



# What Is the Value of Your Insect Collection?

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**T**he word “biodiversity” is used often in science, policy discussions, and writings, and the subject is incorporated into the curricula of many science classes. In many cases, biodiversity is considered to be something that happens “somewhere else,” such as in neotropical rain forests. On the contrary, biodiversity is everywhere, or nearly so: clearly, some areas have greater biodiversity; some less. The extent of diversity often goes unnoticed by the casual observer. Even our own backyards in the populated, temperate world hold more species than many of us would anticipate. The desire to convey the importance of biodiversity close to home gave rise to the concept of a “BioBlitz.” A BioBlitz is an assessment of the biodiversity of a specified place at a specified time. BioBlitz organizers form teams of specialists and non-specialists to count all the species

(or morphospecies, for poorly known taxa) within a defined time period, usually 24 hours.

BioBlitzes have several purposes. They increase public awareness, help to inform decision makers, habitat managers, and planners about the biodiversity of a specific area, and generate data that can be useful in planning and land management. BioBlitzes can also excite the next generation of scientists as they partner scientists with the public.

The first recorded BioBlitz occurred at the Kenilworth Aquatic Gardens in Washington, DC, in 1996. That initial effort yielded approximately 1,000 species within a 24-hour period. Since then, blitzes have been organized in at least 20 states in the U.S., as well as countries worldwide, including Australia, Canada, Ireland, New Zealand, Portugal, Spain, Taiwan, Trinidad & Tobago, and the United Kingdom.

In the U.S., BioBlitzes are conducted at various national, state, and local levels. The National Park Service is

ABOVE: Fig. 1. Michael Skvarla, Ph.D. student at the University of Arkansas, counts dipteran specimens during the BioBlitz.

partnering with the National Geographic Society to conduct a BioBlitz in a different national park every year until the centennial of the National Park Service in 2016. Recent blitzes have included Rocky Mountain National Park in Colorado and the Jean Lafitte National Historic Park in Louisiana. Many of the BioBlitzes have taken place in or near urban areas; e.g., Saguaro National Park (Tucson), Santa Monica Mountains (Los Angeles area), Indiana Dunes (Chicago), Central Park (New York), and Rock Creek Park (Washington, DC). Seven counts have occurred in the suburban areas of Connecticut since 1999, and one in 2002 took place in the previously industrial Calumet area of south Chicago. Urban or near-urban counts attract volunteers (more than 130 in the Calumet count, and 600 in Central Park). The 2011 count in Saguaro National Park attracted more than 5,000 volunteers.

The 24-hour counts in the U.S., including those in urban or suburban areas, yield numbers of species that surprise even the most optimistic biologists, and set up a sense of competition among the different locales. Participants in the 2003 count in New York's Central Park tallied 715 species; the 2001 Danbury, Connecticut count yielded 2,519 species; and the 2002 Calumet (Chicago) count yielded more than 2,200 species, including numerous new state species records and one species of staphylinid that is new to science. As with many of the BioBlitzes, the event in the Calumet neighborhood was geared toward public outreach. That event took on the air of a festival and included presentations all day long to school groups, neighborhood associations, and the general public. People wandered through the central counting area, talking with those tallying species. Clearly, these events meet the definition of "part contest, part festival, part educational event, and part scientific endeavor," as stated by the Connecticut State Museum of Natural History (Censky 2001).

As we were applying for a grant to support digitizing the collection in the University of Arkansas Arthropod Museum, we were faced with the need to know how

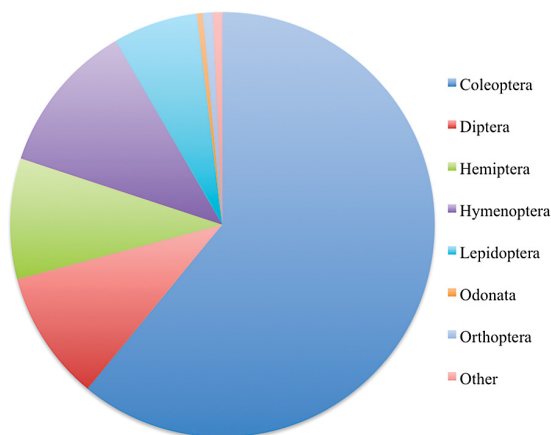


Fig. 2. Proportion of pinned specimens in the University of Arkansas Arthropod Museum represented by major orders.



Fig. 3. Detail of one box of beetles that was counted in the BioBlitz.

many specimens and how many species the Museum holds. Our collection is not databased, so that information was lacking. Previous estimates had been generated, but we were never quite sure of their basis. We knew the number of 12- and 25-drawer cabinets, from which we could extrapolate the number of drawers, but not the number of specimens, let alone the number of identified species the Museum contains.

What to do? Hold a BioBlitz! But one with a twist: we would bring the outdoors inside. Instead of counting all the species in a park, nature preserve, or other defined outdoor area, we planned to count all the species and specimens in the area defined by the cabinets and drawers of the Arthropod Museum. Bringing the BioBlitz indoors had several constraints, most notably limited working space. Because of the space crunch, we expanded the time limit from 24 hours to 96 hours (four days instead of one). We had a crew of graduate students, faculty, technicians, post-docs, clerical staff, an undergraduate honors-project student, and several summer student workers. Only two people had previously participated in a BioBlitz. Non-specialists were paired with a knowledgeable student or post-doc. Each person was assigned to 2-hour time blocks, with many volunteers working multiple time blocks. We developed datasheets to record the number of specimens and species in each family located in each drawer. Vials containing alcohol held from one to more than 100 specimens, so exact numbers were not recorded for the specimens per vial. We developed a spreadsheet to assign volunteers to specific cabinets and to record the amount of time they worked.

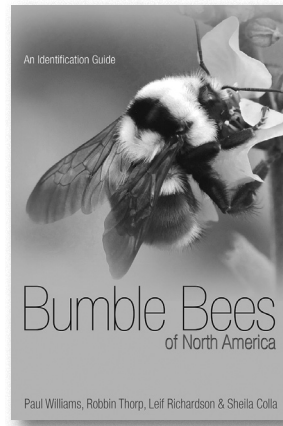
The BioBlitz approach worked wonderfully well. Although we would have liked to include the public more in the count, we settled on 30 volunteers, more than half of which were not specialists. The volunteer group worked a collective 150 hours, or approximately 5 hours per volunteer. Two volunteers worked overnight to count all the pinned Hymenoptera. The total time dedicated to the BioBlitz also included approximately 120 hours for preparation, coordination, data compilation, and analysis.

We found that the 1,818 drawers contain 407,357 pinned specimens, of which 57% (233,950) have been identified to species level, yielding 15,859 species. In addition, there are 22,132 vials containing specimens in alcohol. Although we do not have a precise count of the numbers of specimens contained in the vials, a quick estimate suggests at least another 350,000 specimens in alcohol.

The count also told us something about the makeup of the collection. Perhaps not surprisingly, five orders represent 96% of the pinned specimens (Fig. 2) and 98% of the identified species. The collection is very beetle-rich (or beetle-heavy, according to some), with 250,306 pinned Coleoptera making up 61% of the pinned specimens. The beetles also represent just over half of the identified species. More than 85% of the 18,000 Lepidoptera specimens have been identified to species (2,261 species), whereas only 57–61% of the other three prominent orders have been identified to species. At the other end of the spectrum, the collection also contains small numbers of less prominent taxa, mostly in alcohol-filled vials: 3 vials of Solpugida, 5 vials of Protura, and 7 vials of Zoraptera. The collection also reflects the history of the associated faculty and their interests: 105,000 pinned specimens of Carabidae, representing 4,600 species; 26,000 pinned Staphylinidae, representing 369 species; and 4,500 Asilidae, with 226 species. Those three taxa reflect the interests of a former curator (R. T. Allen), visiting systematist (A. J. Newton), and present curator (J. K. Barnes), respectively. One addition to the collection, made in 1969, was a purchase of a personal collection of 18,000 specimens representing 5,359 species, including important carabid species from habitats that no longer exist.

Aside from being a nice exercise, the BioBlitz yielded several valuable outcomes. We generated data for a grant proposal; the blitz provided an opportunity to make a thorough check for museum pests in the collection; and we introduced the Museum and arthropod collection to a number of department staff who had never been in the Museum, except perhaps to borrow the outreach “Oh, my!” drawers of showy taxa.

What we hope for as an ongoing outcome is to have this activity taken up by others, to count and share the holdings of other arthropod museums and collections. We know there are large holdings at major research museums, such as the U.S. National Museum of Natural History, the Field Museum, and the Florida State Collection of Arthropods, but there are also numerous smaller arthropod collections scattered throughout North America, at most university entomology departments, many biology departments, and some state and local museums. Entomology collections, more so than any other organism-focused collection, rely heavily on use by the scientific community to keep taxonomy current and to advance the utility of the collection through identification, curation, and addition of specimens. Unlike the large museums that regularly attract researchers, small collections struggle to



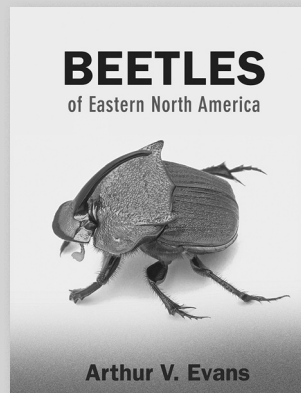
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Fig. 4. Jessica Hartshorn, Ph.D. student at the University of Arkansas, scans a drawer of sawflies during the BioBlitz.

generate interest and use of their specimens. Short of fully digitizing a collection, being able to advertise the strengths and diversity represented therein may help attract researchers that might have never considered contacting an institution with a specialized or regional collection. Presumably, most small or regional collections hold important biological resources, especially local taxa that are hidden away, poorly known to the scientific community. Even having a list of families and numbers of species and specimens within each family can provide enough of a hook to make contact and determine whether a research visit might be in order. Every research visit turns into additional exposure for the collection and expert curation of specimens.

Lastly, by conducting a museum BioBlitz, the collection's curator will gain a better understanding of the extent of the collection and the novelties contained. The University of Arkansas Arthropod Museum began in 1905, and most collections around the country have been building for many decades as well. Over time, curators come and go, and, unless the collection has an active database, the curator on staff generally does not know the full extent of the holdings. During our BioBlitz, we learned a lot about the makeup of our collection. We discovered 6,000 carabid specimens from Saigon Run collected during the Vietnam War. We also found significant collections of unsorted beetles from Thailand and Panama. Although we knew a little about their presence in the collection, we likely

would never have known the extent of those specimens if the BioBlitz had not occurred. Collectively, the holdings of small museums across the country are bound to be huge. Who knows what treasures are waiting to be discovered?

We hope others will adopt this activity and apply the idea to their own collections. Taking the BioBlitz idea to the arthropod museums and then sharing the results among the taxonomic community can make the resources more prominent and available to a larger audience, almost like a "meta-collection." Sharing the information should help provide an answer to the question we are frequently asked: "What is the value of your insect collection?"

### Acknowledgements

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