

# Our AE2017 Plenary speakers

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**Day 1. Wednesday 18th: 09h00 to 10h00.**

**“Is substitution compromising our omega 3 (DHA) position?” - Professor Michael A Crawford, PhD, FRSB, FRCPath, Imperial College, London.**

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The advantages of a long-chain omega 3 (and especially DHA) – rich diet are clearly documented, and especially regarding the key requirement of DHA for brain development and maintenance. The brain evolved in the sea 500 mya using marine nutrients including DHA and several trace elements which it still requires. Indeed we have a hypothesis as to the pivotal role of docosahexaenoic acid in brain function. This hypothesis explains its absolute conservation in neural signalling systems over the whole of vertebrate evolution and indeed how learning, memory, recall, etc works.

As we look to replace more and more fish meal and fish oil (for sustainability requirements) and replace them with terrestrial plants, the DHA content of farmed fish had also declined. Furthermore, arable land use has reached its limit and in many places the available area is in decline. Meeting the nutritional needs for population growth will require prioritising arable land for high yielding crops for human consumption and not to feed fish, hence the development of marine agriculture is a must.

Marine-derived HUFA and trace elements are key to addressing mental ill-health, which is increasing at an alarming rate. If mental ill health continues then the concerns of Steven Hawking and HRH Prince Charles that limited resources in the face of population expansion will lead to the 6th Extinction will become a reality (Steven claimed we need to leave the planet by 2117). The continued impact of escalating mental ill health will do it sooner than Hawking suggests. That is a further reason for the urgency of developing the marine food resource.



*Professor Crawford is currently a visiting professor to Imperial College, London and Chief Investigator for a clinical trial on maternal nutrition and pregnancy outcome at the Chelsea and Westminster Hospital Campus. In his career he documented the relationship between chronic diseases and nutrition in East Africa in the 1960s and China in the 1980s. Both were at a time, when there was a totally different pattern of the chronic diseases to Europe and USA.*

*IN 1972, he discovered the essentiality of the omega 3 fatty acids to the brain. His evidence was supported by the joint FAO-WHO expert consultations of 1978, 94 and 2010. His recent research points to the supreme importance of the health and nutrition of the mother to the intelligence of the new born child even in the*

*months before conception.*

*The brain evolved in the sea 500 million years ago. He concludes from his research that it used omega 3 docosahexaenoic acid for its construction and signalling function. It still uses the same today. His present research is delineating the manner in which docosahexaenoic acid, is pivotal to the quantum mechanical precision of photo-reception, neural signalling, neural pathways, and hence to consciousness, learning, recall and cognition.*

*Today mental ill-health is escalating. It is the no. 1 burden of ill health in the West and is being globalised. A continued escalation of mental ill-health will inevitably lead to the destruction of humanity. Life began in the seas. We have to save the oceans to save ourselves.*

*Professor Crawford has published over 300 peer reviewed scientific papers, 3 books with a new edition in progress. He has received several international awards for his contribution to science and culture and is a Freeman of the City of London. [www.imperial.ac.uk/people/michael.crawford](http://www.imperial.ac.uk/people/michael.crawford)*

**Day 2. Thursday 19th: 09h00 to 10h00.**

## **“Large scale RTD facility to take tuna farming forward” – Fernando de la Gándara, Researcher at the IEO (Spanish Institute of Oceanography) and Director of the Murcia Oceanographic Center.**

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The Atlantic Bluefin tuna is an emblematic species that has fed Mediterranean human populations for centuries. Over the last two decades, its wild stocks have been severely overfished, with high quota limits leading to consequent reduction of the production. In order to satisfy high market demand, it is essential to increase bluefin tuna production coming from sustainable aquaculture where the whole biological life cycle is managed.

The Spanish Institute of Oceanography (IEO) has recently built a land-based large-scale facility (ICRA) for the control of the reproduction of this species, capable of hosting big size breeders. This facility is near the already existing IEO Aquaculture facility in Mazzaron, (Murcia, SE Spain), devoted to the research on Atlantic Bluefin tuna larval rearing and juvenile production.

Through representative organisations such as FEAP and EATiP, aquaculture producers across Europe (working with all species) wish to prioritise research in large scale facilities that are closer to production conditions, and may also provide a benchmark against which technical performance may be measured. This is needed for both hatchery and also grow-out phases of the biological life cycle.

Both of these Spanish facilities are a model of how research centres of excellence can enhance cooperation to generate new knowledge on performance that can be transferred directly to operators and provide the technical basis needed to take the sector forward.

This plenary will be followed by a full-day special session on tuna.

*Fernando de la Gándara, born in Barcelona (Spain) in 1958, is graduate and PhD in Biology from the University of Murcia (Spain). Researcher at the IEO (Spanish Institute of Oceanography) and Director of the Murcia Oceanographic Center.*

*An expert on bluefin tuna (*Thunnus thynnus*) aquaculture and farming research. Over the last 18 years, he has coordinated and participated in more than 20 Spanish and European projects.*

*Fernando was President of the Spanish Aquaculture Society (SEA) from 2006-07. He has authored or co-authored over 50 papers in books and peer-reviewed journals.*



**Day 3. Friday 20th: 11h45 to 12h30 (PLEASE NOTE THE TIME!).**

## “Gene editing. A game changer for aquaculture?” – Anna Wargelius, Institute of Marine Research, Bergen.

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Gene editing, using the CRISPR technique has been hailed as a ‘major breakthrough’ in human medicine, with its ‘pros and cons’ widely published and discussed over recent years in scientific and general press. But what are the uses of gene editing in plant science and agriculture and how have these benefited production of food crops? What is the potential for aquaculture and what are the main lines of work that are being researched at present? What are the quality/nutritional/market benefits and issues of this technology for aquaculture? What are the ethical questions that we must also consider as we assess if and how best to adopt this as a potential game-changer for aquaculture.



*Dr Anna Wargelius is a molecular biologist working on aquaculture genetics. She did her Bachelor and Master degrees at the University of Uppsala, Sweden. She continued to take her PhD at University of Bergen, Norway, working with zebrafish eye development. After finishing her PhD she started as a post doc at the Institute of Marine Research, Norway and has thereafter obtained a scientist position, working with development, reproduction in both salmon and cod.*

*She is currently the Group leader of the group of Reproduction and Development of fish at the Institute of Marine Research in Bergen, Norway. In recent years she has worked extensively with understanding basic reproductive traits in Atlantic salmon, such as time of maturity and how to produce sterile fish for aquaculture. In this context, her group has been the first to develop CRISPR-Cas9 technology applied to Atlantic salmon and her team has in this context managed to produce salmon without germ cells.*

*Her group has also explored and revealed wild genetic traits involved in time of maturation and disease resistance. As such they are currently trying to explore function of wild beneficial genetic variation using CRISPR-Cas9 - with the long-term overall aim to develop more sustainable solutions for salmon farming.*