

# Appearance of new taxa: invertebrates, phytoplankton and bacteria in an alkaline, saline, meteorite crater lake, South Africa

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With 5 figures and 2 tables

**Abstract:** Data generated during 12 field trips in 2006 were used to investigate possible changes in the biotic communities of Lake Tswaing after a borehole was sunk in 1988/89 near the centre of the crater lake. The Tswaing meteorite crater lake is a small (0.07 km<sup>2</sup>), shallow (maximum depth 2.1 m), alkaline (surface water pH varied from 9.6 to 10.3), meromictic lake with a Secchi disk transparency of between 6 and 12 cm. The lake had a distinct surface layer of cyanobacteria (*Arthrospira fusiformis*), located above a layer of purple sulphur bacteria, that was located, in turn, above a layer of green sulphur bacteria. This is the first report on the presence of green sulphur bacteria in the lake. The absence of submerged and emergent aquatic macrophytes in the lake limits habitat diversity for attached diatoms in the littoral regions. Both the numbers of families and the density of the benthic invertebrates were very low. The dominant invertebrate groups present were Nematodes, Muscidae and Hydrophilidae. Seven macroinvertebrate families were recorded, five of which are new to Lake Tswaing. In addition, the periphytic ciliate *Blepharisma* sp. was also observed for the first time within the land/water contact zone of Lake Tswaing. Benthic diatoms were scarce and the dominant species present was *Gyrosigma rautenbachiae*, while *Nitzschia quadrangula* was the dominant planktonic diatom, previously not recorded in the main basin of the lake. The diatom species *Nitzschia communis*, although in low numbers, was also not reported in previous studies of Lake Tswaing.

**Key words:** Bacterial plate distribution, benthic diatoms, macroinvertebrates, *Nodularia spumigena*, Lake Tswaing.

## Introduction

Although there are numerous volcanic crater lakes in East Africa, the Tswaing meteorite crater lake, located near the city of Pretoria in South Africa, is the only southern African example of a lake occupying a meteorite crater (Partridge et al. 1991). The gradient of salinity between the surface (30–80) and bottom water (280–310) in Lake Tswaing varies seasonally, demon-

strating the hypersaline nature of the lake water (Ashton & Schoeman 1983, 1985). In most saline lakes, intensive biological productivity is restricted to a shallow mixing zone at the surface of the lake. The photic zone in most of these lakes is less than 50 cm deep because of the density of planktonic organisms in their surface waters (Hecky & Kilham 1973). Additionally, the seasonal changes in salinity in these lakes may also have important implications for the survival of algae

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