

- 13:00** **Welcome**  
Dekan Prof. Stephan Sieber  
Apl. Prof. Dr. Wolfgang Eisenreich
- 13:15** **Hans-Fischer-Memory-Award 2019**  
Laudatio by Prof. Dr. Thomas Fässler  
Speech of the awardee Dr. Shigeyoshi Inoue
- 13:45** **Keynote Lecture**  
Prof. Dr. Brad Moore  
*Scripps Institution of Oceanography, USA*  
Connecting genes to chemistry to empower marine drug discovery and development

**14:30** **Coffee-break**

## Topic: Marine Drugs

- 15:00** **Prof. Dr. Peter Proksch**  
*Heinrich-Heine-Universität, Düsseldorf*  
A Tale of Big and Small Sponges and Fungi
- 15:30** **Prof. Dr. Jörn Piel**  
*ETH Zürich*  
Identifying and Accessing Bioactive Marine Natural Products from Uncultivated Bacteria
- 16:00** **Prof. Dr. Tobias Gulder**  
*Technische Universität, Dresden*  
Exploring the Marine Microbial Enzymatic Toolbox for Natural Product Synthesis in and ex vivo
- 16:30** **Prof. Dr. Thomas Lindel**  
*Technische Universität, Braunschweig*  
Great problems with small natural products
- 17:00** **Social Event (Beer and Brezels)**
- 18:30** **Dinner (for Invited Guests)**

**Hans-Fischer-Gesellschaft e.V.**  
<http://Hans-Fischer-Gesellschaft.de/>

**Technische Universität München**  
Department of Chemistry  
Chair of Biochemistry  
Prof. Dr. Michael Groll

**Venue:**  
TUM Department of Chemistry  
Hans-Fischer Auditorium  
Lichtenbergstr. 4  
85747 Garching

**Information:**  
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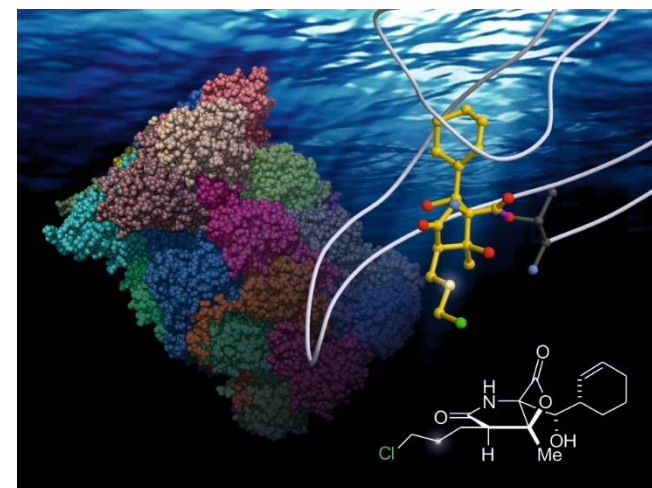


**26<sup>th</sup> Hans-Fischer-Symposium**

**4<sup>th</sup> November 2019**

**Topic:**

**Marine Drugs**



## Brad Moore

### Connecting genes to chemistry to empower marine drug discovery and development

Marine organisms continue to amaze us for their capacity to produce chemically unique and biologically important small molecules. Marine natural products mediate key interactions between ocean-dwelling organisms, have improved human health as medicines, and helped illuminate many foundational cellular processes germane to life. Recent advances in genomics and metabolomics have ushered in a new era in natural products research linking genes to molecules. Synthetic biology programs now offer streamlined approaches to the discovery, production, and design of gene-encoded small molecules. This presentation will highlight recent progress in the genomics-guided discovery and production of marine small molecules, from the oncology agent salinosporamide to the neurotoxin domoic acid.

## Peter Proksch

### A Tale of Big and Small Sponges and Fungi

Marine invertebrates are the most important sources of drugs that are either in clinical use or in late stages of clinical trials. Among the various marine invertebrates, sponges are prolific producers of structurally diverse natural products that often exhibit pronounced biological activities. They harbor a multitude of microorganisms, mainly bacteria. Fungi, are also frequently isolated from sponge tissue. Even though these fungi usually taxonomically resemble strains that are already known from the terrestrial environment, their natural products are often unique. Examples of bioactive natural products from sponge-derived fungi such as new brominated azaphilones will be presented. In axenic fermentation, only a part of the biosynthetic genes that are harbored by fungi may be transcribed. Many biosynthetic genes remain silent and are not expressed, thereby seriously limiting the chemical diversity of microbial compounds. Co-cultivation of different microorganisms often leads to cryptic compounds. For example, *Chaetomium* sp. accumulates the first members of a new alkaloid class, chaetolines A and B, which feature a pyrano[3,2-f]isoquinoline core structure. These compounds are even expressed in the presence of autoclaved *Pseudomonas aeruginosa* but not under axenic conditions. This talk will focus on two examples of bioactive peptides from marine sponges.

## Jörn Piel

### Identifying and Accessing Bio-active Marine Natural Products from Uncultivated Bacteria

Most of bacterial life is functionally unexplored. This includes numerous deep-branching taxa that lack cultivated representatives and live in diverse habitats. Our lab uses genomic, metagenomic, and single-cell-based mining strategies to investigate whether this massive taxonomic and ecological diversity is a resource of metabolic novelty. We and collaborators have previously reported 'Entotheonella' symbionts of marine sponges as the first chemically "talented" producer taxon from microbial dark matter. These organisms belong to the new candidate phylum 'Tectomicrobia' and most of their biosynthetic pathways have no counterparts in classical bacterial producer groups, such as actinomycetes, thus offering major pharmaceutical potential. The talk will present recent insights into the chemistry of these and other elusive producers from uncultivated biomes. Using the highly unusual polytheonamides as an example, opportunities and challenges will be addressed of accessing non-canonical natural products from uncultivated organisms that are only distantly related to available expression hosts.

## Tobias Gulder

### Exploring the Marine Microbial Enzymatic Toolbox for Natural Product Synthesis in and ex vivo

Microbial natural products serve as one of the main sources of novel chemical scaffolds for biomedical applications. Many of these compounds have highly complex molecular architectures that are very difficult to assemble by current synthetic methodology. We are interested in understanding the biosynthetic transformations utilized by Nature to stitch together such structurally and functionally exciting small molecules. By combining modern methods of Synthetic Biology, Molecular Biology and Biochemistry, we aim for a detailed mechanistic understanding of the underlying enzymatic processes. The resulting knowledge facilitates the incorporation of enzyme-catalyzed reactions in streamlined natural product total syntheses. Within this talk, our recent findings on the biosynthesis of potent marine cyanobacterial phytotoxins and on the chemo-enzymatic assembly of an entire class of complex fungal polyketides will be presented.

## Thomas Lindel

### Great problems with small natural products

Hans Fischer pioneered the chemistry of oligopyrroles and porphyrins. Thus, this lecture may start with the pyrrole-imidazole alkaloids, structurally diverse natural products isolated from marine sponges. One aspect will be the oxidation of the pyrrole carboxamide unit to hydroxypyrrrolones, present in oxocyclostylidol. Research on the chemistry of other 2-aminoimidazole derivatives has led us to the discovery of 2-azidobenzimidazole derivatives as chemoselective photolabelling agents. Coarctate ring opening gives access to electrophilic diazaxylene intermediates. An ideal case for the application of that functionality could be the marine peptide hemiasterlin, for which a new enantioselective total synthesis will be presented. The tetramethylated tryptophan unit of hemiasterlin was constructed via organocatalyzed  $\alpha$ -hydrazination. Our work on natural products from marine bryozoans led us to the synthesis of indole derivatives prenylated at the benzene section that can dimerize to the raputindoles. A gold-catalyzed cyclopentannulation was key to the first total synthesis of raputindole A. If there is time, recent work towards the synthesis of salarin C from the marine sponge *Fascaplysinopsis* sp. will be presented, including Wasserman rearrangements of macrocyclic oxazole derivatives to trisacylamines.