

Some Species of Chrysophyta found in Zidaw Dam, Kyaukse Township, Mandalay Region

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Abstract

Algae specimens were collected from four sampling sites of Zidaw Dam, Kyaukse Township and Mandalay Region during the periods June 2017 to November 2018. This area is located in dry zone of Mandalay Region, to study the information of algae species and to know the knowledge of the algae in other researchers. All the collected specimens had been listed by the classification system of Smith (1950). A total of 18 species belonging to 18 genera and 8 families, which were distributed under 2 orders in the class Bacillariophyceae had been identified, described and recorded. Diatoms such as *Cytotella*, *Fragilaria*, *Syndra*, *Eunotia*, *Colonies*, *Gyrosigma*, *Mastogloria*, *Gomphoneis* and *Cymbella* were abundantly occurred in all stations of Zidaw Dam, in winter season and commonly found in summer season and raining season. Algae are much diverged and very applicable for the researchers like taxonomists, environmentalists and ecologists.

Key words: Chrysophyta

Introduction

The Bacillariophyceae are unicellular, sometimes colonial or pseudo-filamentous, microscopic algae. The principal accessory pigments are fucoxanthin, β -carotene, diadinoxanthin and diatoxanthin, and chrysolaminarin; in these respects the Bacillariophyceae most closely resemble the Chrysophyceae. Cells are uni-nucleate, and contain one or more chloroplast. They possess a silica exoskeleton (Frustules) consisting of two halves (valves), each composed of a more or less flattened plate with a connecting band attached to the edge. The two connecting bands are called the girdle. Certain pennate forms possess a slit-like raphe, which is associated with unique gliding motility (South & Whittick, 1987).

Diatoms are abundant in marine and freshwater habitats, in the benthos, and as epiphytes on large algae or higher plants. They fossilize readily, and extensive deposits dating back to the Cretaceous period are known. Diatomaceous earth has various commercial uses; in

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addition, stratigraphic analyses of deposits may indicate past environmental event in lakes (Round, 1957).

Freshwater diatoms are found in a wide variety of habitats, although the greater numbers of them are strictly aquatic. A few of these aquatic species are found only in the plankton of ponds and lakes, where during the spring and autumn they may be present in sufficient quantity to give the water a distinctly fishy odour (Smith, 1950).

Microscopically diatoms are readily recognized by their distinctive shapes of two general types: elongate, cigar-shaped (or open-like, thus pennate); they may be disk, drum-shaped or cylindrical (centric). The cell walls are siliceous and two separating halves, one, the epi-valve, overlapping the other, the hypo-valve, like a petri-dish (Vinyard, 1979).

The present study deals with the algal flora found in Zidaw Dam, Kyaukse Township and Mandalay Region. It lies between 21° 36' 03" and 21° 36' 05" N Latitude and 96° 08' 02" and 96° 08' 04" E Longitude. It is bounded on the east by Outchaint Quarter, on the west by Yisu Quarter, on the south by Ayemyathase Quarter, on the north by Kyetminton Quarter. It has an area of about 421.06 km².

Moreover, there was no record studied with algae in this area. Therefore, this becomes an interesting point to do a research on algae in these fields. As a result, totally 18 species belong to 18 genera, 8 families, 2 orders and classes of one division were observed in this research.

The aims of this study are to record the some species of algal found in Zidaw Dam and to provide the information of for those who are interested in managing and monitoring in application for other researchers.

Materials and Methods

Study Area

Water samples containing algae were collected from the upper surface of four sites in Zidaw Dam, Kyaukse Township, Mandalay Region during June 2017 to November 2018. It lies between 21° 36' 03" and 21° 36' 05" N Latitude and 96° 08' 02" and 96° 08' 04" E Longitude. The location map of four stations in study area was shown in Figure 1 and sampling sites Zidaw Dam, Kyukse Township, Mandalay Region were shown in Figure 2.

Collection of Algal Specimens

Algae samples were collected from upper surface of four sites in Pond of Zidaw Dam, Kyaukse Township, Mandalay Region. 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 Smith (1950). The taxonomic description of algae have been done by the references, Smith (1950), Vinyard (1979), Round *et al.*, (1990),) and John *et al.* (2002).

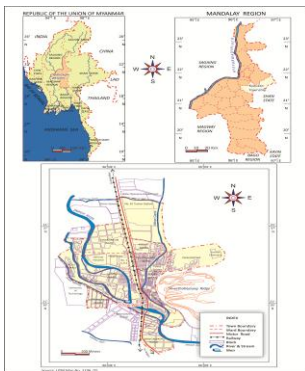


Figure 1 Location Map of Zidaw Dam, Kyaukse Township

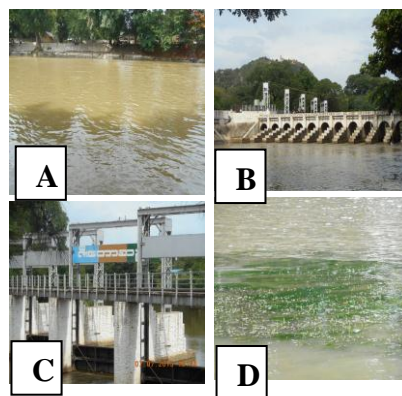


Figure 2 Sampling Sites of Zidaw Dam, Kyaukse Township
 A.Site 1 (East of Zidaw Dam)
 B. Site 2 (West of Zidaw Dam)
 C.Site 3 (South of Zidaw Dam)
 D.Site 4 (North Of Zidaw Dam)

Results

The samples of algae were collected from four sampling sites in Zidaw Dam in Kyaukse Township. The identified specimens were expressed. The total 18 species, 18 genera, 8 families belong to 2 orders of Bacillariophyceae had been identified, described and recorded (Figure 3-4). The classification of algae, water temperature and pH were mentioned in Table 1 - 2.

Table 1. Classification of Some Chrysophyta species found in Zidaw Dam, Kyaukse Township

Division	Class	Order	Family	Genus	Species		
Chrysophyta	Bacillariophyceae	Centales	Coscinodisceae	<i>Cyclotella</i>	1. <i>Cyclotella bodanica</i> Eulenst		
				<i>Melosira</i>	2. <i>Melosira binderana</i> Kutzing		
				<i>Fragilaria</i>	3. <i>Fragilaria pectinalis</i> (Muller.) Lyngbya		
		Pennales	Fragilariaceae	Eunotiaceae	<i>Grammatophora</i>	4. <i>Grammatophora angulosa</i> Ehrenberg	
					<i>Synedra</i>	5. <i>Synedra ulna</i> (Nitzsch) Ehrenberg	
					<i>Eunotia</i>	6. <i>Eunotia diadon</i> Ehrenberg	
				Naviculaceae	<i>Carpantogamma</i>	7. <i>Carpantogamma crucicula</i> (Grun ex. Cleve) Ross	
					<i>Caloneis</i>	8. <i>Caloneis amphisbaena</i> Bory	
					<i>Neidium</i>	9. <i>Neidium hitchcockii</i> (Ehrenberg) Cleve	
					<i>Diploneis</i>	10. <i>Diploneis finnica</i> (Ehrenberg) Cleve	
					<i>Gyrosigma</i>	11. <i>Gyrosigma spenceri</i> (Quekett) Cleve	
					<i>Mastogloia</i>	12. <i>Mastogloia smithii</i> var. <i>abnormis</i> Grunow	
					<i>Croticula</i>	13. <i>Croticula perrotettii</i> Grunow	
					Gomphonemaceae	<i>Gomphonema</i>	14. <i>Gomphonema vibrio</i> Ehrenberg
						<i>Gomphoneis herculeona</i> (Ehrenberg) Cleve	15. <i>Gomphoneis herculeona</i> (Ehrenberg) Cleve
						<i>Cymbella</i>	16. <i>Cymbella aspera</i> Swirensko
					Nitzschiaceae	<i>Nitzschia</i>	17. <i>Nitzschia linearis</i> (Agardh) Smith
					Surirellaceae	<i>Surirella</i>	18. <i>Surirella robusta</i> Ehrenberg

Table 2. Water Temperatures (°C) and pH

Sampling Site	Temperature			pH		
	Rainy	Winter	Summer	Rainy	Winter	Summer
Zidaw Dam (East)	26	23	30	7.4	7.7	7.8
Zidaw Dam (West)	27	24	31	7.3	7.5	7.9
Zidaw Dam (South)	26	24	32	7.2	7.6	7.8
Zidaw Dam (North)	25	23	33	7.3	7.6	7.7

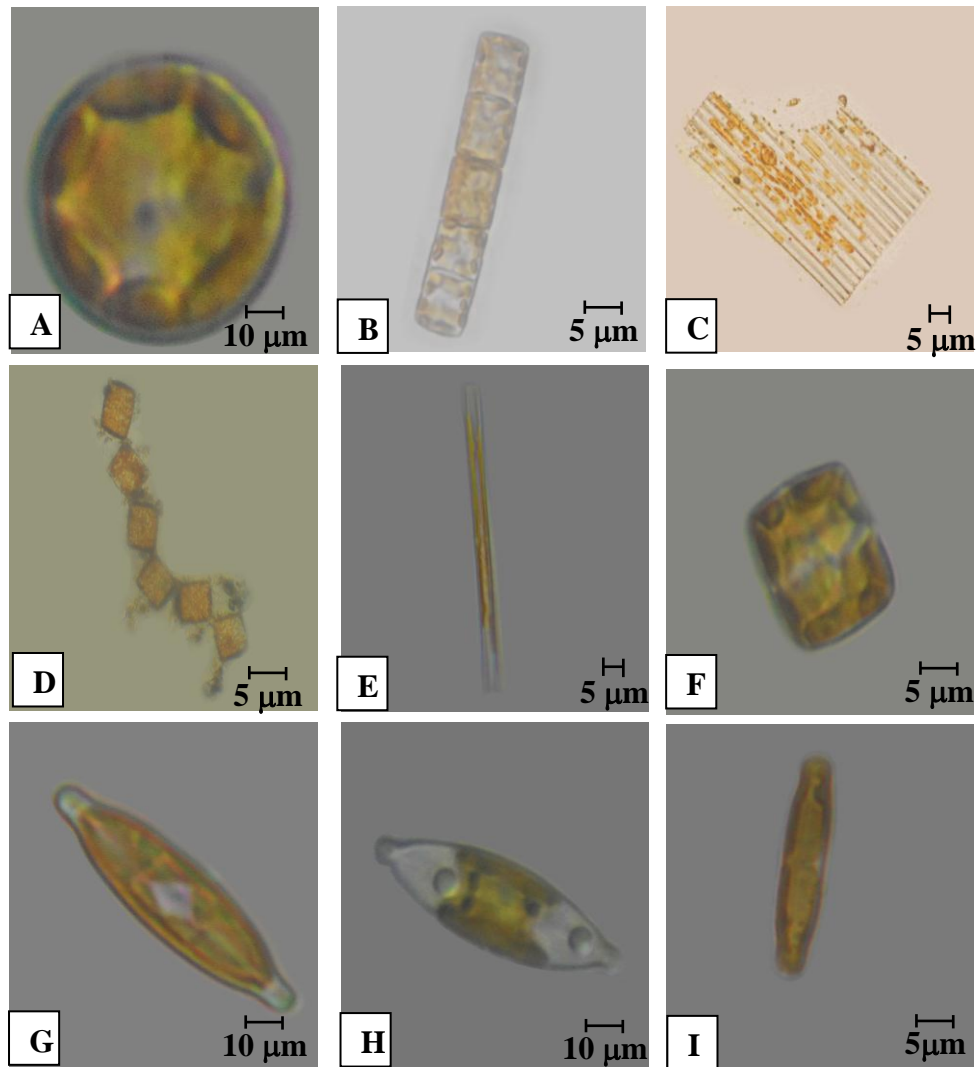


Figure 3. A. *Cyclotellabodanica* Eulenstein
 B. *Melosira binderana* Kutzing
 C. *Fragilaria pectinalis* (Muller.) Lyngbya
 D. *Grammatophora angulosa* Ehrenberg
 E. *Synedra ulna* (Nitzsch) Ehrenberg
 F. *Eunotiadiadon* Ehrenberg
 G. *Carpatogiammacrucicula* (Grun ex. Cleve) Ross
 H. *Caloneis amphisbaena* Bory
 I. *Neidium hitchcockii* (Ehrenberg) Cleve

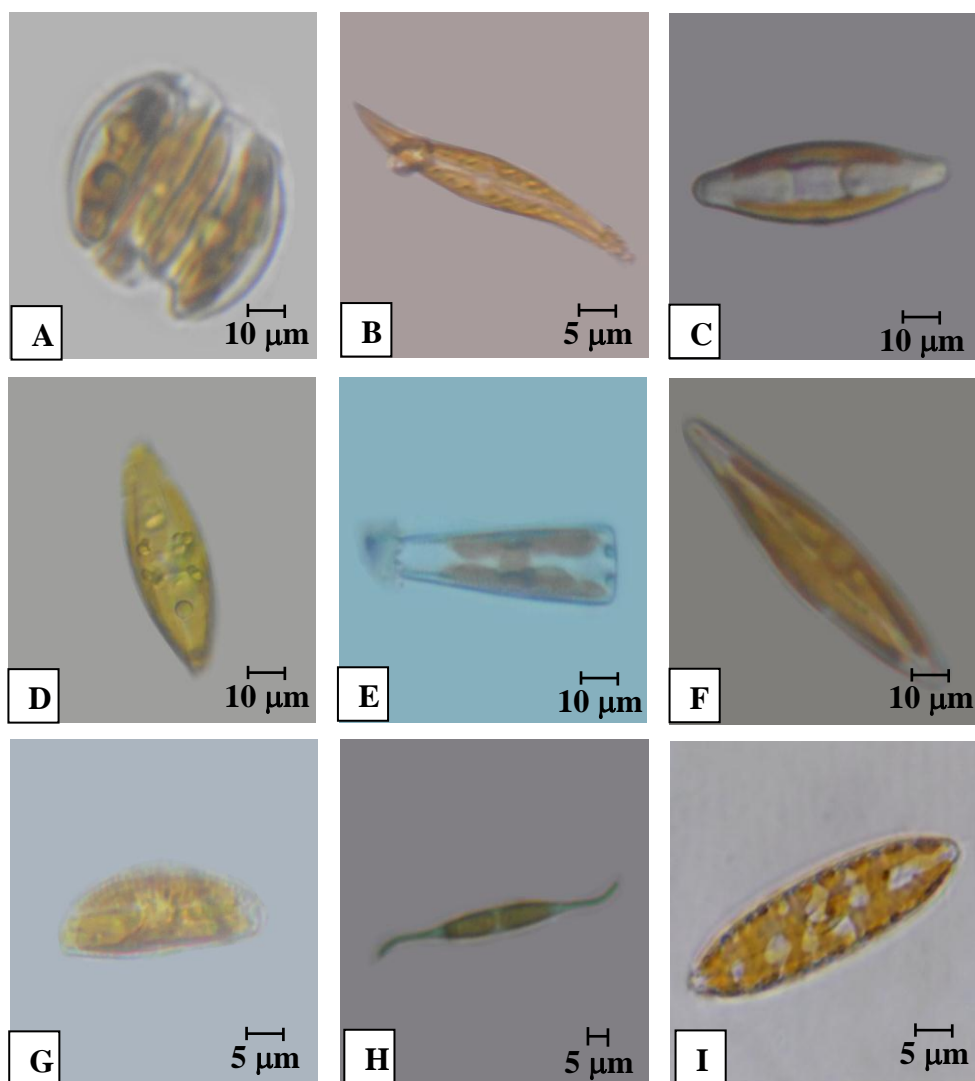


Figure 4. A. *Diploneis finnica*(Ehrenberg) Cleve
 B. *Gyrosigma panceri*(Quekett) Cleve
 C. *Mastogloia smithii* var. *abnormis* Grunow
 D. *Croticula perrotettii* Grunow
 E. *Gomphonema vibrio* Ehrenberg
 F. *Gomphoneis herculeona*(Ehrenberg) Cleve
 G. *Cymbella aspera* Swirensko
 H. *Nitzschia linearis*(Agardh) Smith
 I. *Surirella robusta* Ehrenberg

Discussion and Conclusion

In the present study, algae samples were collected from Zidaw Dam, Kyaukse Township. In the study, all of the collected species belonging to 18 species, 18 genera, 8 families, 2 orders of Bacillariophyceae were observed.

According to Bellinger and Sigeo (2010), diatoms in many temperate lakes, such as *Cyclotella*, *Fragilaria*, *Syndra*, *Eunotia*, *Calonies*, *Gyrosigma*, *Mastogloia*, *Gomphoneis* and *Cymbella* dominate the phytoplankton population in spring and early summer. Diatoms were abundantly occurred in Eastern, Western, Southern and Northern part of Zidaw Dam in winter. Thus, this finding is in agreement with Bellinger and Sigeo (2010).

The diatoms have greatly been used as environmental indicators (Petrick, 1997). Pennate diatoms were commonly found in non-polluted conditions (Nygaard, 1949). They are commonly found in all the sampling sites of the present study.

Diatoms occur in the sea, in freshwater, on damp rocks, or on soil. A few species are soil algae, which grow actively when the soil is damp but can tolerate extreme drought or warmth for sometimes, surviving as dormant resting stages (Hoek *et al.* 1995). In the present study, diatoms live in the freshwater lakes, ponds, streams and rivers can be found abundantly throughout the study period. Therefore, it can be said that these observations are in agreement with Hoek *et al.*, (1996).

Chrysophyta commonly referred to as the golden algae, is recognized by their golden brown colour. There are around 200 genera, present mainly in freshwater although found in brackish and salt water (Bellinger *et al.*, 2010). Hoek *et al.*, (1995) expressed that the division of Chrysophyta contains over 250 genera of living diatoms.

Diatom cells are contained within a unique silica cell wall comprising two separate. The unicellular diatoms are very common, are often abundant and are easily recognized by their highly ornamented siliceous cell walls. The pennate (bilaterally symmetrical) forms are usually benthic on soil, mud and other submerged surfaces and especially common epiphytes on aquatic vascular plants and other algae (Lembi, 1988). In the present study, the habitats of diatoms are benthic on soil, mud and epiphytes on aquatic vascular plants. Therefore, it can be said that these observations are in agreement with Lembi (1988). According to Smith (1950), some Bacillariophyceae have become sufficiently acclimated to the waters of river, lakes and ponds to warrant inclusion among the thermal algae. In the present study, some diatoms such as *Fragilaria* were abundantly found in four sites of Zidaw Dam. Zidaw Dam water temperature was 25°C-27°C in rainy season, 23°C-24°C in winter season and 30°C-33°C in summer season. Therefore, these observations were in agreement with the statement of Smith (1950).

In the present study, pennate diatoms were found abundantly in all sampling sites and centric diatoms were rarely found. Two species of centric and sixteen species of pennate diatoms were observed in the study area. Some members of algae e.g. Chlorophyta, euglenoids and cyanobacteria were also detected in the course of microscopic observation; indicating that further studies are required to describe the remaining taxa in Zidaw Dam.

Acknowledgements

I would like to convey my gratitude to Dr Khin Hnin Yee, Professor and Head, Department of Botany, Shwebo University. I would like to express my thanks to Dr Nilar, Professor, Department of Botany, Shwebo University.

References

- Bellinger, E. G. & D.C. Sige. 2010. Freshwater Algae, identification and use as bioindicators, environmental science and policy, Central European University, Hungary.
- Hoek, van den. C., D.G. Mann & H.M. Jahns. 1995. Algae: An Introduction to Phycology, Cambridge University Press, Cambridge, U.K.
- Lavens, P. & P. Sorgeloos. 1996. Manual on the production and use of live food for Aquaculture. FAO. Rome. United Nation.
- Lembi, C.A. & J.R. Waaland. 1988. Algae and Human Affairs. Cambridge University Press. Cambridge.
- Nygarrd, G. 1949. Hydrobiological studies of some Danish ponds and lakes, II. The quotient hypothesis and some new or little known phytoplankton organisms, K. Danske. Viedersk. Selsk. Skr., 7 (1) : 1 - 293.
- Patrick, R. 1977. Ecology of freshwater diatoms and diatom communities. In the Biology of Diatoms, ed. D. Werner, pp. 284-322. Blackwell, Oxford.
- Round, F.E. 1973. The biology of the Algae., 2nd ed, Edward Arnold London.
- Round, J.A., Crawford, R.M. & Mann, D.G. 1990. The Diatoms, Biology and Morphology of the Genera. Cambridge University Press. Cambridge.
- Smith, G. M. 1950. Freshwater Algae of the United State 2nd ed, the Mc Grauo Hill Book Company.
- South, G. & A. Whittick, 1987. An Introduction to Phycology. Blackwell. Scientific Publications, Cambridge University.
- Vinyard, W.C. 1979. Diatoms of the North America. Eureka Printing Company, Inc. Eureka, California.