Abstract thesis

The isolation and characterization of bioactive substances from medicinal plants and endophytes is done using chromatographic and spectroscopic methods.

The polar extracts of *Acacia albida* and *Albizia chevalieri* species (Mimosaceae), and culture filtrates of endophytic fungi of *Xylaria* sp. are investigated. The dissertation consists of the following three parts:

*Triterpene saponins from Acacia albida (Mimosaceae)*

Chemical investigation of the roots of *A. albida* resulted in the isolation of seven new bidesmosidic triterpenoid saponins named albidosides A – G. Their structures were elucidated using 1D and 2D NMR spectroscopy and mass spectrometry and determined to be bidesmosides of oleanolic acid and 16α-hydroxyoleanolic acid (echinocystic acid). The isolated compounds were assayed for their cytotoxicity against HeLa and HL60 cells using MTT method and microscopic observation. Albidosides E and F showed cytotoxicity against the cell lines studied and induced cytolytic phenotype immediately through membrane damaging effects. Although some saponins showed apoptotic cell death, albidosides E and F did not form apoptotic bodies.

A further detailed investigation of the barks of *Acacia albida* resulted in the isolation of the two additional triterpene saponins named albidosides H and I. These compounds were evaluated for their cytotoxicity against two human cancer cells, HeLa and HL60. Albidoside H exhibited strong cytotoxic effect (IC\textsubscript{50} 12.7 μM on HL60 and 20.8 μM on HeLa) while albidoside I exhibited weak cytotoxicity.

*Two new 5-deoxyflavan-3,4-diol glucosides from the roots of Albizia chevalieri (Mimosaceae)*

Phytochemical investigation of the roots of *Albizia chevalieri* led to the isolation of two new 5-deoxyflavan-3,4-diol glucosides, chevalieriflavanosides A and B. Their structures were
established by 2D NMR techniques, UV, IR, CD, and mass spectrometry. These compounds were screened for their cytotoxicity against HL60 cells. The antibacterial activities of the new compounds also were evaluated against *Pseudomonas aeruginosa* and *Staphylococcus aureus* using the agar diffusion test. However, the tested compounds displayed no significant cytotoxic activity towards HL60 cells at the concentration of 100 µM, but they exhibited weak antibacterial activity at 100 µg/disk.

**Metabolites from endophytic fungi of Xylaria sp. (Xylariaceae)**

The fungal strain *Xylaria* sp. V-27 was isolated from a dead branch collected in Yamagata, Japan. This strain was then cultured on the steamed unpolished rice medium for four weeks. After cultivation the organic extract was subjected to silica gel and octadecyl silica gel (ODS) column chromatography to afford a new eremophilane sesquiterpene 13,13-dimethoxyintegric acid, together with known compound integric acid as the most abundant constituent of the mycelial extract. The structure of the new compound was established by means of spectroscopic analyses. The isolated compounds indicated growth restoring activity against the mutant yeast strain [*Saccharomyces cerevisiae (zds1Δ erg3Δ pdr1Δ pdr3Δ)*] and inhibited degranulation of rat basophilic leukemia RBL-2H3 cells stimulated by IgE+DNP-BSA, Thapsigargin and A23187, respectively.

From endophytic fungus *Xylaria curta*, a new bicyclic lactone was isolated along with two known metabolites, myrotheciumone A and 4-oxo-4H-pyron-3-acetic acid from the ethyl acetate extract. The structures of these compounds were elucidated on the basis of spectroscopic methods (UV, IR, HRESITOFMS, 1D and 2D NMR). The novel lactone isolated from *X. curta* was found to be another rare 5/5 rings-fusion system in a naturally occurring compound. This compound showed moderate antibacterial activity.

**Keywords:** *Acacia* sp., triterpene saponins, cytotoxicity, *Xylaria* sp., eremophilane, Ca$^{2+}$-signaling, degranulation, phytotoxicity.

**Photos**

- Sampling tour at foot of Mt. Gassan
- Sampling tour in the Shonai beach