UCL Research – bactaria = problem but also the solution

UCL found that bacteria communicate to coordinate warfare and gene robbery

Johann Mignolet, post-doctoral researcher in the laboratory of the professor Pascal Hols, did a major breakthrough on bacterial behavior during his researches at UCLouvain (Life Sciences Institute). He discovered that a bacterial inhabitant of the human gut produces a small molecule, called pheromone, to inform the whole bacterial population on what is the best timing to release antibacterial molecules (bacteriocins) and steal genes from the cadavers. The results, published in the renowned Cell Reports journal, tackle the mechanisms of bacterial adaptation and open the way to new antimicrobial treatments.

Skin, vagina, mouth and gut teem with bacteria that proliferate (usually) peacefully with the human host. About 100.000 billions! This number is so extravagant that scientists consider that our body carries 10 times more bacterial cells than human cells. Bacteria constantly struggle in order to monopolize space and food in this overcrowded vast and hostile human landscape. Some of them thus develop strategies to evolve more rapidly and/or synthesize compounds that poison the neighboring bacteria.

Johann Mignolet and Pascal Hols found that a unique pheromone produced by Streptococcus salivarius, a bacterium that dwells in symbiosis inside the human gut, tightly couples the two strategies. In that way, S. salivarius spreads toxins inside the gut to slaughter surrounding bacteria and collect their genetic material. This transfer of genes participates in the acquisition of new survival features and will make S. salivarius better equipped to thrive in the intestinal microflora. The two scientists analogize this behavior to some cannibalistic tribes that kill enemies and eat their brain in order to gain their soul and power.

Johann Mignolet and Pascal Hols also unveiled in their research how beneficial bacteria or bacterial weapons could be used to fight bacteria multi-resistant to antibiotics, a rising issue for human public health. They are absolutely convinced that if bacteria are the problem, bacteria could be the solution. In this scope, the bacteriocins will arise as a viable alternative to antibiotics as the killing molecules produced by S. salivarius are efficient against various bacteria responsible for severe human illnesses (staphylococci, listeria, enterococci, and streptococci causing scarlet fever or caries).

The work was performed in collaboration with Tom Coenye from Ghent University, and Jacques Mahillon, professor at UCL, and subsidize by FNRS and federal funds (IUAP).

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