

## VOLUME 21, NO. 4 Winter 2003

Discoverer of Echolocation  
Transformed Bat Research  
Amy Sugeno



 [View PDF version](#)  
[6.9 MB]

Donald Griffin discovered bats' use of echolocation in 1940, opening what he once called a "magic well" from which scientists have been extracting knowledge ever since. More than six decades later, that well is still pumping. Echolocation, a term he coined, has been confirmed in a wide variety of animals and become a cornerstone of bat research.

Griffin, who did so much to reveal the wondrous complexity of bats, died November 7, 2003, at his home in Lexington, Massachusetts. He was 88. Griffin's wife, Jocelyn Crane, died in 1998; he is survived by two daughters and a son. And, notes bat biologist M. Brock Fenton, Biology Department Chair at the University of Western Ontario, "he is survived by his work. He left the world of biology a much richer place."

Few scientists have done more to fascinate the public about bats. BCI Founder Merlin Tuttle remembers him for his early encouragement, while BCI Science Officer Barbara French found him a wonderful mentor, providing priceless kindness and enthusiasm in support of her studies of free-tailed bat communication. And bat researchers around the world will long remember Griffin's lead-off presentation at BCI's Echolocation Symposium in Austin, Texas, last year.

Donald Redfield Griffin, born August 3, 1915, in Southampton, New York, published his classic book, *Listening in the Dark*, in 1958, describing the biological sonar system of bats and how they use it both for high-speed collision-avoidance and to locate, track, and capture flying insects. It was an epic discovery in biology and was not without controversy at the time.

He saw echolocation confirmed not only in most bat species, but also in toothed whales, porpoises, shrews, oilbirds, and swiftlets. Griffin was a Harvard University undergrad when he conducted the pioneering research with fellow student Robert Galambos from 1938 to 1942.

But the seeds of the echolocation story were planted 150 years earlier [BATS, Summer 1991]. Eighteenth-century Italian scientist Lazzaro Spallanzani put an owl and a bat in a completely dark room and found that while the bat flew effortlessly, the owl kept bumping into objects in its flight path. When he covered the bat's head, it also had trouble navigating in darkness. Spallanzani concluded that bats navigated with an unidentified "sixth sense."

Swiss zoologist Charles Jurine, meanwhile, found that blocking one of a bat's ears spoiled its navigating abilities, a finding Spallanzani pursued, eventually concluding that bats somehow see with their ears, perhaps using sound. That notion was considered preposterous by his peers. It languished until Griffin puzzled over the ability of bats to fly at high speeds through pitch-dark caves without running into each other or walls.

Griffin recalled years later that Harvard Physics Professor George Washington Pierce had developed a "sonic receiver" to study insect sounds. The device took high-frequency

sounds beyond the range of human hearing and reduced the pitch to an audible level. Griffin convinced the professor to use the receiver while bats flew about his laboratory. Those first runs in about 1938 were disappointing. Griffin and Galambos explored and tested until they eventually demonstrated that bats were in fact emitting a stream of high-frequency sonic beeps in flight and that blocking either hearing or sound emission caused the bats to bump into obstacles. “These were,” Griffin understated, “surprising results in 1940.”

Griffin continued his innovative experiments over the years, soon confirming that bats adjust their sonic beeps for the task at hand (whether collision avoidance, searching for prey, or closing in to attack) and analyze the echoes of the beeps with surprising precision. “Animals do not perform miracles,” Griffin wrote of echolocation in 1988, “but some of their capabilities would have seemed magical had anyone ventured to suggest them 50 years ago.”

Griffin, elected to the National Academy of Sciences in 1960, was a professor of zoology at Cornell University, Harvard, and Rockefeller University, from which he retired in 1986. His retirement hardly ended his research: Griffin continued to present papers at national and international meetings, providing key ideas and encouragement to a variety of students and scholars.

The research Griffin spawned continues unabated, as each new bit of knowledge seems to spark still more questions. “Don took us to the magic well of echolocation,” Fenton said. “It is his well, but he always shared it, and he will ever be with those who go there.”

All articles in this issue:

- [Counting Bats the Hard Way](#)
- [Churning the Food Chain](#)
- [Giant Bats Face a Shrinking Forest](#)
- [Bat Conservationist of the Year](#)
- [Corporate Conservationist of the Year](#)
- [A New Kind of Bat House](#)
- [Discoverer of Echolocation](#)