

**Metcalf, J.S., Banack, S.A., Kotut, K., Krienitz, L., Codd, G.A., 2013.** Amino acid neurotoxins in feathers of the Lesser Flamingo, *Phoeniconaias minor*. Chemosphere 90: 835 – 839

## **Abstract**

The Lesser Flamingo (*Phoeniconaias minor*) is known to use cyanobacteria (primarily *Arthrospira*) as a major food source in the East African Rift Valley lakes. Periodically, mass mortalities have occurred, associated with the cyanobacterial toxins (cyanotoxins), microcystins and anatoxin-a. Deposition of these cyanotoxins into *P. minor* feathers has been shown to occur, consistent with the presence of cyanotoxins in the livers, stomach and faecal contents after dietary intake. As cyanobacteria have been shown to also produce the neurotoxins -N-methylamino-L-alanine (BMAA) and 2,4-diaminobutyric acid (DAB), stored wing feathers, previously recovered from flamingos which had been exposed to microcystins and anatoxin-a and had subsequently died, were analysed for these neurotoxic amino acids. Trace amounts of BMAA were detected in extracts from Lake Nakuru flamingo feathers, with DAB also present at concentrations between 3.5 and 8.5  $\mu\text{g g}^{-1}$  dry weight in feathers from both lakes. Toxin recovery by solid-phase extraction of feather digests was tested with spiked deuterated BMAA and showed good recovery when analysed by LC-MS/MS (80-94%). This is the first report of these neurotoxic amino acids in birds. We discuss the origin and significance of DAB, alongside other cyanotoxins of dietary origin, in the feathers of the Lesser Flamingo.