Biosynthetic and Metabolic Pathway Engineering at Novacta Biosystems

Commercially valuable products can be generated from different microorganism such as Bacteria, Yeasts and algae. These include biofuels, bulk chemicals, natural products, antibiotics, pharmaceutical drugs and healthcare fragrances.

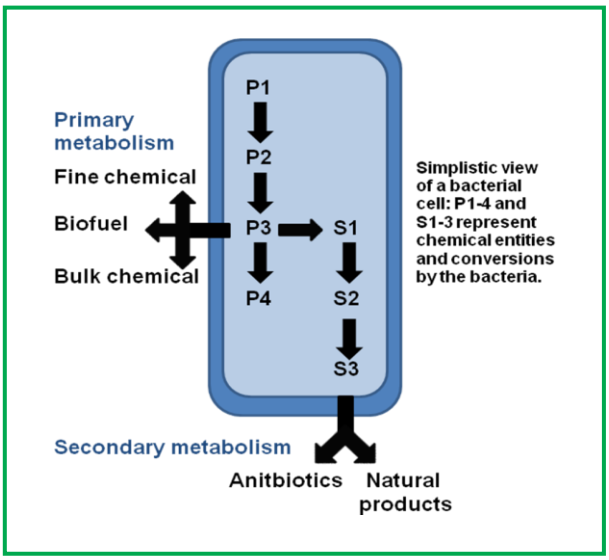
Novacta's expert pathway engineers can help for

- Improving the yield of the products by optimising the *metabolic pathway through* genetic engineering
- Heterologous expression in model organisms
- Optimisation of Biofuel production in bacteria, yeast and algae

Why Novacta Biosystems

Novacta Biosystems has become a world-leader in the pathway engineering of both primary and secondary metabolism in microorganisims - including species that are difficult to engineer, such as **Actinomycetes**, **Thermophiles**, **Bacillus species**, and **Yeasts**. Our approach typically includes:

- Up-regulation of the desired pathway
- Deletion/down-regulation of competing pathways
- Insertion of new genes to manipulate the chemical product
- Mutation of existing genes (to create natural product libraries)
- Subsequent fermentation optimisation



The application of both conventional genetics and molecular biology approaches to metabolic pathway engineering differentiates the Novacta Biosystems team from many other molecular biology teams, whose expertise lies only in the manipulation of model organisms with well-established genetic systems and readily-available suites of vectors.

Who works with Novacta

- Biofuels companies
- White Biotech
- Industrial Biotech
- Pharmaceutical companies
- Generic companies

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Biofuels

Working with TMO Renewables, Novacta Biosystems scientists have developed genetic systems for the challenging manipulation of a thermophilic bacillus and carried out multiple genetic interventions to develop an efficient bioethanol producer.

This resulted in an increase of Bioethanol yield from 20 to 90% and is the first such UK process to be implemented at pilot plant scale.

For further information see:

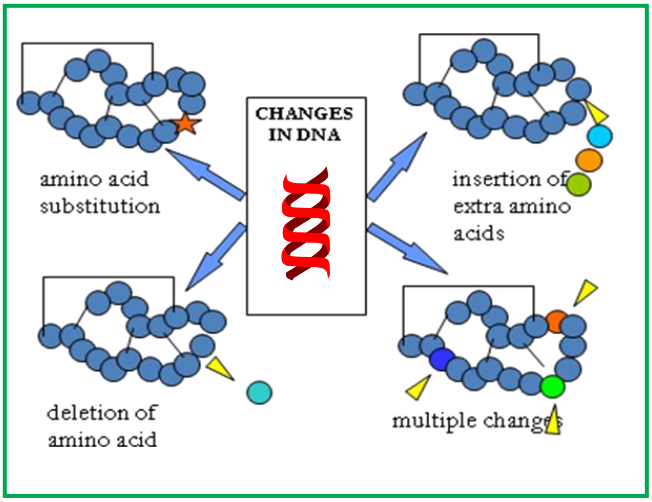
http://www.tmo-group.com/

Pharmaceuticals

Novacta Biosystems' key scientists came from the 'Natural Products and Biotransformation' team of GlaxoSmithKline (GSK). Here and at Novacta they played major roles in the discovery and development of several classes of microbial secondary metabolites including:

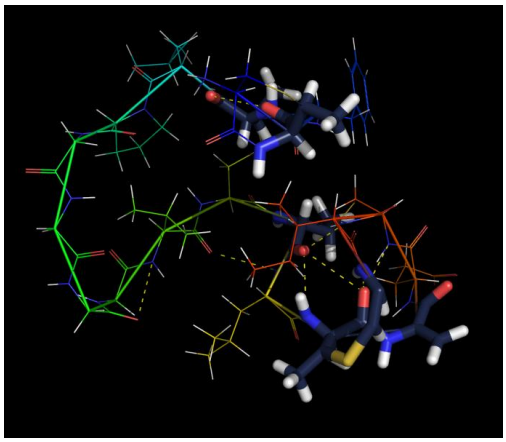
- β-lactams (carbapenems and clavams)
- Polyketides (endectocides and macrolide antibiotics)
- Nucleosides (aristeromycin and nikkomycins)
- Isoprenoids (sordarins).
- Lantibiotics

Example Lantibiotics



In the lantibiotic class new pathways have been cloned and sequenced from *Bacillus* spp. and actinomycetes. The biosynthetic apparatus has been manipulated to carry out what is probably the most exhaustive and systematic modification of a natural product structure by genetic means to date.

This has culminated in the generation of 4 proprietary programmes and the selection of a development candidate for the therapy of Clostridium difficile infections.



Complex structure of a lantibiotic produced by pathway engineering

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