How do bacteria know they have had enough?

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Haem is a molecule fundamental for all living organisms. In humans, haem confers the red colour to haemoglobin-containing cells that transport oxygen, while in bacteria it is used as a cofactor in a large number of proteins with essential biological functions that sustain growth and survival. Due to its importance, almost all organisms have the capacity to synthesize haem endogenously. Moreover, several bacterial pathogens also utilize specialized systems that "steal" haem from haemoglobin of the infected host. However, too much haem is toxic to cells and is thus fundamental to have a mechanism that inhibits haem synthesis when the external uptake is active. Such mechanism has just been revealed in Lígia Saraiva Lab and published today in *Molecular Microbiology*.

"We describe how the human pathogen Staphylococcus aureus deals with this conundrum. The protein-protein interaction that occurs between IsdG, one of two S. aureus haem monooxygenase enzymes that belong to the external haem uptake system, and ferrochelatase, the last enzyme of the S. aureus haem biosynthetic pathway, inhibits the endogenous formation of haem. This seems to be a general mechanism as IsdG homologues appear widespread in many pathogens, and we propose that this crosstalk reconciles their high haem requirements with the paradox that excess of haem is lethal," according to Lígia Saraiva, corresponding author.

More information:

Marco A.M. Videira et al. Staphylococcus aureus haem biosynthesis and acquisition pathways are linked through haem monooxygenase IsdG, *Molecular Microbiology* (2018). DOI: 10.1111/mmi.14060

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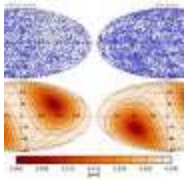
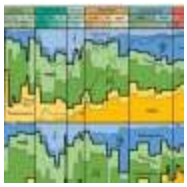


A possibly better way to measure our own galaxy speed moving through space

A pair of physicists at Aix-Marseille University has offered a possible way to measure the speed of our own galaxy more accurately as it moves through space. In their paper published in the journal Physical Review Letters, ...



New evidence suggests the Devonian Nekton Revolution never occurred

A pair of researchers at Yale University has found evidence that suggests the Devonian Nekton Revolution never actually occurred. In their paper published in Proceedings of the Royal Society B, Christopher Whalen and Derek ...

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ESO's Very Large Telescope (VLT) has achieved first light with a new adaptive optics mode called laser tomography—and has captured remarkably sharp test images of the planet Neptune and other objects. The MUSE instrument ...

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Sawtooth swings—up-and-down ripples found in everything from stock prices on

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A new approach for narrowing down huge calculations by focusing on a single, predictive parameter

A team that includes nuclear physicists, a machine-learning researcher and an NC State mathematician has created a new approach for narrowing down huge calculations – such as those involved in quantum physics – by focusing ...

Materials processing tricks enable engineers to create new laser material

By doping alumina crystals with neodymium ions, engineers at the University of California San Diego have developed a new laser material that is capable of emitting ultra-short, high-power pulses—a combination that could ...

Jupiter's moon count reaches 79, including tiny 'oddball'

Twelve new moons orbiting Jupiter have been found—11 "normal" outer moons, and one that they're calling an "oddball." This brings Jupiter's total number of known moons to a whopping 79—the most of any planet in our Solar ...

Concentrated wealth in agricultural populations may account for the decline of polygyny

Across small-scale societies, the practice of some males taking multiple wives is thought to be associated with extreme disparities of wealth. But in fact, polygyny has been more common among relatively egalitarian low-tech ...

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