

## **Cyanide degrading alkaliphilic bacteria from Rift Valley soda lakes and their potential for bioremediation**

Birhanu M Kinfu<sup>1</sup> and Amare Gessesse<sup>2,3</sup>

<sup>1</sup>*University of Hamburg, Germany*

<sup>2</sup>*Addis Ababa University, Ethiopia*

<sup>3</sup>*Nelson Mandela Metropolitan University, South Africa*

### **Abstract**

Cyanide is a key component in mining and other applications which release up to giant lakes of toxic waste deadly to the environment. Treatment of cyanide waste is usually done by expensive chemical methods which only converts it to less toxic products. Bioremediation, on the other hand, is environment-friendly and more efficient alternative. The aim of this study was to explore selected alkaline soda lakes for cyanide degrading bacteria suited for high pH bioremediation conditions. Using medium provided with cyanide as a sole nitrogen source and pH of 10.2, 72 isolates able to degrade and utilize cyanide were found. After preliminary screening of the isolates based on morphology, ARDRA of PCR amplified 16S ribosomal genes following restriction digest using AluI, HaeIII and RsaI revealed the presence of nine polymorphic groups. 16S rDNA amplicon sequence analysis further details seven distinct bacterial species from which three belonged to genus *Bacillus*, three to genus *Halomonas*, and another was more close to an uncultured bacterium clone. Based on phylogenetic analysis, the later was more related to and clustered with *Halomonas* sub-lineages. Isolates CNA12, CNC1 and CNS10, isolated from Lakes Abijata, Chitu and Shala respectively utilized up to 99.33% of 200 mg/l cyanide and tolerated up to concentration of 600 mg/l cyanide in batch mode. While acetate was supplied as a source of carbon for isolation, cheap molasses interestingly enhanced bacterial growth and subsequent biodegradation of cyanide. In general, this study shows the presence of diverse cyanide utilizing alkaliphilic bacteria in the Rift Valley Soda Lakes with practical potential for bioremediation of cyanide waste.

### **Biography**

Birhanu M Kinfu has obtained his MSc in Biotechnology from Addis Ababa University and worked as university Lecturer for 2 years. After winning the prestigious DAAD (German Academic Research Service) Research Grant Award under its 'Young Academics And Scientists' program, he is currently pursuing his PhD in Germany at the University of Hamburg, Microbiology and Biotechnology Department. He has published 3 papers in reputed journals.

birhanu.kinfu@uni-hamburg.de