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Toads Anticipate Earthquakes

By Susan Cosier, LiveScience Contributor
posted: 30 March 2010 07:03 pm ET

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Predicting an earthquake is notoriously difficult, yet before the ground shakes, some animals reportedly jump into action, from birds flying in unusual directions to dogs becoming restless during those pre-quake hours to days.

Most of these tales, however, aren't backed up by scientific data, until now. Breeding toads might be able to notice subtle changes in the environment before an earthquake, allowing them to flee the scene and hop to safety, according to a new study announced today.

The study researchers found that common toads (*Bufo bufo*) abandoned their breeding grounds five days before an [earthquake](#) struck L'Aquila, Italy, in April of 2009. The toads didn't return for a few days after the tremor, something they almost never do.

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The team also found that disturbances that occurred in the upper atmosphere before that quake correlated with the toads' movements.

"It's the first time that any study has really documented unusual behavior before an earthquake in a scientific and methodical way," lead study author Rachel Grant, a zoologist from The Open University in the U.K., told LiveScience. "We did it properly and scientifically, and consistently looked at behavior."

A fair shake

The team was studying the effect of the lunar cycle on the toads, which only breed during one month a year in a shallow pool on an Italian lakebed, when they noticed the [seismic behavior](#). Over a 29-day period, Grant and her colleagues had been watching the toads at their breeding site, and got the opportunity to see them before, during, and after the quake.

Five days before the earthquake, after spawning had just begun, the number of male toads at the site decreased by 96 percent. Six days after the last significant aftershock, the toads came back and produced the rest of their spawn.

"So they had two spawning periods, which is really unusual," said Grant.

Toads are highly sensitive to weather changes, yet no [odd weather](#) occurred before the earthquake that would have led to the exodus of toads from their breeding grounds. What did change, however, were the Earth's magnetic field and the amount of radon gas in the groundwater, which the planet's crust burped out before the earthquake.

The researchers aren't sure which factor might have caused a disturbance in the upper atmosphere that was detected using very low frequency (VLF) radio sounding. Whatever the cause, the toads' reactions suggest the amphibians can sense the difference and take action to protect themselves.

Quake prediction

An earthquake detector could be particularly beneficial to toads, which move slowly and so can take hours or even days to find an area that won't be affected by a flood or a mudslide. And postponing their breeding to avoid the disaster could result in greater reproduction success, said Grant.

"I was really surprised because I wouldn't think that earthquakes would be that dangerous to toads, but the fact that they disappeared indicates that they are," said Grant.

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Determining the exact reason for that response, however, would be extremely difficult because no one knows when earthquakes will happen. The knowledge that toads can anticipate them, however, could prove beneficial in the future, said Grant.

"One day there could be a system involving [amphibians](#) as an early earthquake predictor in combination with other seismic indicators," she said.

The study is detailed in a recent issue of the Journal of Zoology.

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[ChaosAvenger](#) wrote: posted 31 March 2010, 12:17 am ET

So why can't dispersed Argon gas and VLF radar detectors be used to predict earthquakes?

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[hanse672000](#) wrote: posted 31 March 2010, 12:31 am ET

so if they know the magnetic field changed and the radon gas increased, have these things not been monitored around seismic areas for awhile now? I would think if there was a correlation we'd know that by now.

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[aerohunter](#) wrote: posted 31 March 2010, 1:42 am ET

the ancient Chinese already knew about the toads.. check out the ancient Chinese earthquake detector
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[AllenAllen](#) wrote: posted 31 March 2010, 9:24 am ET

"I was really surprised because I wouldn't think that earthquakes would be that dangerous to toads, but the fact that they disappeared indicates that they are," said Grant.

Well, earthquakes don't have to be *that* dangerous to toads in order for them to inherit that behavior. 1) Sometimes inherited features are useless. 2) There could have been (somewhere back in toad history) one group in one generation (out of millions) that both had that predilection *and* where it gave a competitive advantage for a grand total of *one* time in all of their history.

Just saying that I don't think we can assume how dangerous earthquakes are to toads based on their behavior. The presumption could be correct: "I was really surprised because I wouldn't think that earthquakes would be that dangerous to toads" Could be 9,999,999 out of a million, not that hazardous. Yes?

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dcrowley wrote:

posted 31 March 2010, 11:22 am ET

They "speculate" through observation that one possibility for the toads leaving the area was the earthquakes coming.

Schrödinger would probably disagree on this one as well.

This kind of scientific observation was the same one that made people think the world was flat. Ship sails over edge of horizon, people don't come back, fell off edge of planet.

There is no science to this other than observation and now they are making a truth out of that observation. I wish I could just do that at my work, and ignore the actual testing required for making a claim like this.

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