U Patrick Meister

This limestone was excreted by bacteria.

Ancient methane-makers

Three and a half billion years ago, the first-ever micro-organisms dwelled in self-built, mat-like limestone structures called stromatolites. They used photosynthesis to produce the first oxygen, and thereby created the basic prerequisites for higher forms of life on Earth. Patrick Meister, a geologist at the University of Vienna, has now shown that the stromatolites at times also emitted methane, which is a potent greenhouse gas.

In order to gain insights into the very beginnings of life, Meister and his colleagues at ETH Zurich and the University of Zurich have been investigating carbon in the limestone of prehistoric stromatolites from Australia. Although photosynthesis primarily traps the lighter isotope carbon-12, the proportions of it in the stromatolites don't correspond to expectations. "There is a lot of the heavier carbon-13 in the stromatolites. That's unusual", says Meister.

According to these researchers, the micro-organisms that produced oxygen, sugars and lime must have lived in the stromatolites alongside a second bacterium, which ate the sugar, releasing carbon dioxide and methane. In the process, the lighter carbon was taken up into the methane, and the tiny residue of the heavy carbon into the carbon dioxide, which after further reactions precipitated as limestone. The researchers found confirmation of their theory in a modern stromatolite from a lagoon in Brazil, where the microbes to this day produce both oxygen and methane. *Atlant Bieri*

D. Birgel et al.: Methanogenesis produces strong 13C enrichment in stromatolites of Lagoa Salgada, Brazil: a modern analogue for Palaeo-/Neo-proterozoic stromatolites? Geobiology, 2015.

An organ system on a chip

Liver damage is one of the most frequent reasons for the failure of new drugs during the development stage. In order to recognise problems as early as possible, and to avoid unnecessary animal testing, a research group led by Oliver Frey at ETH Zurich's Department of Biosystems Science and Engineering in Basel has developed a new cell-culture system in collaboration with the start-up company Insphero. It offers an intermediary step between testing on cells and animals: a miniature organ system that comprises spheres half a millimetre in size that are made of cells – such as liver cells or tumour cells, for example.

These 'spheroids' replicate the functions of organs better than normal cell cultures can, because there is more intra-cellular contact than on the two dimensions of the bottom of a petri dish. All manner of tissue-type combinations can be used for these spheres. They are then placed in recesses on a chip developed by Frey's team, which is linked to others like it by narrow little channels. By slowly swivelling the chip, the nutritive solution flows around the different mini-organs and allows the exchange of messenger materials and metabolites.

This allows the team to test the anti-tumour effect of new substances that only become active after they have been metabolised by liver cells. "It's the simplicity of our system that makes it so beautiful", explains Frey. The miniature scale of the chip saves material, it's easy to use, and in its present design it allows up to a hundred experiments to be conducted in parallel. *Angelika Jacobs*

K. Jin-Young et al.: 3D spherical micro-tissues and microfluidic technology for multi-tissue experiments and analysis. Journal of Biotechnology, 2015.

J.Y. Kim

The micro-tissues in these chambers are provided with metabolites and messenger materials through the coloured channels.

Christoph Grüter

These marked ants have found their own way to this food source.

Ants make a beeline

Ants are perfect examples of the social insect, and their behaviour is very complex. When faced with the choice between different sources of food at equal distance from their nest, the common black garden ant, *Lasius niger*, will choose the source of food that lies at the end of the simplest path. And it uses visual landmarks to help it get there, as has been shown by Christoph Grüter and his colleagues at the Department of Ecology and Evolution of the University of Lausanne.

They created two mazes with bifurcating T-shaped paths. The first was the simpler to memorise: worker ants had to turn twice in the same direction (either twice left or twice right). In the second maze, they were required to turn alternately (left then right). Having tested both paths, the ants tended to take the first.

In a second experiment, the researchers laid out visual markers along another maze, which was yet more difficult to memorise. The worker ants preferred this to a labyrinth without the visual guides. "Thanks to the visual markers, they can move around more quickly and, when they take the wrong path, they correct their mistakes more quickly", says Grüter. This shows us then that when it comes to finding sources of food, ants don't just follow the pheromone trails left by scout ants, as was previously thought; they also use their visual memory. *Elisabeth Gordon*

C. Grüter et al.: Collective decision making in a heterogeneous environment: *Lasius niger* colonies preferentially forage at easy to learn locations. Animal Behaviour, 2015.