Another research focus is dealing with sponge-associated microorganisms and possible interactions between these microorganisms and the sponge. To a great part, bacteria associated with the sponge \textit{Halichondria panicea} are able to produce antibiotically active substances and the analysis of actinobacterial isolates from this sponge demonstrated their ability to produce a great number of known bioactive substances but also revealed many so far not identified possibly new compounds. Quite interestingly there are multiple interactions between these bacteria based on their excreted secondary metabolites, though these interactions are poorly understood. Interestingly, low concentrations of the antibiotic bacitracin, which is produced by a \textit{Bacillus} species, stimulated the production of new biological active substances in a \textit{Streptomyces} strain isolated from the sponge (Mitova et al., 2008). These substances, different streptophenazines, in turn inhibited the growth of various \textit{Bacillus} strains. Representatives of both genera, \textit{Streptomyces} and \textit{Bacillus}, co-occur in the bacterial communities of \textit{Halichondria panicea} and therefore the findings in the laboratory may very well be of relevance in the environment. These few examples demonstrate the importance of interspecies interactions in the microbial communities associated with sponges and...
to produce biological active substances. One of the most promising applications of such secondary metabolites from marine microorganisms is their use as drugs in the treatment of human diseases. Because there is a strong need for the detection of new drugs, e.g. for the treatment of infectious, cancer, inflammation or metabolic diseases such as diabetes, research on natural products as performed at the KiWiZ is highly demanded. In particular a project on the establishment of a substance library of marine natural products is of great significance, because it is supposed to meet the urgent demand for new chemical structures for drug development. The KiWiZ is well established for this research: it uses a great collection of biologically active strains of marine bacteria and marine fungi derived from different marine habitats, has profound technical equipment for microbiological and chemical analyses, uses a number of established bioassays for activity measurements, and has an engaged interdisciplinary team for laboratory work and networking with local, national and international partners. Interesting substances are promoted for applications in cosmetics, plant protection and pharmacy and the application of most promising candidates is protected by patents. Patent protection was achieved for cyclodepsipeptides produced by a sponge-associated fungus Scopulariopsis brevicaulis (Imhoff et al., 2008, 2009). Recently, also antitumoral drug candidates, new benzanthrins from a sponge-associated Streptomyces strain, were patented (Schneemann et al., 2010).

We are therefore convinced, that small biological active molecules from marine microorganisms provide great perspectives both for in depth ecological studies and for biotechnological applications.

References


