

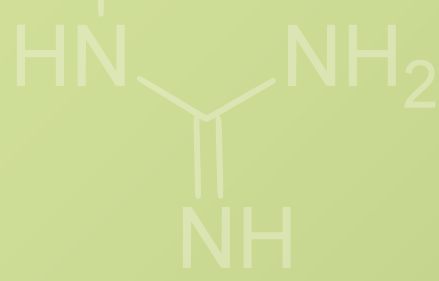


# Natural Products from Cyanobacteria



Cyano Biotech – Managing Cyanobacteria



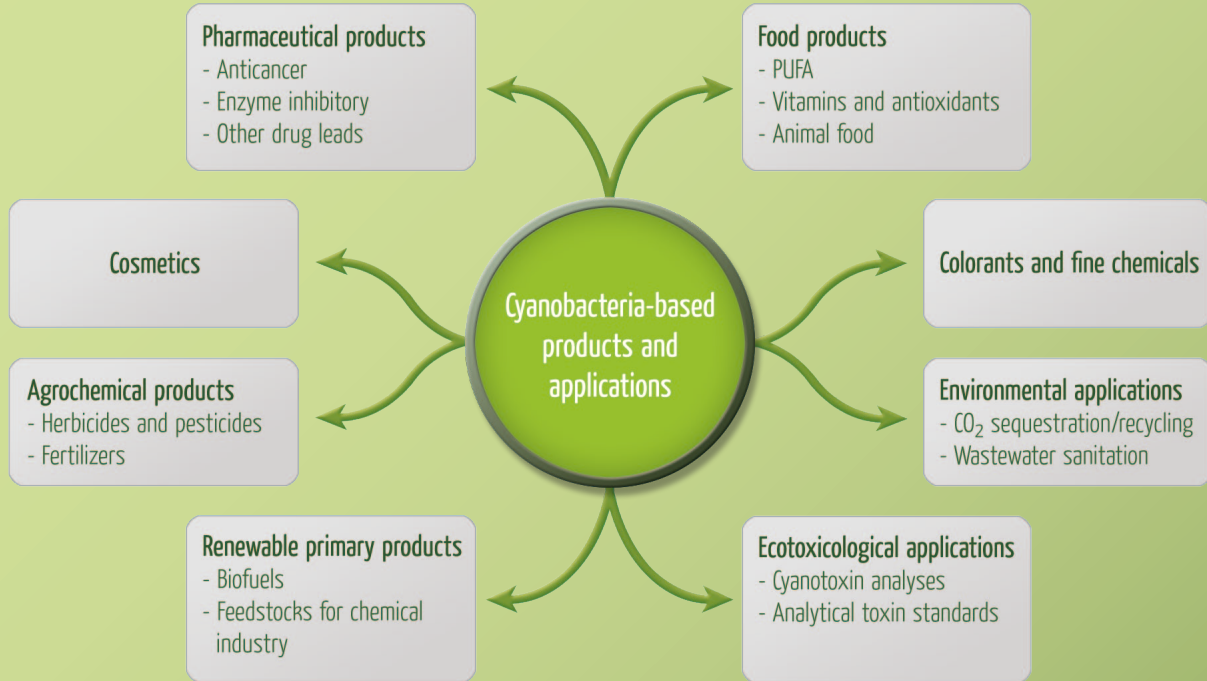


# Company

## Cyano Biotech – Managing Cyanobacteria

Cyano Biotech GmbH is the worldwide leading company in applied R&D on cyanobacteria. The company's business is aligned with the diverse cyanobacteria-based products and applications.

Transferring the know-how gained in almost 30 years of academic research into an innovative biotech company, the exploitation of cyanobacteria is a worldwide unique approach.



**If applied R&D on cyanobacteria - then Cyano Biotech!**

## Drug Discovery

The company's business is focused on the discovery and development of novel lead structures based on cyanobacterial natural products. Using its proprietary strain collection, Cyano Biotech identifies novel leads, optimizes their pharmacological activities by proprietary techniques and finally

generates recombinant microbial producer strains delivering high yields of the target compounds for large scale production. Beside its own drug discovery program, Cyano Biotech collaborates with international pharmaceutical and biotech companies.



# Products and Services

## Biomass, extracts and compound supply

### Strains and Cultivation

- Proprietary cyanobacterial strain collection comprising pre-selected strains belonging to more than 50 genera
- Cultivation from small scale to up to 1000 liters in computer-controlled photobioreactors in laboratory and outdoor environment

### Extraction, Fractionation, Compound Purification

- Crude extracts from biomass and cultivation media
- Extract fractions generated by Solid Phase Extraction (SPE) or Centrifugal Partition Chromatography (CPC)
- Isolation of compounds in high purity (> 95%) by preparative High Performance Liquid Chromatography (HPLC)
- Standard or customer defined ready-to-screen microplates with extracts, extract fractions or pure compounds

### Strain development

- Generation of modified and optimized products (precursor feeding, combinatorial biosynthesis)
- Generation of microbial producer strains for larger scale production of target compounds

### Cyanotoxin analytical standards

- Manufacture and distribution of cyanotoxin analytical standards (e.g. microcystins, nodularin, cylindrospermopsin)

### Analytical services

- Environmental and food analysis (e.g. quantification of cyanobacterial toxins)
- LC-HRMS<sup>D</sup> services of individual substances or complex mixtures (e.g. identification of compounds in extracts or pharmaceutical formulations)
- Fragmentation studies and molecular formula predictions
- Data mining using Cyano Biotech's comprehensive database
- Bioactivity screening (antimicrobial, antioxidant)





# Technologies

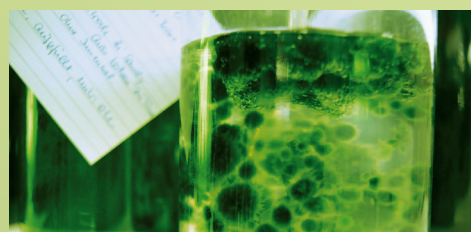
## Isolation

Our technology allows for an efficient isolation of unialgal cultures even from highly complex cyanobacterial blooms. Isolated strains are being classified and cryo-preserved using proprietary procedures.



## Screening

Pre-selected strains enter a screening procedure, employing PCR-based methods as well as HPLC/UV-Vis/ELS/MS analyses of cell and media extracts after cultivation under certain defined conditions.



## Cultivation

Strains are scaled up to culture volumes of up to 1000 liters in the lab and outdoors. For selected strains, cultivation conditions are optimized with respect to natural product spectrum and yield.



## Purification / Fractionation

An extraction and fractionation procedure in combination with our automated CPC, LC/MS, SPE and liquid handling technology yields libraries of pure substances or pre-purified extract fractions from pre-treated cyanobacteria extracts.

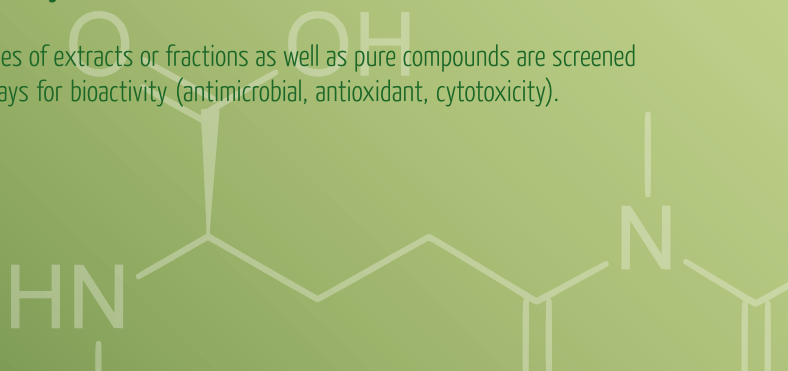
## Analysis / Dereplication

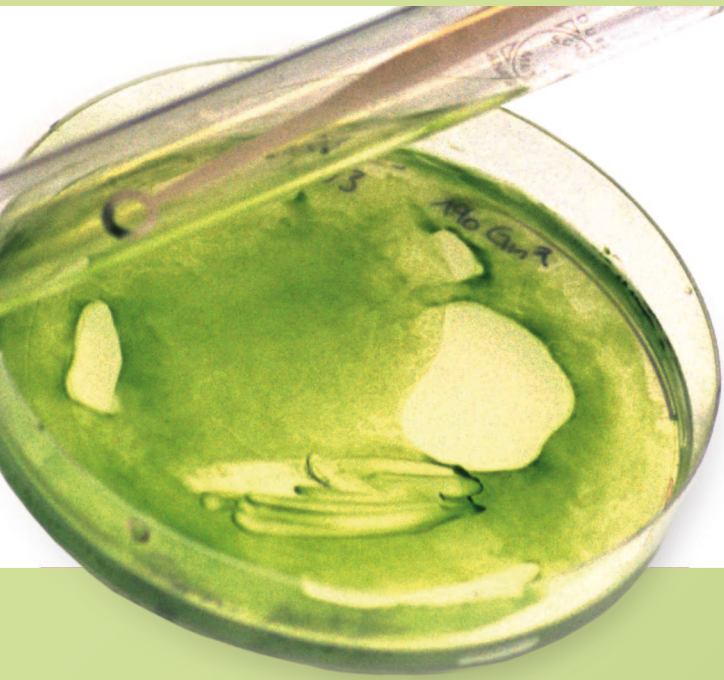
HPLC coupled with high-resolution tandem mass spectrometric detection in conjunction with commercial and in-house databases is used for initial characterization and dereplication of compounds.



## Bioactivity Assays

Our MTP libraries of extracts or fractions as well as pure compounds are screened in various assays for bioactivity (antimicrobial, antioxidant, cytotoxicity).



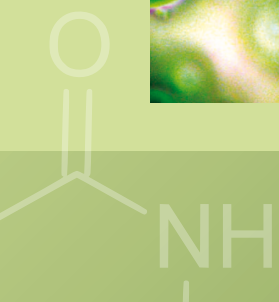
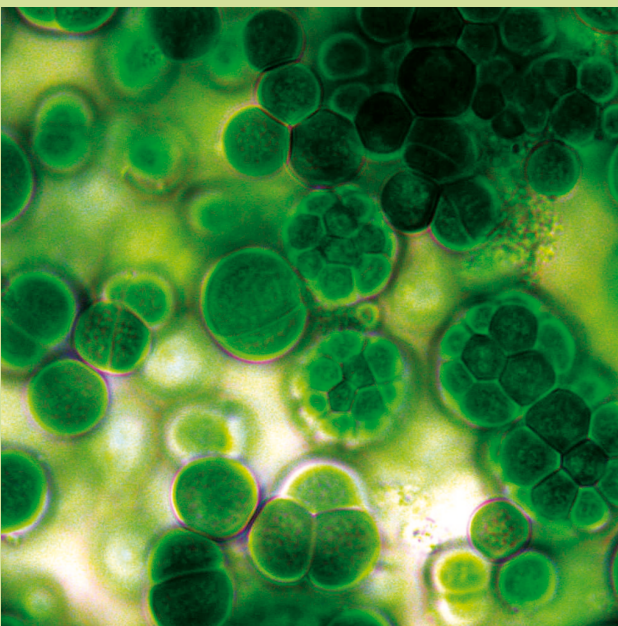


# Cyanobacteria

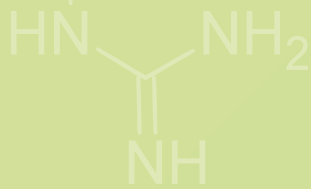
Cyanobacteria (formely known as blue-green algae) belong to the earliest life forms on earth. Their enormous adaptability and vast diversity of species and strains allow them to inhabit almost all ecological niches.

Cyanobacteria synthesise diverse natural products with a broad range of biological activities and represent a novel source of lead structures for the pharmaceutical, chemical, food and cosmetic industry.

The relative disregard of cyanobacteria in the past, as well as the huge diversity of strains and the biological activities of their natural products, make them an attractive source for many industrial products and applications today.







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