

Sandfish lizard slithers into science spotlight

March 20 2012, By Miles O'Brien and Ann Kellan

In less than a second, a sandfish lizard can dig its way into the sand and disappear. Blink and you miss it. The sandfish's slithering moves are inspiring new robotic moves that could one day help search-and-rescue crews find survivors in piles of rubble left from disasters like Hurricane Katrina.

"The sandfish is a little lizard that lives in the [Sahara Desert](#)," says Daniel Goldman, a physicist at Georgia Tech. Goldman is an assistant professor specializing in the [biophysics](#) of locomotion. "It manages to move around on the surface of [sand](#) using its limbs and, when startled, it dives into the sand using its [body](#) to propel itself forward."

With support from the National Science Foundation (NSF), Goldman and his team at Georgia Tech use x-rays to track the lizard's underground movements. They've also developed a robot to mimic the lizard's [locomotion](#) so they can study the way it moves in precise detail. Goldman says the sandfish tucks its limbs close to its body and swims through the sand much like an [eel](#) wiggles its way through water.

"The animal propagates a wave down its body from its head to its tail and the wave of the body pushes against the material and the material then pushes the animal forward," says Goldman.

"Part of the complexity of the problem addressed by Goldman stems from the interaction of the lizard with the sand," explains Krastan Blagoev, director of NSF's Physics of Living Systems program in the Division of Physics, which funded the research. "Sand by itself is a

complex material with some properties of fluids and some properties of solids. These [lizards](#) have learned the laws governing the behavior of sand and use them to survive."

"The sandfish's body is very square-shaped," says Sarah Sharpe, a [bioengineer](#) working with research assistant Andrew Masse and Goldman to analyze the sandfish movements. They say the lizard's chiseled body and its shovel-shaped head are what help it to slice through sand like a knife through butter. It happens so fast that the sand around the lizard takes on the characteristics of a fluid and the sandfish literally swims through it.

"We've discovered the sandfish actually creates a fluid around it and swims through that fluid. The animal is essentially pushing off the fluid that it creates," explains Goldman.

Goldman says there are engineers working to incorporate the sandfish movement into deployable robots that could one day help canine search-and-rescue teams find survivors more quickly. "It would be nice to have a device like a sandfish robot that could swim around in rubble or debris after a landslide, an earthquake or any number of disasters--to get into small spaces to look for trapped people or hazardous chemicals," he says.

David Atkins with the DeKalb County Fire and Rescue Canine Unit in Georgia agrees. "Anything we can do to save lives is a good idea," he says. "You only have so much time to get those people out."

So while the little sandfish may not look like a hero, it is teaching us a lot about what it takes to worm through rugged terrain and debris. And that could one day save lives.

Provided by National Science Foundation

Citation: Sandfish lizard slithers into science spotlight (2012, March 20) retrieved 20 April 2024 from <https://phys.org/news/2012-03-sandfish-lizard-slithers-science-spotlight.html>

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