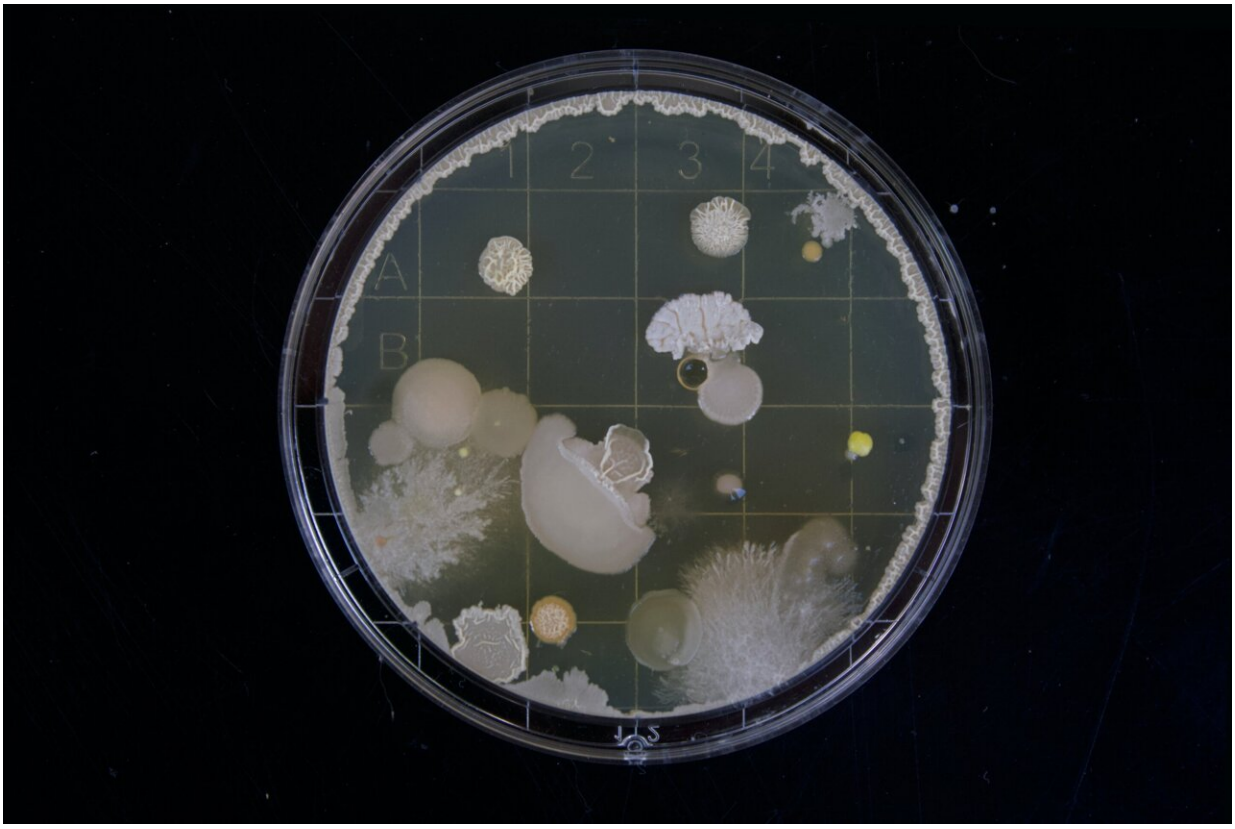
Gourmet meals are filled with bacteria – and they taste delicious

April 13 2016, by Joanna Verran And Mike Dempsey, Manchester Metropolitan University



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When diners sat down at a recent gourmet experience held at the Harvey Nichols department store in Manchester, their food was filled with

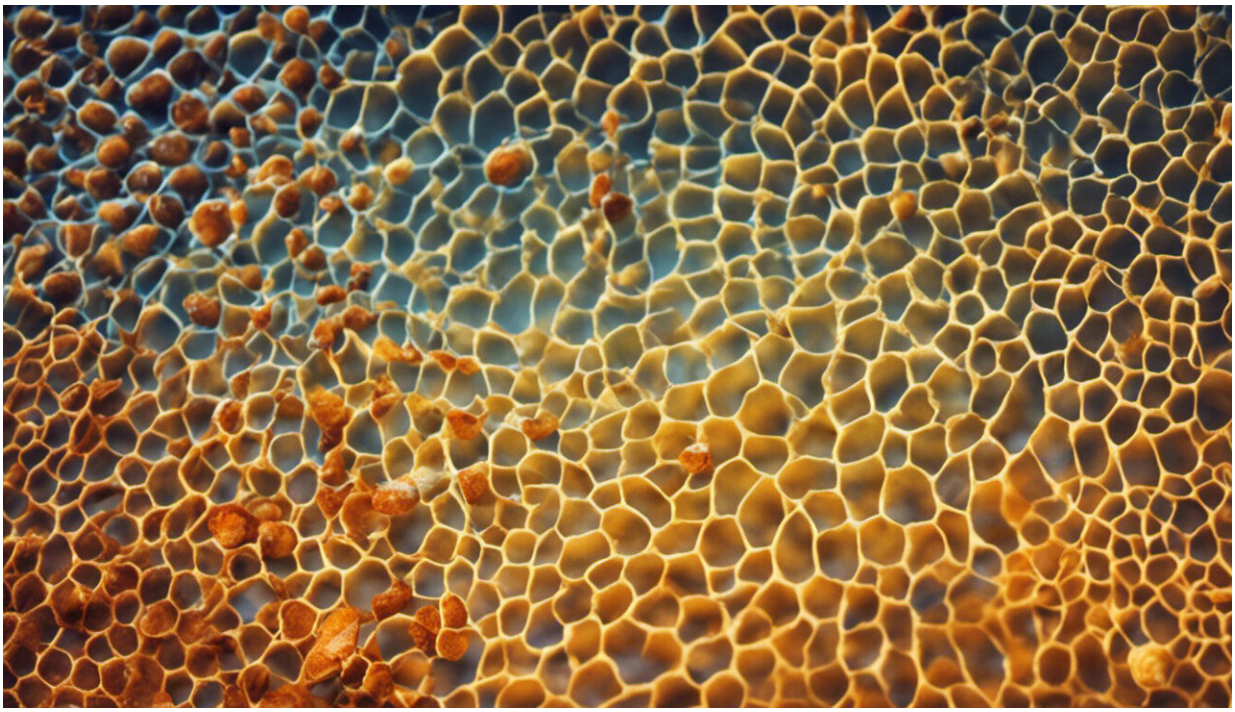
bacteria, fungus and mould. Far from being a public health hazard, this special five-course meal was designed to show how microorganisms are a fundamental part of the food we eat.

In general, microbes don't have a good reputation. Yet while some cause disease and decay, the vast majority of the planet's microorganisms are not harmful to us. In fact, they can be incredibly useful, producing alcohol, acids and other molecules that add flavour, texture and nutritional value to food, as well as helping to preserve it.

Microorganisms are used to make many of the staples of our diets. Bread, cheese and wine all immediately spring to mind. But the roles of these tiny living cells is far more diverse than you might think. The term "artisanal food microbiology" has even been coined recently to describe an emerging interest among cooks to explore the potential for microbes to create new flavours and dishes.

At the gourmet meal we introduced in Manchester – the first of four we are running to raise awareness of the importance of microbes in food – almost every aspect of the food had been touched in some way by microorganisms.

Sourdough crostini were the base for our delicious Welsh Rarebit canapes. Bread is produced through the action of the yeast *Saccharomyces cerevisiae* (baker's yeast). This type of fungus is dormant until activated by the warm water in the dough, at which point it starts feeding on the sugars in the flour, releasing carbon dioxide that makes bread rise. Yeast adds many of the distinctive flavours and aromas we associate with bread and also produces the alcohol in beer and wine.



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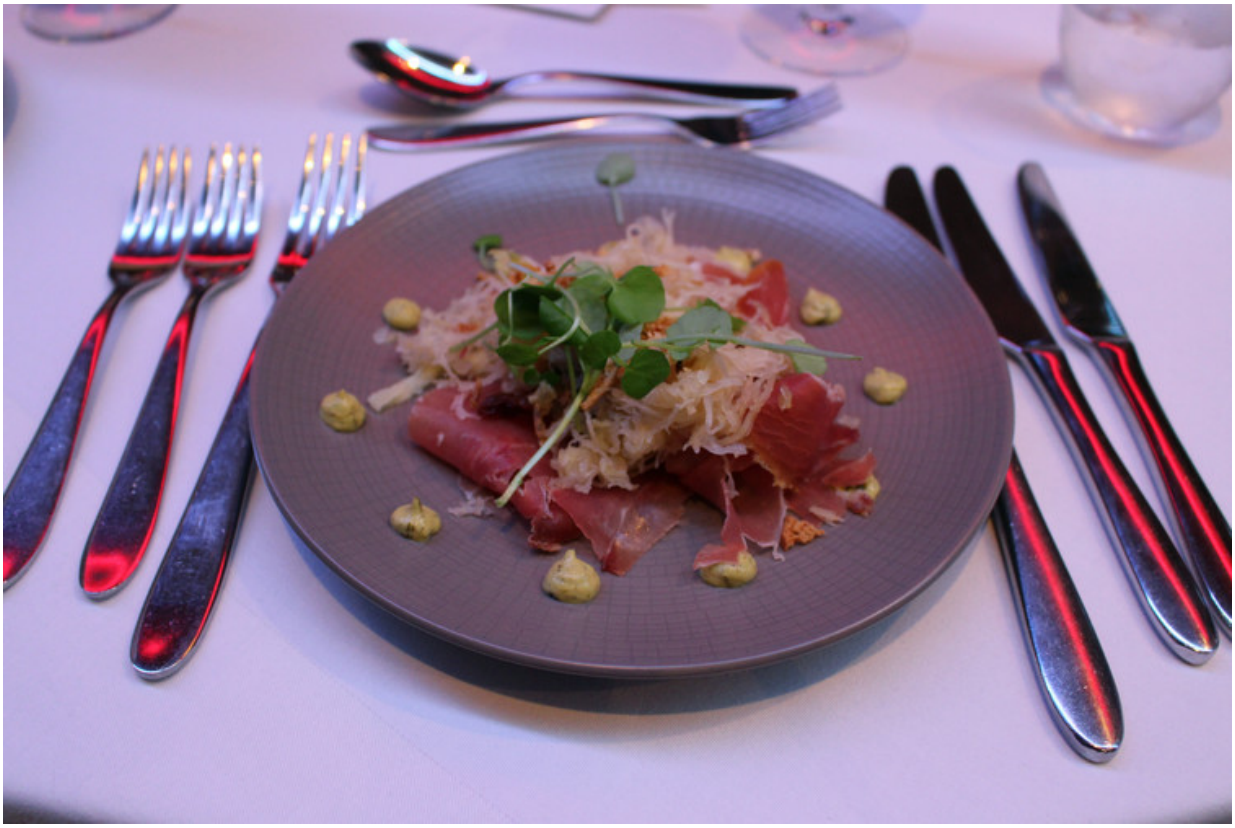
Sourdough bread dough ferments and rises more slowly because it uses lactic acid bacteria and wild yeasts found naturally on cereal grains, rather than baker's yeast. This produces lactic acid that gives it a tart flavour and breaks down the gluten that some people struggle to digest.

Our first course was a prosciutto platter, with apple and sultana sauerkraut (sour cabbage). The sourness comes from lactic acid, which is produced by lactic acid bacteria naturally present on the cabbage that feed on sugars released when the vegetable is sliced. These bacteria also produce vitamins including vitamin C, which is why sailors used to take sauerkraut on long voyages to help prevent scurvy.

A warm salad of deep-fried Roquefort with smoked tofu followed. Cheese is made using bacteria such as *Lactobacillus* and *Streptococcus*

that ferment the sugar in milk (lactose) into lactic acid. This causes a decrease in pH, preventing the growth and survival of other microbes and clotting the milk protein, turning it into solid cheese. The blue colour and distinct flavour of Roquefort comes from the mould *Penicillium roqueforti*, which – as you can guess – is related to the fungus that makes the antibiotic penicillin. Moulds are filamentous (thread-like) fungi that produce coloured spores, giving their colonies a distinctive and powdery appearance.



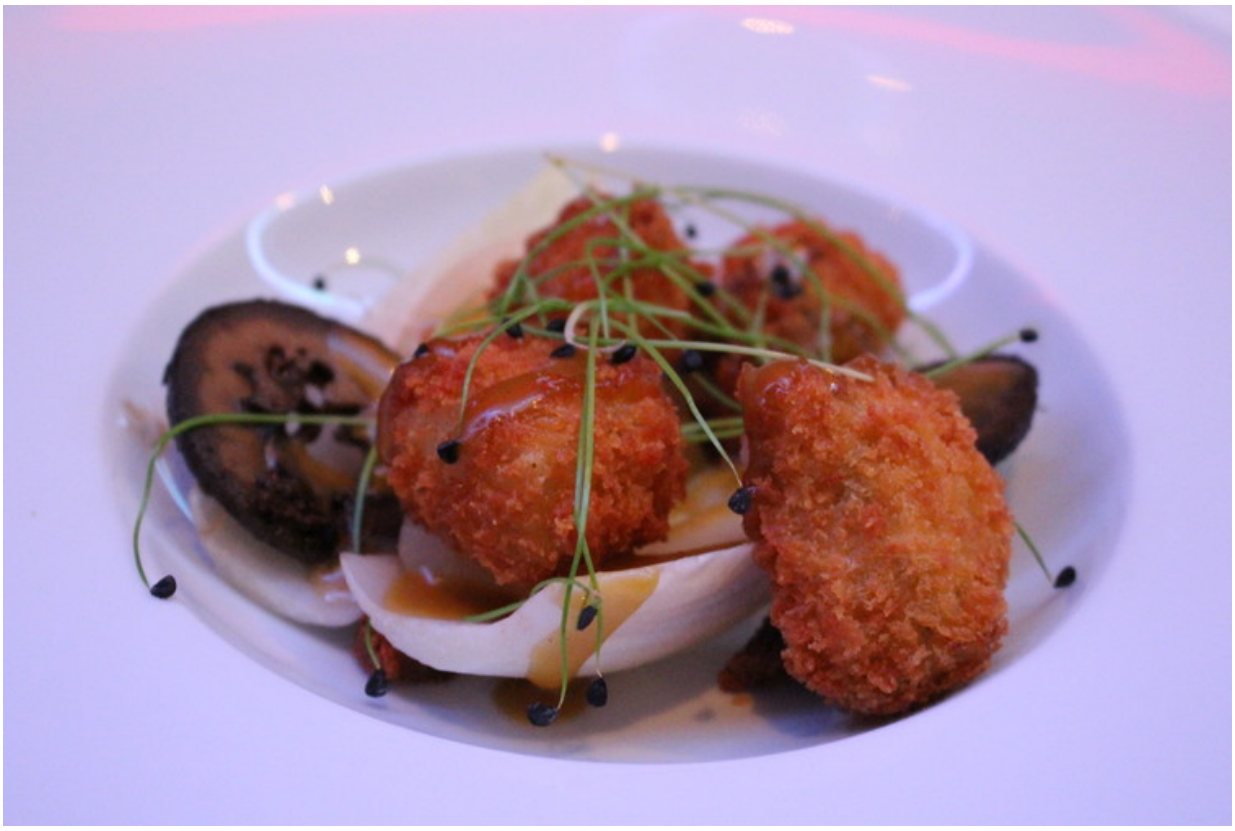
Sauerkraut surprise. Credit: Devin Louttit

The main course was truffled mushroom risotto and beer flatbread with

rosemary. Like mushrooms, truffles are the fruiting body (spore-forming part) of fungi – organisms that are neither plants nor animals. Truffles form a symbiotic relationship (mycorrhiza) with the tree roots they grow on. This means they help the plant to gather water and minerals from the soil in exchange for sugars. Their pungent, musky smell is thought to come from a combination of molecules given off by the truffles themselves and more microbes – the bacteria that live on them.

And for dessert …

The dessert consisted of pears poached in sauternes, a sweet wine that is unusual because it is made from mouldy grapes. This concentrates the grape sugar so that a significant amount remains in the wine after the traditional fermentation converts most of it to alcohol. Because of the delicious flavour this develops, the mould is known as the "Noble Rot". The scientific name for this grey mould is *Botrytis cinerea* and it is closely related to species of *Penicillium*. It produces a chemical aroma compound, phenylacetaldehyde, which is also commonly found in buckwheat and milk chocolate.

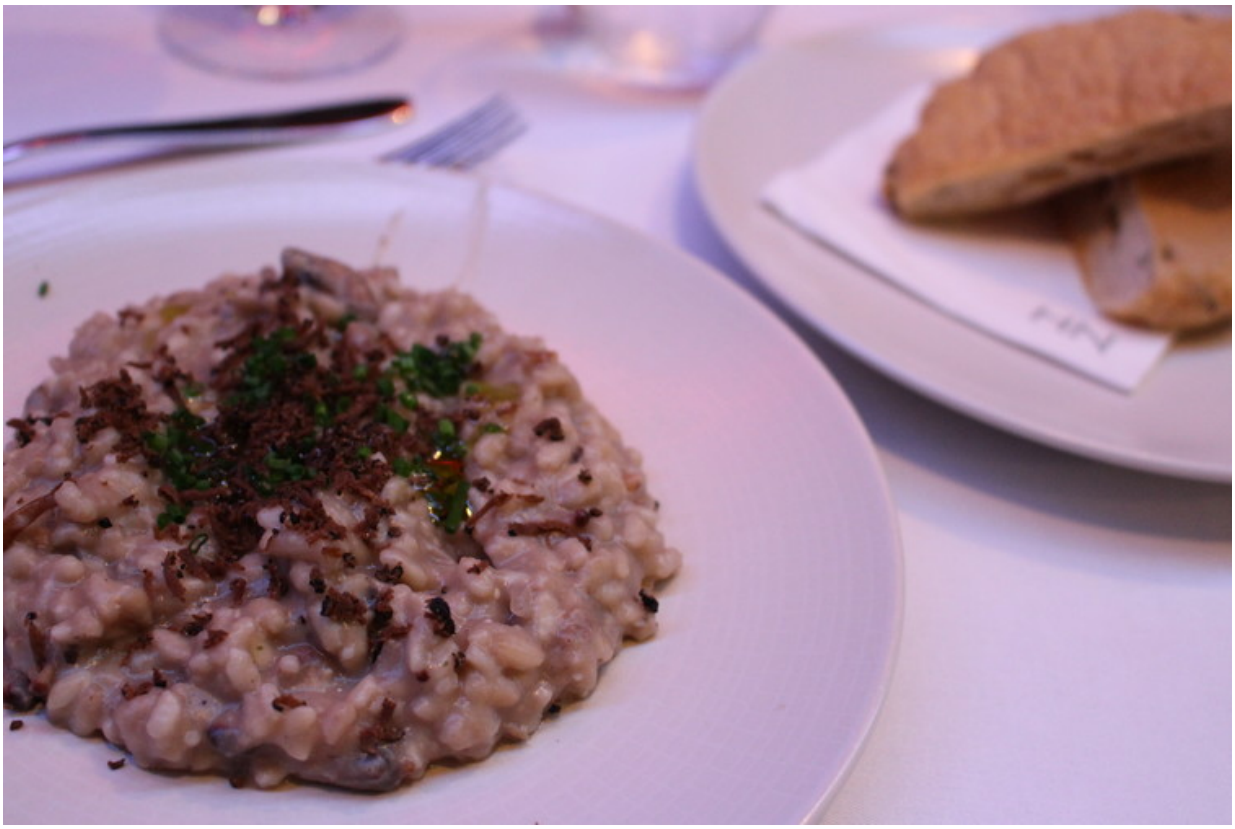


Deep-fried mould. Credit: Devin Louttit

We finished our gourmet microbe meal with chocolate tart with framboise beer sauce, followed by coffee and chocolate petit fours. Both chocolate and coffee beans, which are actually seeds, go through a fermentation process that is used to break down the slimy "mucilage" coating that holds the seeds in the pod and to develop delicious and important chemical compounds. A series of bacteria, yeasts and moulds are used to develop these flavour compounds, natural chemicals that we enjoy for their aroma and flavour.

Although many of these food fermentations are thousands of years old, chefs at experimental restaurants such as noma in Copenhagen are still

playing with microbes to produce new flavours. There is even a growing fermentation community of professional and amateur microbiologists who can cook up new kinds of acid to help make your new dish taste just right. So when you're looking for a special new ingredient, perhaps you should turn to some of the oldest lifeforms on the planet.



Merely a truffle. Credit: Devin Louttit

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