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CSA

MARINE BIOTECH

An ERA-NET Preparatory Action in Marine Biotechnology

A new wave of marine biotech

How does CSA MarineBiotech define marine biotechnology and in what ways can these technologies help to meet the Grand Challenges for the 21st Century?

Biotechnology, as defined by the Organisation for Economic Co-operation and Development (OECD), is the application of biological knowledge and techniques to develop products, knowledge and other benefits. MarineBiotech takes this definition and applies it to the marine environment. Marine organisms contain molecules not seen in the terrestrial environment that may lead to the development of new drugs and disease treatments. The same is true for enzymes with unique properties that can be used in industrial processes to make them cleaner and more energy efficient, and for processes that will benefit both the environment and climate. In addition, a focus on marine biology and marine biotechnology will increase the possibilities for sustainable production of food and energy from the seas.

What is the importance of effective coordination of marine biotechnology research in Europe and what is required to achieve this?

The development of technology and applications using marine biotechnology will be greatly improved when it is coordinated and developed in close synergy between European partners. It is a big challenge to penetrate the understanding of biology and uncover how this can be best utilised technologically. This requires the efficient use of human, infrastructure and monetary resources which can be facilitated by coordination and innovative thinking. To achieve this, networks between policy makers and scientists must be active and open, effective communication channels must be operative and a political understanding of the importance must be manifested in budgets enabling developments and innovations.

Sum up the specific aims and objectives of this project?

CSA MarineBiotech's main objective during its 18-month duration is to establish a trans-European consortium of funding agencies and other stakeholders, who together will facilitate developments in marine biotechnology. This is most likely through a Seventh Framework Programme (FP7)-financed European Research Area Network (ERA-NET) aimed to start in late 2013 that will work in close collaboration with other European and international activities relevant for this field.

Who are the CSA MarineBiotech's target audience and how are you looking to effectively distribute your findings and results?

The main audience is the European funding agencies who actively want to create the consortium to fund collaborative research and developments in marine biotechnology. In addition we need support and advice from a range of stakeholders, including industry and science organisations, to define the best possible research priorities and knowledge gaps. Findings and results are being distributed through two workshops, newsletters, our website and a final conference in the spring of 2013.

What future activities have been proposed by the MarineBiotech consortium?

The CSA MarineBiotech consortium will discuss these in detail as they will provide the basis for the European cooperation areas, but a coordinated working group leading up to this project completed an initial mapping of fields where common interests exist. These were molecular aquaculture, biodiscovery/bioprospecting, biomass production and utilisation for energy, fine chemicals and nutraceuticals, and tools and infrastructure developments tailored for the marine field. These and probably others will be further developed in the ERA-NET consortium established through the project.

What are the major strengths of the project? Have you faced any significant obstacles in achieving the project's objectives to date?

The strengths are the dedication from the consortium and the increased awareness marine biotechnology is attracting from many different angles. Significant obstacles have not emerged so far, but building a common understanding of the importance of marine biotechnology, and assembling the right and strong consortium to advance marine biotechnology in Europe will certainly be a big challenge. An emerging obstacle, though we are not yet sure how big it might be, is the economic situation in some of the countries that should be central players in this area. Also, other initiatives might divert interest and focus from a Marine Biotech ERA-NET participation for some.

Would you like to discuss any other aspects of CSA MarineBiotech?

CSA MarineBiotech is the first action that the EU has supported to bring together funding agencies in a deliberate way, to plan for a future in which marine biology and biotechnology have a strong role to play in the bioeconomy. This is an important time to 'get it right' in this area, in terms of sustainability and collaboration, so it is very exciting for us to see how the next years will progress.

Dr Steinar Bergseth explains the work of a Europe-wide project that seeks to enable easier and more effective collaboration and funding for marine biotechnology research in Europe



Scientific synergy

CSA MarineBiotech, an ERA-NET Preparatory Action in Marine Biotechnology, is engaging with European partners in order to facilitate effective cooperation and research collaborations

THE CHANGES FACING marine environments due to human-driven factors mean that we are currently in the midst of a critical period for preservation of these ecosystems. Yet concurrently, the seas represent one of the most abundant sources of food and energy production on the planet, as well as containing the potential for countless innovations in drug production, industrial process development, ecosystem management and other related fields. Consequently, research into marine environments is incredibly important, both in discovering critical products and processes, and avoiding over-exploitation either for food production, aquaculture or any other uses.

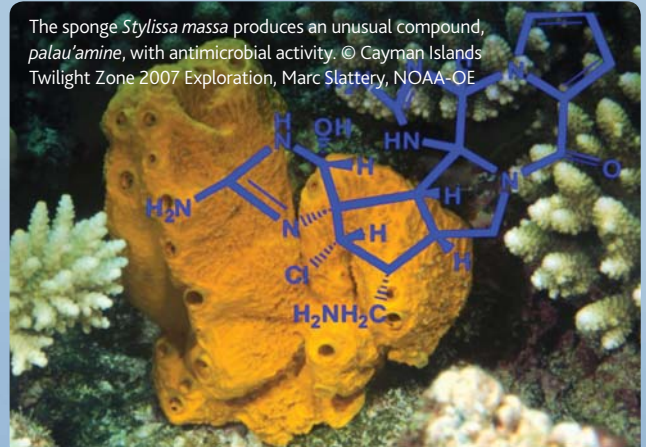
Investigations into these environments must be carefully coordinated but, at present, research activities across Europe are fragmented. Biotechnology challenges must be better defined and coordinated so that high quality research is more effectively utilised. This can be achieved through a number of carefully considered measures including common research and innovation agendas, better use of infrastructure, improved stakeholder participation and the identification of existing gaps and barriers to cooperation.

In order to address this, the CSA MarineBiotech programme, led by Dr Steinar Bergseth, of the Research Council of Norway, was launched in October 2011 for an 18-month period. It seeks to create a synergy between 11 partners involved in marine biotechnology research (members

of funding agencies, research institutes and consultancies) across nine countries. CSA MarineBiotech will thus prepare the foundations for a European Research Area Network (ERA-NET) which will subsequently help prevent unnecessary repetition of work and maintain the sustainability of investigations.

GOOD TO TALK

There are a number of ways in which CSA MarineBiotech is helping to create an effective environment for biotechnology innovation across Europe. Two significant components are the MarineBiotech Strategic Forum, and the MarineBiotech Stakeholder Group. Bergseth explains the thought process behind the creation of these two branches of their work: "CSA MarineBiotech is a coordination effort to improve interest in and create the networks for the next stage which will promote science and development in academia and innovations in the industries". Within this aim, the Strategic Forum brings together all funding agencies interested in supporting research and development across Europe. Similarly, the Stakeholder Group provides advice on the areas which require investigation, helping to



identify the priorities and paths for developing marine biotechnology across Europe.

The CSA MarineBiotech consortium is laying the foundations for an ERA-NET that will develop a biotechnology toolbox of advanced methods and analyses tailored to the challenges of making use of marine bioresources. This will then accelerate innovative marine biotechnology developments in sectors ranging from environmental and human health, to the sustainable supply of food, energy and biomaterials. By developing technological solutions, new knowledge within marine biology can be applied to other disciplines and problems which encompass a number of related fields.



INTELLIGENCE

CSA MARINEBIOTECH

OBJECTIVES

The main goal of the CSA is to prepare the foundation for an ERA-NET in the area of marine biotechnology.

PARTNERS

VLIZ – Flanders Marine Institute, Belgium

EMB-ESF – European Science Foundation Marine Board

DTU – Technical University of Denmark

CNRS – Centre National de la Recherche Scientifique – Station Biologique Roscoff, France

IFREMER – French Research Institute for Exploration of the Sea, France

Norgenta North German Life Science Agency, Germany

CNR – National Research Council of Italy

RCN – Research Council of Norway

FCT – Ministry of Education and Science, Portugal

TÜBİTAK – The Scientific and Technological Research Council of Turkey

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CONTACT

Dr Steinar Bergseth
Project Coordinator

Research Council of Norway
PO Box 2700 St Hanshaugen
0131 Oslo
Norway

T 47 220 37323

E stb@forskningsradet.no

www.marinebiotech.eu

DR STEINAR BERGSETH is special advisor on biotechnology in The Research Council of Norway and has seven years' experience of building and running Norway's largest biotechnology effort, FUGE. He is instrumental in much of the strategic biotech work in Norway, chairs the international Salmon genome sequencing effort and is active in OECD's work on marine biotechnology.

MICROALGAL STRAINS WITH POTENTIAL FOR BIOFUELS © IFREMER/OLIVIER DUGORNAY



ASSISTING STRATEGIES

One area of special note is the contribution of marine biotechnology to the Europe 2020 strategy. This initiative is focused on boosting growth and employability across a 10-year perspective and aims at intelligent, sustainable and inclusive growth. Bergseth is quick to explain how the consortium is working within these parameters: "CSA MarineBiotech will pave the ground for contributions to these goals by generating new innovations, leading to employment possibilities in new areas, utilising biological resources in a smart and sustainable way". The programme partners are also hoping that their work will contribute to climate and energy efforts by facilitating collaborations and innovations in these fields, helping researchers to investigate the power and potential contained within the marine environment more effectively.

SAFE, SECURE SEAFOOD

A area in which biotechnology innovations can impact consumers and the general public is safe seafood production. This comprises a number of elements, as Bergseth explains: "One major aspect of seafood safety is traceability, the facility of following the product from the sea to the shelf in order to confirm its identity". With DNA-based methods providing excellent tools for this aspect of the work, developing and improving these tools is a central focus for many biotechnology researchers. Biotechnology will also help in selecting seafood lines that are inherently more resistant to disease, or have enhanced nutritional profiles. Similarly, researchers are at pains to find inexpensive and high throughput ways of assessing the microbial and toxicological safety of the food. Biotech labs are working through continuous developmental processes in order to address these issues in ways that are both efficient and secure. Innovations in this field can also include the analysis of marine environments for substances which may affect food production in negative ways. The team are hoping that their work will facilitate improved methodologies for both traceability and safety within seafood – technologies which could have an impact across Europe and the world.

DEVELOPING NOVEL DRUGS

Another major field within which marine biotechnology can contribute is drug

development. In fact, new molecules are continuously being discovered within the marine context, including a large number related to the cancer field such as *cytarabine*, *eribulin* (*Halaven*®) *trabectin* (*Yondelis*®) and *salinosporamide A*. A notable drug recently developed from marine biotechnology is *Prialt*® (*ziconotide*), an analgesic which has been produced from the cone snail *Conus magus*. Used to manage severe chronic pain, the drug has proven extremely effective.

MARINE BIOTECH AND THE BIOECONOMY

Such discoveries are examples of the many and varied outputs that research and development in marine biotechnology can produce. CSA MarineBiotech hopes that by defining the current state of the art and laying the foundations for strong collaborative activities, it will be able to assist future discoveries and new technologies. It is through the success of these future projects that the value of marine research can be realised – creating both technology at the cutting-edge of science and useful outputs that are sustainably produced.

Many of the aims of the Copenhagen Declaration, which was issued at the end of the 'Bioeconomy in Action' event in 2012, have helped to promote the need for biotech solutions. Focusing on the European Commission's Strategy 'A Bioeconomy for Europe: Innovating for Sustainable Growth', which was submitted during the Danish Presidency of the EU, the declaration presents a number of key findings that suggest an ERA-NET along the lines envisaged by CSA MarineBiotech would be beneficial to European scientists, industries and society at large. In the European context, marine biotechnology can and should make an important contribution towards meeting the 'Grand Challenges' for the 21st Century and the development of greener, smarter economies, central components of the Europe 2020 Strategy.

With key initiatives including knowledge and innovation communities, CSA MarineBiotech's efforts to aid collaboration amongst researchers will assist in achieving the targets of the declaration. The partners are hoping that their own work in committing funding agencies to become part of an ERA-NET will provide a strong statement on the power of working synergistically in the pursuit of biotechnology outcomes.

