



# Ambarnil GHOSH

**Technology centre:** Food for Health Ireland (FHI), University College Dublin (UCD)

**Academic Mentor:** Prof. Denis Shields

**Commercial Partner:** Carbery Group

**Commercial Mentor:** Dr. Kevin Turner

Ambarnil is a computational biologist. He received his bachelor's degree in Microbiology from University of Calcutta, India. In 2004 he started his master's degree in University of Kalyani, India, focusing on Molecular Biology & Biotechnology. In 2007 Ambarnil started his doctoral degree in Jadavpur University doing research on a novel graphical representation method for protein sequence analysis and characterization. From 2013 to 2018, he worked as postdoctoral fellow in the field of genomics, immunology and medicine. Notable outcomes of his research are: protein/peptide characterization algorithm & several potential drug candidates (small-molecule, peptide).

## Prof. Denis Shields

He is a bioinformaticist, carrying out computational analysis of biological protein and DNA sequence data, spanning both molecular evolutionary and genetic epidemiological analyses. He has worked in industry as Biometrics Manager at ICON Clinical Research, preparing clinical trial analyses for regulatory approval, and as Managing Director at Surgen Ltd, a campus company providing biobanking and genetics services in clinical trials. He co-leads PhD training programmes funded by the Wellcome Trust and by the SFI CRT programme. His current research focusses on bacterial bioinformatics (pathogen identification, in collaboration with the EU Joint Research Centre, and gene cluster identification) and on food proteolysis and peptide release, working closely with Food for Health Ireland (a consortium of academic and industry partners). His many peptide sequence analysis softwares are provided to academics worldwide.

## Dr. Kevin Turner

Dr. Kevin Turner joined Carbery Group in 2017 as R&D Innovation Project Manager. Kevin has held numerous roles in the diagnostics, biopharmaceutical, industrial biotechnology and food industries as well as time spent in academia. He has worked extensively in the area of new product development and biomanufacturing with specific focuses in protein and carbohydrate chemistry, enzymology, microbiology and fermentation technology in a variety of applications. Kevin has presented extensively to a variety of academic, government and commercial audiences and has published a number of papers and edited books in the area of biotechnology, protein chemistry and enzymes. Kevin has extensive supervisory and mentoring experience in both academia and industry and has successfully applied for significant funding.

## Food for Health Ireland (FHI)

Food for Health Ireland (FHI) unites world-class science and industry expertise to improve health through innovation in food. Its purpose is to identify novel ingredients coming from milk to develop functional food ingredients that will offer health benefits to consumers. FHI links world-class academic research with industry vision for the potential of successful market innovations. The industry-focused research strategy within FHI includes the identification, development and exploitation of novel milk-derived bioactive compounds for improving health and wellbeing.

## Carbery Group

Carbery Group have been active in the food ingredients space for several decades and have been active in the area of protein hydrolysates since 2001. Carbery Group has invested significantly in the area of protein science and are currently conducting a number of projects in terms of optimization of their new product development platform. Carbery Group use the latest dairy protein science and technology to develop functional ingredients with demonstrable benefits. Carbery's goal is to excel in formulating new product applications with nutrition and taste appeal.

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## Ambarnil's project

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### **“Developing computational method to characterise multiple proteolytic processes in hydrolysed food protein before, during and after digestion”**

More and more, consumers, regulators and food producers are looking for features of foods that help in choosing one food ingredient or product over another. Many protein products are “hydrolysed” or broken down from long chains to shorter chains ('peptides') or even down into the building blocks, amino acids. There is great scope for varying how they are hydrolysed, producing different peptides, which can have bioactivities or alter other useful functions.

The newest generation of ever more precise and sensitive analytical machines, mass spectrometers, can study the released peptides in a detail never seen before. This creates a strong need for new computer methods to relate the observed peptide patterns to the underlying processes of breakdown, which can be carried out by different kinds of enzymes.

While existing software can capture some evidence regarding the chopping of the proteins inside the chain, and map this to known enzymes, it is not so useful when looking at ingredients hydrolysed by lesser-known enzymes. Also, no software considers how other enzymes are chewing the chains down, a building block at a time, from the two ends.

Ambarnil will develop methods to solve these two problems and build them into a software package to analyse data from peptide mass spectrometry analysis of foods. He will develop a range of tools to service industrial needs and deliver more targeted information to customers.

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