

Hidden Invaders?

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Droplets of sugary honeydew produced by endemic scale insects are a key feature of some *Nothofagus* forests.

Photo: Landcare Research

What has a glass of wine and honeydew beech forest in common? The answer is not drunken ecologists on a South Island field trip.

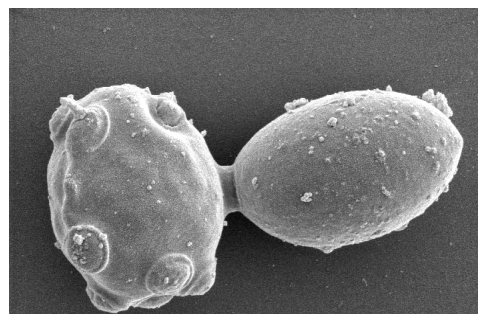
The human eye is only able to discern a fraction of the biodiversity present in a particular ecosystem: the vast majority of life on the planet is hidden from view as it is microscopic. These hidden organisms are essential since they play major roles in nutrient turnover and recycling. The only way to really understand what microbes are present in a particular area is to take samples and either directly culture the micro-organisms in the laboratory or to indirectly analyze the DNA of these microbes.

Sticky, sweet and with the aroma of fermentation, honeydew beech forests are an important ecosystem in New Zealand. While many of the macroscopic members of the honeydew ecosystem are characterized, and their ecological roles well understood, we know very little of the microbes in this ecosystem. The honeydew is a sugary exudate

produced by endemic scale insects (*Ultracoelostoma* spp.), and this represents a massive addition of bio-available carbon to the honeydew ecosystem. Kaka, bellbird, tui, lizards and insects (including the notorious *Vespula* wasps) all love feasting on the sugary bonanza, but what of the microbes? Yeasts are unicellular fungi that may specialize on sugar rich sources. Are there any yeasts associated with the honeydew systems in New Zealand?

Serjeant et al (NZ J Ecology 2008 Vol 2) were intrigued by this question, so gathered some samples from Pelorus Bridge (Marlborough) and headed to their lab for some detective work. Molecular genetic analyses revealed at least four different species of yeast: *Hanseniaspora osmophila*, *Candida railenensis*, *Zygosaccharomyces cidri* and

Zygosaccharomyces rouxii. Interestingly, among other places, *Candida railenensis* has been isolated from beech trees in South America – perhaps this yeast is adapted to inhabit niches afforded by beech trees generally? While the other three species of yeast have been isolated from a number of different environments, they tend to be associated with fruits and/or wine fermentation. It is possible that these yeasts are indigenous to NZ, alternatively they



Four species of yeasts were found associated with honeydew, and there may be many others. This shows the yeast best adapted to high sugar niches -*Saccharomyces cerevisiae* (these cells are ~4µm long).

may have been introduced by humans along with the advent of winemaking in NZ, and then radiated into indigenous sugar rich niches to which they are adapted. Whether these yeasts represent microbial examples of invasive species or endemic members of the honeydew system requires further investigation.

Serjeant, K.; Tang, R.; Anfang, N.; Beggs, J.R.; Goddard, M.R. Yeasts associated with the New Zealand *Nothofagus* honeydew system. *New Zealand Journal of Ecology* 32(2) in press.



Dr Mat Goddard

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Dr Jacqueline Beggs

lectures in entomology and ecology at the School of Biological Sciences, University of Auckland. Jacqueline has studied the ecology of kaka and wasps in honeydew beech forests for many years.

Mat and Jacqueline's overlapping interest in New Zealand ecology united them to investigate the microbes associated with honeydew. Kelsey Serjeant is an undergraduate student at Auckland who conducted a summer studentship placement in Mat's lab; Lucia Tang is the technician in Mat's lab, and Nicole Anfang is a PhD student under Mat's supervision.