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## Antifouling potentials of marine-derived fungi and their secondary metabolites

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It is urgent to find effective and environmentally friendly antifoulants for marine industries. Marine derived microbial secondary metabolites are promising potential sources of nontoxic antifouling agents. Over the past seven years, we have focused on the investigation of antifouling potentials of fungal isolates from deep sea sediments and coral samples of the South China Sea and have obtained over 40 antifouling compounds from marine-derived fungi. These compounds mainly included alkaloids, butyrolactones, polyketides and fatty acids. The antifouling activity was primarily evaluated by antibacterial activity against larval settlement of bryozoan *Bugula neritina* and *Balanus amphitrite* and then tested in field trial. Four of the antifouling natural products showed significant antifouling activity in field trial in different seasons. The potentials of these antifouling natural products as non-toxic antifouling agents are under further evaluation.

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## Quality of drinking water in Mafikeng, South Africa

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The quality of water, whether used for drinking, domestic purposes, food production or recreational purposes has an important impact on health. Drinking water can become contaminated by the products and materials with which it comes into contact. Bacteria, inorganic, organic and water soluble radioactive substances are considered as the major water pollutants contributing to the deterioration of water quality and responsible for various public health problems. Mafikeng, the capital of the North West Province, receives water from two sources, namely the Molopo-eye and the Modimola dam. Once treated, the potable water is mixed and supplied to the city via distribution systems. Around the Molopo-eye there is a rural community that uses septic tanks and the community also uses this water for recreational purposes. The Modimola dam drinking abstraction site is down-stream from the domestic wastewater treatment plant which receives treated effluent. The health risk-associated with this practice have long been recognized. This study was designed to assess the quality of drinking water in Mafikeng by combining physicochemical and bacterial analysis and also determine whether the water from these two sources has an impact on the mixed water quality. Physicochemical parameters [pH, temperature, total dissolved solids (TDS)] were monitored at three drinking water sites (taps) three times a week using a multi-meter. Bacteriological quality [fecal coliforms (FC), total coliforms (TC), heterotrophic plate count bacteria (HPC) and *Peudomonas* spp.] was monitored weekly for four months using spread plate counts of serial dilutions or membrane filtration and growth on selective media. The results revealed that the physicochemical quality of the water was generally acceptable. The pH ranged from 5.7±0.18 to 8.6±0.14, the temperature ranged from 18.3±0.69 to 25.1±0.69° C and the TDS ranged from 159.9±22.44 to 364.4±12.44 mg/l. These values are within the target water quality range for drinking water as prescribed by 'WHO', 'DWA' and 'SANS 241'. What was of concern is the microbial quality of the water. Fecal coliforms (FC), total coliforms (TC), heterotrophic bacteria and Pseudomonas spp., were present in some of the treated water samples. Antibiotic susceptibility of these isolates were tested against 11 antibiotics of clinical interest using Kirby-Bauer disk diffusion method and the multiple antibiotic resistance (MAR) patterns were compiled. The most prevalent antibiotic resistance phenotype observed was KF-AP-C-E-OT-TM-A. All isolates from all samples were susceptible to ciprofloxacin and streptomycin. On the contrary all organisms tested were resistant to erythromycin (100%) trimethoprim and amoxycillin. The highest prevalence of antibiotic resistant isolates was observed in Modimola Dam and Molopo-eye. Virulence gene determinants for the confirmed Pseudomonas species were detected by amplifying the exoA, exoS and exoT genes. The isolates were found to harbor virulence gene determinants indicating that they have the potential to cause diseases in humans. The most significant finding of this study is that all drinking water samples were positive for HPC and virulent Pseudomonas spp. (>100/100 ml). Pseudomonas spp., are waterborne opportunistic pathogens which may have impacts on human health, especially in immunocompromised populations; also that when one considers the TDS, it demonstrates that water from the Modimola dam has an impact on the quality of the mixed water.

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