

Stirling – Korea linkages

Dr Gil Ha Yoon



Dr Gil Ha Yoon's links with the UK began in the spring of 1995 when, as a fresh faced young Korean, he started on a PhD programme of research investigating *Entobdella hippoglossi*, a parasitic worm which infects Atlantic halibut, (*Hippoglossus hippoglossus*). Despite working many hours in the cold waters of Machrihanish, Gil Ha survived and his research findings made a notable contribution to the management of this parasite. In 1998, the new Dr Yoon

returned to Korea to take up a lecturer's post at Kunsan National Fisheries University. A year later he took up a permanent government scientist's post at ChungPyoung Inland Freshwater Institute, a branch of the National Fisheries Research and Developmental Institute (NFRDI). Here, Gil Ha investigated the potential of breeding endangered indigenous fish species like the golden mandarin fish (*Siniperca scherzeri*) and Korean bitterling (*Acheilognathus signifer*). Gil Ha also explored the potential of culturing new species like river puffer (*Takifugu obscurus*), sea bass (*Lateolabrax japonicus*) and black sea bream (*Acanthopagrus schlegelii* schlegelii) in freshwater under intensive biological culture system conditions. Later in 2002, following a move to NFRDI, Busan, Gil Ha worked in the mobile fish disease service established by Dr Myoung-Ae Park. Fish farms in Korea are usually geographically widely dispersed and isolated and farmers frequently have problems in getting an appropriate sample of live and moribund fish to a diagnostician for examination. To assist, the Korean government operates a "mobile fish doctor programme" each year, during the summer

months, that travels out to many of the farms offering a diagnostic service.

In 2005, Gil Ha returned to the Institute of Aquaculture to take up a two year Marie Curie International Incoming Fellowship with Dr Andy Shinn to screen and assess the efficacy of a wide range of natural plant extracts, as alternative treatments for the control of bacterial and fungal fish pathogens. The effects of some of these "bioflavonoids" on *Saprolegnia*, a fungal pathogen of fish are discussed in greater detail in this issue. Collaboration with Dr Mags Crumlish, also at the Institute, has demonstrated that certain plant extracts have bacteriostatic and bacteriocidal activities against a wide range of species, including those belonging to the genera *Aeromonas*, *Edwardsiella*, *Streptococcus* and *Listonella*. Bioflavonoids show great potential in aquaculture as alternatives to the use of traditional antimicrobials and hence Gil Ha is looking to extend his research to explore these further.

For further information, please contact Gil Ha Yoon at ghy2@stir.ac.uk.

Dr Myoung-Ae Park



Dr Myoung-Ae Park has been working at the National Fisheries Research and Development Institute, Korea since 1984. Dr Park has made significant inroads into researching virus infections of Korean fish. In 2006/2007, Dr Park made a one year study visit to work with Professor Sandra Adams and Dr Kim Thompson (IoA), and Dr Jichang Jian (a visiting scientist from Guangzhou Ocean University, China) to investigate the fate and immune response of oral vaccines in tilapia and rainbow trout. Oral administration is considered "the ideal method" for administering vaccines to fish whereby the vaccine is incorporated into fish feed. It is less labour intensive than other methods (i.e. injection or immersion) and is suitable for vaccinating large numbers of fish of all

sizes. It also avoids the handling stressors experienced by the fish with the other two methods. The major disadvantage with this route of administration is that lower levels of protection are achieved and the duration of protection elicited is shorter. However oral vaccination may play an important role in offering a booster vaccination method for fish already primed by immersion and/or injection or already primed orally. This would allow booster vaccination to be carried out without the stressful or damaging removal of fish from the holding facility and allow booster vaccination strategies akin to those used in higher animals to be routinely used in aquaculture. One of the major technical problems associated with oral vaccination is the degradation of antigen by the gastric fluid in the stomach and anterior gut of the fish, and therefore the antigen may be inactivated by the time it reaches the posterior part of the intestine. In this project Schering Plough's oral vaccine Antigen Protection Vehicle (APV) technology was used whereby the antigens were protected from breakdown in the low pH conditions in the stomach of the fish by incorporating them into a stable water-in-oil emulsion. Few oral vaccines are available commercially and therefore it is important

that basic information on the fate of the antigens in oral vaccines and the immune response in fish are well characterised so that this technology can progress.



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Links with Korea were also fostered through a visit by John Bostock (Manager of the Stirling Aquaculture consultancy group) in November 2007 to speak at a seminar on traceability at the Busan International Seafood and Fisheries Expo. The implementation of traceability in the seafood industry in Korea is some way behind that of Europe, although the Ministry of Marine Affairs and Fisheries (MOMAF) is in the process of introducing a traceability system. John introduced the situation in Europe with reference to high profile food scares in the 1990s that led to food laws requiring chain traceability of food products and ingredients. Through additional legislation, industry practice and the emerging importance of food certification schemes, John explained how traceability has become both more important and comprehensive in the European food industry. Several examples were given of the way in which traceability and product tracking are now combined using modern electronic sensors, global positioning systems, mobile communications technologies, computers,

networks and Internet services. Projects that are seeking to create universal standards and gateways for traceability data exchange were also discussed. A key message of the presentation was that although often regarded as a costly imposition, traceability can become a powerful tool for business management, enabling improved cost, production and quality management, and strengthening customer relations.

In addition to participating in the traceability seminar, John also visited the National Fisheries Research and Development Institute (NFRDI) laboratories near Busan, where Dr Myoung-Ae Park is based, and gave a short presentation on current aquaculture developments in Europe. In the following days, visits were made to the impressive Gyeongsangnam-do Marine Resources Research Institute and some commercial fish farms around Tong Yeong. Here he also met with Professor Jae-Yoon Jo from Pukyong National University, with the opportunity to share a mutual interest in recirculated

aquaculture systems over an excellent dinner. Before departing, meetings were held with staff of MOMAF and the Korea Maritime Institute (KMI) in Seoul to discuss current developments and opportunities for greater linkages between Stirling and Korea.

Facilitating the visit and acting as interpreter and guide throughout was Dr Duk-Hyun Yoon (PhD Institute of Aquaculture, 1999), now General Manager of Aqua-Int. Consulting Ltd. and Research Scientist for the Korean Ocean Research and Development Institute (KORDI). This provided an ideal opportunity to explore potential synergies and build stronger collaboration between our consultancy services. This will allow both groups to provide a greater range and depth of services including sector and market analysis, feasibility studies, technical expertise, management and training. These will be especially promoted at the World Aquaculture Society Meeting and Exhibition in May 2008 in Busan.

Aqua-TNET

Step into the ancient courtyards of many famous colleges and you feel yourself in a timeless world where only the clothes people wear or the music drifting from open windows indicates which century you are in. However, under the skin, higher education is changing rapidly, with factors such as globalisation and the development of the Internet creating new challenges and opportunities. Aqua-TNET is a network of 109 partner organisations in Europe with a stake in aquaculture and aquatic resources education, which is seeking to address these issues for our sector.

European policy recognises the increasingly competitive nature of the global economy and the importance of strengthening and maintaining innovation. This can be addressed by improving links between research and teaching; extending access to further and higher education and developing both a culture and infrastructure for lifelong learning. Innovation is also helped by improving collaboration across Member States, hence policies are in place for improving student and teacher mobility through standardised and mutually recognised qualification frameworks; more transparent descriptions of competences achieved; and addressing barriers such as lack of quality resources in less widely spoken languages.

Global trends for greater student mobility, offshore campuses, franchised courses, and e-Learning suggest increasing academic

consolidation. More radically, the growing movement for Open Educational Resources and drive for the formal recognition of competences acquired through work experience could lead to some separation or specialisation of the core teaching functions of material preparation and presentation, student coaching and formal assessment.

The Institute of Aquaculture is playing an active role in the Aqua-TNET project, which is coordinated by the University of Gent, with Aqua TT Ltd providing the project secretariat. John Bostock is leading the workgroup on innovation in teaching, which has recently published a review on the topic. This examines the impacts and opportunities of new information and communication technologies on teaching and learning, and provides a basis for more practical guides currently in preparation. Kim Jauncey is a key participant in the workgroup on educational transparency and competence-based learning

and assessment; Trevor Telfer and Richard Corner have worked with the group on PhD curriculum development and assessment and Lindsay Pollock (until recently) with the group on Masters Courses. The Institute is well ahead in adapting to the new demands with the restructuring of our Masters level teaching to create modules for more flexible learning patterns and the innovation of e-Learning and blended learning courses for international and work-based learning. However, this is only the start and we look forward to further innovations and closer collaborations in the future. *For more information about the Aqua-TNET project see www.aquatnet.com*



The Aqua-TNET website showing partner locations.