



marine biodiscovery,
biotechnology and
aquaculture:

the blue farm

Biomolecular diversity and partnered biodiscovery (WA Institute of Medical Research and AIMS)

- Identifying valuable compounds from marine biodiversity
- Enhancing marine, microbial, chemical and biomedical sciences
- Using marine samples in screening programs targeting breast cancer
- Producing marine natural products, including anti-cancer agents
- Reviewing industry interests for economic sustainable generation of biomaterials and bioproducts derived from marine organisms (nanomaterials, collagen, chitin, biofuels)

Microbial quorum sensing (UWA)

- Analysing marine and estuarine bacteria for their 'quorum quenching' compounds which may be able to be used to control bacterial infections

Researchers have:

- applied for regulatory approval to process biological material and make it available for biodiscovery research; and
- liaised with State and Federal Government organisations to develop biotechnology legislation.

Research and investigations aim to:

- promote the establishment of a WA bioresources library to store marine biodiversity extracts. Curated professionally, the extracts should be able to be used by State, national and international organisations; and
- encourage the introduction of WA biotechnology legislation to improve biodiscovery research investment and exploration prospects.

The Western Australian Marine Science Institution (WAMSI) is a consortium of 15 State and Commonwealth government, academic and private partners undertaking multi-disciplinary marine research. It is Australia's first collaborative research facility dedicated to understanding the marine environment and resources, and to contributing to policy and management decisions on the future use of oceans.

WA State Government provided a \$21 million five-year investment with a \$60 million co-investment by member partners. WAMSI's strategic projects address climate change, its likely impacts, how marine and coastal ecosystems function and how science can be used to understand the impacts of human activity in the marine

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Images courtesy of the Western Australian Museum (C.Bryce).



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An unprecedented focus on the Western Australian marine estate for both conservation, medical research and the development of the oil and gas industry is providing an unequalled opportunity for the exploration of marine biodiversity.

WA's pristine and biodiverse oceans – the blue farms – have the potential to offer a wealth of raw, genetic materials to develop pharmaceutical and other biotechnology products.

Already the marine biotechnology industry which is growing at 18 per cent a year is benefitting from the scientific evidence being discovered by the WA Marine Science Institution's research partners. The partners are being led by the Department of Fisheries and include The University of Western Australia (UWA), the WA Museum, the Australian Institute of Marine Science (AIMS) and the WA Institute of Medical Research.

Many of WA's marine species are found nowhere else in the world. From the small number of samples collected on WA explorations to date, an extraordinarily high 'hit rate' has been found in medicinal areas.

Research has found species of WA's sponges and sea squirts have some of the world's highest rates of anti-tumour activity while cyanobacteria has been identified as having the potential to develop biofuels. Ingredients from marine filter feeders such as sponges are being used in cosmetics, medicine, sunscreens, anti foulants and industrial enzymes.

Microbes are at the basis of this research: more than a billion micro-organisms live in each litre of seawater and it is known that microbes dominate the abundance, diversity and metabolic activity of the ocean.

They comprise 98 per cent of the biomass of the world's oceans, supply more than half the world's oxygen, are the major processors of the world's greenhouse gases and have the potential to mitigate the effects of climate change.

They are the cause of diseases that are suspected to be spreading because of global warming yet paradoxically, the compounds they produce are potential cancer cures and solutions for combating human disease.

Scientists are only just beginning to understand the important environmental roles that microbes play in marine systems.

The WAMSI collaborative research projects will provide industry with biological resources able to be used well into the future.

Research projects

The establishment of a WA Marine Bioresources Library (WA Museum and AIMS)

- Presenting a draft business case for the establishment of a self-funding WA Biodiversity Repository for Discovery
- Creating an inventory of marine frozen samples to constitute the inaugural WA Marine Bioresources Library
- Creating georeferenced biodiversity database
- Delivering samples to two WAMSI screening partners
- Providing a central point for marine specimens curated elsewhere (WA Museum, UWA, Department of Fisheries, Department of Environment and Conservation, AIMS and CSIRO)
- Collating AIMS and WAMSI specimens into WA Museum's repository