

Some Species of Cyanophyta found in Phaungdaw Chetma Pond and Yanaung Myin Pond, Naypyitaw

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Abstract

Algae specimens were collected from two sampling sites of Phaungdaw Chetma Pond and Yanaung Myin Pond, Naypyitaw during the periods May 2017 to October 2018. This area is located in capital of Myanmar, to achieve the information of algae species and to get the knowledge of the fresh water algae in other researchers. All the collected specimens had been listed by the classification system of John *et. al* (2002). A total of 24 species belonging to 15 genera and 4 families, which were distributed under 2 orders in the class Cyanophyceae had been identified, described and recorded. Algae are much diverged and very applicable for the researchers like taxonomists, environmentalists and ecologists. Some of the cyanobacteria are toxic produces while blooming and there are well known as bio-indicators for conservation of ecological and environmental research works, some are very important nitrogen fixing from the air for the other plants groups. The present research work give the records of algae inventing support the information on distributed sites of individual species that interested to be looking for and contribute the information on systematic characterization in taxonomic study of algae in the future.

Key words: Cyanophyta (blue-green algae)

Introduction

Algae are abundantly everywhere except in sandy desert region and on permanent snow and ice fields, and even in these inhospitable regions specialized algal floras can be found in favourable habitats. The aquatic environment comprises some 70 per cent of earth's surface and here the algae are important as primary producers of elaborated organic material, and thus play a critical role in the economy of the seas and freshwaters. On the land they are important constituents of the flora of soils, moist rocks and stone surfaces. Along the coasts at the boundary between land and sea an extremely rich flora is found and here the large macrophytic forms reach their greatest abundance and diversity (Round, 1973).

The Cyanophyceae or blue-green algae are the only prokaryotic algae. They have chlorophyll a, phycobiliprotein, glycogen as a storage product, and cell walls with amino sugars and amino acids. The Cyanophyceae are more closely related to the prokaryotic bacteria than to the eukaryotic algae, a relationship that has led to a recent drive for the recognition of the term blue-green bacteria (cyanobacteria) instead of blue-green algae (Lee, 1980).

The Cyanophyta lack a nuclear envelope and mitochondria; their photosynthetic lamellae are single or unstacked and distributed peripherally in the cytoplasm and not with in a membrane-bounded chloroplast. Morphology ranges from unicellular to filamentous; many possess extensive mucilaginous sheaths. Specilized feature include the ability to fix atmospheric nitrogen (South & Whittick, 1987).

In this study, algae specimens and water samples were collected from two sites in the Yanaung Myin pond and Phaungdaw Chetma pond during a period May 2017 to October 2018. Yanaung Myin pond is situated Dekkhinathiri Township, position at latitude 19° 39' N and longitude 96° 07' E and the water body is approximately 130.0 m². It has pH was 7.6-8.0. Phaungdaw Chetma pond is located

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Naypyitaw Lewe, position at latitude 19° 37' and longitude 96° 06' E and the water body is approximately 190.2 m². It has pH was 8.1-8.3.

The present research work to give the records of algae inventing support the information on distributed sites of individual species that interested and to be looking for and contribute the information on systematic characterization in taxonomic study of algae in the future.

Materials and Methods

Study Area

Algal specimens and water samples were collected from the upper surface of Yanaung Myin pond and Phaungdaw Chetma pond during May 2017 to October 2018. It lies between Yanaung Myin pond is situated Dekkhinathiri Township, position at latitude 19° 39' N and longitude 96° 07' E and Phaungdaw Chetma pond is located Naypyitaw Lewe, position at latitude 19° 37' and longitude 96° 06' E. The location map of study area was shown in Figure 1 and sampling sites of Yanaung Myin pond and Phaungdaw Chetma pond, Naypyitaw were shown in Figure 2.

Collection of Algal Specimens

Algae samples were collected from upper surface of two sites in Yanaung Myin pond and Phaungdaw Chetma pond. 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 meter. The collected algal specimens were examined by using compound microscope (Olympus) in laboratory, Department of Botany, Shwebo University. The measurements of algae were taken by using micrometer and the images of them were recorded by digital camera. Algal populations were counted on Fuchs - Rosenthal haemocytometer by using microscope (Lavens & Sorgeloos, 1996).

Classification of Algae

The samples were identified on the thallus shape, size and colour, Some collected specimens had been listed by the classification system of John *et al.* (2002). The taxonomic description of algae has been done by the references, Prescott (1962), Komarek & Anagnostis (1985-1989), and John *et al.*, (2002).

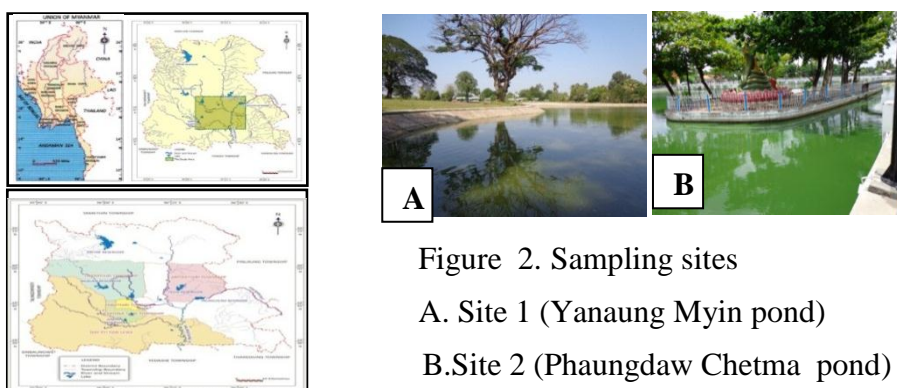


Figure 1. Location Map of Naypyitaw



Figure 2. Sampling sites

A. Site 1 (Yanaung Myin pond)

B. Site 2 (Phaungdaw Chetma pond)

Results

The samples of algae were collected from two sites in Yanaung Myin pond and Phaungdaw Chetma pond, Naypyitaw. The total algal species are found 24 species, 15 genera, 4 families and 2 orders of Cyanophyceae had been identified, described and recorded (Figure 3-5). The classification of algae, water temperature and pH were mentioned in Tables 1-2.

Table 1. Classification of Some Cyanophyta species found in Yanaung Myin pond and Phaungdaw Chetma pond

Division	Class	Order	Family	Genus	Species		
Cyanophyta	Cyanophyceae	Chroococcales	Chroococcaceae	<i>Aphanothece</i>	1. <i>Aphanothece microscopica</i> Nageli		
				<i>Chroococcus</i>	2. <i>Chroococcus prescottii</i> Drouet & Daily		
					3. <i>C. virgidis</i> (Kutzing) Nageli		
				<i>Merismopedia</i>	4. <i>Merismopedia elegans</i> Braun ex Kutzing		
					5. <i>M. tenuissima</i> Lemmermann		
				<i>Microcystis</i>	6. <i>Microcystis aeruginosa</i> Kutzing		
					7. <i>M. firma</i> (Kutzing) Schmidle		
					8. <i>M. flos-aquae</i> (Wittrock) Kirchner		
					9. <i>M. ichtyoblabe</i> Kutzing		
				Oscillatoriales	Oscillatoriaceae	<i>Lyngbya</i>	10. <i>Lyngbya cincinnata</i> (Itzigsohn) Compere
			<i>Lectolyngbya</i>			11. <i>Lectolyngbya thermobia</i> Anagnostidis	
			<i>Oscillatoria</i>			12. <i>Oscillatoria formosa</i> Bory	
						13. <i>O. limosa</i> (Koth) Agardh	
						14. <i>O. terebriformis</i> Agardh	
				Phormidiaceae	<i>Pseudanabaena</i>	15. <i>Pseudanabaena biceps</i> Bocher	
					<i>Planktothrix</i>	16. <i>Planktothrix agardhii</i> Gomont	
					<i>Spirulina</i>	17. <i>Spirulina gignea</i> Schmidle	
					<i>Arthrospira</i>	18. <i>Arthrospira maxima</i> Setchell & Gardner	
					<i>Anabaena</i>	19. <i>Anabaena flos-aquae</i> Berth in Born & Flash	
						20. <i>A. smithii</i> (Komarek) stat. nov	
						21. <i>A. vignieri</i> Denis et Fremy	
				Kivulariaceae	<i>Cylindrospermopsis</i>	22. <i>Cylindrospermopsis raciborskii</i> Wolosynska	
					<i>Gloeotrichia</i>	23. <i>Gloeotrichia echinulata</i> (Smith) Richter	
					<i>Kivularia</i>	24. <i>Kivularia minutula</i> (Kutzing) Bornet & Flahault	

Table 2. Water Temperatures (°C) and pH

Sampling Site	Temperature			pH		
	Rainy	Winter	Summer	Rainy	Winter	Summer
Yanaung Myin pond	28	24	37	7.6	7.9	8.0
Phaungdaw Chetma pond	29	25	36	8.1	8.2	8.3

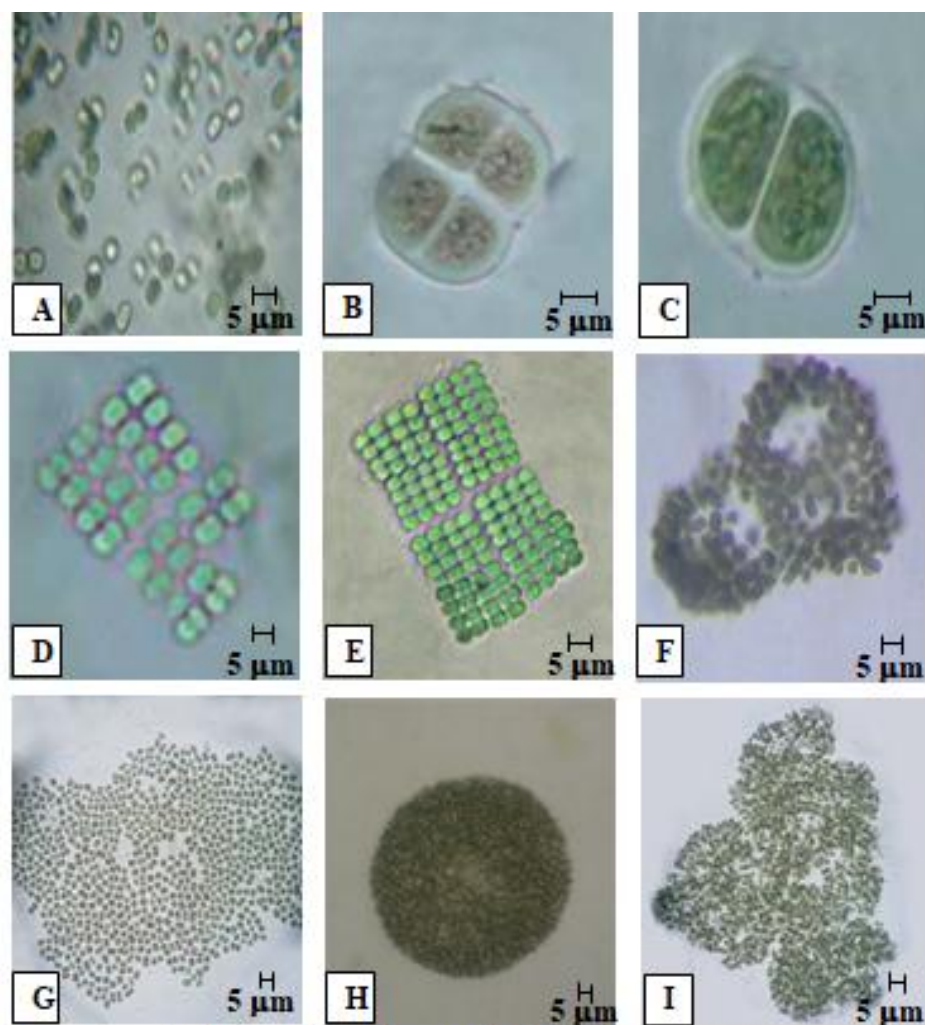


Figure 3. A. *Aphanothece microscopica* Nageli
 B. *Chroococcus prescottii* Drouet & Daily
 C. *C. turgidus* (Kutzing) Nageli
 D. *Merismopedia elegans* Braun ex Kutzing
 E. *M. tenuissima* Lemmermann
 F. *Microcystis aeruginosa* Kutzing
 G. *M. firma* (Kutzing) Schmidle
 H. *M. flos-aquae* (Wittrock) Kirchner
 I. *Michthyoblabe* Kutzing

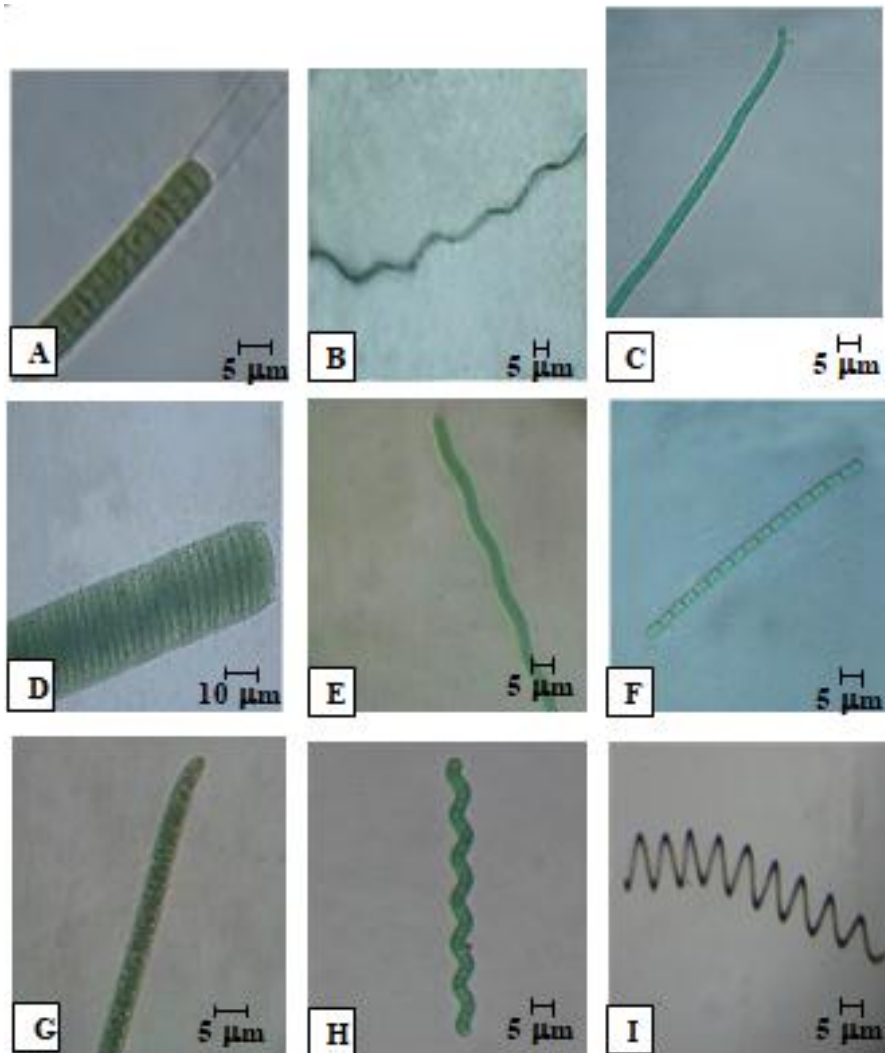


Figure 4. A. *Lyngbya cincinnata* (Itzigsohn) Compere
 B. *Lectolyngbya thermobia* Anagnostidis
 C. *Oscillatoria formosa* Bory
 D. *O. limosa* (Roth) Agardh
 E. *O. terebriformis* Agardh
 F. *Pseudanabaena biceps* Bocher
 G. *Planktothrix agardhii* Gomont
 H. *Spirulina gigantea* Schmidle
 I. *Arthospira maxima* Setchell & Gardner

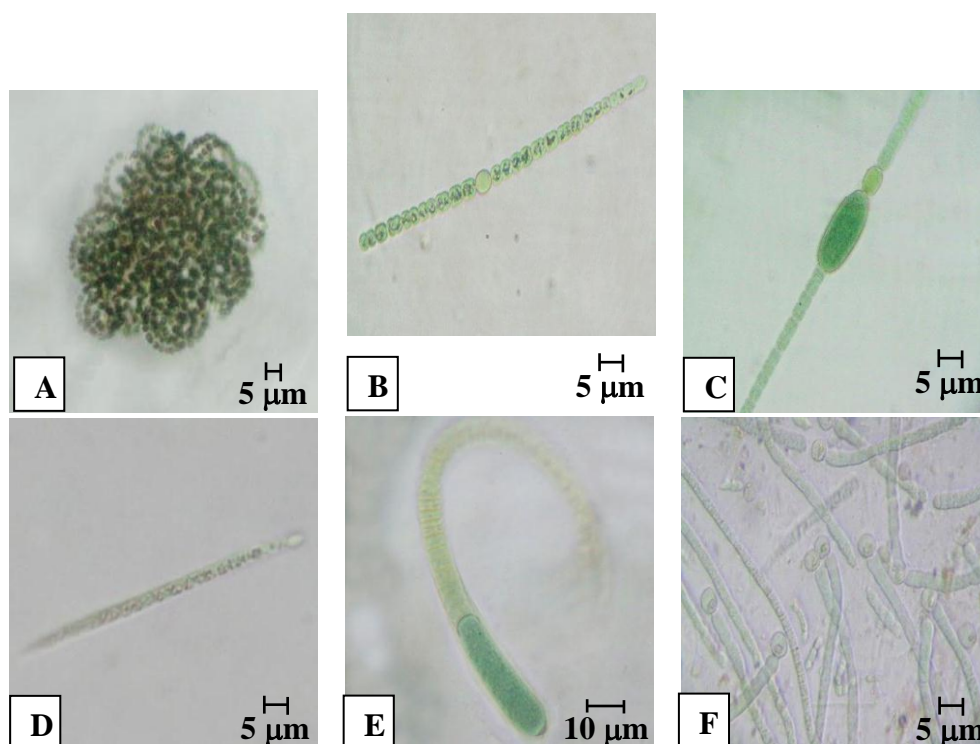


Figure 5. A *Anabaena flos-aquae* Berb in Born & Flash

B. *A. smithii* (Komarek) stat.nov

C. *A. viguieri* Denis et Fremy

D. *Cyndrospermopsis raciborskii* Wolosynska

E. *Gloeotrichia echinulata* (Smith) Richter

F. *Rivularia minutula* (Kutzing) Bornet & Flahault

Discussion and Conclusion

In the present study, the algal specimens observed were belonged to 24 species, 15 genera, 4 families, 2 orders, 1 class in the division Cyanophyta. The morphological characteristics of the species documented here are highly consistent with the description of Prescott (1962), Komarek & Anagnostis (1985-1989), and John *et al.*, (2002).

When the number of algal species assigned to respective orders was taken into consideration, it was displayed that Oscillatoriales comprised 62.5%, followed by Chroococcales 37.5%, each. The diversity of algae is mainly based on the environmental factors such as temperature and pH. In the studied area, the range of temperature was between from 24°C to 37°C, the pH value of water varied from 7.6 to 8.3.

Microcystis, *Anabaena*, *Lyngbya*, *Leptolyngbya*, *Oscillatoria* and *Cyndrospermopsis* were abundantly found in Phaungdaw Chetma pond and the rest members were commonly occurred. *Chroococcus*, *Merismopedia* and *Rivularia* were abundantly occurred in Yanaung Myin pond. Cyanophyta is well defined group of eubacteria. Cyanobacteria include unicellular and filaments forms, some having specialized cells. The simplest morphology in the cyanobacteria is that of unicells, free living or enclosed within a mucilaginous envelope. Subsequent evolution resulted in the formation of a row of cells called a trichome. When the trichome is surrounded by a sheath, it is called a filament (Robert, 2013).

Heaney (1971) has indicated that *Microcystis* and *Anabaena* may be the cause of cattle death of toxic species. Other toxin producing species which are *Anabaena*, *Lyngbya*, and *Oscillatoria* were reported by Heise (1951). In the case of the present study, *Anabaena*, *Lyngbya* and *Oscillatoria* are mostly found occurring in almost all locations especially nearby villages and agricultural fields. So, the water bodies with these species present may be toxic and not fit for drinking. Goel (1997) stated that the

algal growth in the bodies of water can be controlled by a number of ways depending upon the problems and the kinds of algae.

It may be concluded that, algae are much diverged and very applicable for the researchers like taxonomists, environmentalists and ecologists. Some of the cyanobacteria are toxic produces while blooming and there are well known as bio-indicators for conservation of ecological and environmental research works, some are very important nitrogen fixing from the air for the other plants groups.

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