

PHYTOPATHOLOGY

Dr Rhodo and Mr Coccus

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Microbes have a bad reputation. However, one of the most profound discoveries in biology over the past decades is the realization that microorganisms have a tremendous influence, often positive, on the animals and plants they closely associate with. Microbes can be commensal, beneficial or pathogenic for the host. These categories were thought to be quite different in terms of genomic sequences, and relatively easy to classify. However, a team of researchers led by Jeff Chang now demonstrates that a beneficial microorganism can easily switch to pathogenic with the acquisition of a single plasmid.

Rhodococcus is a genus of bacteria that associates with many plants, and is the

causative agent for the leafy gall disease that affects plant growth and development. The researchers started with a genomic epidemiology approach by collecting many bacterial isolates from nurseries, for which they obtained genome and plasmid sequences. They realized that bacteria lacking one plasmid that contains three virulence genes are beneficial for their host, as they enhance root architecture. On the other hand, the acquisition of this plasmid is the only change necessary for beneficial bacteria to become pathogenic and cause disease, regardless of its genomic background. This type of horizontal gene transfer may happen frequently in agricultural settings.

The consequences of this research go beyond the discoveries about sudden evolutionary transitions. The authors also developed a more accurate method to diagnose the presence of *Rhodococcus* in commercial pistachio orchards, and to discriminate between beneficial and pathogenic bacteria. In a strongly worded discussion that criticizes previously published results, the authors mention that this could help to avoid potential misdiagnoses that may have already caused the unfortunate felling of entire orchards.

Guillaume Tena

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