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Selective bio-analytical methods for specific identification and detection of toxic *Microcystis* species and Microcystins in water

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Abstract

The aim of this study was to investigate the toxigenicity of *Microcystis* spp from the water environment using a multi-disciplinary approach involving molecular-based methods for early detection of toxigenic species, chromatographic separation and organic synthesis of polymers for selective extraction, structural characterization and quantification of microcystins. The occurrence and potential for production of MCs from *Microcystis* spp were determined using Polymerase Chain Reaction (PCR) method after DNA extraction. Purified DNA extracts from algal/water samples were confirmed to be of cyanobacterial origin by PCR amplification of cyanobacterial specific 16S-rRNA gene and separated by agarose gel electrophoresis and products visualized after ethidium bromide staining. A product size pertaining to 16SrRNA gene PCR product was 500 bp based on the PCR primer pair used. The investigated DNA samples showed the presence of six microcystin synthetase (*mcy*) genes, namely *mcy*A, -B, -C, -D, -E & -G that are known to be directly involved in the biosynthesis of MCs in toxigenic *Microcystis* spp. Results from DNA sequencing using new *mcy*A primers and subsequent BLASTN sequence alignment showed that the DNA samples from the Hartbeespoort Dam (North-West Province, South Africa) are of M. *aeruginosa* origin whereas those from Phakalane pond effluents (Gaborone, Botswana) were from M. *novacekii.*

Biography

Dr. Msagati is an associate professor at the Department of Applied Chemistry, University of Johannesburg, South Africa. He has more than 12 years of active research experience in which he has extraordinarily shown his presence in the areas of analytical chemistry research globally and he has thus far published more than 45 papers in both regional and international peer reviewed journals. He has also contributed more than 50 papers as conference proceedings and presentations in various congresses and symposia within and outside the Africa continent. Dr Msagati has also published one (1) book and four (4) chapters in books.