MaCuMBA

MaCuMBA is a four-year research project that aims to uncover the untold diversity of marine microbes using cultivation-dependent strategies. This joint venture of 22 partner institutions from 11 EU countries is led by the Royal Netherlands Institute for Sea Research (NIOZ), and has a budget of more than €12 million, of which €9 million is funded by the EC Seventh Framework Programme.

project news

www.macumbaproject.eu

Issue 15 | June 2016

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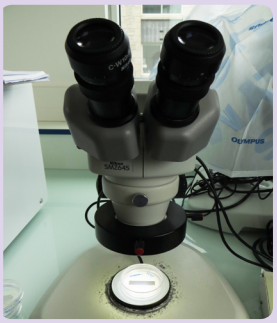
MicroDish demonstrate MDCC in new animated short video



An MDCC placed under a dissection microscope for examination of microcolonies

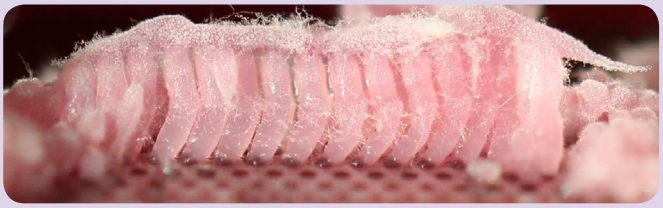
MaCuMBA Project Partner MicroDish BV has developed an informative short animation illustrating the use of the MicroDish Culture Chip (MDCC) to perform a screening of marine microorganisms.

We are all familiar with the tried-and-tested Petri dish as the classic method of growing bacteria and fungi; and one which has hardly changed in centuries. However, the Petri dish was developed in an era of low throughput and is designed for skilled manual labour. The MicroDish Culture Chip (MDCC) is a disposable hardware for the culture of microorganisms, effectively a massive number of miniaturised "Petri dishes on-a-chip". The opening shot of the movie illustrates this concept perfectly with a shot of a Petri dish (which typically holds up to 300 colonies) compared to a MDCC which can grow up to 240,000 microcolonies in a smaller area!

Cell culture is a critical part of diagnostics biotechnology and contributes to the quality of our health and that of the environment. There is a strong need to develop faster, more automatable methods of growing and assaying cells.

Colin Ingham, Chief Scientific Officer at MicroDish explains how the MDCC functions:

"The base of the chip is porous, allowing nutrients to reach the microorganisms but not allowing them to penetrate the chip. One use of the chip is to place a natural substrate, such as sediment, underneath to simulate a natural environment - a strategy used to obtain better cultures. Microorganisms can be inoculated simply, for example by spreading over the chip so the probability of a bacterium in any given compartment is less than one."



Marine Eukaryote growing on an MDCC (cultivation chip). This is a MACUMBA isolate, obtained during the sampling activity in Roscoff in 2013 from a sponge sample. The circular areas are 180 microns across wells with a porous ceramic base and the image is around 7 mm across

The upper surface of the MDCC is divided into growth compartments or "microwells" which allow for segregation of different strains of microbes within the individual wells. Some valuable strains may be present, for example microorganisms which produce an enzyme or antibiotic. In the example illustrated in the video, a fluorogenic dye, introduced from below, is used to detect the desired property in a high throughput screening.

The researcher then has the option to replicate the pattern of microorganisms on the chips allowing replicates to be grown under different conditions. Ultimately, the chip offers an improved and simplified way of recovering a desired strain for cultivation and analysis.

The full animated movie can be seen here: **www.microdish.nl**

MicroDish BV is a Small and Medium-sized Enterprise (SME) founded in the Netherlands and dedicated to improving microbial culture through the design, manufacture and use of microengineered culture chips and nanoscale reagents. The MDCC, developed by MicroDish BV, is versatile, allows for rapid changes of culture medium, has the capacity to deal with difficult organisms and is highly suitable for imaging and recovery from target microcolonies.

For more information, visit: **www.microdish.nl**

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Under the Microscope:
Marine Microorganisms in the news

How deep does life go? Study describes microbial neighborhood beneath ocean floor

A new study offers the first description of an active microbial community buried in cold oceanic crust at North Pond, an isolated sediment pond on the western flank of the Mid-Atlantic Ridge.

Source: Marine Biological Laboratory. "How deep does life go? Study describes microbial neighborhood beneath ocean floor." ScienceDaily. ScienceDaily, 6 April 2016.

Shortened URL: http://goo.gl/7JQ6ot

The microbes that keep hydrothermal vents pumping

Chemical-harvesting microorganisms are found in different habitats all over the world, and they are essential to the hydrothermal vent ecosystem. This article gives information on some of the microbes that make this amazing ecosystem possible.

Source: Smithsonian Ocean Portal

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Wealth of unsuspected new microbes expands tree of life

Researchers at the University of California, Berkeley, who have discovered more than 1,000 new types of bacteria and Archaea over the past 15 years lurking in Earth's nooks and crannies, have dramatically altered the tree to account for these microscopic new life forms.

Source: Phys.Org, 11 April 2016

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Metal-munching microbes could manufacture machines on Mars

Scientists at the Ames Research Center in California are engineering microbes that could break down metallic parts of electronics and then create new ones. This project was one of 13 to be awarded a $100,000 grant from the NASA Innovative Advanced Concepts (NIAC) programme, which invests in the development of "transformative" and "pioneering technologies".

Source: Popular Science, 13 April 2016

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MaCuMBA PRESENTS

MARINE MICROBIOME
DISCOVERY & INNOVATION

BERLIN ADLERSHOF - CITY OF SCIENCE TECHNOLOGY & MEDIA 27-30 JUNE 2016

UPDATED PROGRAMME NOW ONLINE!

An updated version of the **Marine Microbiome Programme** is now available to view and download from the conference website: **www.macumbaproject.eu/international-marine-microbiome-conference**

This programme contains additional details on the line up of speakers for both the Industry Conference and Open Science Meeting; as well as information on the exhibitors who will be present throughout the three day event, and timings for all scheduled activities.

Remember to keep an eye on our project website **www.macumbaproject.eu**, Facebook page **www.facebook.com/MaCuMBAProject**, and Twitter account (**@MaCuMBAProject**) regularly for all the latest news as the event approaches.

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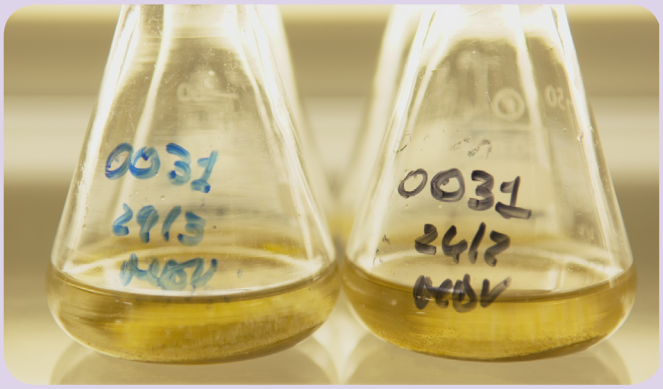
Spotlight on MaCuMBA – New Project Video

Over the past year, **eCOAST**'s creative team have been working on shooting and editing a number of short films to showcase the work of **MaCuMBA**. Two of these short films will premiere on Tuesday 28 June in Berlin at the Marine Microbiome event.



However, a sneak peak in the form of a short promotional teaser video entitled 'Spotlight on **MaCuMBA**' is now available to view on the project website:

www.macumbaproject.eu/macumba-disclaimer/macumba-news/1611-spotlight-on-macumba-new-project-video

This short film gives a little glimpse into the story of the project: its genesis, objectives and successes, as told by **MaCuMBA** Project Coordinator Prof. Lucas J. Stal.

Of the more in depth videos which will premiere at the Marine Microbiome, the first of these presents an overview of **MaCuMBA**. Aimed at a large public audience, this video visually explains **MaCuMBA**'s inception, its chief objectives, and the scope of the fantastic work that has been undertaken in its lifetime.

There is also a longer film on the **MaCuMBA** Summer School which focuses on some of the techniques and methods that were used and developed for the sampling and cultivation of marine microorganisms. This film is primarily intended for students and all those with a special interest in the subject matter. The video shows techniques alternated with fragments of interviews, in order to get a glimpse of the researchers behind the project and to gain insight into the challenges and novelties of the work of **MaCuMBA**.

Both of these videos were shot during the **MaCuMBA** Summer School last year at Texel, Netherlands and in other relevant locations, such as the Royal Netherlands Institute of Sea Research (NIOZ) in Yerseke and the research vessel 'Simon Stevin'. They were directed by Katrien Vanagt who, after obtaining a PhD in the history of science, turned to filmmaking. She was assisted by Stefano Bertacchini, an Italian director of photography who specialises in shooting documentaries.

For more information, visit: **www.ecoast.be**

Photo credit: Katrien Vanagt, eCOAST

Publications: This section includes details of some of the most recent scientific publications acknowledging MaCuMBA

Diversity and distribution of haptophytes revealed by environmental sequencing and metabarcoding – a review.
Edvardsen, B., Egge, E. S. & Vaulot, D. 2016. Perspectives in Phycology, in press.
Shortened URL: http://bit.ly/1XnUffl

Photosynthetic pigments of oceanic Chlorophyta belonging to prasinophytes clade VII.
Lopes dos Santos, A., Gourvil, P., Rodriguez, F., Garrido, J.L. & Vaulot, D. 2016. Journal of Phycology, 52(1):148–55.
Shortened URL: http://1.usa.gov/1RT3CuT

Pseudo-nitzschia arctica sp. nov., a new cold-water cryptic Pseudo-nitzschia species within the P. pseudodelicatissima complex.
Percopo, I., Ruggiero, M.V., Balzano, S., Gourvil, P., Lundhölm, N., Siano, R., Tammilehto, A., Vaulot, D. & Sarno, D. 2016. Journal of Phycoltogy, 52(2):184-199.
Shortened URL: http://bit.ly/1XVtBZR

Diversity and oceanic distribution of Parmales (Bolidophyceae), a picoplankton group closely related to diatoms.
Ichinomiya, M., Lopes dos Santos, A., Gourvil, P., Yoshikawa, S., Kamiya, M., Ohki, K., Audic, S., De Vargas, C., Noël, M.H., Vaulot, D. & Kuwata, A. 2016. The ISME Journal, in press.
Shortened URL: http://go.nature.com/1XVtQnJ

Cyanobacteria and eukaryotic algae use different chemical variants of vitamin B12
Helliwell, K.E., Lawrence, A.D., Holzer, A., Kudahl, U.J., Sasso, S., Kräutler, B., Scanlan, D.J., Warren, M.J. & Smith, A.G. 2016. Current Biology, 26(8):999-1008.
Shortened URL: http://1.usa.gov/1XVup0E

Deep subseafloor fungi as an untapped reservoir of amphipathic antimicrobial compounds
Navarri, M., Jégou, C., Meslet-Cladière, L., Brillet, B., Barbier, G., Burgaud, G. & Fleury, Y. 2016. Marine Drugs, 14(3):50.
Shortened URL: http://1.usa.gov/1sRMNvE

Improvement of phytoplankton culture isolation using single cell sorting by flow cytometry
Marie, D., Le Gall, F., Edern, R., Gourvil, P. & Vaulot, D. 2016. Journal of Phycology. Submitted.
Shortened URL: not currently available

Phylogenetic diversity and ecology of green micro algae in marine systems.
Tragin, M., Lopes dos Santos, A., Christen, R. & Vaulot, D. 2016. Perspectives in Phycology. Submitted.
Shortened URL: not currently available

Brandtodinium gen. nov. and *B. nutricula* comb. Nov. (Dinophyceae), a dinoflagellate commonly found in symbiosis with polycystine radiolarians.
Probert, I., Siano, R., Poirier, C., Decelle, J., Biard, T., Tuji, A., Suzuki, N. & Not, F. 2014. Journal of Phycology, 50(2):388-399.
Shortened URL: http://bit.ly/1sRKOHE

Connecting thermal physiology and latitudinal niche partitioning in marine *Synechococcus.*
Pittera, J., Humily, F., Thorel, M., Grulois, D., Garczarek, L. & Six, C. 2014. The ISME Journal, 8(6):1221-1236.
Shortened URL: http://go.nature.com/1U1T07E

Sequential splicing of a group II twintron in the marine cyanobacterium *Trichodesmium*
Pfreundt, U., & Hess, WR. 2015. Scientific Reports, 5.
Shortened URL: http://1.usa.gov/1XnZjjW

Functional distinctness in the exoproteomes of marine *Synechococcus*
Christie-Oleza, JA., Armengaud, J., Guerin, P., Scanlan, DJ. 2015. Environmental Microbiology, 17(10):3781-3794.
Shortened URL: http://bit.ly/1Ulw8H5

"You produce while I clean up", a strategy revealed by exoproteomics during *Synechococcus-Roseobacter* interactions
Christie-Oleza, JA., Armengaud, J., Scanlan, DJ. 2015. Proteomics, 15(20):3454-3462.
Shortened URL: http://bit.ly/1U1V36J

Designed and developed by AquaTT

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