Bioactive metabolites of a marine *Calcarisporium* sp.

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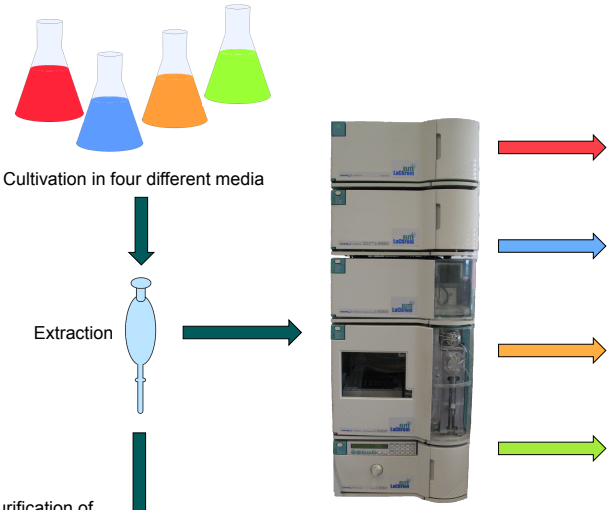
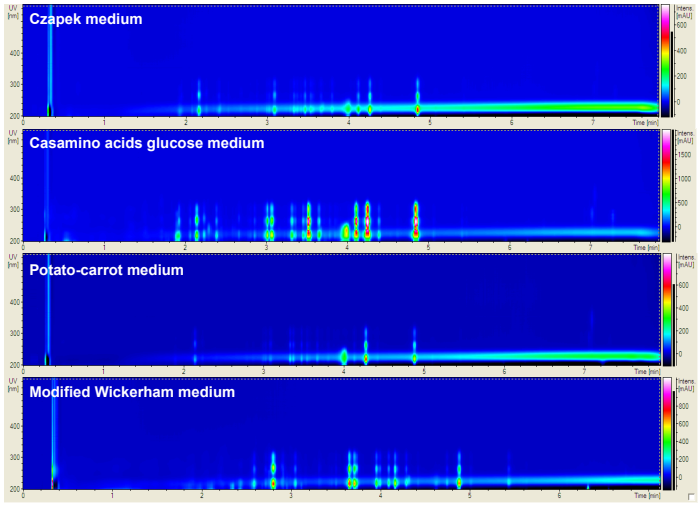
Introduction

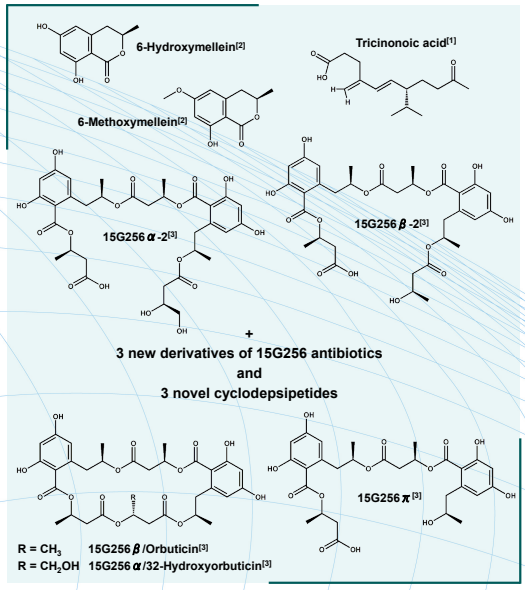
Fungi living in changing environments presumably need a high metabolic versatility in order to survive. As metabolic versatility may also relate to secondary metabolite biosynthesis, fungal strains isolated from the German Wadden Sea were investigated with regard to secondary metabolite production. The focus was put on bioactive compounds with the potential of possible biotechnological application. One of the isoates, KF525, showed exceptionally attractive metabolite profiles within the screening on various media and was selected for detailed investigations.

Morphology of the fungus KF525. From left to right: Colonies on modified Wickerham medium, REM picture of conidiophores, REM picture of conidia.





3D-DAD-chromatograms of HPLC analysis. The fungus' ability to respond to several nutritional stimuli was investigated. The production and concentration of secondary metabolites varied depending on the growth media.



Measurement of bioactivities

Structures of isolated compounds of KF525. Structure elucidation was mainly realised on the basis of one- and two-dimensional NMR spectra. Beside the pictured, known substances, 6 new compounds were identified[6,7].

	Inhibition [%]		
Test strain	**15G256β**	**15G256 π**	**New 15G256 antibiotic**
Bacillus subtilis	100	0	88
Staphylococcus lentus	100	0	44
Staphylococcus epidermidis	100	0	0
Xanthomonas campestris	49	0	76
Propionibacterium acnes	0	72	0

Antibacterial activities of selected compounds. Resazurin-based assays were performed at a compound concentration of 100 µM. Shown is the inhibition of metabolic activity of test strains in relation to untreated cells. Even though the tested 15G256 antibiotics share the same core structure and vary only in small structural changes their respective antibacterial activities differed significantly.

Discussion

The fungus KF525 turned out to be an excellent secondary metabolite producer. A variation of the culture media resulted in diverse metabolite profiles suggesting highly regulated biosynthetic pathways that may respond to environmental stimuli. The fungus produced several 15G256 antibiotics as well as their precursors 6-hydroxymellein and 6-methoxymellein[3]. The 15G256 antibiotics were previously described as antifungal agents and nerve growth factor potentiators[3,4,5]. Here, we detected antibacterial properties that might be of interest for biotechnological applications as antibiotics. In addition, the structurally closely related compounds exhibited different antibacterial activities indicating tight structure-activity relationships.
The isolation of six new compounds showed that it is still worth it to have a closer look at little explored habitats such as the Wadden Sea.

References

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