

New antibiotic from bacteria found on Kenyan ant could help beat MRSA

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Methicillin-resistant *Staphylococcus aureus*. Credit: NIH/NIAID

A new antibiotic, produced by bacteria found on a species of African ant, is very potent against antibiotic-resistant 'superbugs' like MRSA according to scientists.

Researchers at the University of East Anglia (UEA) and the John Innes Centre (JIC) discovered a new member of the Streptomyces [bacteria](#) family, isolated from the African fungus-growing plant-ant *Tetraponera penzigi*. They have named the new species *Streptomyces formicae* and the antibiotics formicamycins, after the Latin *formica*, meaning ant.

Lab tests have shown these new antibiotics are effective against methicillin resistant *Staphylococcus aureus* (MRSA) and Vancomycin-Resistant Enterococci (VRE), bacteria which are resistant to a number of common antibiotics and can cause life-threatening infections.

Almost all of the antibiotics currently in clinical use come from a group of bacteria called actinomycetes that were isolated from soil between 40-80 years ago, the 'golden age' of antibiotic discovery. Inappropriate use of these antibiotics since then has led to widespread antimicrobial resistance (AMR), where disease-causing bacteria and fungi have become resistant to one or more antibiotics.

Prof Matt Hutchings from UEA said: "We have been exploring the chemical ecology of protective symbioses formed between antibiotic-producing bacteria and fungus-growing insects to better understand how these associations are formed and explore them as a new source of anti-infective drugs.

"Kenyan plant-ants live in symbiosis with thorny acacia trees. They live and breed in domatia - which are hollowed out structures which the plant evolved to house them - and grow fungus in them for food. In return, they protect the plants from large herbivores including elephants, which won't eat plants covered in ants."

The team isolated a number of actinomycete bacterial strains from the acacia plant housing the ants, selecting a number for genome sequencing. One particular strain caught their attention, and the antibiotic

compounds produced from it showed promising activity in early tests against other disease-causing bacteria.

Prof Hutchings said: "We tested formicamycins against clinical isolates of MRSA and vancomycin-resistant *Enterococcus faecium* (VRE) and found that they are very potent inhibitors of these organisms."

To test this further, they repeated the tests by growing the strains for 20 generations in very low, sub-inhibitory concentrations of formicamycins and found no sign that the test strains acquired spontaneous higher level resistance to the [new antibiotics](#).

Prof Wilkinson from JIC said: "Our findings highlight the importance of searching as-yet under-explored environments, which, when combined with recent advances in genome sequencing and editing, enables the discovery of new species making natural product [antibiotics](#) which could prove invaluable in the fight against AMR."

'Formicamycins, antibacterial polyketides produced by *Streptomyces formicae* isolated from African *Tetraponera* plant-ants' is published in the journal *Chemical Science*.

More information: Zhiwei Qin et al. Formicamycins, antibacterial polyketides produced by *Streptomyces formicae* isolated from African *Tetraponera* plant-ants, *Chem. Sci.* (2017). [DOI: 10.1039/C6SC04265A](https://doi.org/10.1039/C6SC04265A)

Provided by University of East Anglia

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