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## Sniffing for Clues

Russ Blogg '05

*Illinois Wesleyan University*, [iwumag@iwu.edu](mailto:iwumag@iwu.edu)

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# Sniffing for Clues

**Russ Blogg '05 spent a year among the elephants of Africa to learn how they use their sense of smell to survive.**

**Story and photos by Russ Blogg '05**



**The Addo Elephant National Park is home to 350 elephants and many other species.**

Parked at the waterhole called Addo Heights in my 1986 Toyota Land Cruiser for close to an hour, I still hadn't seen much of anything. Gazing at the placid surface of water, I glanced at my watch. It was approaching noon and I was already sweating bullets. My windows were rolled down in hopes that a light breeze might pick up. No such luck.

Suddenly, there was movement in bushes to my left. The elephants had arrived! Rebecca, the family matriarch, led the way along a well-worn path to the waterhole, closely followed by her two daughters, six grandchildren, and great-grandchild, as well as her six younger sisters and their offspring. Young calves remained close to their mothers while older calves and juveniles strayed farther from the group, but not too far.

Though I'd seen this spectacle many times before, it never failed to excite me. I wasn't the only one — as they neared the waterhole, some of the younger elephants broke into eager runs, tails raised, screaming and trumpeting with delight. Other members of the group casually strolled within inches of my Land Cruiser, barely noticing my presence.

Water was sucked up into trunks and then squirted down parched throats. After thirsts were quenched, many of the elephants began mudding and splashing water onto themselves. This is a common behavior for elephants during hot weather; the water cools off their thick, textured skin and the mud acts as a skin conditioner and sunscreen.

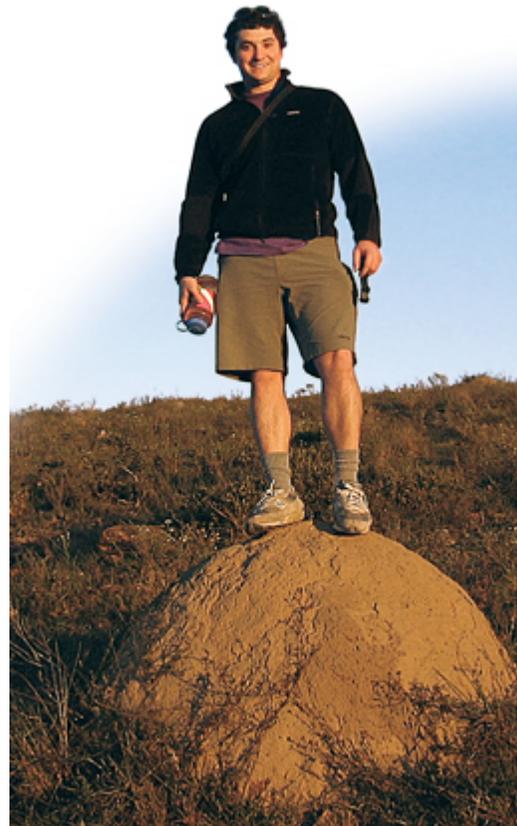
Parked less than 10 feet from the edge of the waterhole, I was close enough to feel the spray of water and mud on my bare arms. Sometimes a misdirected or deflected spray would splash me in the face. Being soaked with water that comes directly out of an elephant's trunk can be quite refreshing, especially on a stifling-hot day.

Recalling it now, I'm reminded just how lucky I was to experience such a moment, following a path that started at Illinois Wesleyan, where I majored in biology. After graduating in 2005, I enrolled in the biology department at Georgia Southern University in Statesboro, Ga., where I spent my first semester taking several graduate-level courses, teaching environmental biology labs, and working on the research proposal that would eventually take me to Africa.

After successfully defending my proposal, I packed my bags and met my advisor, Bruce Schulte, in South Africa. After two weeks of training, Dr. Schulte flew back to Georgia and I began my research in earnest.

The length of my study — funded by the National Science Foundation and Georgia Southern University — was 11 months. I arrived in mid-January 2006 and left in December, just before Christmas. All of my research was done at Addo Elephant National Park in the Eastern Cape Province of South Africa. The park is located 60 kilometers northeast of Port Elizabeth, or P.E., as the locals called it. P.E. is where I went once a month to pick up groceries and supplies and send e-mails. P.E. is a huge and very urban city — especially when compared to the rural setting of Addo, where I lived, in a tiny cabin called a wendy house. Picture a backyard shed and you have an approximate idea of its size. But what my wendy lacked in room was more than compensated by its location, nestled beneath two ancient fig trees, with a gorgeous view of the Zuurberg Mountains and many spectacular sunsets.

All the elephants and the park's other wildlife lived in the fenced game area just up the hill from my wendy. The evening air was filled with the sounds of hooting owls, shuffling porcupines, yipping jackals, howling hyenas, and roaring lions. I would lay in bed, listening, with a grin on my face ... those wild sounds served as nightly reminders that I was truly in Africa and not just dreaming.



**Russ Blogg stands atop a termite mound to get a better view.**

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The Addo Elephant National Park was established in 1931 to protect a small part of the African elephant population which, according to the World Wildlife Federation, fell from several million at the beginning of the 20th century to fewer than 700,000 by 1989. Covered with dense evergreen vegetation, the park's main section preserves a band of 350 elephants. It's remarkable to think that Addo's elephant population has grown from 11 to 350 in a mere 75 years.

My first job after arriving in Addo was to familiarize myself with the elephants in the park. Each elephant had a specific I.D. code and name. Of course, they don't answer to those names but there are other ways to tell them apart. Except for the young calves, each individual's ears have distinctive patterns of veins, notches, rips, and holes. You might also see distinguishing scars (usually from old tusk pokes) on their sides or backs. The length and shape of tusks can also set individuals apart: Some are shorter, longer, missing, or broken.



**An elephant family (above) crosses the plains on the north side of Addo.**

It doesn't take long to notice that elephants are very social animals. They live in a matriarchal society, which means that the oldest female in a family group is most dominant. A family group consists of the matriarch, such as Rebecca, her daughters, and their offspring. The social bonds within a family group are very strong for females, who remain within their family, or natal group, for life. Young males, however, only remain with their natal groups until puberty, around the age of 10 or 11.

Adult males mainly associate with family groups to mate. While younger bulls (age 15–20) are physiologically capable of breeding, they can't compete with the older, larger, and more dominant bulls for mates. Bulls generally reach reproductive status around age 25. Once he reaches this status, a bull begins undergoing an annual cycle of musth, a period of highly elevated testosterone levels, accompanied by heightened interest in females and increased aggressiveness.

My research involved many hours observing this behavior. It can be a tricky endeavor when you consider that a full-grown adult bull stands 11–12 feet tall at the shoulder and weighs approximately six to seven tons. On the several occasions where a bull elephant charged me head-on, I flinched, even within the protection of my sturdy Land Cruiser. There is nothing like an aggressive, incoming bull elephant to make your stomach drop and your heart race.

Of course, one of the best places to observe elephants is at one of Addo's many waterholes. On a hot summer's day, elephants will stay at a waterhole for hours, which is ideal for collecting behavioral data. You don't have to spend hours searching through the thick bush; you can simply wait at a waterhole and allow the elephants to come to you. As an added bonus, there aren't any thick bushes or tall trees to obstruct your view, so it's just you and the elephants.

For example, one morning I had been out early in search of a group known as the H-family, led by Hettie, the 56-year-old matriarch. I found them at Hapoor, the park's largest waterhole. The group left soon after I arrived, but not long afterwards, Taitao — a 35-year-old bull who happened to be in musth at the time — strolled in for a drink. Before slaking his thirst, he spent several minutes investigating the feces and urine left behind by members of the H-family.



**Two elephant bulls, named Henry and Liam (right), quench their thirsts at one of the park's many waterholes.**

This might seem repugnant to you, but for an elephant, excretions are full of informative chemical signals called pheromones. By assessing the signals in the excrement, Taitao was able to gather useful information about the elephants that had just been at the waterhole. He might have been able to tell how long ago the family group had been there, which direction they had gone, and he may have even recognized which family it was.

Most importantly, Taitao would have ascertained if any of the females in that group were in or close to being in estrus (sexually receptive). Female elephants have a 16-week estrous cycle and are only receptive for five to seven days each cycle. An acceptable male like Taitao must locate and form a mating pair with an estrous female at this crucial point in her cycle and it is imperative for him to accurately understand the chemical signals left behind at the waterhole to complete this task.

In technical terms, Taitao was engaged in chemosensory behavior, which relates to perception of a chemical stimulus by sensory means, primarily smell. Because these chemical signals are so important to elephants, my research in Addo focused on examining how they are transmitted, determining when in the development they are understood, and deciphering what they mean to elephants.



**A male and female lion enjoy a lazy summer day.**

I recorded behavioral data on male and female elephants in four defined age classes (calf, juvenile, pubescent, and adult), focusing on four chemosensory behaviors (sniff, check, place, and flehmen) that elephants perform with their trunk to different substrates such as urine or feces. I looked particularly close at the pubescent age category (10–19 year olds). This is an important time period for elephants behaviorally as they transition into their adult roles. I also spent time comparing differential rates of chemosensory behaviors in bulls prior to, during, and after musth.

I am one of several biologists who have been involved in this project, led by Dr. Schulte and funded by the National Science Foundation. Our combined studies, as Dr. Schulte writes, “will lay the groundwork for future investigation on male-based signals and of ultimate questions on this topic. The findings may assist in the conservation of endangered elephants in practice and other species in principle.”

Knowing that the year I spent in Addo may help in the management and conservation of these magnificent animals is rewarding, to say the least. Along with my data (which I will continue to analyze as I write my thesis), I brought back many unforgettable memories. Chief among them was a visit by Molly Hornbaker (IWU Class of 2004), my longtime girlfriend and now fiancée. I had the engagement ring with me when I arrived in January and had eight months to pick the perfect spot to propose. After much consideration, I chose a place within the game area: on the top of a hill, far away from any roads, and with a spectacular view of the park, Zuurberg Mountains, and Sundays River Valley. Molly flew over in September and soon after she arrived, I popped the question. Thankfully, she said yes!

Romance aside, I hope that sharing some of my experiences in Africa might inspire current Illinois Wesleyan biology students to consider doing graduate work in the field. I know many biology majors leave IWU with the intention of enrolling in medical, dental, or veterinary schools. While these are admirable goals, I suspect many students simply do not consider the possibility of a career in field biology, biological research, or academics. The possibilities out there are endless. Biology is a dynamic field and there is always something new and exciting being researched and discovered — be it in the wilds of Africa or in your own backyard.