

Some Species of Algae found in Northern Part of Taung-tha-man Lake

Nu Nu Yee*

Abstract

Algae specimens were collected from Taung-tha-man Lake during April 2019 to June 2019. The total algal species: 15 species, 11 genera, 10 families, 4 classes and 7 orders were found in this study area. All collected species belong to 4 divisions: Cyanophyta, Euglenophyta, Chrysophyta and Chlorophyta had been described and identified with colourful photograph records. The algae samples were collected from different habitats in the northern part of Taung-tha-man Lake. These samples were carried in plastic bottles to the laboratory, Department of Botany, Yadanabon University. The collected specimens were examined under the compound microscope (Olympus). And then they were recorded by digital camera. *Microcystis*, *Oscillatoria*, *Anabaena*, *Euglena*, *Phacus*, *Frustulia* and *Scenedesmus* were abundantly found in Taung-tha-man Lake. *Arthrospira*, *Cyclotella*, *Actinastrum* and *Pediastrum* were rarely occurred in this study area. Algae are extremely important not only ecologically but also phylogenetically and thus, they are essential to investigate.

Key words: Algae flora, collected species, division

Introduction

The algae had been in the interesting group for investigation because of their very primitive nature and a world-wide distribution, which was due to their capability to exist under most varied environmental conditions. Algae are considered as an important biological organism. They are the source of oxygen and the first ring of the food chain in aquatic systems. Algae might be more than 25,000 species that found in rivers, lakes, ponds, puddles, rock and damp soil and also can live in everywhere. Algae could take place photosynthesis by the sunlight because algae possess chlorophyll like the other higher plants (Graham and Wilcox, 2000).

Nowadays, algae were widely used in many purposes all over the world. They were used as human nutrition, animal feed, aquacultures and biofertilizers. In Germany, food production and distribution companies had started serious activities to market functional food with microalgae and cyanobacteria. Examples of algae products were pasta, bread, yogurt and soft drinks. Similar developments could be observed, for examples, in France, Japan, USA, China and Thailand (Pulz, 2004).

In this study, algae specimens were collected from Northern part of the Taung-tha-man Lake during April to June, 2019. The Taung-tha-man Lake is located about 3 miles south of

* Lecturer, Dr, Department of Botany, Yadanabon University

Mandalay and lies adjacent to eastern boundary of Amarapura. This lake is situated in North Latitude 21° 54' to 22° 53' and East Longitude 96° 53' to 96° 63'. The lake stretches 2438.4 m from the East to the West and 3048 m from the North to the South.

In the present study, 15 species of algae specimens were described with coloured photograph. They are *Microcystis aeruginosa* var. *major*, *M. firma*, *M. flos-aquae*, *Oscillatoria tenuis*, *Arthrospira jenneri*, *Anabaena affinis*, *Anabaena pseudocompacta*, *Euglena acus*, *Euglena deses*, *Phacus orbicularis*, *Cyclotella bodanica*, *Frustulia rhomboides*, *Actinastrum gracilimum*, *Pediastrum tetras* and *Scenedesmus dimorphus* respectively. The aim of the present study is to investigate some members of algae found in Northern Part of Taung-tha-man Lake, to identify some algal flora in studied area and to provide the basic knowledge of algae for other algal researchers.

Materials and Methods

The algae samples were collected from different habitats in the northern part of Taung-tha-man Lake within April 2019 to June 2019. The location map and sampling sites of Taung-tha-man Lake were shown in Figure 1 and 2. Algal samples were taken from the upper surface of water. These samples were carried in plastic bottles to the laboratory, Department of Botany, Yadanabon University. The collected specimens were examined under the compound microscope (Olympus) in Department of Botany, Yadanabon University. The size of algae was measured by using micrometer. The photomicrographs of collected specimens were recorded by digital camera. And then they were identified on the basis of Desikachary (1959), Dillard (1982–2000), Prescott (1962), Hoek *et al.* (1995) and John *et al.* (2002).



Figure 1. Location Map of Taung-tha-man Lake



Figure 2. Sampling Sites of Taung-tha-man Lake

A. Near the shore of northern part of Taung-tha-man Lake

Results

The specimens of algae were collected from different habitats in the northern part of Taung-tha-man Lake. The total 15 species, 11 genera, 10 families, 4 classes and 7 orders had been described and recorded. The classification of algae was mentioned in Table 1.

Table 1. Classification of some algae found in Northern Part of Tuang-tha-man Lake

Division	Class	Order	Family	Genus	Species
Cyanophyta	Myxophyceae	1.Chroococcales	1. Chroococcaceae	1. <i>Microcystis</i>	1. <i>M. aeruginosa</i> var. <i>major</i> Smith 2. <i>M. firma</i> (Kutzing) Gomont 3. <i>M. flos-aquae</i> (Wittrock) Kirchner
		2.Oscillatoriales	2.Oscillatoriaceae	2. <i>Oscillatoria</i>	4. <i>O. tenuis</i> Agardh
		3.Nostocales	3.Phormidiaceae 4.Nostocaceae	3. <i>Arthrospira</i> 4. <i>Anabaena</i>	5. <i>A. jenneri</i> (Kutzing) Stizenberger 6. <i>A. affinis</i> Lemmermann 7. <i>A. pseudocompacta</i> Watanabe
Euglenophyta	Euglenophyceae	4. Euglenales	5.Euglenaceae	5. <i>Euglena</i> 6. <i>Phacus</i>	8. <i>E. acus</i> var. <i>rigida</i> Huebner 9. <i>E. deses</i> John 10. <i>P. orbicularis</i> Huebner
Chrysophyta	Bascillariophyceae	5. Centrales	6.Coscinodiscaceae	7. <i>Cyclotella</i>	11. <i>C. bodanica</i> Eulenst
		6. Pennales	7.Naviculaceae	8. <i>Frustulia</i>	12. <i>F. rhomboides</i> (Ehrenberg) Toni
Chlorophyta	Chlorophyceae	7. Chlorococcales	8. Oocystaceae	9. <i>Actinastrum</i>	13. <i>A. gracilimum</i> Smith
			9. Hydrodictyceae	10. <i>Pediastrum</i>	14. <i>P. tetras</i> var. <i>tetraedon</i> (Corda) Rabenhorst
			10. Scenedesmaceae	11. <i>Scenedesmus</i>	15. <i>S. dimorphus</i> (Trup) Kutzing

Cyanophyta

1. *Microcystis aeruginosa* var. *major* Smith (Figure 3 A)

Colony numerous, saccate and clathrate-crowded within a gelatinous matrix; cells ovate, spherical, or irregularly lobed; cells 2.5–5.0 μm in diameter.

2. *Microcystis firma* (Kuetzing) Schmidle (Figure 3 B)

Colonies more or less irregular-spherical with densely packed cells, with indistinct mucilaginous envelopes; cells 1.3–2.3 μm in diameter.

3. *Microcystis flos-aquae* (Wittrock) Kirchner (Figure 3 C)

Colonies spherical, with very densely aggregated cells, mucilaginous envelope; cells 2.5–5.0 μm in diameter.

4. *Oscillatoria tenuis* Agardh (Figure 3 D)

Trichomes aggregated to form a blue-green mass; straight; apical cell convex, smooth; slightly constricted at the cross walls, which are granular; cells 10.0–15.0 μm in diameter.

5. *Arthrospira jenneri* (Kuetzing) Stizenberger (Figure 3 E)

Trichomes blue-green, loosely coiled, not tapering toward the apices; cells quadrate, granular; cells 7.5–12.5 μm in diameter.

6. *Anabaena affinis* Lemmermann (Figure 3 F)

Trichomes straight; free floating, cell spherical to spheroidal, apical cell rounded. Heterocysts, slightly larger than vegetative cells. Akinetes globose to ovate; cells 2.5–5.0 μm in diameter.

7. *Anabaena pseudocompacta* Watanabe. (Figure 3 G)

Trichomes free, solitary, regularly twisted. Heterocysts spherical, gas vacuole present. Akinetes ellipsoid, curved, asymmetrical, spiral regular; cells 5.5–6.5 μm in diameter.

Euglenophyta

8. *Euglena acus* var. *rigida* Huebner (Figure 3 H)

Cells elongate, spindle shaped, anterior end narrowed and truncate, posterior end tapering and long acuminate, paramylon bodies numerous, small rods; without pyrenoid, chloroplast numerous; cells 5.0–12.5 μm in diameter.

9. *Euglena deses* John (Figure 3 I)

Cells elongate, cylindrical to ellipsoidal, anterior end rounded or slightly truncate and posterior end blunt point; paramylon bodies rod-shaped; cells 5.0–10.0 μm in diameter.

10. *Phacus orbicularis* Huebner (Figure 4 A)

Cells orbicular to broad ovoid in outline, anterior end slightly narrowly rounded, posterior end broadly rounded with a short curved caudus, apical groove nearly full length of cell, pellicle longitudinally and roughly striated, short transverse striae present, paramylon of 1–2 disc or circular plate-like bodies; cells 35.0–50.0 μm in diameter.

Chrysophyta

11. *Cyclotella bodanica* Eulenz (Figure 4 B)

Cells drum-shaped discoid, mostly solitary, valves circular with two concentric regions, an inner smooth and an outer with radial striae, girdle view smooth; cells 20.0–22.5 µm in diameter.

12. *Frustulia rhomboides* (Ehrenberg) Toni (Figure 4 C)

Cells solitary, linear elliptic to rhombo-lanceolate, raphe groove between siliceous ribs which fuse at terminal nodules, often appearing as a single rib; striae longitudinal and transverse; cells 5.0–10.0 µm in diameter.

Chlorophyta

13. *Actinastrum gracilimum* Smith (Figure 4 D)

Cells cylindrical, with very slightly narrowed to abruptly truncate poles, forming colonies of individuals with the long axes of the cells radiating in all planes from a common center; cells 2.5–5.0 µm in diameter.

14. *Pediastrum tetras* var. *tetraedon* (Corda) Rabenhorst (Figure 4 E)

Colonies 4-celled, outer margins of peripheral cells with deep incision; the lobes extended into sharp, horn-like processes; cells 5.0–10.0 µm in diameter.

15. *Scenedesmus dimorphus* (Turpin) Kutzing (Figure 4 F)

Colonies 4-celled, fusiform, cells arranged in a linear alternating series, the inner cells with straight, sharp apices, the outer cells lunate, strongly curved, with sharply acute apices; cells 2.5–3.0 µm in diameter.

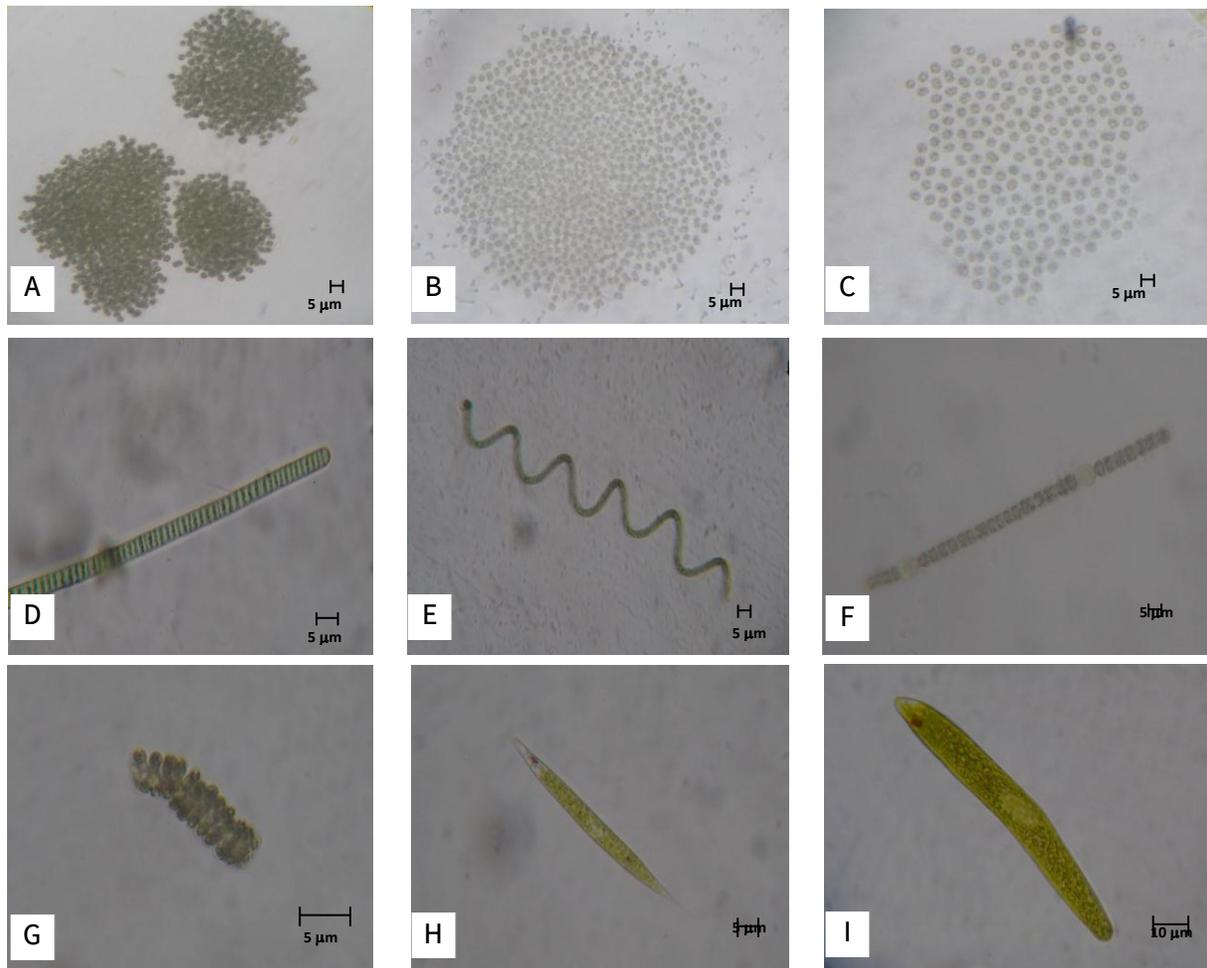


Figure 3. A. *Microcystis aeruginosa* var. *major* Smith

B. *Microcystis firma* (Kutzing) Schmidle

C. *Microcystis flos-aquae* (Wittrock) Kirchner

D. *Oscillatoria tenuis* Agardh

E. *Arthrospira jenneri* (Kutzing) Stizenberger

F. *Anabaena affinis* Lemmermann

G. *Anabaena pseudocompacta* Watanabe

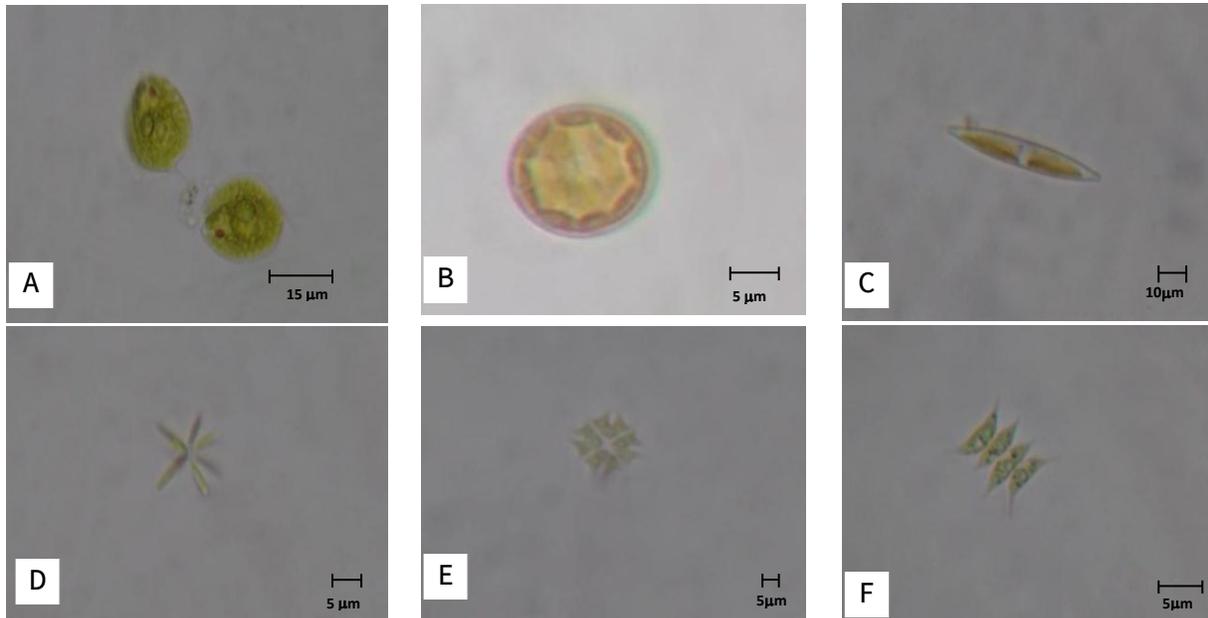


Figure 4. A. *Phacus orbicularis* Hubner

B. *Cyclotella bodanica* Eulenst

C. *Frustulia rhomboides* (Ehrenberg) Toni

D. *Actinastrum gracilimum* Smith

F. *Pediastrum tetras* var. *tetraedon* (Corda) Rabenhorst

Discussion and Conclusion

Algae are important as primary producers of organic matter at the base of the food chain. They also provide oxygen for other aquatic life. They may contribute to economic well-being in the form of food, medicine and other products. Algae specimens were collected from the northern part of Taung-tha-man Lake during April to June, 2019. Algal taxonomists believed that there were from 36,000 to 50,000 and more than 10 millions species of algae (Hoek *et al.* 1995).

In the present study, the totals of 15 species were found in this study area. Among them 7 species, 4 genera, 4 families belong to 2 orders of Myxophyceae or Cyanophyceae; 3 species, 2 genera, one family belong to one order of Euglenophyceae; 2 species, 2 genera, 2 families belong to 2 orders of Bacillariophyceae; 3 species, 3 genera, 3 families belong to 1 orders of Chlorophyceae had been identified, described and recorded. All these algae that have unicellular forms, colonial forms and irregular forms in study sites. Among them, *Microcystis*, *Oscillatoria*, *Anabaena*, *Euglena*, *Phacus*, *Frustulia* and *Scenedesmus* were abundantly found in this Lake. *Arthrospira*, *Cyclotella*, *Actinastrum* and *Pediastrum* were rarely occurred in this study area.

The previous studies reported the algal blooms observed in the surfaces of the ponds in the environs of Mandalay (Tin Tin Moe, 2007). Lin Lin Nwe (2016) also stated algal flora of Mingalar

Lake in Ngwe–Daw–Kyi–Kone Ward, Pyigyitagun Township. In this result, 15 species of algae were collected to study in northern part of Taung–tha–man Lake. These species are *Microcystis aeruginosa* var. *major* Smith, *M. firma* (Kutzing) Schmidle, *M. flos-aquae* (Wittrock) Kirchner, *Oscillatoria tenuis* Agardh, *Arthrospira jenneria* (Kutzing) Stizenberger, *Anabaena affinis* Lemmermann, *Anabaena pseudocompacta* Watanabe, *Euglena acus* var. *rigida* Huebner, *Euglena deses* John, *Phacus orbicularis* Hubner, *Cyclotella bodanica* Eulenst, *Frustulia rhomboides* (Ehrenberg) Toni, *Actinastrum gracilimum* Smith, *Pediastrum tetras* var. *tetraedon* (Corda) Rabenhorst and *Scenedesmus dimorphus* (Turpin) Kutzing respectively.

According to the result of the present study, it can be concluded that many different kinds of algae were found on northern part of Taung–tha–man Lake. But some algae are polluted in Lake and others are beneficial for agriculture. Therefore, this paper was emphasized on morphological characters of each species. It is expected that this paper provides information on the identification of microalgae for further study on algal researchers.

Acknowledgements

I'd like to express my thanks to Dr Maung Maung Naing, Rector and Dr Si Si Khin and Dr Tint Moe Thuzar, Pro-rector of Yadanabon University for their permission to submit this article. I am also indebted to Dr Htar Lwin, Professor and Head and Dr Pyone Yi, Professor, Department of Botany, Yadanabon University for their invaluable suggestions and guidance. Finally, I'm highly indebted to my beloved parents for their constant support and endless helps throughout my life.

References

- Desikachary, T. V. 1959. *Cyanophyta*, Indian Council of Agricultural Monographs on Algae. New Delhi.
- Dillard, G. E. 1982–2000. *Freshwater Algae of the Southern United States (Part 1–7)*. Berlin. Stuttgart.
- Graham, L.E. and Wilcox, L.W. 2000. *Algae*. Wisconsin University Prentice–Hall, Inc. Upper Saddle River, NJ 07458, printed in United States of America.
- Hoek, van den. C., Mann, D.G and John, H.M. 1995. *Algae: An Introduction to Phycology*. Cambridge University Press, Cambridge, U.K.
- John, D.M, Whitton, B.A and Brook, A.J. 2002. *The Freshwater Algae Flora of the British Isles*. Cambridge University Press.
- Lin Lin Nwe, 2016. *Algal Flora of Mingalar Lake in Ngwe–Daw–Kyi–Kone Ward, Pyigyitagun Township*, MSc Thesis. Department of Botany, Yadanabon University.
- Pulz, O. 2004. *Valuable Products from Biotechnology of Microalgae*, Germany.
- Prescott, G.W. 1962. *Algae of the Eastern Great Lakes area*. Gran. Book. Inst. Sci, Bull. Bloom Field. Hills.
- Tin Tin Moe, 2007. *Effect of algal blooms on environment*, Ph.D Dissertation, Department of Botany, University of Mandalay.