**The Changing Sea: Squid Will Be Vulnerable to Ocean Acidification**

By [Bryan Walsh](http://science.time.com/author/bryanrwalsh/)June 03, 2013



Reinhard Dirscherl / Getty Images

I was in sixth grade, and I needed to do a science-fair project. I was worried about the environment even then — unseasonably warm winter days used to send me into paroxysms of anxiety — and given that the year was 1990, the environmental issue to be worried about was acid rain. You remember [acid rain](http://www.epa.gov/acidrain/)? Sulfur-dioxide and nitrogen-oxide pollution, chiefly from coal plants, caused rainfall to become more acidic, damaging the forests upon which it fell.

Acid rain was a well-established concept by 1990 — so much so that the [landmark Clean Air Act of 1990](http://www.epa.gov/air/caa/) was put into place largely to combat the pollution that led to acid rain — but if science is nothing else, it’s about proving things that we already know. So I decided to set up an acid-rain experiment, taking two sets of identical plants and watering one with standard tap water, and the other with a water solution made more acidic with vinegar. Unsurprisingly, the acid-rain plants fared poorly — though to be honest, the control group didn’t do so well either, though that was probably because I had no idea how to take care of plants. Poor protocol.

So that experiment wasn’t any better than the honorable mention I think it earned at the science fair, but it got the point across: more acidic water can be hazardous to organisms that aren’t adapted to it. And that’s what is likely to happen to many sea creatures as the ocean itself becomes more acidic, thanks to growing greenhouse-gas emissions. The oceans [have absorbed](http://www.environmentalgraffiti.com/sciencetech/damage-to-ocean-currents-could-cause-climate-change-to-escalate/200) about a third of the billions upon billions of tons of carbon that humans have emitted into the atmosphere — and the more carbon the oceans absorb, the more acidic they will become. Right now those changes in ocean chemistry are still slight, and even carbon emissions continue growing unchecked for decades, it’s not as if clams and oysters will start dissolving in an acid sea. But even relatively small alterations to ocean chemistry might have big impacts — especially on the most vulnerable creatures.

That’s the takeaway from a [new paper](http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0063714) published in the open-access journal *PLOS ONE.*Researchers at the Woods Hole Oceanographic Institution trawled for a number of young Atlantic longfin squid off the coast of [Massachusetts](http://topics.time.com/massachusetts/). After capturing study samples, they took them back to the lab. Some were kept in tanks with a pH of 8, roughly the pH level of the ocean today. (As I’m sure you remember from junior-high chemistry class, 7 is neutral on the pH scale, with anything below 7 increasingly acidic and anything above 7 increasingly basic — which means the ocean now is slightly basic.) The rest of the squid were kept in tanks with a pH level of 7.3 — the level of acidity that climate models suggest the open ocean might eventually reach over the next 100 to 200 years.

The squid in both groups were allowed to mate and lay eggs. They found that the eggs laid in the more acidic environment took about 24 hours longer to hatch on average. That’s not good — the longer it takes squid to emerge from their eggs, the longer they remain vulnerable to predators. Those young squid were also smaller on average than the squid raised in the more basic water, which would also leave them at a disadvantage. Lastly, the statoliths — calcified, internal structures that function like mammalian inner ears — of the acidified squids were irregularly shaped, which could mean that the changing pH level retarded the development of organs.

So a more acidic ocean is likely to be a [less hospitable one for squids](http://www.livescience.com/37058-ocean-acidification-threatens-squid.html). That’s bad for the squid, but since the cephalopods are also a key part of the marine food chain, it’s also bad for the rest of the ocean. And it’s not so great for us — squid are popular throughout much of the world, supporting a 3 million-ton annual fishery. Of course, we already know that ocean acidification — and [climate change](http://topics.time.com/climate-change/) — won’t be good for us. But science will keep telling us.