

## Some species of Euglenophyta found in Ancient Wadee Lake, Natogyi Township, Myanmar

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### Abstract

In the present study, algae specimens were collected from four sites of Ancient Wadee Lake, Natogyi Township, Myanmar during December 2017 to August 2018. Among them, 17 species, 3 genera, 1 family belong to 1 order of Euglenophyceae in Euglenophyta were identified, classified and described in this study. In winter season, *Euglena* species were abundantly occurred in site 3. A few species of *Phacus* were found in site 4. *Phacus* and *Trachelomonas* were commonly found in sites 1, 2 and 3. In summer season, *Euglena* was abundantly found in site 4. *Phacus* was abundantly occurred in all sites. In rainy season, *Trachelomonas* was abundantly found in sites 1 and 4. Many species of *Phacus* were commonly occurred in sites 1, 2, 3 and 4. A few species of *Euglena* was occurred in sites 2 and 3. All specimens were recorded, classified and described in figures.

**Keywords :** Algae, Euglenophyta, ancient Wadee Lake

### Introduction

Algae are the main producer of organic substance in the water environment. Approximately 80 percent of all the organic substances created annually on the earth are created by algae and other aquatic plants. Algae serve either directly or indirectly as the source of food for all aquatic animals (Chapman 1962).

Algae cause water colouration. The main colours produced by algae include yellow-green, green, blue-green, red brown to black. Euglenoids are majority freshwater forms often producing water bloom in ponds, pools and lakes. Some of them can change their shape readily Euglenoid flagellates occur in most freshwater habitats, ditches, ponds, streams, lakes, and rivers, particularly water contaminated by animal pollution or decaying organic matter (Buetow 1962). Euglenoids algae (Euglenophyta) are almost entirely unicellular organisms, with a total of 40 genera, about 900 species worldwide, most of which are fresh water (Bellinger *et al.* 2010).

Study on algal flora is basic and important field of phycology. The algal floras of many countries were done by many. Smith (1950) pointed the freshwater algae of United States. Prescott (1962) freshwater expressed algal floral in Eastern great lake area. John *et al.* (2002) also reported the freshwater algal floral of the British Isles. Myanmar algal flora of freshwater was also carried out by other researchers West & West (1907), Handa (1927) and Skuja (1949). Algal floras of ponds and lakes in Myanmar have been studied by previous researchers for many years.

In this study area, Wadee Lake is situated at the Wadee Ancient City, Natogyi Township. Algae specimens and water samples were collected from Wadee Lake. Among them, Euglenophyta was presented in this research paper. The previous studies reported some algae of the ponds in Mandalay Region, Saw Ohnmar Win (2008). However, this research of Ancient Wadee Lake, Natogyi Township has not been studied. The aims of the present study are to know and to identify the algal composition of Ancient Wadee Lake, to record their seasonal variation and to share

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the knowledge of some algal flora found in this area, to give algal flora information to the person who work the applied algal researchers.

### Materials and Methods

**Study Area:** Ancient Wadee Lake is situated in Natogyi Township, Myingyan District, Mandalay Region, Myanmar. It lies between 21° 22' and 21° 24' N latitude and between 95° 41' and 95° 44' E longitude. It has an area of approximately 52270 m<sup>2</sup>.

**Collection of the Algae Specimens:** Algae specimens were collected from four sampling sites namely: East, West, South and North of Wadee Lake; which are in Natogyi Township as shown in figure 1-2. Algal species were collected during December 2017 to August 2018. Algal samples were collected from the upper surface of the water.

**Data Collection of pH, GPS and Water Temperature:** The positions of all sampling sites were measured by Global Position System (GPS), temperature of water was measured by thermometer and pH of water was measured by pH paper in the fields.

**Laboratory Observation and Classification of Algae:** Laboratory observation of samples was made by using compound microscope at Department of Botany, Yadanabon University, Amarapura Township, Mandalay, Myanmar. The size of algae was measured by using micrometer. Collected species were presented by digital camera. The identification and taxonomic description had been done by referring on Skuja (1949), Smith (1950), Desikachary (1959), Prescott (1962), Philipose (1967), Vinyard (1979), Komarek (1985-1989), Dillard (1982-2000), Hoek *et al.* (1995), Graham & Wilcox (2000) and John *et al.* (2002). Arrangements of classification were done by John *et al.* (2002).

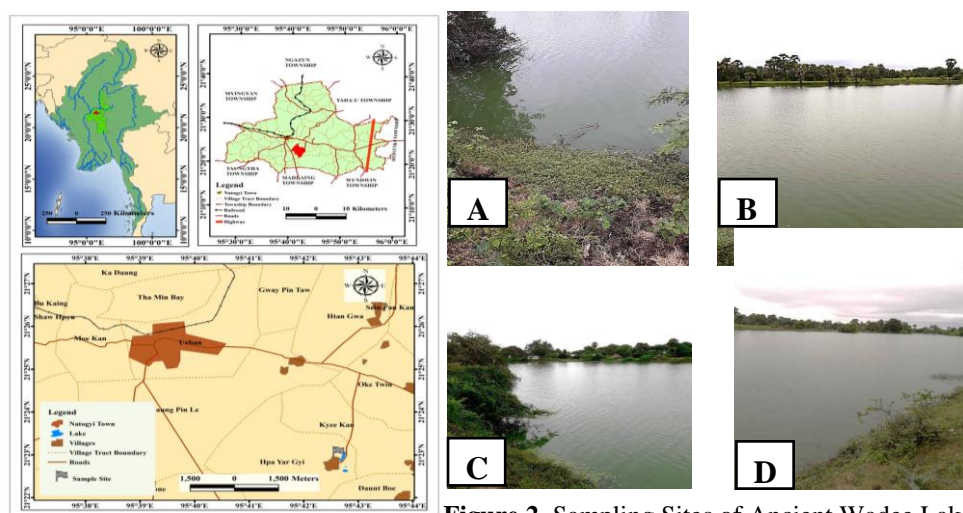


Figure 2. Sampling Sites of Ancient Wadee Lake

Wadee Lake in Natogyi Township

- A. Site 1 (East of Wadee Lake)
- B. Site 2 (West of Wadee Lake)
- C. Site 3 (South of Wadee Lake)
- D. Site 4 (North of Wadee Lake)

### Results

**Algal Flora:** In this research, totally 17 algal species were reported. The specimens of algae were collected from four sampling sites in Wadee Lake, Natogyi Township. The collected specimens were identified. These algae belong to division Euglenophyta. In this

study 17 species, 3 genera, 1 family belong to 1 order of Euglenophyceae were classified, recorded and described with photomicrographs. The classification of algae was mentioned in Table 1. The water temperature and pH were also stated in Table 2-3.

**Table 1.** Classification of algae found in Wadee Lake, Natogyi Township

Division	Order	Family	Genus	Species
Euglenophyta	Euglenales	Euglenaceae	1. <i>Euglena</i>	1. <i>E. acus</i> var. <i>rigida</i> Huebner
				2. <i>E. mainxi</i> Deflandre
				3. <i>E. oblonga</i> Schmarda
				4. <i>E. polymorpha</i> Dangeard
				5. <i>E. pseudospiroides</i> Swirenko
				6. <i>E. rostrifera</i> Johnson
				7. <i>E. sciotensis</i> Lackey
				8. <i>E. spirogyra</i> Ehrenberg
				9. <i>E. stellata</i> Mainx
			2. <i>Phacus</i>	10. <i>P. denisii</i> Allorge et Lefevre
				11. <i>P. glaber</i> (Deflandre) Pochmann
				12. <i>P. longicauda</i> (Ehrenberg) Dujardin
				13. <i>P. megalopsis</i> Pochmann
			9. <i>Trachelomonas</i>	14. <i>P. ranula</i> Pochmann
				15. <i>T. acanthostoma</i> (Stoke) Deflandre
				16. <i>T. hispida</i> var. <i>punctata</i> Lemmermann
				17. <i>T. lacustris</i> Drezepolski

***Euglena acus* var. *rigida* Huebner 1886 (Figure 3 A)**

Cells cylindrical; straight, anterior end narrowed and truncate, posterior end tapering and long acuminate; without pyrenoid, chloroplast numerous; cells 5.0 – 12.5 µm in diameter; 97.5 – 110.0 µm long.

***Euglena mainxi* Deflandre 1967 (Figure 3 B)**

Cells ovoid, tapering gradually to a point, chloroplast 1, sheathed pyrenoid; additional paramylon bodies; cells 10.0 – 15.0 µm in diameter; 50.0 – 55.0 µm long.

***Euglena oblonga* Schmarda 1884 (Figure 3 C)**

Cells oval to ellipsoid, anterior end rounded, posterior end bluntly pointed into a short tail, chloroplasts numerous short bands disposed in 2 patterns; cells 20.0 – 15.0 µm in diameter, 40.0 – 62.5 µm long.

***Euglena polymorpha* Dangeard 1901 (Figure 3 D)**

Cells ovoid to pear-shaped and narrowing gradually to a short, blunt, anterior end conical, posterior end tapered; chloroplasts disc-like; a double sheathed pyrenoid; cells 10.0 – 15.0 µm in diameter, 62.5 – 85.0 µm long.

***Euglena pseudospiroides* Swirenko 1915 (Figure 3 E)**

Cells elongate, flattened, spirally twisted, anterior end rounded, posterior end rather abruptly tapered to a sharp point, chloroplast numerous small disc; cells 10.0 – 15.0 µm in diameter, 170.0 – 177.0 µm long.

***Euglena rostrifera* Johnson 1944 (Figure 3 F)**

Cells top-shaped with a bulge at the midregion, fusiform anterior end conical, posterior end tapering gradually to a hyaline caudus; chloroplasts numerous; cells 10.0 – 25.0 µm in diameter, 80.0 – 125.0 µm long.

***Euglena sciotensis* Lackey 1939 (Figure 4 A)**

Cell cylindrical, anterior end obliquely truncate, posterior end tapering abruptly to a sharp point; chloroplast numerous without pyrenoid; cells 10.0 – 12.5  $\mu\text{m}$  in diameter, 30.0 – 52.5  $\mu\text{m}$  long.

***Euglena spirogyra* Ehrenberg 1838 (Figure 4 B)**

Cells elongate cylindrical and twisted, narrowed posteriorly and extended into a sharp, bent tail-piece, periplast brownish, spirally started with alternating rows of large and small shining granules; chloroplasts numerous, disc-like; without pyrenoid; cells 5.0 – 10.0  $\mu\text{m}$  in diameter, 95.0 – 110.0  $\mu\text{m}$  long.

***Euglena stellata* Mainx 1926 (Figure 4 C)**

Cells spindle-shaped anterior end rounded, posterior end tapering rather abruptly to an acuminate tail; chloroplast, several, band-shaped, pyrenoids; 10.0 – 20.0  $\mu\text{m}$  in diameter, 30.0 – 55.0  $\mu\text{m}$  long.

***Phacus denisii* Allorge et Lefevre (1931) (Figure 4 D)**

Cells orbicular, anterior end broadly rounded, posterior end abruptly produced into a short, straight caudus, flagellum; cells 10.0 – 20.0  $\mu\text{m}$  in diameter, 20.0 – 27.5  $\mu\text{m}$  long.

***Phacus glaber* (Deflandre) Pochmann 1942 (Figure 4 E)**

Cell oval, anterior end broadly rounded, posterior end abruptly narrowed into a long awl-like caudus, flagellum; cells 20.0 – 27.5  $\mu\text{m}$  in diameter, 32.5 – 45.0  $\mu\text{m}$  long.

***Phacus longicauda* (Ehrenberg) Dujardin 1841 (Figure 4 F)**

Cells ovoid to obovoid, anterior end broadly rounded, posterior end abruptly produced into a long, straight, acuminate caudus; cells 40.0 – 55.0  $\mu\text{m}$  in diameter, 75.0 – 187.5  $\mu\text{m}$  long.

***Phacus megalopsis* Pochmann 1942 (Figure 5 A)**

Cells pyriform, anterior end rounded, appearing bilobed, posterior end abruptly into a long, straight, acuminate caudus; cells 10.0 – 15.0  $\mu\text{m}$  in diameter, 25.0 – 30.0  $\mu\text{m}$  long.

***Phacus ranula* Pochmann 1942 (Figure 5 B)**

Cell ellipsoid, anterior end narrowly rounded, posterior end abruptly produced into a long, straight, acuminate caudus; cells 20.0 – 27.5  $\mu\text{m}$  in diameter, 55.0 – 62.5  $\mu\text{m}$  long.

***Trachelomonas acanthostoma* (Stoke) Deflandre 1887 (Figure 5 C)**

Lorica subglobose to very broadly ellipsoid, flagellar pore with thinned annular ring, bordered by 1-2 rows of irregularly disposed, short spines; without short collar; lorica 20.0 – 25.0  $\mu\text{m}$  in diameter; 20.0 – 27.5  $\mu\text{m}$  long.

***Trachelomonas hispida* var. *punctata* Lemmermann 1883 (Figure 5 D)**

Lorica broadly oval; flagellum pore with an annular thickening, with a very short collar; wall coarsely and densely punctate; lorica 15.0 – 22.5  $\mu\text{m}$  in diameter, 25.0 – 27.5  $\mu\text{m}$  long.

***Trachelomonas lacustris* Drezepolski 1925 (Figure 5 E)**

Lorica cylindrical, lateral margins almost parallel, broadly rounded at poles, golden yellow-brown, coarsely and densely punctate, flagella pore usually without collar; lorica 20.0 – 32.5  $\mu\text{m}$  in diameter; 42.5 – 57.5  $\mu\text{m}$  long.

**Table 2.** Water temperature and pH of sampling sites

Sampling Sites	Water Temperature and pH					
	Winter		Summer		Rainy	
Site 1 (East)	24 °C	7.2	32 °C	7.8	28 °C	6.7
Site 2 (West)	23 °C	7.3	33 °C	7.6	27 °C	6.6
Site 3 (South)	22 °C	7.5	34 °C	7.9	29 °C	6.4
Site 4 (North)	24 °C	7.4	35 °C	7.7	28 °C	6.5

**Table 3.** Location of identified specimens found in Wadee Lake

Genus	Winter Season				Summer Season				Rainy Season			
	1	2	3	4	1	2	3	4	1	2	3	4
<i>Euglena</i>	++	++	+++	++	-	-	-	+++	+	+	+	+
<i>Phacus</i>	++	++	+	+	+++	-	++	+++	+	++	+	-
<i>Trachelomonas</i>	-	+	-	-	++	+	-	+	+	+	+	+++

+++	=	abundant	1. Site 1	(East of Wadee Lake)
++	=	common	2. Site 2	(West of Wadee Lake)
+	=	a few	3. Site 3	(South of Wadee Lake)
-	=	absent	4. Site 4	(North of Wadee Lake)

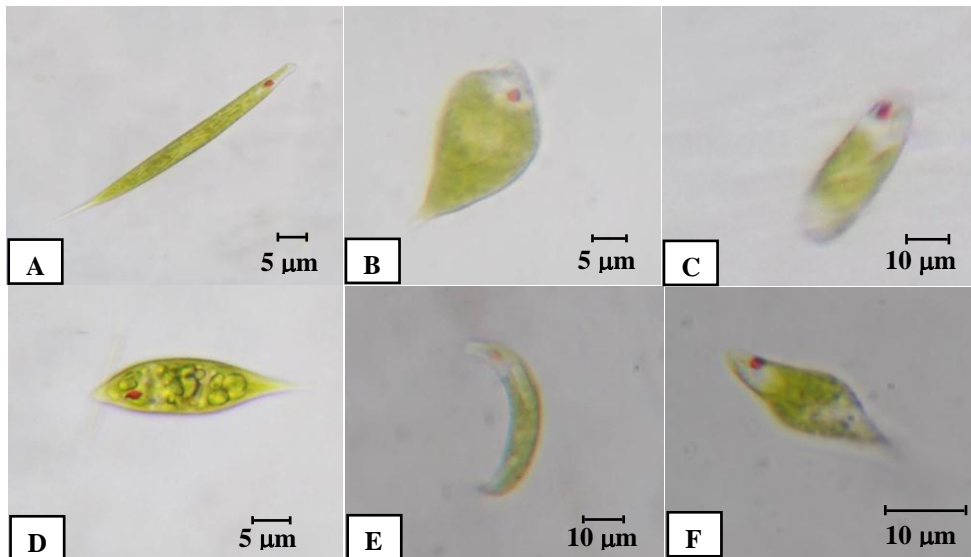
### Discussion and Conclusion

In this research, four stations from Wadee Lake, Natogyi Township, Mandalay Region were selected for study of algae flora. Total of collected 17 species of division Euglenophyta was observed.

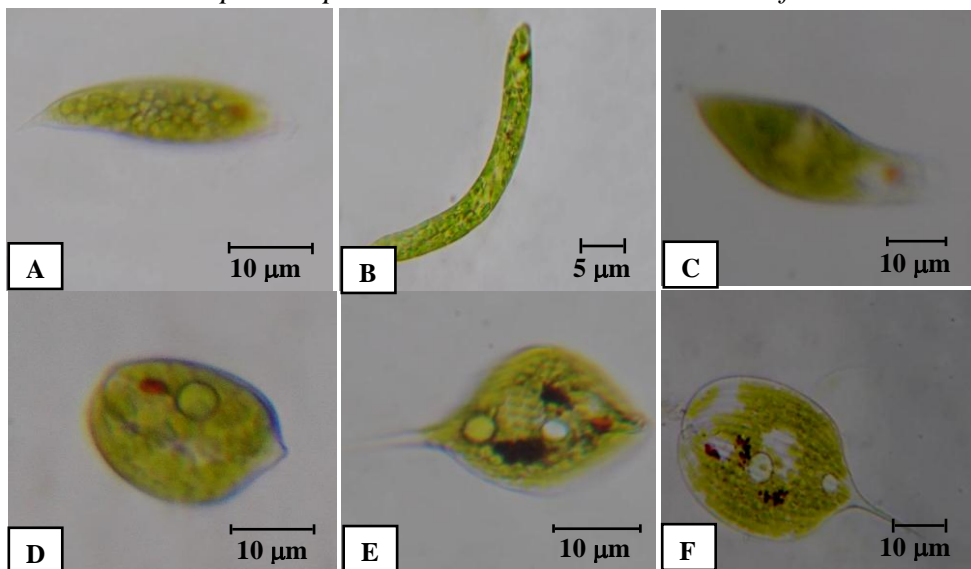
Euglenophyta are almost entirely unicellular organisms, with a total of 40 genera, about 900 species worldwide, most of which are freshwater (Hoek *et al.* 1995). The present study showed 17 species belonged to 3 genera of Euglenophyta. They were 9 species of *Euglena*, 5 species of *Phacus* and 3 species of *Trachelomonas* are found in this study area.

The diversity of algae was mainly based on the environmental factors such as temperature and pH, the range of temperature was between from 22°C to 35°C, the pH value of water varied from 6.4 to 7.9 (Table 2). In winter season, *Euglena* was abundantly occurred in site 3. *Euglena* and *Phacus* were commonly found in sites 1, 2, 3 and 4. *Phacus* was found a few in site 4. In summer season, *Euglena* was abundantly found in site 4. *Phacus* was abundantly occurred in sites 1 and 4. *Phacus* and *Trachelomonas* were commonly found in sites 1, 2 and 3. *Trachelomonas* was found a few in all sites. In rainy season, *Trachelomonas* was abundantly found in sites 1 and 4. *Euglena* and *Phacus* were occurred a few in sites 1, 2, 3 and 4 (Table 3).

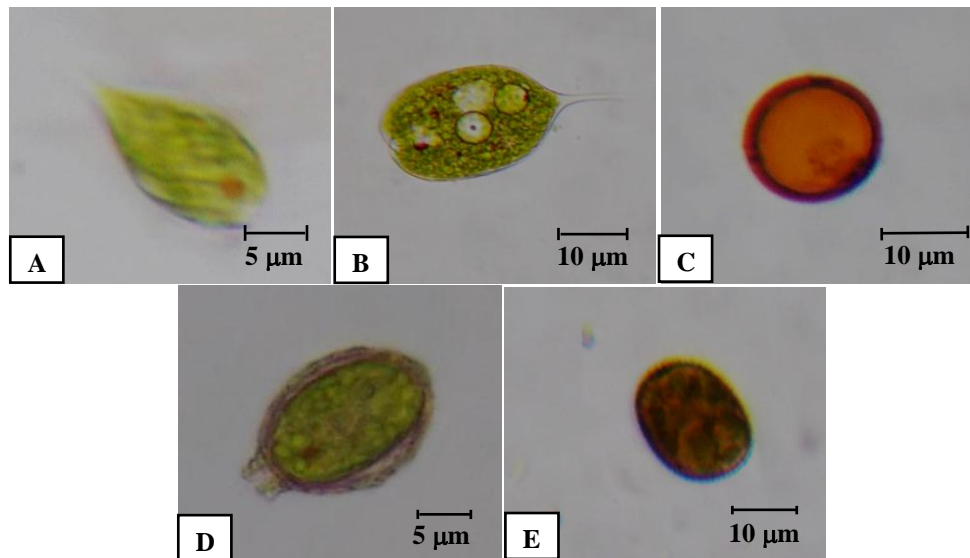
It may be concluded that, algae are very diverse and very applicable for the researchers like taxonomists, environmentalists and ecologists. According to literature, *Euglena* has been grown as a food source in the form of health supplements and drinks, beauty products like facial creams and hair serums, environmental applications including water treatment and CO<sub>2</sub> reduction. In the present study, Euglenophyta was maximumly occurred in winter season and fairly in rainy region. In the summer season, algal populations were minimumly occurred. So, different growth of algal population was depended on the temperature and pH value of water.



**Figure 3.** A. *Euglena acus* var. *rigida* Huebner B. *E. mainxi* Deflandre  
 C. *E. oblonga* Schmarda D. *E. polymorpha* Dangeard  
 E. *E. pseudospiroides* Swirenko F. *E. rostrifera* Johnson



**Figure 4.** A. *E. sciotensis* Lackey B. *E. spirogyra* Ehrenberg  
 C. *E. stellata* Mainx D. *Phacus denisii* Allorge et Lefevre  
 E. *P. glaber* (Deflandre) F. *P. longicauda* (Ehrenberg) Dujardin  
 Pochmann



**Figure 5.** A. *P. megalopsis* Pochmann B. *P. ranula* Pochmann  
 C. *Trachelomonas acanthostoma* (Stoke) Deflandre  
 D. *T. hispida* var. *punctata* Lemmermann E. *T. lacustris* Drezepolski

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