



Biomanufacture Natural Products on Demand

Agriculture & Aquaculture

Challenge

Escalating population growth has continued to place pressure on world food supply. This has driven ever more intensive processes, at the same time as consumer awareness is focusing on more environmentally friendly pesticides and insecticides and more nutritious and better tasting produce.

Bondi's Solution

Thanks to advanced bioengineering, it is now possible to fulfil many of these demands through biomanufacturing. Bondi Bio is a **Solar Biomanufacturing** business. We bioengineer photosynthetic cyanobacteria to produce high-value target compounds from light, CO₂ and water. Our production methods can substantially reduce environmental impacts by requiring less arable land and water, to quickly and reliably produce alternative pesticides, fungicides and insecticides as well as providing an alternative source of feed additives and supplements to support high-quality and sustainable agriculture & aquaculture industries.



Example Natural Products

Bondi's platform technology is designed to maximise our ability to utilize advanced bioengineering methods to create key compounds. Using a modular and structured design process, we optimise our base "chassis" strains to suit the requirements of your target compound.

With a focus on the broad and diverse compound classes of Terpenes and Carotenoids, Bondi has access to over 70,000 compounds including many expensive and difficult to source feed additives and supplements as well as exciting possibilities for a new generation of pesticides and insecticides.

Compared to petrochemically-derived synthetics, bioengineering allows the manufacture of stereospecific compounds for improved efficiency in these agriculture and aquaculture products.

About Bondi

Bondi is a Sydney-based solar bioengineering company focused on producing traditionally plant-derived Natural Products, at low cost from light and carbon dioxide and without the dependence on energy-crops or arable land.

Our target-agnostic platform combines the elegant evolutionary solutions of plants with the latest advances in biotechnology to design robust, reliable and sustainable cyanobacteria able to produce targeted compounds for a broad range of markets.

Our photosynthetic organisms are sustainable and beneficial to the environment. They fix carbon, do not require arable land and can be engineered to grow in sea, waste or polluted water sources.

They also offer a means to biomanufacture rare/complex Natural Products where existing chemical or biological solutions are inefficient or prohibitively expensive.

Innovate with Us

Bondi Bio is at the forefront of biomanufacturing and is working with industry leaders to create Natural Products for the future. If you would like to progress discussions with us, please contact us at partners@bondi.bio or fill in the form at <https://bondi.bio/partnerships>.

Existing commercial Natural Products include:

Feed additives	Astaxanthin Citranaxanthin	Canthaxanthin	Retinol	Food orange 7
Agriculture supplements	Carvone	Pyrethrin		

Potential new compound markets

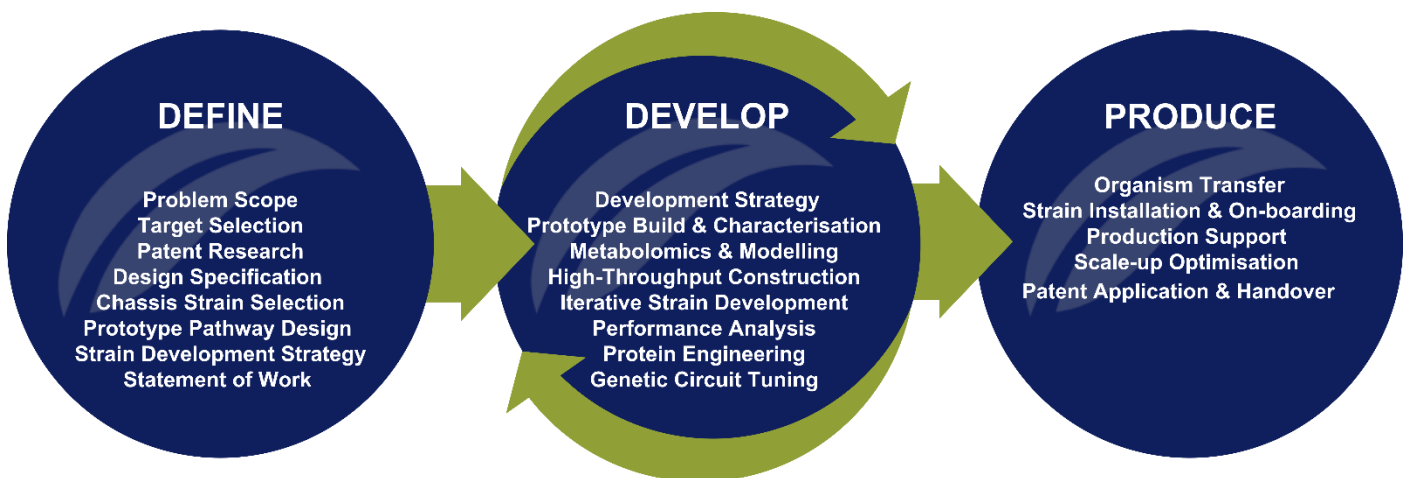
Beyond existing agriculture & aquaculture products, Terpenes offer a powerful alternative to traditional pesticides, fungicides and insecticides. While still a developing field, Terpenes have been demonstrated to act as natural herbivore defence in plants. With ongoing advances in this field and increased legal and consumer-driven limitations on the use of existing solutions, Bondi's platform is ideally placed to facilitate commercial production of these compounds.

Our Approach

Science has revealed many of our planet's genetic secrets. Coupled with the huge advances in the writing and manipulation of DNA, it is now possible to use the power of millions of years of evolutionary optimisation to integrate production pathways from threatened species, or where the production levels are limited, to manufacture them in fast-growing and target-optimised cyanobacteria biofactories.

Our proprietary cyanobacteria strains build on the inherent benefits of cyanobacteria to produce Natural Products using biofactories that deliver:

- high growth-rate and photosynthetic efficiency relative to other photosynthetic platforms.
- global production with elevated robustness allowing them to cope and thrive in most conditions.
- existing metabolic pathways producing key terpene precursors, e.g. methylerythritol 4-phosphate (MEP) pathway.
- genetic tractability, allowing relatively straightforward genetic manipulation.
- native thylakoid membranes, providing the perfect environment to express complex plant proteins, e.g. the cytochrome P450 family of enzymes that represents an attractive Synthetic Biology platform for terpene biosynthesis.



Define - At Bondi, we work closely with you to define the problem space you have and build a design specification that meets your requirements. We consider your specific scenario and use that to determine the most appropriate solution for you. We take into account a wide range of parameters including target compound, growth environment, scale, use-case, extraction process and many more. We then generate a design that is the most appropriate solution for your specific circumstances and define a strategy and accompanying Statement-of-Work for the next phases of the process.

Develop - Having defined our design specification that addresses your problem space, we first prototype a Proof-of-concept solution, before going through an iterative strain development cycle, where we repeatedly Engineer and Test improved strains:

Engineer - We use our in-house design tools, libraries of genetic parts, and our proprietary high-throughput construction techniques to integrate our DNA designs into our optimised strains at a rate never before seen in cyanobacteria. This allows us to rapidly prototype a large number of variants, using a range of strategies, and to iteratively develop these for performance in our "Test" cycle.

Test - At Bondi, we utilize the latest advanced technology to analyse the performance of our cyanobacteria designs; detailed biochemical characterisation is aided by transcriptomic-, proteomic- and metabolomic-studies. The results of this analysis are then fed back into our computational models and drive future design decisions for continued iterations of strain engineering, until we reach the specifications agreed in the Statement-of-Work.

Produce - Our optimized strains are production platform agnostic allowing you to use the best available solution for your circumstances. Our strains can be engineered for batch or continuous production with both intracellular and extracellular compound accumulation possible. We envisage the use of closed-system flat-panel photobioreactors and can suggest appropriate suppliers but will design to your circumstances, and can assist you every step of the way to your final target compounds.