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School of Science & Technology news

A biology student's research exploration in the desert



Tim Revell, PhD, MA, nooses a lizard for his research study by using his creative contraption—a fishing rod and dental floss.

Ask anyone what they use dental floss for, and you'll get an obvious answer, right? Not with Tim Revell, PhD, MA, a 2006 graduate from the Department of Earth and Biological Sciences, and professor of biology at Mt. San Antonio College. So what does Dr. Revell use dental floss for? To catch desert iguanas.

"My father-in-law is a dentist and he gives us all dental floss every year for Christmas in our stockings," says Dr. Revell. "I always tell him, 'Oh, this is just what I need for catching lizards!'"

By using a noose made of dental floss that's attached to a fishing pole, Dr. Revell catches his research subjects.

It all started when he was a little boy. "My earliest memory was catching anolis lizards in Florida at my grandparents' when I was about 4 years old. I've been interested in lizards ever since then."

Then in the summer of 2002, he decided to do his doctoral dissertation on desert iguanas. "I absolutely wanted to work with lizards. I think lizards are the coolest animals on the planet."

In his dissertation, "The Behavioral Ecology of Sleep in the Desert Iguana (*Dipsosaurus dorsalis*)," Dr. Revell had several research aspects: 1) a field study to discover where desert iguanas sleep; 2) a lab study to see how sleep patterns changed when lizards were exposed to sidewinders (rattlesnakes); 3) a lab study to see how sleep patterns changed in response to food availability; 4) a lab study to see how sleep patterns changed in response to tail injury (a naturally occurring phenomena in these lizards); and, 5) a lab study to examine the metabolic rates of desert iguanas during sleep and wakefulness to see if sleep saves energy.

Studying in 110-degree weather isn't what most would call fun. But, Dr. Revell made the most of it. "I often cooked my bean and cheese burritos by laying them out in the sun."

And of course, working in the desert brings adventures of its own. Like that one

sandstorm.... "It became so incredibly bad that I had to wear goggles to continue working," explains Dr. Revell. "When I left the site, the blowing sand took chips of paint off my car, and it completely buried the road in sand."

But at other times, the desert could be far from a chaotic sandstorm. "One time I was out in the late summer, and I decided to go for a run."

He continues, "It was a very strange day for the summer because it was cloudy and somewhat overcast. Then it started to rain, and it was a very, very peaceful feeling to be out running in the middle of the desert during a rainstorm. All sorts of lizards came out onto the road as well as birds and insects."



Dr. Revell found that desert iguanas (pictured above) use different holes for escaping predators than for sleeping. They seem to be very cautious about entering a sleep burrow when an observer is a predator.

Through Dr. Revell's adventures, he discovered quite a lot:

- Desert iguanas use different holes for escaping predators than for sleeping. They seem to be very cautious about entering a sleep burrow when an observer is a predator.
- Desert iguanas slept less when a sidewinder was present. They also increased the use of ASEC (when one eye is open and the other eye is closed, called asynchronous eye closure) away from the snake (when one eye is open, it is usually the one facing the snake). This is a very significant finding because it strongly suggests the ability for these lizards to undergo USWS (unihemispheric slow wave sleep—one side of the brain is asleep while the other side is awake). This has not been seen in reptiles yet.
- Food seemed to have no effect on sleep patterns.
- Desert iguanas, when they experience a tail injury, respond by sleeping more almost immediately (next day). But this behavior reverts back to normal within two days.
- Desert iguanas save energy by sleeping, on average about 25 percent more energy is saved by sleeping than by remaining awake. This is significant because it defends a popular theory that sleep serves an energy conservation function (which most researchers have concluded is not the function of sleep).

In addition to lizards in the desert, Dr. Revell found a nest of loggerhead shrikes—birds that are known to kill lizards and rip them apart and leave them hanging from bushes. Fortunately, he never saw any of his research subjects in that particular manner.

And let's not forget to mention the time when Dr. Revell was stoked to see a beetle the size of a hummingbird slam into his leg one night. "Upon closer examination, my friend Lou Shainberg who is an entomologist, and I identified it as a California prionus beetle." Which, by the way, is one of the largest insects in California.

But an experience he'll never forget is the time when he and Al Muth, the field station director who works in the area of desert conservation biology, talked one night in the desert.

"As we talked, we stared out into the desert night and looked upon the lights of Palm Springs/Palm Desert," Dr. Revell remembers. "I asked him, when looking back through his career as director, what he accomplished. He said something to the effect of 'when we look out upon all those lights of Palm Desert there are many empty spaces where there are no lights. Those are the areas that I have saved from development.' I thought that was a very cool experience. One that I won't forget."

By Patricia Thio

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Dr. Tim Revell earned his Ph.D. under the supervision of Dr. William K. Hayes, in the Laboratory of Behavioral Ecology and Conservation

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