

The Cicada Pulse: Ants, Ecosystems, and a Rare Experiment

Alvaro Arroyo

Lake Forest College
Lake Forest, Illinois 60045

When periodical cicadas emerge from the ground by the trillions every seventeen years in northern Illinois, most people grab earplugs. For Dr. Sean Menke and his team, it was a once-in-a-generation scientific jackpot. The mass emergence of cicadas across Lake County gave Menke, a field ecologist at Lake Forest College, a rare natural experiment: a chance to test how sudden surges of resources—what scientists call “pulses”—reshape ecosystems. His project asks a simple question: when ants encounter a flood of free food, do they abandon their usual ecological roles or keep doing their normal work? The answer matters because it tells us how ecosystems respond when the rules suddenly change. Every 17 years, Lake County becomes an epicenter of ecological drama. Cicadas cover trees, lawns, and sidewalks. For homeowners and businesses, it’s mostly a nuisance. For scientists, it’s a pulse of energy big enough to alter an entire landscape. Cicadas are not small players in this story. Their collective biomass during emergence rivals that of many other organisms in the region. For about six weeks above ground, their shells cling to trees, their bodies pile in drifts, and their mating calls can reach 100 decibels, which is louder than a motorcycle. Then, just as suddenly as they arrive, they vanish, leaving behind nutrients in the soil and countless questions about what happened while they were here. Ants are often overlooked as pests, but in ecological terms, they’re keystone workers. They disperse seeds of native plants, defend trees from herbivores, scavenge dead material, and regulate populations of other insects.

Their roles ripple through ecosystems, affecting plants, animals, and even humans. Because ants respond rapidly to environmental changes, they’re also reliable indicators of ecosystem health. That makes them the perfect test case for Menke’s question: do ants change their behavior when cicadas appear in overwhelming numbers? If so, what are the consequences for everything else tied to them? Most ecological studies are conducted in small, controlled settings such as plots, cages, or lab microcosms. Menke’s project is different. “Most people who do experiments in ecology study small areas,” he explained. “To study an entire county is unheard of.” The cicada emergence effectively turned Lake County into a vast, real-world laboratory. Ecologists compare this kind of event to other “pulse experiments”: whale carcasses sinking to the seafloor, cow carcasses decomposing in the desert, or fertilizer runoff flooding a river. In each case, the sudden arrival of nutrients changes how species interact. But almost none of those events happen on the scale of an entire county, making Menke’s project one of the most ambitious of its kind. None of this work would be possible without support from the National Science Foundation (NSF). The grant funds three full years of study: the cicada year itself and two additional years to monitor lingering effects. Crucially, it also pays for people to do the work. Two undergraduates each summer, a full-time post-baccalaureate lab assistant, travel to conferences, and collaborate with partner labs on the East Coast. “All the money basically goes into student support,” Menke said. That’s not just a financial detail. It’s a deliberate choice to make research accessible to students who might otherwise be shut out. Menke doesn’t accept unpaid volunteers.

With this grant, ten students in just the first year and a half gained hands-on experience in the field and lab while being compensated for their time. For a liberal arts college, that kind of opportunity is transformative. Student research isn’t about standing behind a microscope in climate-controlled labs. It’s long drives to field sites, muddy boots, and hours of patient observation. Menke’s team maintains five sites across Lake County, each requiring 2-4 hours of monitoring per week. When it rains, ants stay underground. When temperatures dip, activity stops. A week of bad weather can derail carefully laid plans. Students learn resilience the hard way: how to pivot when conditions change, how to keep collecting

data even when the day doesn’t go as planned. They also learn technical skills that carry far beyond college: field identification of ant species, statistical analysis of behavioral patterns, and the art of presenting results at national conferences. Many of these skills come from working alongside Menke in real time, troubleshooting problems as they arise. The immediate question is whether ants shift their activity during cicada pulses. But the broader implications reach far beyond Illinois. Ants disperse the seeds of endangered plants; if their foraging changes, plant reproduction could be affected. Ants also regulate insect populations; if they’re distracted by cicadas, pests could temporarily spike. More broadly, the study speaks to how ecosystems respond to human-driven pulses. Fertilizer runoff, agricultural waste, and urban nutrient surges all create sudden shocks that ripple through environments. By comparing cicadas to these human-made pulses, Menke’s team can generate insights that are widely applicable. “The results will be very generalizable because they cover such a large area,” he explained. For Menke, cicadas and ants weren’t always the plan. Originally trained as a herpetologist, his career shifted when his PhD advisor retired suddenly. He found a new direction through a lab focused on ants, and what began as a detour became a defining path. It’s a story he shares with his students to remind them to stay open. “You don’t know what you will like doing until you actually do it,” he said. That philosophy fits neatly with the liberal arts ethos of Lake Forest College. Students may arrive with rigid expectations for careers in medicine, veterinary science, or molecular biology, but often find passion in unexpected places.



Dr. Sean Menke, Professor and Chair of Biology Department at Lake Forest College.

For Menke, an unwelcome surprise early in graduate school turned into a career in field ecology. For his students, it might be ants. Though the study doesn’t directly tie into climate change, its relevance to local conservation is clear. Ants are key seed dispersers for native plants in Lake County, meaning that changes in their behavior could ripple through conservation efforts. The project also turns the county into a “living laboratory,” connecting residents to science happening in their backyards. Neighbors notice the cicadas, but they may not realize their yards are part of an experiment that informs global ecological theory. Seventeen-year cicadas are more than a noisy curiosity. They’re reminders that ecosystems are dynamic, unpredictable, and occasionally overwhelming. For Menke and his team, the 2024 emergence was not just a spectacle; it was an ecological experiment on a scale rarely seen. By tracking how ants respond to a pulse of free food, they’re uncovering insights that apply from forests to rivers to deserts, and from Illinois backyards to global conservation. Although the cicadas won’t return for another seventeen years, the lessons from this project may shape science and student careers for decades to come. In the end, the buzzing invasion left behind more than molted shells. It left a blueprint for studying, teaching, and learning from the sudden shocks that define life on a changing planet.

Note: Eukaryon is published by students at Lake Forest College, who are solely responsible for its content. This views expressed in Eukaryon do not necessarily reflect those of the College. Articles published within Eukaryon should not be cited in bibliographies. Material contained herein should be treated as personal communication and should be cited as such only within the consent of the author.