



NUIM OFFICE OF COMMERCIALISATION

CONNECTING EXPERTISE AND INDUSTRY

NATIONAL UNIVERSITY OF IRELAND MAYNOOTH, MAYNOOTH, CO KILDARE IRELAND

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Welcome to the latest edition of the information sharing newsletter from the NUI Maynooth Commercialisation Office. Our goal is to share the latest news and activities on the commercialisation of NUIM research. We hope you enjoy the newsletter and find it informative. Comments or questions to commercialisation@nuim.ie.

BEEMUNE-NUIM SPIN OUT 2009

The latest spin out from NUIM is Beemune Ltd, spun out from technology developed by Dr. Kevin Kavanagh. The purpose of Beemune is to commercialise a breakthrough in the treatment and prevention of diseases that affect the world's bee population. It has been estimated that honeybees contribute over \$200 billion to the global economy - directly through production of 1.3 million tonnes of honey annually and (more importantly) through crop pollination. Bee diseases have been of growing concern over the last 20 years. Between 1987 and 2006, the number of managed bee colonies has dropped by 45%, mainly due to the Varroa mite parasite.

Nosema infection has also become widespread in the last 10 years, lowering the productivity of colonies and contributing to 30-70% of bee death over winter periods.

In the last five years, Colony Collapse Disorder (CCD) has become prevalent. This is a poorly understood condition, believed to be caused by a multitude of factors such as environmental stress from the spread of mono cultural farming and loss of habitat, use of pesticides and viral infections. Treatments are either inadequate or non-existent. In nearly all cases of CCD, beekeepers have found evidence of multi-infection in every one of the few young worker bees remaining in the hive. Some had five or six infections and were also infested with fungus - a sign, experts say, that the insects' immune systems had been suppressed.

Beemunes first product, a novel and unique formulation which is rationally designed to augment bee health and hive strength. Beekeepers will be able to bring their colonies for pollination to a close to optimal state in terms of strength, bee-to-brood ratios and colony health.

Beemune Limited was set up to commercialise a set of proprietary agents for bee health and is led by David Moody and Rosaleen McGuckin who have significant experience in business growth and pharmaceuticals. They are also the key investors and the Beemune agents are now being trialled both in Europe (Greece) and Mann Lake, a US partner under the supervision of the US Dept. of Agriculture. The lead academic promoter Dr. Kevin Kavanagh NUIM, is a shareholder and acts as the Technical Director of Beemune. NUIM is a significant shareholder and supports the nascent company in business development, lab space, operations and IP.

There are some 26 million bee colonies worldwide employed either in the production of honey or the pollination of crops. In Europe, the market is highly fragmented on both the demand and supply side: demand is spread across 41 countries and is met by a multitude of suppliers. In the US, the market is much less fragmented; The main split is between pollination services and honey production. Pollination charges have increased dramatically over the last five years. The US pollination season is 7 months' duration. During this period, bees are routinely fed.

The pollination industry in the US is so highly mechanized that train trucks from state to state transport beehives. Fortunately, the experts in this country estimate that the cost of pollination to crop farmers is only 1% of the total value of their yield. In the US there are a high number of commercial beekeepers with significant numbers of colonies (10-60K). The market has one dominant supplier - Mann Lake, which has a turnover of \$90 million, generated mainly in their domestic market. It is clear that the best commercialisation option for Beemune is to license its technology for use in feeds, maximising early market penetration. We expect to develop a pipeline of ever more complex, effective, and broad treatments to improve bee health in our Irish research centre. Enterprise Ireland is helping develop this technology through a commercialisation fund proof of concept grant.



RESEARCHER SPOTLIGHT: GEMMA KINSELLA



Above: Dr. Gemma Kinsella

Dr. Gemma Kinsella is a HRB postdoctoral research fellow in the Membrane Protein Lab, of the Department of Biology, NUIM. Her research focuses on protein structure modelling and the early stages of drug development for diseases encompassing Type II Diabetes, genetically pre-disposed obesity and Parkinson's Disease.

There is ongoing economic pressure to develop new drugs in a faster and more efficient way. It costs on average \$1 billion to launch a new drug with much of

the expenditure coming from failures along the way, since for every 150 drug discovery projects that get started only one, ~15 years later, reaches the market. To match this need pharmaceutical companies are moving increasingly towards working with and progressing academic research projects. Knowledge of how a small molecule interacts with a target protein and what structural changes it induces is essential in the drug discovery process, and can be exploited in the design of drugs that have these specific interactions and produce the desired response. Dr. Kinsella's current projects focus on:

- The design of novel compounds that target the retinol binding protein (RBP) and may have a role in preventing the genesis of insulin resistance, and consequently Type II Diabetes and its cardiovascular complications.
- Protein structure prediction of R and R* states of the melanocortin 4 receptor (MC4R) a G protein coupled receptor (GPCR) implicated in individuals genetically pre-disposed to obesity - coupled with novel drug design initiatives.
- Protein structure prediction of Adenosine receptor subtypes - related to novel design and validation of small molecule

modulators in the treatment of Parkinson's Disease.

Dr. Kinsella harnesses computational power from High Performance Computing (HPC) clusters to rationally design and reduce the number of potential hit compounds that are investigated further through laboratory trials, thereby reducing the cost. Such virtual high throughput screen (vHTS), performed in NUIM, has already resulted in the identification of novel small molecules, which are undergoing lead optimisation to design modifications to improve their potency and selectivity and Absorption, Distribution, Metabolism, Elimination and Toxicity (ADMET) properties to avoid later detrimental issues when progressing candidate compounds.

A consortium of expertise has developed in NUIM with a synergic relationship existing between Dr. Kinsella as a molecular modeler and a range of collaborators including experimental and computational biologists and medicinal chemists. Biological evaluation is performed in the Membrane Protein Lab (Dr. José Ángel Campos Sandoval) and with collaborators in the University of Leeds. Chemical synthesis of analogues is being undertaken by Dr. Velasco-Torrijos and Dr. Stephens, in the Department of Chemistry, NUIM. While through collaboration with Dr. Huisinga (Hamilton Institute, NUIM), the fate of these compounds if administered externally to a living organism, termed pharmacokinetics, will be modelled. Given the importance of the resultant intellectual property of these small molecules, the consortium actively work with the NUIM Commercialisation Office towards patent protection.

Dr. Kinsella received her PhD from the Department of Chemistry in TCD in 2005 and subsequently was a postdoctoral fellow in the Molecular Design Group (MDG) in the Department of Biochemistry, TCD. She has completed a one year IRCSET postdoctoral fellowship in NUIM. Gemma has published eight scientific papers in internationally recognized journals.

GENERIC SKILLS



Above: Graduates of the 2009 Generic Skills module on Innovation and Research Commercialisation.

The Commercialisation Office ran the first Generic Skills GSE2 program in October and December last year. The module is "Innovation and Research Commercialisation" and the aim of the module is to equip researchers with the skills required to commercialise the outcome of their research, to provide them with the ability to interact with industry and to improve their skills to innovate and act with an entrepreneurial mindset.

The course covered the basics of intellectual property, technical marketing, product development, spin-out company formation and research commercialisation contracts. Also included were a couple of workshops and exercises, including preparation of a marketing pitch, culminating in a group business plan competition. Both were very useful in informing the student how to present their ideas as a business opportunity rather than as pure science. There were 14 successful graduates, all pictured on the left. Congratulations to all. Positive feedback included: "It will help me to try to avoid common pitfalls in starting up a new business having talked to people who've already been through it" and "lecturing standard was excellent. There was a good balance between more theoretical material and real life examples"

THE DIFFERENCE BETWEEN INVENTION AND INNOVATION

Are they not the same thing? No, not at all, says Raymond Hegarty of IP Foundation who says that "innovation is inventions that are useful" with the measure of usefulness being decided by the market. To draw a parallel we often say the difference between research and market focussed research is that research often concentrates on features while market focussed research concentrates on benefits which will entice or provide value add to the consumer. To extend this further, a paper written by an academic on a new discovery generally describes the science and innovative steps but is often lacking in how the science can be applied, consequentially the market potential doesn't often jump off the page. In contrast, a marketing catalogue for a product will scream benefits to the reader to engage them and solicit a sale. Ultimately, if we are to make significant strides in creating a smart economy we need more academics to give some thought to the benefits and applications of the science so that the time between discovery of a potential application and the production of a market ready product is reduced. The acceleration of "benefit discovery" is especially critical in ICT where the timelines are significantly shorter than the life sciences. With a small change of emphasis Ireland's researchers can greatly affect the outcome of our Smart Economy by making their market potential easily identifiable.

NUIM STUDENT ENTREPRENEUR COMPETITION

After strong interest in the NUIM Student Entrepreneur competition we have short listed 15 entries to go forward to the next round. This years entries at first glance appear to have strong potential with clear business models being presented by the promoters. With the continued support of our sponsors Bank of Ireland, McCannFitzgerald and FRKelly, expectations are high that further companies will be formed from this Commercialisation Office initiative. The first round of judging will take place in February.