



# THE IDENTIFICATION AND ENUMERATION OF FRESHWATER ALGAE AND CYANOBACTERIA

## Introduction

Micro-Algae, commonly referred to as 'Algae' is a term used to define 'microscopic aquatic non stem-forming plants'. The term Phytoplankton refers to all suspended microalgae, including the group Cyanobacteria (commonly called blue-green algae). Cyanobacteria are of great significance due to their potential toxic effect on animals and humans should an 'algae bloom' occur.

Algal populations within a water body (e.g. lakes, rivers and reservoirs), are monitored to help protect stakeholders through early detection of toxic algal blooms. This is achieved through the regular enumeration (counting) and identification of the phytoplankton genus/species.

Following extensive validation and external expert technical review, ALS is pleased to offer **NATA accredited enumeration and identification services for;**

- Freshwater Phytoplankton (Algae) and Cyanobacteria (Blue-Green Algae)
- Phytoplankton biomass (biovolume).

## Principles of Analysis

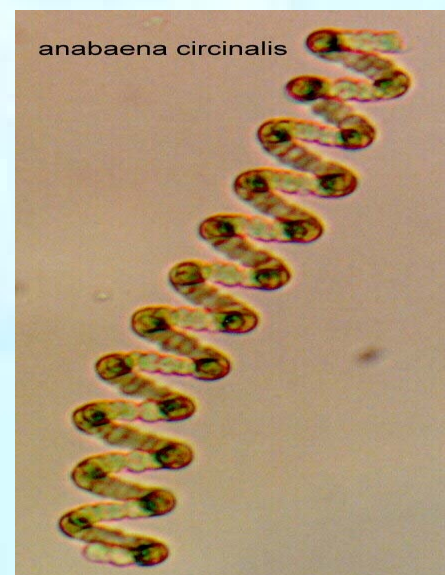
The enumeration and identification is conducted on a preserved sample, which is concentrated via Gravitational Sedimentation. 90% of the sample is then siphoned off leaving a final aliquot for analysis. The aliquot is loaded into a calibrated "Lund Cell" and viewed under phase contrast microscopy to identify and enumerate the Algae Species. The results are expressed as Cells/mL.

The Biovolume phytoplankton test is conducted on an aliquot using phase contrast microscopy at 1000X magnification under oil immersion. The cell dimensions are recorded and the volume of algae is calculated with results expressed as mm<sup>3</sup>/L.

## Holding Time and Preservation

Samples that cannot be received by the Laboratory within 12 hours of sampling require the Algae to be preserved with Lugol's solution in accordance with NATA guidelines. The iodine in the Lugol's solution preserves the cells and flagella and also facilitates sedimentation and once preserved can be submitted un-chilled. Samples submitted without 'Lugols' must be maintained in the dark and transported in an esky (<10°C) and received within 12 hours.

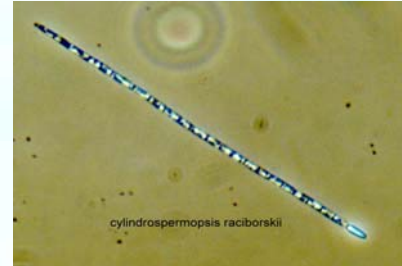
ALS offers pre-dosed sampling bottles containing 'Lugols' for your convenience.



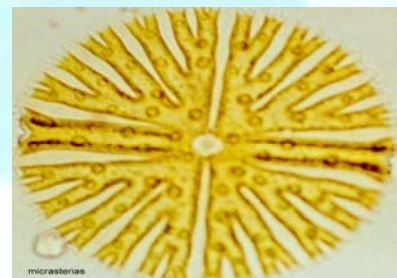
## Major Algae Groups

Algae are extremely diverse in form, colour characteristics and habitat and have been classified in separate “phylum”. A phylum is a classification of organisms in groups according to a common characteristic. The following are examples of some major algae phyla and a brief description.

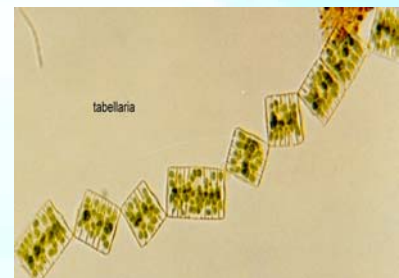
1. Cyanophyta (Cyanobacteria): This group consists of unicellular bacteria capable of photosynthesis. Due to pigmentation this group is also known as “blue-green” algae. Some species in this phylum (e.g. *Cylindrospermopsis raciborskii*) have been found to produce toxins, which may adversely affect aquatic and human life.



2. Chlorophyta (Green Algae): This group of algae species contains both chlorophyll a and b and their cells can store excess food as starch and reproduce through exposed organs.



3. Bacilliarophyta (Diatoms): This group includes single-celled phytoplankton with an external skeleton made of silica.



## Sample Bottles and ALS Method Codes

For Algae a 250mL opaque bottle containing 1% Lugols Solution is preferred. These dedicated bottles have a “green” label. Bottles should not be washed out during sampling and should be mixed gently once the water sample is taken (note that Marine Algae samples should not be preserved with ‘Lugols’ and either separate containers should be used or the above bottle rinsed with sample to remove the ‘Lugols’).

<u>ALS Method Codes:</u>	Total Algae- Enumeration and Identification	MW024.T
	Cyanobacteria- Enumeration and Identification	MW024.C
	Predominant Genera- Enumeration and Identification	MW024.P

## References:

- Hotzel G. and Croome C. “A Phytoplankton Methods Manual for Australian Freshwaters” (1999).
- Prescott G.W “How to Know the Freshwater Algae” (1970)
- Falconer I.R “Cyanobacterial Toxins of Drinking Water Supplies- Cylinderspermopsins and Microcystins” (2005)
- Photos courtesy of Derek Cannon.

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