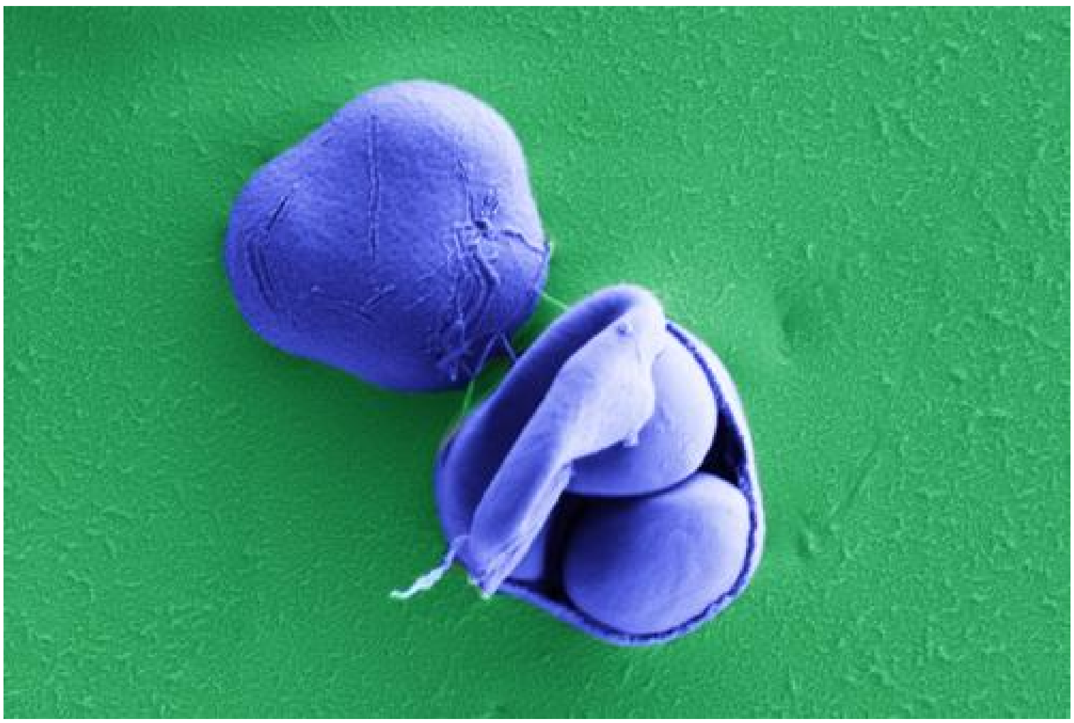
Strictly yeast: Ribosomal dance leaves evolutionary footprints

March 27 2014



This is a photo of ascus, a sexual spore-bearing cell, plus ascospores of the yeast *Saccharomyces paradoxus*. Credit: Institute of Food Research

Researchers at the National Collection of Yeast Cultures at the Institute of Food Research have turned a problem in evolutionary biology into a new tool to better understand phylogeny in closely related species. Resequencing ribosomal DNA in closely related yeast species has given them new information about the origins of modern yeast strains and a useful tool for evolutionary biologists.

We all know yeasts make beer and bread but their huge contribution to science, including helping us understand the nuts and bolts of life itself, tends to stay out of the spotlight. Over the past few years, through studies carried out on yeast DNA, biologists have begun to learn that something that looks like a simple cog in all living things is actually performing an intricately choreographed dance. In the same way that the Charleston differs from the Waltz, the dance displayed by this cog is faster and uses different steps from other parts of the yeast machinery. What's more, the dancers leave tell-tale footprints behind in their DNA.

The team at National Collection of Yeast Cultures at the Institute of Food Research have made a computer app to spot these footprints, and to decode the footprints in order to learn more about the rhythm of the dance and how the dance partners have come together and moved apart. The 'dancers' in question are the ribosomal RNA genes which give shape to the ribosome, a tiny protein-making machine found in all living cells.

If the ribosome goes wrong the cell dies, so its blueprint is highly protected. Not so protected though that small changes in the DNA, our footprints, don't occur. Biologists often use these changes to map various bits of the tree of life, so it's important to be able to track even the smallest alterations.

With funding from the Biotechnology and Biological Sciences Research Council, the NCYC team have now achieved this, using huge DNA datasets to uncover the footprints left behind in yeasts.

"Our app is a very strict judge of the dance steps," said bioinformatician Dr Jo Dicks. "The fast tempo of the ribosomal RNA dance lets us detect very close relationships between different yeasts."

"As well as helping biologists around the world to work out the relationships between other species using their unique footprints, in future we hope to use yeasts with beneficial footprints in the biorefining" said Dr Ian Roberts, NCYC curator. The NCYC team work closely with the Biorefinery Centre, also based at the IFR on the Norwich Research Park.

"Our long-term aim is to exploit our new knowledge to brew up better biofuels and chemicals from yeast, and so reduce dependency on oil as we move towards a new green economy," said Dr Roberts.

Provided by Norwich BioScience Institutes

Citation: Strictly yeast: Ribosomal dance leaves evolutionary footprints (2014, March 27) retrieved 6 May 2024 from https://phys.org/news/2014-03-strictly-yeast-ribosomal-evolutionary-footprints.html