PROFILE

Gordon Burghardt: Forty Years of Studying Reptilian Behavior

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In August 1979, scientists who were studying the systematics, behavior, ecology, physiology, and conservation of iguanas met to compare notes and take part in a symposium held at the University of Tennessee, Knoxville. The symposium was organized by Gordon M. Burghardt of the University of Tennessee and A. Stanley Rand of the Smithsonian Tropical Research Institute (STRI) in Panama. It led to *The Iguanas of the World: Their Behavior, Ecology and Conservation* (1982. Noyes Publications, Park Ridge, New Jersey). Edited by Burghardt and Rand, the volume quickly became something of a bible for those of us interested in the biology of iguanas. In 1997, a similar symposium, held at the University of Washington in Seattle, resulted in the second in what will hopefully become a continuing series devoted to these fascinating lizards (Alberts et al., eds. 2004. *IGUANAS: Biology and Conservation.* Univ. California Press, Berkeley; see review on p. 60). Forty-two biologists contributed to the latest volume and it was dedicated to Gordon Burghardt and Stan Rand. Gordon was the only individual to contribute to both the 1982 and 2004 volumes.

Gordon was born in Milwaukee, Wisconsin and remembers being drawn to reptiles at the age of about eight. Although he initially majored in Chemistry as an undergraduate at the University of Chicago, he soon became aware of the program in biopsychology and changed majors. His adviser was Eckhard H. Hess. Hess knew that the behavior of reptiles had received little attention from ethologists (scientists who study the natural behavior of animals) and encouraged Gordon, while still an undergraduate, to become involved in research. A problem, however, arose. Gordon's primary interest was in snakes, and Hess's wife hated snakes. She had extracted a promise from her husband that none would be allowed in his laboratory. As a result, the man who would later conduct research on giant iguanas began small, by studying the feeding behavior of Green Anoles (*Anolis carolinensis*) and Five-lined Skinks (*Eumeces fasciatus*). This work led, in 1964, to the first of over 150 research papers, books, and book chapters that Gordon has published to date. Despite the subjects of that first study, Gordon was still determined to study snakes and the opportunity arose when he was given a pregnant garter snake. Unable to keep it in Hess's lab, he set it up in his studio apartment and, before long, he had an entire litter of snakes, each housed in its own small cage and all squeezed into his small apartment — and that was where he began the research on the feeding behavior of snakes that has been a hallmark of his career. This research became the basis for his doctoral research and, fortunately, by the time he entered graduate school, Hess had found a way for him to house snakes in his laboratory.

A recent photograph of Gordon Burghardt (and friend) in his office at the University of Tennessee. *Photograph courtesy of the University of Tennessee Photography Services.*

After receiving his Ph.D. in Biopsychology, Gordon taught biology at the University of Chicago for about a year and a half before joining the faculty of the Department of Psychology at the University of Tennessee, Knoxville. He presently holds a

joint appointment in that department and in the Department of Ecology & Evolutionary Biology (EEB). Until it was merged into EEB, he directed the Graduate Program in Ethology, which he had founded. He directs the research of undergraduate and graduate students in both Psychology and Biology and teaches, among other courses, the popular Comparative Animal Behavior Laboratory course (the "CAB lab"). Very active in several professional societies, he is Past-President of the Animal Behavior Society, a member of the Editorial/Advisory Board of the International Iguana Society, the IUCN Species Survival Commission Iguana Specialist Group, and the AZA Komodo Dragon Species Survival Plan management group grant panel. Virtually all of his research has involved living animals, and he is a very active advocate for the ethical treatment of all animals used in research.

He has been a strong proponent of collaboration between university-based biologists and their zoo-based counterparts, and several of his graduate students have conducted research in zoos. He served for many years on an advisory board for the Knoxville Zoological Park and once provided a foster home for a young lion in his basement, which became an effective security device when the need arose. Having broken the glass in a basement door, the would-be burglar apparently encountered the lion, which was no longer a small cub and had the run of the house. One has to guess what happened but, whatever ensued, the burglar left in an apparent rush. Not only was nothing stolen, not even the camera equipment in plain view, but the hammer used to gain entry was left behind on the floor. Gordon also fostered two orphaned bear cubs, which led to a long involvement with studies of Black Bear behavior, including bear-human interactions.

In 1973, Gordon attended a meeting of herpetologists in Costa Rica and, afterward, visited the STRI facility on Barro Colorado Island (BCI) in Panama. Although he was there to study snakes, his attention was drawn to the large numbers of baby Green Iguanas (*Iguana iguana*) that were basking and feeding in the shrubs around his cabin. At the time, Stan Rand was studying the nesting behavior of adult iguanas, but no one was studying the hatchlings. Gordon soon returned to BCI and initiated what was to be a long series of studies on the nesting behavior of female iguanas, the emergence and dispersal of hatchlings, and various aspects of adult behavior. He was joined in these studies by an army of undergraduate, graduate, and postdoctoral students from the United States and Latin America.

Gordon Burghardt in full field mode demonstrating the proper use of a "stump-ripper" to students prior to a safari around his cabin in the wilds of eastern Tennessee. *Photograph by Paul T. Andreadis.*

A blind used by Gordon Burghardt and his students to study the nesting behavior of Green Iguanas on Slothia, an islet adjacent to Barro Colorado Island, Panama. *Photograph by Gordon Burghardt.*

Many of these studies were carried out on Slothia, a small (0.3 ha) islet in Gatun Lake near BCI. Aside from its proximity to the STRI facility on BCI, Slothia was ideal for these studies because, working from a blind, the iguanas could easily be observed. Stan Rand had found that over 100 female iguanas migrated to Slothia yearly to nest communally in a small (8 x 6 m) clearing. In this crowded environment, each female aggressively defended her nest against others who were intent on appropriating a partially completed nest or who might, in the process of digging their own nests, uncover and scatter her eggs. They all shared space with American Crocodiles (*Crocodylus acutus*). This was an uncomfortable arrangement, at least for the iguanas and the biologists: the crocodiles occasionally ate an iguana and Gordon has very dramatic film footage, taken in the course of observing iguanas, of a huge crocodile quite unex-

Hatchling Green Iguanas emerging synchronously from their nest chamber on Slothia. *Photograph by Gordon Burghardt.*

Stan Rand (left) and Gordon Burghardt relaxing aboard a research vessel on the return trip from the Archipélago de las Perlas in the Bahía de Panamá, where they had been studying the nesting behavior of Green Iguanas. *Photograph courtesy of Gordon H. Rodda, photographer unknown.*

pectedly launching itself out of the water and coming to rest directly in front of the blind.

Among the results of that research, we now know that hatchling iguanas, like hatchling Green Sea Turtles (*Chelonia mydas*), emerge synchronously from the nest chamber. They remain on Slothia for a few days before rapidly dispersing in groups by swimming to the adjacent mainland. For up to a year following emergence from the nest, most baby iguanas remain in groups, and Gordon and Rand have shown that, on BCI, the growth rates of iguanas in these groups is higher than those that adopt a solitary existence. A partial, but substantial, list of publications on iguanas by Gordon and his collaborators can be found in his chapter in *IGUANAS: Biology and Conservation.*

All the while Gordon was conducting research on iguanas, he also was building on his earlier studies of snake behavior and ecology. The chemical senses, especially those associated with the vomeronasal or Jacobson's organ (vomerolfaction), are very important to snakes and are especially critical in, among other things, prey identification. In his early research, Gordon established what have become the standard methods for studying the chemical cues that elicit predatory responses in snakes. He has been especially interested in whether the attraction to a particular type of prey (or, more accurately, prey chemical) is inherited, implying an evolutionary basis, modifiable by experience, and whether preferences change ontogenetically, that is, as a snake ages. These interests also have led him to study geographic variation in prey preferences within a single species and among closely related species. Much of this work has involved North American Garter Snakes (*Thamnophis* spp.) and Water Snakes (*Nerodia* spp.), and his lab is typically full of converted plastic shoe boxes, each housing an individual new-born snake.

Recently, he has been involved in an effort to save an important piece of the habitat of Butler's Garter Snake (*Thamnophis butleri*), which had been threatened by land development in Milwaukee, Wisconsin. A group of developers had asked the state to remove the snake from the state's official list of endangered and threatened species. As of this writing, Gordon's efforts, and those of others of like mind, have won, at least temporarily. In January, a state legislative panel directed the Wisconsin Department of Natural Resources to formulate a plan for protecting the species from developers.

Gordon's snake research has occupied most of his time lately, but he has broadened the scope of his studies to include consideration of the enrichment and psychological well-being of reptiles, the behavior of Monitor Lizards (*Varanus* spp.), and play behavior, cognition, and visual perception in reptiles and fish. His book on animal play will soon be published.

In a rather radical departure from his research on reptiles, he soon will leave Tennessee temporarily to study amphibians at the National Amphibian Conservation Center at the Detroit Zoo. Iguanas, however, are never far from his mind, and he continues to be a valuable source of information, advice, and assistance to anyone studying these lizards. One gets the impression that it wouldn't take much to lure him back into the fold on a more active basis.

If you would like to learn more about Gordon's activities, you can visit his web site: http://web.utk.edu/~gburghar.

What Goes Around Comes Around

When Allison Alberts, who was featured in the profile in *IGUANA* 10(4), decided to change her major from English to biology, the decision was based, at least in part, on her experiences during the herpetology unit of a two-semester course on the "Natural History of Vertebrates." That unit was taught by Harry Greene, who had been one of Gordon Burghardt's students at the University of Tennessee. Yet another of Gordon's students, Paul J. Weldon, had earned his doctorate working on snake behavior. Later, when Paul was on the faculty at Texas A&M University, one of his post-doctoral students was none other than Allison Alberts.