Turbo Cheetah

Scientists use cutting-edge technology to uncover the cheetah's big secret

By Avery Elizabeth Hurt
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Everything seems quiet on the African savanna. A herd of antelope is grazing in the tall grass. One of the animals strays a little way apart from the group. Then suddenly a cheetah erupts from the nearby brush. The antelope dashes toward safety, bobbing and weaving, and the cheetah rushes after it, moving so fast that its legs seem to blur.

Cheetahs have been clocked at speeds up to 65 miles (105 kilometers) per hour. That's faster than any other land animal on Earth. These speeds have been measured by

using a car to drag an object such as a stuffed animal on a rope and watching the big cats chase it. But for Alan Wilson, a scientist at the Royal Veterinary College of London, just knowing how fast a cheetah can run wasn't enough. He wanted to know much more about where and how these graceful predators hunt. What routes do the cats take? How quickly do they move? How do they catch and kill the agile impalas that are their primary prey? To answer these questions, he needed to study the animals in the real world, and he needed some special equipment to do it.

A Very Special Collar

Wilson and his team traveled to the Botswana, a country in Africa with one of the world's largest cheetah populations. Driving across vast plains in search of cheetahs, the scientists soon encountered a 90-pound female ambling along the grassy terrain. One team member leaned out the car window and zapped the cat with a tranquilizer dart. The cheetah dropped to the ground, quickly going into snooze mode. Then the scientists hopped out of their car and got to work.

After giving the animal a checkup, they fitted her with a tricked-out radio collar that Wilson and his team designed themselves. These collars have accelerometers

(instruments that measure increases and decreases in the animals' speed), gyroscopes (devices that stay stable no matter what direction they are tilted, and can help track the animals' movements as they twist and turn), and GPS (global positioning systems) that keep up with exactly where on Earth the animals are at any time. The collars run on solar batteries and transmit information by Wi-Fi to the teams' computers. Wilson's collars have another feature that is especially nice for the cheetahs: They fall off after they've transmitted the data, so the animals don't have to be re-captured for the researchers to remove the collars.

When Wilson collected and analyzed the data from the collars, he learned a lot about where and how cheetahs take down their prey. "When put together, all of this information gives a very detailed picture of how these athletic and very active animals live in the wild," says Wilson. Using the data from the collars—and overlaying it on maps from Google Earth—Wilson and his team have been able to learn not only how fast the cats are moving, but exactly where and when they weave and pivot and how they swerve to avoid an obstacle or keep up with their prey.

It turns out that speed alone is not what makes cheetahs such great hunters.

Smooth Moves

During a typical hunt, Wilson discovered, cheetahs run at only about half their top speed, and often run much slower even than that. Being a great hunter isn't just a matter of speed. "Acceleration [how fast the cats get to that speed] is important, too," Wilson says. "But what really makes a difference when it comes to bringing down the prey is how well the maneuver." Impalas, which are cheetahs' main prey, are not nearly as fast as cheetahs, but they are very agile. A cheetah can go from standing still to top speed in a flash. But in order to catch an impala, it also has to be able to slow down and change direction with equal quickness.

Cheetahs have lots of adaptations that help them run so fast and get up to speed so quickly. They have very flexible spines that can stretch and curve while they are running, allowing them to take very long strides. Their skulls are lighter than most animals their size. This means they can hold their heads steady and keep their eyes focused on their prey while they run. Their long tails help them maneuver easily and keep their balance. The feet of these champion runners are unique, too. "Unlike other cats that can retract their claws, cheetahs' claws are extended all the time and act much like running spikes [on athletic shoes]," Wilson explains. These cleats grab the ground to keep the speeding cats from losing their footing when they make quick changes in direction.

Saving the Cheetahs

In addition to helping us learn more about these amazing and graceful animals, Wilson's high-tech collars and the information they've provided may help us save them. Cheetahs are an endangered species, partly because they are losing the habitats they need to survive. Probably less than 7,000 survive in the wild. Wilson's detailed picture of how these animals move through their natural environment can give people who are working to protect cheetahs a better idea of what cheetahs need to thrive. "We can see where they hunt, and where they are the most successful," says Wilson.

Though cheetahs are famous for how fast they run, the fastest land animal in the world has a few more tricks that just speed. And now humans may have a few more tricks to use to protect these amazing cats.