

## Marine bioprospecting

From the open ocean to specialised laboratory procedures, Plymouth Marine Laboratory (PML) has the expertise and experience to support the development of new marine bio-products for a range of industries; pharmaceutical, cosmetic, healthcare, industrial chemicals and biofuels. As one of the worlds leading marine research organisations, PML has the skills and resources to be able to offer access to a wide range of bio-prospecting opportunities.

### Organism collection, identification and selection

Collecting and identifying samples of organisms from the world's oceans predates our scientific research. PML's Western Channel Observatory is one of the longest time series of marine ecological data ever established. The collection of organisms from here, and PML's annual surveys of the whole length of the Atlantic Ocean and other locations worldwide provide our basic raw materials.



Using a combination of classical and state-of-the-art methodologies PML can collect, separate, identify and select organisms for their specific desirable

characteristics from international waters globally. In this way PML ensures the selection of indigenous organisms suitable for projects in international locations.

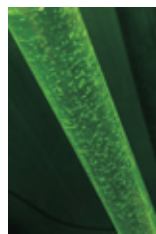
Having collected the organisms, the ability to culture, separate and purify the various strains and maintain a live collection is again fundamental to our science. PML currently maintains a unique collection of over 4,000 marine bacteria as well as smaller collections of viruses and micro-algae.



Together with PML's research partners the Marine Biological Association (MBA), practices have been developed to curate marine algae with current research focussing on cryogenic preservation techniques.

PML Applications Ltd would be pleased to provide culture curation and improvement services.

### Engineering production of cultures



PML has a strong track record of photobioreactor engineering supporting both laboratory scale and commercial production of cultures.

Scientists at PML include the co-inventor of a leading industry standard algae production system.

PML scientists are currently producing algae on a commercial scale with industry partners such as the Boots Group, using waste gases from a power plant.

New photobioreactors are being developed and collaborators include a range of partners from leading specialist chemical engineering and design consultants to early stage inventors. It is clear that there is no ubiquitous photobioreactor solution, rather, PML works to develop the right equipment for the specific organism and environmental conditions.

The ability to provide both the right growing conditions and the right stress conditions so that the organism produces the desired characteristics is a core skill. PML has a successful track record of rapid assessment to identify optimum conditions at both lab and pilot scale. Recent successes include:

- Partnering in two major bio-fuels initiatives to identify, produce and modify lipid producing algae.
- A recently completed industry partnership to investigate high value products from algae.

### Genetic analysis and manipulation

Its expertise in genomics allows PML to identify, map and modify gene sequences to improve an organism's selected performance. These skills are generally used to support our in-house molecular biological research and typical techniques include:

- Transcriptomics
- Micro-arrays
- Expressing genes
- Strain engineering

In recent projects whole bacterial genomes have been sequenced and key genes identified, cloned, and where appropriate over expressed to produce the target enzyme.

PML has a number of longstanding relationships with specialist genomics service providers and would be pleased to discuss the range of options available.

## Screening capability

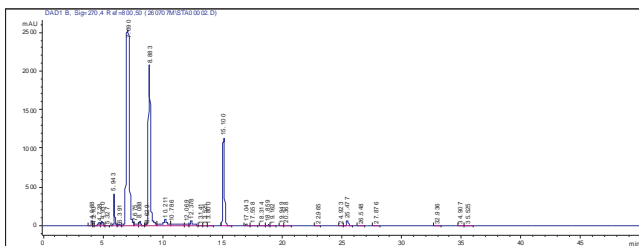
The testing and screening of bioactivity is an iterative process, linked with the organism selection and culture process. PML is currently screening for specific activities:

- Antibacterial
- Protein inhibitor
- Surfactants
- Antioxidant
- Selected enzymes
- Novel inhibitors

Typical techniques include whole-cell screening as well as specific enzyme and related assays. Recent successful projects include:

- Isolation of novel marine viruses for an industrial partner.
- The identification and characterisation of specific enzymes for applications in industrial biotechnology.

With its associates PML can tailor its screening capabilities to your specific needs including characterisation of activities e.g. substrate profiling.

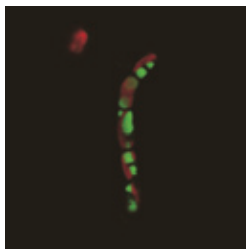


HPLC analysis of extract sample

The extraction and concentration of active agents follows a step-wise approach. Preliminary crude extracts are produced (small molecules and proteins) and tested for bioactivity. Bioassay-guided purification is then used to isolate pure single molecules. These in turn provide inputs to health care products (e.g. antioxidants, vitamins) early-stage drug discovery and biocatalysis. A recent example involves the isolation and structural analysis of a lytic agent with applications in large-scale bioprocessing.

PML can purify compounds in-house sufficient to identify compound structures.

## Bioprocessing



Novel microalgae isolated from the Western Channel

PML is experienced in a range of biological harvesting methods from filtering techniques through chemical auto-flocculation to the latest centrifuge technologies.

Efficient cell lysis to extract the 'product' is critical in the process and PML is currently developing research in the use of novel, natural lytic agents and continuous liquid/liquid separation processes

that overcomes the constraints of batch productions. These processes will unlock a wide range of applications currently limited by existing technologies.

## About PML Applications Ltd



PML Applications Ltd was created in 2002 by PML to help deliver its knowledge transfer most effectively.

The organization has a range of customers at the R&D and commercialisation stages, covering a broad spectrum such as Research Councils, consultancies, healthcare and pharmaceutical companies, large corporations, government, environmental managers/bodies and the shipping industry.

It is concerned with the development and application of outputs from science and technology carried out within PML as well as developing its own more applied science and business opportunities.

**For further information and/or to discuss your requirements please contact:**

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