

H2020-MSCA-ITN  
Bringing marine ecology  
into 21<sup>st</sup> century

# MixITiN

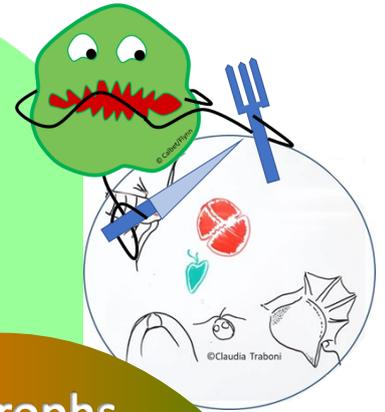
Training next generation  
marine ecologists in the  
mixotroph paradigm

## Spring 2018 Newsletter: Education & Outreach



### Welcome...

... to the first newsletter from Team MixITiN! We are a cross-disciplinary group of experts from 9 countries. Over a 4 year period this €2.88M project will train 11 young researchers to upgrade marine science capability in an area of importance for food security, environmental quality and our understanding of climate change. Read on to learn more about the project and our education and outreach activities.



### Planktonic Life In Our Oceans

Some 50% of the oxygen that you are breathing in right now comes from the activities of a group of organisms that you most likely do not know of. These are microscopic “plankton” that live off the coasts and in the sunlit oceans.

Over millions of years they have shaped our planet, made the limestone we walk on, and the rock used to make the soft abrasive we brush our teeth with. Even if you think you know about them, most likely that information is out of date and incorrect.

Most people’s understanding of marine life comes from programmes such as the BBC’s Blue Planet series. Without the plankton none of those beautiful fish, penguins and whales would exist. And neither would you. If you look in text books you may find reference to plant-like “phytoplankton”, and their predators, animal-like “zooplankton”. We now know this represents a flawed description.

### Why?

### Mixotrophs

It transpires that most of the phytoplankton, and half the microzooplankton species, are “mixotrophs” – they are plant-like and animal-like within the same single cell!

Mixotrophic plankton are typically very small: a line of 100 of them may extend to just 1mm. You may not even see the colour of a population of millions of them swarming in a bottle of seawater. But the oceans are truly vast, and the collective number of these mixotrophs is equally vast.

Some of their blooms can be seen from space, and the foam on the beaches is often a consequence of their growth. Then there are the good guys and the bad guys. While many mixotrophs make good food to support fisheries, others can be deadly toxic, killing whole ecosystems, and potentially humans.



### What is Team MixITiN doing?

Only very recently have we realised how important and common mixotrophs actually are. We did not recognise their activity because we did not look. If you do not feed a Venus fly-trap plant with an insect you would not know it was a mixotroph. So marine scientists did not know of planktonic mixotrophs because they did not look for them. In consequence, the text books are wrong, and our teaching is incomplete.

As part of the project, Team MixITiN will be making education packs combining biology, ecology and mathematics (using computer models) to introduce students to the fascinating world of mixotrophs. We will be running public engagement events, building and updating Wikipedia pages, and approaching publishers and authors of school and university text books to get the message across.

Website: [www.mixotroph.org](http://www.mixotroph.org) Email: [mixotroph@swansea.ac.uk](mailto:mixotroph@swansea.ac.uk) Follow us on Twitter @mixotrophs  Like us on Facebook 

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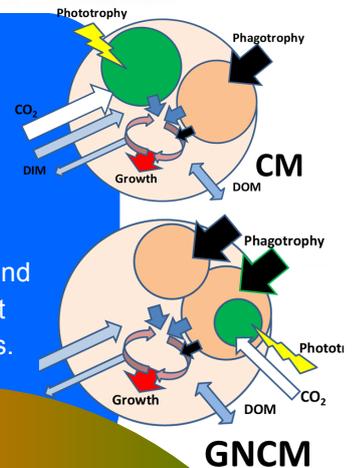
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## Spring 2018 Newsletter: Stakeholders



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### A New Paradigm in Marine Ecology

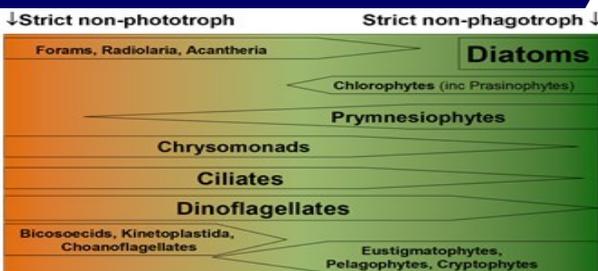
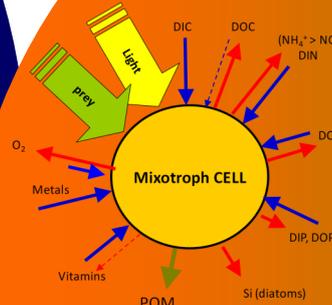
Marine science is now recognising the importance of a group of organisms that we have hitherto been viewing in an incomplete fashion. These are the mixotrophic protist plankton, organisms that have traditionally been grouped into phytoplankton or microzooplankton. Many mixotrophs are benign and important components of the marine food chain supporting fisheries. Others are responsible for harmful algal blooms (HABs) and ecosystem disruptive algal blooms (EDABs) that develop in consequence of eutrophication and other events that may also be affected by climate change.

### So What is New?

In a nutshell, we have only been studying half the physiology of the plankton organisms.

**Most eukaryote phytoplankton and 50% of microzooplankton are mixotrophic!**

Viewing eutrophication for plankton as primarily associated with inorganic nutrients is thus incorrect. Further, many mixotrophs have dependencies upon prior growth of other (prey) species: we need a more holistic understanding of plankton ecology. Information on species composition provided by molecular biology, and our revised understanding of ecophysiology needs to be incorporated into enhanced simulation models for coastal-zone and seas management. It is these models that typically form the lynchpin in decision-making and yet these simulations currently do not recognise the role of mixotrophy at all.



### What is Team MixITiN Doing?

MixITiN is undertaking a series of interconnected laboratory, field and *in silico* research projects, combining the expertise of 11 university and institutes covering the breadth of pure and applied science in this arena. We will be working to update our understanding of the problem, and the tools to better simulate the reality that we now appreciate is there. We are involving the full spectrum of applied science from small marine consultancy to global-players in marine management. And, we are at the same time training the next generation of marine scientists to continue that effort when MixITiN finishes. We would welcome the opportunity to engage with you on our journey.

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