

Study on Some Algal Species of Chlorophyta Found in Naung-Yar Lake, Loikaw, Kayah State

Kyaw Kyaw Sann¹, Nyunt Nyunt San², Thet Naing Htwe³, Phyar Reh⁴

Abstract

In this research paper, the occurrence of monthly algal populations from the Naung-Yar Lake was conducted during a period of the whole year in 2018. The taxonomic identification of each species was carried out by using the classification system of John *et al.* (2002). In this investigation, totally 18 algal species belonging to 5 genera, 1 family, 1 order, 1 class and 1 division of Chlorophyta were studied. The most commonly found genera of the whole year were *Cosmarium*, and *Closterium*. Monthly variations of Phytoplankton were mostly depending upon physicochemical parameters of water. The temperature of water was 22°C – 25 °C and the pH of water was ranged between 7.73 and 8.02. Therefore, the water of Naung-yar Lake was alkaline or hard water.

Keywords: Chlorophyta, green algae

Introduction

A lake may be defined as an enclosed body of water (usually freshwater) totally surrounded by land and with no direct access to sea. Lakes are essential sources of freshwater for the man population (Chapman 1996). Otherwise, lake is the important natural resource for human population. They provide water for domestic and industrial uses, and fisheries. So, knowledge of the lake is essential for their proper use and conservation.

Srivastava *et al.* (1987) described that phytoplankton is a predominant type of a plant found in most aquaculture pond and lake. The quality and quantity of phytoplankton is a good indicator of water quantity. The component of phytoplankton communities and relative abundance of component species undergo continuous changes and on varying scale. Algae are widely present in freshwater environments, such as lakes and rivers, where they are typically present as microorganisms- visible only with the aid of a light microscope.

There are two basic types of cells in the algae, prokaryotic and eukaryotic. Prokaryotic cells lack membrane-bounded organelles (plastids, mitochondria, nuclei, Golgi bodies, and flagella) and occur in the cyanobacteria. The remainders of the algae are eukaryotic and have organelles. The chloroplasts have membranes sacs called thylakoids that carry out the light reactions of photosynthesis. The thylakoids are embedded in the stroma where the dark reactions of carbon fixation take place.

The term "algae" embraces a number of phyla (e.g. Cyanophyta, Bacillariophyta and Chlorophyta) of chlorophyll-containing organisms with different growth forms and cytologies. Algae are important primary producers in both freshwater and marine systems. When present in very large numbers, they can produce "blooms" that, on decomposition, deoxygenate the water-causing fish death other ecological problems. Some algae produce toxins that are lethal to both aquatic and terrestrial organisms. It is important to be aware of these impacts and to monitor waters for the presence of these potentially harmful organisms.

¹Dr, Lecturer, Department of Botany, University of Mandalay,
Email: kyawkyawsann15@gmail.com

²Dr, Professor and Head, Department of Botany, Mandalay Degree College

³Dr, Associate Professor, Department of Botany, Bamaw University

⁴U, Assistant Lecturer, Department of Botany, Loikaw University

The aim of this research paper is to classify and record of some species of algae which grown in Naung-yar lake and to share the knowledge of algae and to achieve the continued research of the algae.

Materials and Methods

The samples of algae were collected in December 2017 to November, 2018 from several sampling site in Naungyar lake of Loikaw, Kayah State. The study area was shown in Fig. 1. The positions of sampling site were measured by Global Positional System GPS; in addition, temperature was measured by thermometer and pH of water was measured by using pHmeter. (Graham and Wilcox, 2000).

After collection, morphological observations were studied by using a light microscope (NOVEX, HOLLAND) in Department of Botany, Loikaw University. And then, photomicrographs of the species describes here were taken with a digital camera (CANON). The taxonomic identification of each species was carried out by using the classification system of Prescott (1962), Dillard (1989-2000), Graham and Wilcox (2000) and John *et al.* (2002).

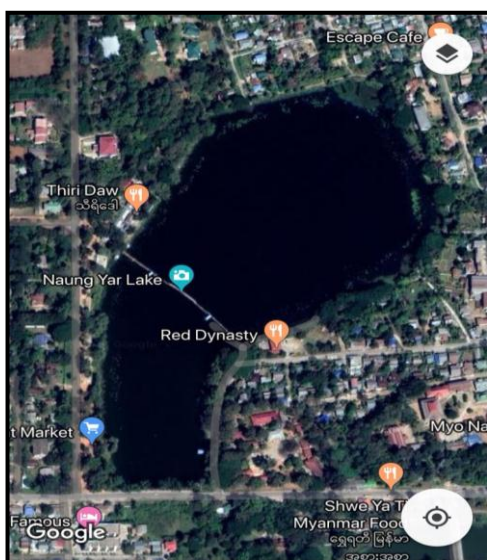


Figure 1. Location Map of Study Area



Figure 2. Sampling Sites

- A. Naung-yar Lake
- B. East side of Naung-yar Lake
- C. West side of Naung-yar Lake
- D. South side of Naung-yar Lake
- E. North side of Naung-yar Lake

Results

The alga samples were collected from various locations in Naung-yar lake. The 18 algal species were described in the study area, belonging to 5 genera, 1 family, 1 order, 1 class and 1 division of chlorophyta (Table 1).

Table 1. Classification of Chlorophyta found in Naung-yar Lake

Division	Class	Order	Family	Genus	Species
Chloro- phyta	Chlorophyceae	Desmidiiales	Desmidiaceae	<i>Euastrum</i>	<i>E. verrucosum</i>
				<i>Cosmarium</i>	<i>C. cucumis</i>
					<i>C. depressum</i>
					<i>C. hammeri</i>
					<i>C. moniliforme</i>
					<i>C. obsoletum</i>
					<i>C. portianum</i>
					<i>C. pyramidatum</i>
					<i>C. reniforme</i>
					<i>C. rociborskii</i>

	<i>Closterium</i>	<i>C. acerosum</i> <i>C. attenuatum</i> <i>C. costatum</i> <i>C. porrectum</i> <i>C. pseudolunula</i>
	<i>Micrasterias</i>	<i>M. johnsoniiv</i> <i>M. pinnatifida</i>
	<i>Staurodesmus</i>	<i>S. megacanthus</i>

Table 2. Shape, size and features of 18 Algal species in Desmidiaceae Family

Species	Shape and Size	Features
1. <i>Euastrum verrucosum</i>	Semicells broadly oval, cells 60.0-100.0 µm in diameter and 70.0-120.0 µm long	basal lobes extended and rounded, the lateral margins convergent and concave, apical margin retuse
2. <i>Closterium cucumis</i>	Semicells elliptic-oblong, cells 30.0-50.0 µm in diameter and 50.0-100.0 µm long	lateral margins of the cells slightly convex and smooth, apical margins convex or slightly flattened
3. <i>C. depressum</i>	Semicells kidney-shaped, cells 10.0-25.0 µm in diameter and 15.0-30.0 µm long,	lateral margin smooth, apical margin broadly rounded
4. <i>C. hammeri</i>	Semicells trapeziform, cells 20.0-50.0 µm in diameter and 30.0-60.0 µm long,	basal and apical angles broadly rounded, lateral margins slightly concave, apical margins broad, straight or concaves
5. <i>C. moniliforme</i>	Semicells subcircular, cells 10.0-25.0 µm in diameter and 10.0-30.0 µm long	apical margins slightly flattened; cell wall finely punctuate,
6. <i>C. obsoletum</i>	Semicells depressed-elliptic, cells 40.0-60.0 µm in diameter and 25.0-50.0 µm long,	basal angles mamillately thickened, apical margin slightly flattened
7. <i>C. portianum</i>	Semicells elliptic, cells 20.0-30.0 µm in diameter and 25.0-45.0 µm long,	cell wall granulate, basal margin broadly convex
8. <i>C. pyramidatum</i>	Semicells pyramidal, cells 30.0-50.0 µm in diameter and 80.0-100.0 µm long,	basal and apical angles rounded, lateral margins convex, apical margins rounded or truncate, cell wall punctuate
9. <i>C. reniforme</i>	Semicells reniform, cells 40.0-50.0 µm in diameter and 60.0-75.0 µm long	basal angles rounded, upper angles broadly rounded, lateral margin slightly convex to nearly straight, cell wall densely granulate

Species	Shape and Size	Features
10. <i>C. rociborskii</i>	Semicells elliptic, cells 30.0-42.5 µm in diameter, 25.0-30.0 µm long,	lateral margin subcircular, apical margin elliptic; cell wall minutely and slightly crenulate, appearing punctuate
11. <i>Closterium acerosum</i>	Cells straight, narrowly fusiform, 5.0- 12.5 µm in diameter and 150.0-250.0µm long	inner margin slightly convex, gradually tapering to the apices which are narrow and truncately rounded
12. <i>C. attenuatum</i>	Cells slightly curved, 5.0-10.0 µm in diameter and 300.0-350.0 µm long	gradually attenuated then rather suddenly narrowed to the obtuse apices, not swollen at the midregion
13. <i>C. costatum</i>	Cells moderately curved, 10.0-17.0 µm in diameter and 200.0- 250.0 µm long	dorsal margins convex and ventral margins not swollen at the midregion, gradually tapering to the apices
14. <i>C. porrectum</i>	Cells strongly curved, 10.0-17.5 µm in diameter and 125.0- 130.0 µm long	dorsal margins is convex and ventral margins swollen at the midregion
15. <i>C. pseudolunula</i>	Cells slightly curved, 30.0-55.0 µm in diameter and 150.0-255.0 µm long	ventral margins concave and lateral margins convex, slightly tumid at the midregion
16. <i>Micrasterias johnsoniiv</i>	Cells 200.0-220.0 µm in diameter and 210.0-240.0 µm long	lateral lobes divided twice, the lobes swollen at the base and terminating in 2 long, divergent teeth
17. <i>M. pinnatifida</i>	Cells 30.0-55.0 µm in diameter and 40.0-95.0 µm long	cell star-shaped in front view with semicells deeply lobed
18. <i>Staurodesmus megacanthus</i>	Cells mostly 3 radiate, some 4-radiate, 40-60 µm wide without spines, 35-61 µm long, spines 11-18 µm long	semi cells triangular to transverse spindle-shaped with straight or convex margins and a slightly convex apex

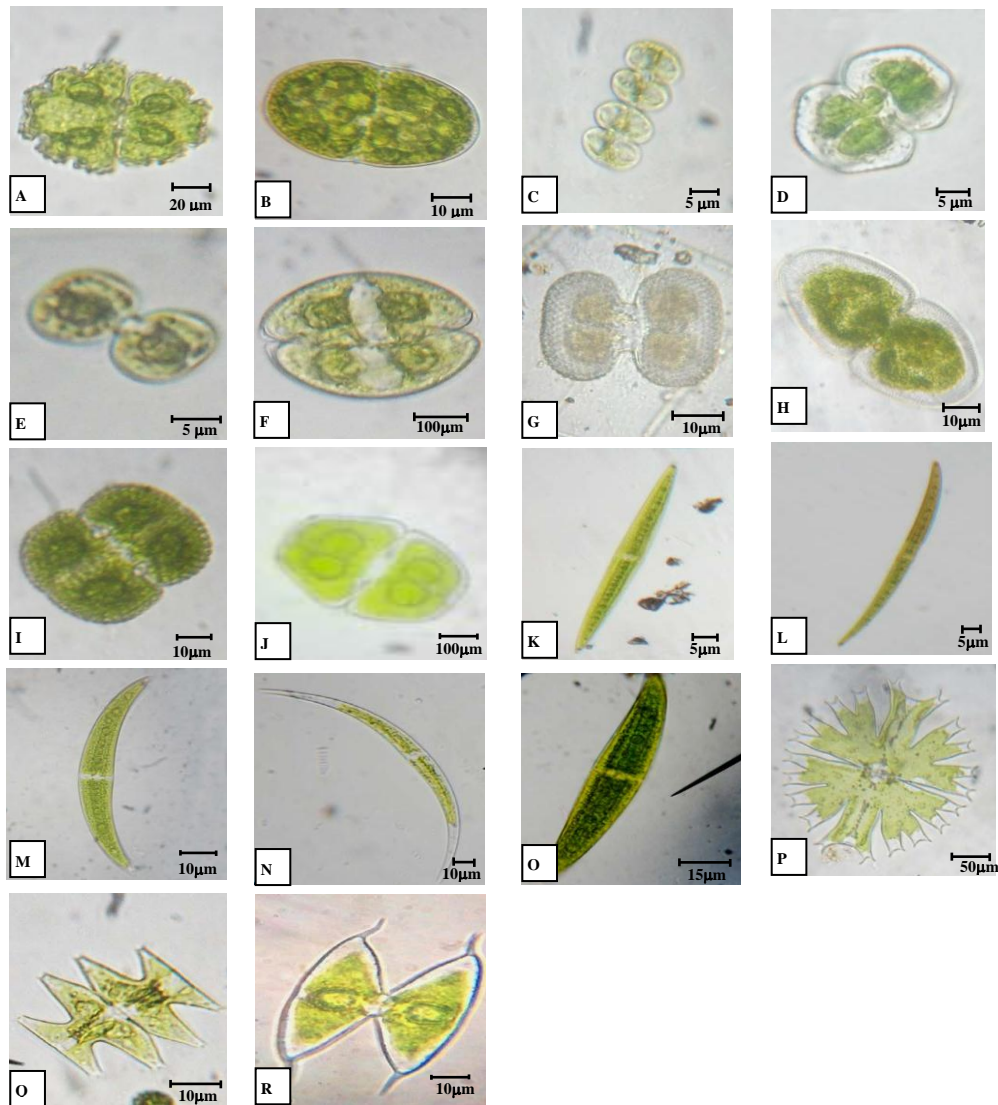


Figure 3. A. *Euastrum verrucosum*
 C. *Cosmarium depressum*
 E. *Cosmarium moniliforme*
 G. *Cosmarium portianum*
 I. *Cosmarium reniforme*
 K. *Closterium macerosum*
 M. *Closterium costatum*
 O. *Closterium pseudolunula*
 Q. *Micrasterias pinnatifida*

B. *Cosmarium cucumis*
 D. *Cosmarium hammeri*
 F. *Cosmarium obsoletum*
 H. *Cosmarium pyramidatum*
 J. *Cosmarium rociborskii*
 L. *Closterium attenuatum*
 N. *Closterium porrectum*
 P. *Micrasterias johnsonii*
 R. *Staurodesmus megacanthus*

Discussion and Conclusion

In this study, the algae flora with seasonal variation in Naung-yar Lake in Loikaw city was presented. The algal species grow abundantly in the study area. Some algae are attached to the stones and rocks and some are floating on the surface of water.

Bellinger and Sigeo (2010) reported that Cyanobacteria (blue-green algae) are remarkable within the prokaryote kingdom for showing the range of size and form.

Algae and Cyanobacteria are used as indicator of environmental condition in terms of individual species and communities (Bellinger and Sigeo, 2010). In the present study, many species of Desmidiaceae family are widely distributed in Naung-yar Lake (Table 2). These algae are highly diverse unicellular green algae that are primary producers in fresh water ecosystem and can serve biological indicators of the biological health of fresh water bodies (Coesel, 1996).

Bell & Hemsley (2000) stated that the order Desmidiales are typically unicellular and are conspicuous in the phytoplankton of oligotrophic meres. The cells have complex shapes and symmetry. The cell is divided into two halves, connected by isthmus. The nucleus usually lies in the isthmus. In *Cosmarium*, the central constriction is less conspicuous. In *Closterium*, the cells are narrowed toward the poles and slightly curved. These algae are mostly abundant in the whole season of Naung-yar Lake.

Nowadays, algae are widely used for many purposes all over the world such as medicine, functional food, aquaculture, cosmetics, bio fertilizer and biofuel. Many others countries become interested in large amount production of algae. In Myanmar, a plenty of beneficial algae are found naturally.

In conclusion, this study was targeted on morphological characters of each investigated species and we shall not attempt a complete morphological survey of these group. We expected that the results of the present study will provide precious and beneficial information for natural environmental conservation in Naung-yar lake.

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