Some microscopic marine organisms could adapt to climate change

March 28 2013, by Harriet Jarlett

Certain tiny, ocean-dwelling creatures called foraminifera can survive in conditions similar to those caused by ocean acidification, say scientists.

The researchers, from Plymouth University and the National Autonomous University of Mexico, found the first evidence that some foraminifera can handle very low-pH conditions near seafloor vents in the Gulf of California. Carbon dioxide bubbles up through these vents, lowering the pH of the surrounding seawater and mimicking conditions of ocean acidification.

The lower a solution's pH the more acidic it is, and as carbon dioxide emissions dissolve in seawater the pH of the oceans is lowering, making it more weakly acidic than it currently is. Scientists are concerned about how this will affect marine life.

Of the two different types of foraminifera examined, both survived in the harshest conditions. 'Some foraminifera form calcium carbonate shells and look a bit like snails,' explains Laura Pettit, from Plymouth University, who led the research. 'But others form shells by binding minerals in the sediment around them together –called agglutinated forms.'

'We were expecting that only the agglutinated forms would be found in the lowest pH conditions. This is because they don't produce a calcium carbonate shell that could dissolve in lower pH conditions, so we predicted that they would be able to outcompete the other ones as they aren't struggling to rebuild their shell,' says Pettit. Calcium carbonate is particularly vulnerable to dissolving in lower pH environments, so agglutinated foraminifera that make their shells using other minerals may be more easily able to adapt to the unfavourable pH.

Although some foraminifera can survive around these vents, the conditions they are expected to have to deal with due to ocean acidification are even harsher, so the researchers are still unsure they will be able to adapt. Pettit and her colleagues found that some foraminifera were resilient enough to withstand a pH as low as 7.55 – well below the current average ocean pH of 8.1.

'Currently, the average global surface pH is 8.1. But pH is expected to drop down to 7.4 through burning fossil fuels, so it's going to be lower than we see around these vents,' she says.

Foraminifera are very sensitive to even slight changes in their environment, so they are useful for studying the effects of climate change on our oceans. But previous studies, conducted around similar vents in the Mediterranean, didn't find any surviving foraminifera that build their shells from calcium carbonate in the lower pH waters.

The team examined both living and dead foraminifera, from the vents, for signs of corrosion to their shells, called 'tests'. The survivors had suffered less corrosion. This could mean these animals are naturally more resilient to lower pH water and will cope better with ocean acidification.

'This research could be used in the future for detecting leaks from carbon capture and storage (CCS) sites. 'The foraminifera are easy to sample and are found in large numbers. If we were looking for signs of leakage, although it's unlikely to happen, we could look at the species of foraminifera living in the area and see if there had been any corrosion, which could indicate the CCS site was leaking,' she explains.

More information: Pettit, L. et al. (2013) Benthic foraminifera show some resilience to ocean acidification in the northern Gulf of California, Mexico, *Marine Pollution Bulletin* In Press.

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