

Toxin-producing bacteria- the importance of knowing your enemy

A better understanding of how bacterial toxins cause common human diseases may lead to their improved treatment and prevention according to a paper just published by Irish and US scientists in *Nature Reviews Microbiology*.

Scientists discuss the identification, genetics and biochemistry of streptolysin S (SLS), a bacterial toxin produced by the bacteria *Streptococcus pyogenes*. *S. pyogenes* causes a wide variety of infections of the upper respiratory tract and the skin, with complications leading to invasive diseases such as the “flesh-eating” skin disease, necrotising fasciitis, and streptococcal toxic shock syndrome. As a consequence of these diseases, and other auto-immune complications like acute rheumatic fever, and subsequent rheumatic heart disease, up to half a million deaths per year worldwide are attributed to *S. pyogenes* infections.

Further research into this group of toxins will lead to the identification of novel targets for antibiotic and vaccine development for the treatment and prevention of human disease.

Lead author of the review, Evelyn M Molloy is a PhD student in microbiology at the Alimentary Pharmabiotic Centre, UCC, under the supervision of Paul Cotter, Colin Hill and Paul Ross. The research involves collaboration between the researchers at the Alimentary Pharmabiotic Centre based in UCC and Teagasc Moorepark Food Research Centre, along with colleagues at the University of Illinois at Urbana-Champaign, USA.

Molloy’s interest in listeriolysin S, a member of the SLS toxin family found in the food poisoning bacteria *Listeria monocytogenes* led to a collaboration with Douglas Mitchell at the University of Illinois at Urbana-Champaign, USA. Research trips by Molloy to the University of Illinois were funded by the Science Foundation Ireland and the Society for General Microbiology. Molloy’s research is on food-grade antimicrobial peptides (‘bacteriocins’), which can be employed to enhance food safety and improve human and animal health.

Infections likely to have been caused by *S. pyogenes* have been documented in humans for many centuries, including the apparent scarlet fever epidemic described by Hippocrates in the fifth century BC. Pasteur was the first to report isolation of this organism from the bloodstream in a woman with puerperal sepsis in 1884. The ability of the SLS toxin to destruct red blood cells was first discovered in the 1930s and since then its contribution to *S. pyogenes* infection has been the subject of much attention. However, despite a 100-year history of research, it has only recently been established that there is a family of SLS toxins produced by other streptococci and food poisoning bacteria such as *L. monocytogenes* and *Clostridium botulinum*.

The independent international ratings agency Thomson Reuters Science Watch global analysis, recently ranked University College Cork at number two in the world for probiotics research, due to publications from researchers in the Alimentary Pharmabiotic Centre (<http://sciencewatch.com/ana/st/probiotics/institution/>)

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About the Alimentary Pharmabiotic Centre

The Alimentary Pharmabiotic Centre, (APC; <http://apc.ucc.ie>) is a research centre funded by Science Foundation Ireland and industry partners. The APC, a partnership between University College Cork, Teagasc, the Irish Agriculture and Food Development Authority, and the Cork Institute of Technology, focuses on research in gastrointestinal health. Pharmabiotic is a neologism devised by the APC to represent any material (including molecules and microbes) originating from the gut ecosystem that can be exploited for a health benefit, and includes probiotics, prebiotics, metabolites, and potential new anti-microbials and anti-inflammatories.

Notes to editors

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CAPTION

Lead author of the review, Evelyn M. Molloy, a PhD student in microbiology at the Alimentary Pharmabiotic Centre, UCC, with supervisor Dr Paul Cotter, Teagasc Moorepark Food Research Centre.