ANIMATION SCRIPT

MARINE BIOLOGY WITH DR SUSAN FITZER
DOES CLIMATE CHANGE IMPACT AQUACULTURE?

TO MAKE THE MOST OUT OF THIS SCRIPT, YOU COULD:

- Stick it in your book as a record of watching Susan's animation
- Pause the animation and make notes as you go
- Add your own illustrations to the sheet
- Create your own animation to accompany it
- Add notes from classroom discussions
- Make notes of areas you will investigate further
- Make notes of key words and definitions
- Add questions you would like answered – you can message Susan through the comment box at the bottom of her article: **futurumcareers.com/how-does-climate-change-impact-aquaculture**

SCRIPT:

Did you know that bivalve farming is considered one of the most sustainable forms of animal protein production?

Bivalves are a type of shellfish that have two hard shells hinged together over a soft body. Clams, oysters, mussels and scallops are all examples of bivalves.

Worryingly, bivalve farming could be threatened by climate change. As more carbon dioxide enters the atmosphere, a significant amount is absorbed by the ocean, making it much more acidic.

Dr Susan Fitzer is a marine biologist at the University of Stirling in the UK. She is studying the effects of ocean acidification on shellfish to help the shellfish farming industry prepare for the future.

Susan collects bivalves from the ocean and grows mussels and oysters in the lab to see how they respond to seawater of different acidities.

In particular, Susan is investigating how bivalves' shell building process is altered. Shellfish produce their shells using calcium and carbonate minerals as building blocks – a process known as biomineralisation.

Marine bivalves source carbonate in different ways. Either directly from seawater, by producing hydrogen carbonate through a protein-mediated process, or directly from tissues through metabolic processes.

By studying ratios of two stable carbon isotopes, 12C and 13C, Susan can identify movements of 13C, the rarer carbon isotope. This isotope often follows the fossil fuel-emitted carbon dioxide from the atmosphere into the ocean.

12C and 13C act as markers that Susan can use to identify where the carbon in the shell comes from. If Susan measures shellfish grown in seawater with increased carbon dioxide, she can see whether any new shell growth uses carbonate derived from this environment or from existing molecules within the organism.

Susan's research found that mussels and oysters source carbonate from a metabolic route under favourable conditions, and switch to sourcing carbonate from seawater in more acidic conditions. Worryingly, this switch leads to reduced shell growth.

While this is not good news for bivalves or bivalve farming, there is a silver lining. Susan's team selectively bred oysters for faster shell growth and disease resistance. These oysters were able to grow larger shells compared to wild oysters in more acidic environments.

This suggests that selective breeding could be an important strategy for sustainable shellfish farming.
What would you study as a marine biologist? How could your studies inform society and help marine animals adapt to climate change?