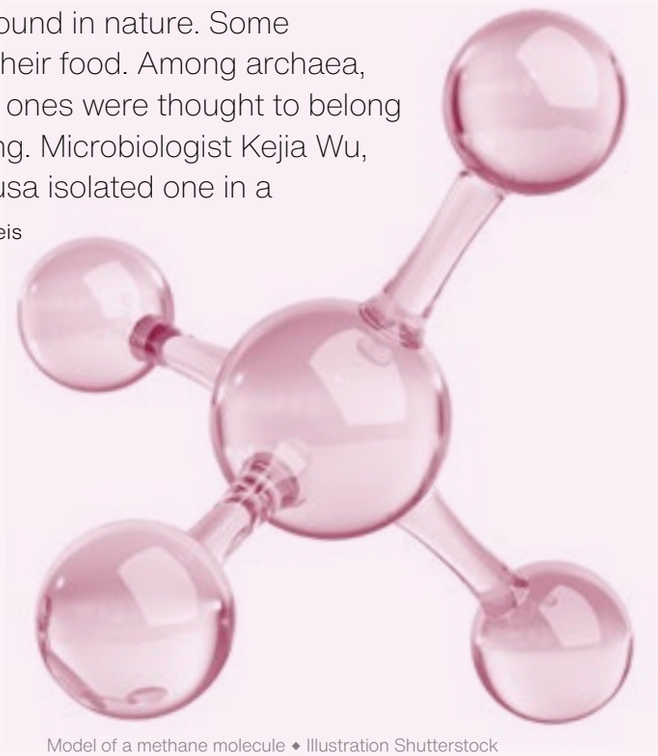
# New methane-forming archaeon cultivated

Many different kinds of metabolism mechanisms are found in nature. Some microorganisms produce methane when combusting their food. Among archaea, the oldest microorganisms, all the methane-producing ones were thought to belong to the *Euryarchaeota* group. It turns out that was wrong. Microbiologist Kejia Wu, working at the group of microbiologist Diana Z. de Sousa isolated one in a completely different branch of the archaea. Text Roelof Kleis



Model of a methane molecule ◆ Illustration Shutterstock

It had already been suggested that there were methane-forming archaea outside that one specific group. That is to say, metagenome studies showed the genes involved in methane production were found outside the *Euryarchaeota* group. But that doesn't mean the genes are still functional. To show that, you first need to isolate and culture the archaeon. And that is notoriously difficult and time-consuming.

It took the teams of De Sousa and her Chinese counterpart Lei Cheng (Biogas Institute, Ministry of Agriculture and Rural Affairs) six years to isolate *Methanosuratincolia petrocarbonis*. A major achievement that resulted in a publication in *Nature* this summer. Wu will soon be getting her PhD for this work. De Sousa: 'She is doing a sandwich PhD and had already made considerable progress in China when she joined our lab. I am delighted for her that she was able to isolate the archaeon in a pure form. That kind of thing often fails.'

**'It is important that you have proof for your theory'**

'In fact,' continues De Sousa, 'When we sent the first version of the paper to *Nature*, we had a co-culture with a bacterium rather than the pure archaeon. We went to a lot of effort to separate the two. That process took a long time. We wanted to isolate the archaeon from its environment but this often doesn't work because they grow better in the company of other microorganisms. Fortunately we were successful before the article was published.'

## Methane alone

The archaeon in question comes from the Chinese oil fields of Shengli. The strictly anaerobic microorganism lives off hydrogen and methanol, which it converts into methane and water in its 'respiration' process. The archaeon is spherical with a diameter of half a micrometre. Various tests show that it lives on methane alone. 'It doesn't convert any other substrates,' says De Sousa. 'The genome data had led to speculation that it did Grow on sugars, but that is not true.'

De Sousa sees the successful culture and isolation as 'a victory'. 'In the first place, it is important that we discover new organisms, especially if they are taxonomically different to the ones we already knew about. These days, the discovery is made with the aid of genomics. But that is the theory. It's also important to be able to prove the theory, and to do that you need to isolate and cultivate the microorganisms.'

As chance would have it, De Sousa has to share the accolade for the world first with the group of Roland Hatzenpichler at Montana State University. 'Two years ago at a conference, I saw a poster by PhD student Anthony Kothz on exactly the same topic we were working on. They too have an enriched culture with related methane-forming archaea. After talking to them and to *Nature*, it was decided to publish our articles at the same time.'