Peptide Conversations…

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In the run-up to our *5th Annual Peptides Congress*, we sat down with *Mark Howarth from Oxford University* to discuss his research and upcoming talk. Mark is currently an Associate Professor at Oxford University and is currently undertaking research into ultra-stable protein interactions through engineering of bacterial peptide superglues.

At our upcoming *5th Annual Peptides Congress*, you will give a talk on *"Spy And Snoop Peptide Superglues For Assembly Of Vaccines, Enzymes And Biomaterials"*. Peptide 'superglues' are quite a novel area of study; can you explain a little more about what this new area involves and what this may mean for the industry?

Peptide superglues are peptides which quickly form irreversible covalent bonds to specific protein partners. The key thing we wanted to achieve is to do everything with natural amino acids in both the peptide and its partner. Our best example is SpyTag and SpyCatcher but we have other effective systems. I am glad that many people have started using SpyTag/SpyCatcher, probably because it is simple to add these units genetically or synthetically and they have worked for many groups in diverse contexts (bacteria, worms, mammalian systems) and diverse applications (e.g. biomaterials, vaccination and super-resolution microscopy).

What are the possible applications and opportunities?

Their use to accelerate vaccine generation might be the most exciting area right now. We are using them to enhance malaria vaccination, but there are opportunities in a range of bacterial and viral diseases.
They have also been used to enhance enzyme resilience, to build programmable protein teams to control cancer cell signalling, or for rapid evaluation of bispecific antibodies.

Why is it so important to explore this new biological space?

There is a big gap between how single peptides or proteins (conventional therapeutics) modulate cellular behaviour and the spatial complexity of much of normal cellular signalling. Efficient ways to build multi-component assemblies will help to uncover some of the sophistication of cell behaviour and should help the generation of therapeutics with greater potency and fewer side-effects.

What attracts you to working on peptides?

Peptide scientists are very creative and have led the way in so many areas, from solid-phase synthesis to combinatorial chemistry to phage library screening. It is an exciting place to be involved in the convergence of chemistry and biology, while then seeing opportunities for major medical impacts to come out from it.

Career & Experience

Mark Howarth has been a group leader in Oxford University Department of Biochemistry since 2007. This year he spun-out the company SpyBiotech. He did postdoctoral studies at MIT with Alice Ting, where he developed monovalent streptavidin and single molecule probes for tracking neurotransmitter receptors. His doctoral work was with Tim Elliott at Southampton University on MHC class I-peptide quality control. His current work is on innovating ultra-stable protein interactions through engineering of bacterial peptide superglues. These tools are being applied to vaccine development, enzyme stabilization, and multimerization of antibodies and antibody-like molecules for cancer detection and killing.

Mark Howarth will be speaking on Day 2 of our 5th Annual Peptides Congress in the Peptide Discovery, Manufacturing And Delivery stream. His talk is entitled: *Spy And Snoop Peptide Superglues For Assembly Of Vaccines, Enzymes And Biomaterials*