sectors), doled out matériel

(mercury vapor lamps and white sheets, ultraviolet light-traps, nets, GPS devices), and reviewed logistics for dealing with tourist traffic, bears, copperheads, and rangers who might demand permits in an environment where insect nets are normally anathema. Excitement mounted as the three o'clock starting-hour approached. "Lisa Vice, run a sheet in Cosby Creek Campground," Dave barked. "We really need people over at Purchase!"

The teams deployed in the widest variety of habitats possible—the Smithsonian's Michael Pogue even packed batteries and lights to high-elevation sites on llama-back—and prepared for a long night's vigil. Their work, like their quarry, was mostly nocturnal, but as butterfly leader, mine was a day job. With my volunteers, I headed to Cades Cove, where old fields are coming back as meadows full of native plants. The bright litter on a damp, sandy road resolved into mud-puddling blues, sachem skippers, sleepy oranges, commas, swallowtails, and many more. Our task was to net two specimens (designated vouchers) of each species. By sunset we'd found some twenty species, and I joined Dale's moth group to see the action at the bedsheets.

When the morning came, Lisa, Steve, Andrea, and I set out for Newfound Gap, a high point with a dynamite view over miles of *Cold Mountain* country. Andrea netted a purple-glazed skipper, our sole *Panoquina ocola*; then Lisa nabbed a day-flying pyralid moth, black-dotted yellow and as big as a clothes moth, which I tucked away in a vial. Who knew whether anyone would find another? At Towstring Horse Camp, a knot of little Halloween-colored butterflies appeared on horse apples. Called harvesters, their larvae feed on woolly aphids. And in a nectar garden planted by Job Corps workers on the North Carolina side of the park, we chased bright buckeyes and variegated and gulf fritillaries to swell our count. When word got out how

much fun we had, Dave accused me of trying to steal all his volunteers.

Chasing silver-spotted skippers through flowery meadows may be more appealing than sorting dead moths, but in fact an elegant assembly line was under way at Sugarlands. First, each trapful of specimens receives archival labels keyed to its site. Then experienced volunteers sort mid-dens of moths into major taxonomic groups—noctuids, arctiids, geometers,

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bombicoids, gelechioids, butterflies, and so on—a table for each. Now the Opti-vised specialists go to work making hundreds of specific determinations. One labeled voucher is cryogenically preserved in liquid nitrogen for later reference. The other one revolves to a pair of Canadians taking single legs for DNA analysis and then to the digital imaging table. Each specimen finally comes to rest in the park's or some other approved collection, as an absolute baseline of what's here, right now.

On the last morning, our butterfly team made a final foray up the Little River. We sought red-spotted purples and Diana fritillaries, both mimics of the pipevine swallowtail. No such luck, but we did watch seventy-five iridescent black-and-blue pipevines sipping from a river-splashed rock—a stilling vision. I would love just to watch or catch-and-release the insects. But positive identification and DNA analysis require specimens. Most insect populations are immune to direct take. Besides, the moth blitz was bested nightly by bug-zappers on campground RVs and bright-light gas stations in Gatlinburg, while every motorist's windshield exceeded our butterfly catch. Not to mention the sad, shiny pavement of swallowtails crushed by the constant parade of SUVs.

Back at Sugarlands we found that a moth-er on a sun-break had sighted the missing red-spotted purple, and a graduate student had snagged a male Diana. At the press conference Dave called for summaries and discoveries for each category. The final count reached 788 species, 42 of which were butterflies—about the same twenty-to-one proportion you'll find all over the world. Both figures set new blitz records, with several moths new to

the count, and the olive hairstreak added to the park's impressive list of 115 butterflies. The result of all this bustle: the largest taxonomic sample ever documented by DNA. The task now is to extend the inventory to other parks, other realms: to census our neighborhood of life as if it really matters.

Later, as overtaxed taxonomists dispersed for beer and pizza and teachers combed the leftovers for classroom specimens, I found the little vial in my pocket and handed it to Don Davis of the Smithsonian, who took a bleary-eyed look. He and Dave Wagner raised their collective eyebrows over the unfamiliar mite and concurred that in all likelihood it was species number 789, and perhaps even new to science. Some 25 new species of moths, more than 500 species of all groups, have been discovered since the Great Smokies Bio-Blitz began. One tiny moth might not mean much in the big picture, but that's how diversity evolved, and shall be known, or lost: species by species. 🐛

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