First report on phytoplankton communities of Barishal City, Bangladesh

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ABSTRACT

Phytoplanktons, also called microalgae, are microscopic photosynthetic living organisms that generally found in aquatic environments. Although they are considered as the most important primary producers and bioindicators of aquatic ecosystems, there was no previous report found for Barishal City about these tiny organisms. Consequently, the present study selected 10 freshwater reservoirs from the city to investigate phytoplankton communities and listed 110 taxa under 4 phyla, 7 classes, 18 orders, 24 families and 49 genera. The distribution of Chlorophytes was abundant relatively in terms of species number (45 taxa) followed by Euglenophytes, Chlorophytes and Cyanophytes in this area. Only Euglenaceae possessed one-third of the total species of this report. Among all stations, the highest number of taxa was recorded from station 2 and according to nine biodiversity indices, the station 2 and 9 showed comparatively good results. All of the recorded taxa were previously mentioned by different authors from Bangladesh.

KEYWORDS: Phytoplankton, Microalgae, Scenedesmus abundans, Barishal and Bangladesh

INTRODUCTION

Algae are considered as sole primary producers in oceans [1] and one of the most important primary producers in freshwater ecosystems. The term ‘phytoplankton’ also called microalgae is generally referred to mean microscopic algae to cyanobacteria, and they provide a major share of oxygen in an aquatic ecosystem. Besides, they serve as foods, fertilizers and considered as an effective bio-indicator for fishing as well as assessing water quality. Furthermore, several bioactive compounds have been extracted from phytoplankton, which have the properties of antioxidant, anti-inflammatory, anticancer, and antiviral medicines [2]. Thus, phytoplankton have been considered as an alternate of synthetic dietary supplements for treatments of many human diseases [3]. And for their high lipid content per cell, rapid growth rate, biodegradable, renewable and environment-friendly natures, they have been regarded as a prospective source of biofuel to reduce the use of terrestrial food crops for biofuel production in future [4].

Barishal is one of the oldest beautiful municipal with a large number of freshwater reservoirs and the second largest river ports of Bangladesh. The City is located in the southern part of this country and lies on the bank of Kirtankhola River. The area of the City is 24.91 km² located in between 22°38’ and 22°45’ north latitudes as well as 90°18’ and 90°23’ east longitudes [5]. As the City is expanding, several industries are operating already near to many ponds or lakes and thus the water is being polluted by waste dispersal and leakages. To assess the water quality of the area, phytoplankton would be the most important bio-indicators and sometimes they would be far better than other parameters. Moreover, to measure biodiversity of any region phytoplankton must be included as a large group of aquatic microorganisms. Some previous investigations were done on the phytoplankton communities from Barishal divisional region, such as Pirojpur district [6] and Bakerganj upazila of Barishal district [7]. But there were no available reports found on phytoplankton communities of Barishal City.

Diversity of freshwater phytoplanktons is highly complex in an aquatic environment because diversity consists of two components, the variety and the relative abundance of species. Even ecologists set many indices to measure diversity and it is obviously an important tool for measuring the species status of an area. Therefore, the main goal of this work was recording phytoplankton species of Barishal City with their distribution and diversity. Moreover, outcome of the study would be helpful...
to analyze the water quality, environment pollutions, and biodiversity of this region.

MATERIALS AND METHODS

Study Area

The survey was carried out between September 2019 and January 2020 from 10 stations (St.) of Barishal City (Figure 1). The stations were Rupatali Pond (1), Rupatali Lake (2), DC Office Pond (3), DC Lake (4), Gol Pukur (5), Kalushah Sarak Pond (6), Kawnia Road Pond (7), Notun Bazar Pond (8), College Road Pond (9) and Nazrul Islam Sarak Pond (10).

Samples Collection

Samples (1L water) were collected between 7 to 10 am from each station. They were collected from the surface layer of 10 to 50cm depth with Ruttner water sampler and fixed with 4% neutral formalin before transferring to graduated cylinders (1L capacity). Then added a few drops of Lugol’s solution and left for 48 hours to sediment. The supernatant water was then siphoned until the sample was concentrated to 100 ml. Finally, the sediment was examined under a light microscope (100x magnification) equipped with digital camera for photographing, recording and measuring.

Taxonomy & Identification

Identification and enumeration were done by a binocular microscope. And as literatures, Bellinger and Sigee [8], Ahmed et al. [9], Islam and Alfasane [10], Islam and Moniruzzaman [11], and Smith [12] were followed to confirm identification. Moreover, the presented taxonomic arrangements and classifications were prepared based on Robert Edward Lee [13], but in some special cases Komárek and Fott [14], and Bold and Wynne [15] were consulted.

Distribution & Diversity Measurement

The frequency was counted by using haemocytometer based on the percent occurrence of an individual species to refer species distribution. The rare and the dominant species were indicated following the resulted frequency. The phytoplanktons were expressed as organisms per ml for the purpose of calculating diversity indices and the data were subjected to a software program PAST which generates nine diversity indices (Dominance index, Shannon index, Simpson index, Pielou’s index, Menchinick’s index, Margalef’s index, Equitability index, Fisher alpha index and Berger-Parker’s Dominance Index).

RESULTS

A total of 110 taxa including 16 prokaryotic and 94 eukaryotic phytoplanktons were recorded from the City. They were found belonging to the four major phyla Cyanophyta, Chlorophyta, Heterokontophyta and Euglenophyta within 49 genera, 24 families, 18 orders and 7 classes. The Chlorophytes were found dominantly in terms of the percentage of taxa present in the study (41%), while the Cyanophytes and Heterokontophytes were less dominant comparatively (Figure 2). All taxa of the survey were listed in the table 1 with their brief description and distribution. Then the taxonomic classifications were presented in the table 2. The classifications were arranged following alphabetic orders and all prokaryotes were presented first following the eukaryotes. The habits found in the study were colonial, filamentous, aggregated, coenobial and solitary. The listed phytoplanktons were spherical, oval, square, round, conical, disk, curved, crescent, spindle, elliptical, leaf, triangular, drum, boat, needle, horn, linear, and fusiform shaped. And, their cell size ranges from 1.5×2 to 21×95 μm.
| No. | Name                        | Habit (Cell) | Shape (Cell) | Size (µm) | Distribution (Frequency) |
|-----|-----------------------------|--------------|--------------|-----------|-------------------------|
| 1   | Closterium kuetzingii       | Colonial     | Spherical    | 1.5×2     | 0                       |
| 2   | Closterium setaceum         | Solitary     | Spherical    | 12×9      | 0                       |
| 3   | Closterium secalis          | Solitary     | Spherical    | 14×20     | 0                       |
| 4   | Closterium subulatum        | Solitary     | Spherical    | 21×9      | 0                       |
| 5   | Closterium tumidum          | Solitary     | Spherical    | 17×19     | 0                       |
| 6   | Closterium portianum        | Solitary     | Spherical    | 20×22     | 0                       |
| 7   | Closterium rostratum        | Solitary     | Spherical    | 8.5×12    | 0                       |
| 8   | Closterium sphaericum       | Solitary     | Spherical    | 16×90     | 0                       |
| 9   | Closterium sphaericum       | Solitary     | Spherical    | 18×85     | 0                       |
| 10  | Closterium sphaericum       | Solitary     | Spherical    | 20×90     | 0                       |
| 11  | Closterium sphaericum       | Aggregated   | Crescent     | 13×95     | 0                       |
| 12  | Closterium sphaericum       | Aggregated   | Crescent     | 13×95     | 0                       |
| 13  | Closterium sphaericum       | Aggregated   | Crescent     | 14×20     | 0                       |
| 14  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 15  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 16  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 17  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 18  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 19  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 20  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 21  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 22  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 23  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 24  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 25  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 26  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 27  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 28  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 29  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 30  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 31  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 32  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 33  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 34  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 35  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 36  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 37  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 38  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 39  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 40  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 41  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 42  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 43  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 44  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 45  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 46  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 47  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 48  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 49  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 50  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 51  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 52  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 53  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 54  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 55  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 56  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 57  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 58  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 59  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 60  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 61  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 62  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 63  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 64  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
| 65  | Closterium sphaericum       | Aggregated   | Crescent     | 9.0×40    | 0                       |
Table 1: (Continued)

| No. | Name             | Habit (Cell) | Shape (Cell) | Size (µm) | Distribution (Frequency) |
|-----|------------------|--------------|--------------|-----------|--------------------------|
| 66  | Euglena geniculata | Solitary     | Spindle      | 4.0×15    | St.1 11 0 0 2 10 0 3 0 0 |
| 67  | Euglena granulata | Solitary     | Spindle      | 4.0×14    | St.2 0 0 0 0 0 0 0 2 0 0 |
| 68  | Euglena pisciformis | Solitary   | Spindle      | 4.5×65    | St.3 0 0 0 0 0 3 1 0 |
| 69  | Euglena polymorpha | Solitary     | Spindle      | 8.5×75    | St.4 0 0 0 0 0 0 0 0 0 0 |
| 70  | Euglena proxima   | Solitary     | Curved       | 11×55     | St.5 5 0 1 1 0 0 0 0 0 0 |
| 71  | Euglena sociabilis| Solitary     | Spindle      | 7.0×75    | St.6 1 0 0 0 1 0 0 0 0 7 |
| 72  | Euglena spirigera | Solitary     | Curved       | 12×70     | St.7 0 1 4 5 0 0 0 0 1 0 0 |
| 73  | Euglena triptera  | Solitary     | Spindle      | 11×65     | St.8 0 0 0 0 6 0 2 0 2 |
| 74  | Euglena variabilis| Solitary     | Oval         | 21×77     | St.9 1 2 1 0 0 0 0 2 0 0 |
| 75  | Lepocinclis acuta | Solitary     | Oval         | 8×95      | St.10 4 1 0 0 0 0 0 0 0 1 0 4 |
| 76  | Lepocinclis ovum  | Solitary     | Spherical    | 14×19     | St.1 0 0 0 0 0 0 0 0 0 1 0 |
| 77  | Lepocinclis playfairiana | Solitary | Spherical | 15×19 | St.2 0 0 0 0 2 0 0 0 0 3 |
| 78  | Lepocinclis sphagnophila | Solitary | Spindle      | 7×8.5 | St.3 0 0 0 0 3 0 0 0 0 4 |
| 79  | Lepocinclis teres  | Solitary     | Oval         | 7.5×9     | St.4 1 1 0 5 0 0 0 0 0 4 |
| 80  | Lepocinclis texta | Solitary     | Oval         | 14×35     | St.5 0 0 1 1 0 0 0 0 0 4 |
| 81  | Phacus acuminatus | Solitary     | Leaf         | 30×40     | St.6 0 0 4 0 0 0 0 0 0 0 |
| 82  | Phacus caudatus   | Solitary     | Leaf         | 11×25     | St.7 0 0 0 0 1 0 0 1 2 0 |
| 83  | Phacus curvicauda | Solitary     | Leaf         | 35×65     | St.8 0 2 0 0 2 1 0 0 0 0 |
| 84  | Phacus densi     | Solitary     | Leaf         | 30×40     | St.9 0 0 0 0 2 0 0 0 0 0 |
| 85  | Phacus hamatus   | Solitary     | Oval         | 9×15      | St.10 0 0 4 5 0 0 0 0 0 1 1 |
| 86  | Phacus pseudonordstedii | Solitary | Oval          | 11×19 | St.1 0 0 1 0 0 0 2 0 0 |
| 87  | Strombomonas gibberosa | Solitary | Oval         | 15×19     | St.2 1 0 0 0 4 1 0 0 0 0 |
| 88  | Trachelomonas granulosa | Solitary | Spherical    | 11×18     | St.3 0 0 0 0 5 0 3 0 0 1 |
| 89  | Trachelomonas hispida | Solitary | Spherical    | 18×28     | St.4 0 0 0 0 4 0 0 0 0 0 |
| 90  | Trachelomonas oblonga | Solitary | Elliptical   | 7.5×16    | St.5 0 0 3 0 1 0 0 0 0 0 0 |
| 91  | Trachelomonas pulcherrima | Solitary | Spherical    | 10×20     | St.6 0 0 0 0 1 2 0 0 0 6 |
| 92  | Trachelomonas pusilla | Solitary   | Elliptical   | 11×14     | St.7 0 0 1 2 0 1 0 0 0 0 |
| 93  | Trachelomonas robusta | Solitary     | Spherical    | 21×29     | St.8 0 0 1 0 0 0 0 0 0 0 0 |
| 94  | Melosira granulata | Colonial     | Spherical    | 8×14      | St.9 0 0 8 5 0 0 0 0 0 0 0 |
| 95  | Melosira varians | Colonial     | Spherical    | 10×21     | St.10 0 0 3 0 0 0 0 0 0 0 0 |
| 96  | Gymnophora lanceolatum | Solitary         | Leaf         | 13×45     | St.1 0 0 1 1 0 4 0 0 0 0 0 |
| 97  | Gymnophora subtile | Solitary     | Leaf         | 13×37     | St.2 1 0 0 0 0 4 4 0 1 1 1 |
| 98  | Nitzschia acicularis | Solitary     | Needle       | 5×0.40    | St.3 0 0 0 5 5 0 0 0 0 0 0 |
| 99  | Nitzschia longissima | Solitary     | Needle       | 4.5×30    | St.4 0 0 0 3 0 0 0 3 0 0 0 |
| 100 | Nitzschia uvea | Solitary     | Boat         | 21×60     | St.5 0 0 0 0 0 2 0 0 0 0 0 |
| 101 | Navicula exiguia | Solitary     | Elliptical   | 7.5×21    | St.6 0 0 3 0 0 0 0 0 0 0 2 0 |
| 102 | Navicula meniscus | Solitary     | Boat         | 6.5×26    | St.7 0 0 0 0 0 0 0 0 0 9 0 |
| 103 | Pinnularia acrosphaeria | Solitary | Boat         | 11×82     | St.8 0 0 6 0 0 2 0 0 1 0 0 |
| 104 | Pinnularia acuminata | Solitary     | Elliptical   | 23×95     | St.9 0 0 5 0 0 0 0 0 0 0 0 0 |
| 105 | Pinnularia tabellaris | Solitary | Elliptical   | 16×85     | St.10 0 0 0 0 0 0 0 0 0 3 0 |
| 106 | Cyclotella comensis | Solitary | Round        | 8.5×11    | St.1 0 0 5 0 0 0 0 0 0 0 |
| 107 | Cyclotella comta | Solitary     | Drum         | 10×18     | St.2 0 0 4 0 0 0 0 0 1 0 0 |
| 108 | Cyclotella stelligera | Solitary     | Round        | 8.0×12    | St.3 0 0 1 0 0 0 2 0 0 0 0 0 |
| 109 | Gonyostomum semen | Solitary     | Oval         | 28×48     | St.4 3 0 0 0 0 0 0 0 0 1 0 |
| 110 | Synura ovellia | Solitary     | Spherical    | 7×8.5     | St.5 0 0 4 0 1 1 0 0 0 0 0 |

Table 3 showed the nine diversity indices of phytoplankton found in the 10 stations of Barisal City. In case of dominance index, the highest value was found in Station 8 and 9 (0.08) and the least in Station 2 (0.04). In terms of Simpson index, it was ranges from 0.92 to 0.96 among the all stations. Station 2 showed highest value by Shannon index and Equitability index, while Shannon index was lowest in Station 8 and a 0.05. Pielou’s index is a measure of diversity that quantifies how equal the community is numerically, and the value was highest was for the first Station and 2 (0.77), while it was lowest in Station 4 (0.65). Menhinick’s index was low (2.32) in Station 7 and high in Station 9 (3.54). Similarly Margalef’s index showed higher value in Station 2 (7.41) and lower value in Station 8 (5.12). Moreover, Fisher’s alpha index and Berger- Parker index was highest in Station 9, but lowest in Station 7 and 2 respectively.

**DISCUSSION**

The Barisal City has numerous freshwater reservoirs but for the survey this experiment selected 10 reservoirs as sampling stations which were relatively old and large. And the stations demonstrated a rich number of phytoplanktons throughout the investigation. In terms of species number and percentage, the occurrence of Chlorophyta was dominant followed by Euglenophyta, Heterokontophyta and Cyanophyta, which indicated this group of green algae was common in this City (Figure 2). On the other hand, among the families the highest richness was represented by Euglenaceae (32 Taxa)
Table 2: Position of each taxon in the taxonomic classification

| Domain       | Phylum     | Class            | Order            | Family            | Taxa |
|--------------|------------|------------------|------------------|-------------------|------|
| Prokaryotes  | Cyanophyta | Cyanophyceae     | Chroococcales    | Chroococaceae     | 1-11 |
|              |            |                  | Nostocales       | Nostocaceae       | 12-13|
|              |            |                  | Oscillatoriales  | Oscillatoriaceae  | 14   |
|              |            |                  | Chlorellales     | Chlorellaceae     | 15-16|
|              |            |                  |                  | Oocystaceae       | 17-18|
| Eukaryotes   | Chlorophyta| Charophyceae     | Charales         | Characiaceae      | 19-24|
|              |            |                  | Desmidiales      | Closteriaceae     | 25-30|
|              |            |                  | Zygmematales     | Zygmemetaceae     | 31   |
|              |            |                  | Chaetopeltidiales| Chaetopeltidaceae | 32-36|
|              |            |                  | Chlorophyceae    | Chlorellaceae     | 37-40|
|              |            |                  |                  | Scenedesmaceae    | 41   |
|              |            |                  |                  | Selenastraceae    | 42-50|
|              |            |                  |                  | Bacillariaceae    | 51-53|
|              |            |                  |                  | Melosiraceae      | 54-55|
|              |            |                  |                  | Chlamydomonadaceae| 56-59|
|              |            |                  |                  | Volvocaceae       | 60-61|
|              | Euglenophyta| Euglenophyceae   | Euglenales       | Euglenaceae       | 62-93|
|              | Heterokontophyta| Bacillariophyceae| Biddulphiales    | Melosiraceae      | 94-95|
|              |            |                  | Cymbellales       | Gomphonemataceae  | 96-97|
|              |            |                  | Pinnales          | Bacillariaceae    | 98-99|
|              |            |                  | Naviculaceae      |                   | 100-105|
|              |            |                  |                   |                   | 106-108|

Table 3: Diversity indices of phytoplankton of Barishal City during the study period among the 10 stations

| Indices          | St.1 | St.2 | St.3 | St.4 | St.5 | St.6 | St.7 | St.8 | St.9 | St.10 |
|------------------|------|------|------|------|------|------|------|------|------|-------|
| Taxa_S           | 31   | 37   | 36   | 36   | 28   | 30   | 27   | 24   | 24   | 37    |
| Individuals      | 110  | 129  | 126  | 118  | 89   | 131  | 136  | 89   | 46   | 152   |
| Dominance index  | 0.06 | 0.04 | 0.05 | 0.06 | 0.06 | 0.07 | 0.06 | 0.08 | 0.08 | 0.05  |
| Simpson index    | 0.94 | 0.96 | 0.95 | 0.94 | 0.94 | 0.93 | 0.94 | 0.92 | 0.92 | 0.95  |
| Shannon index    | 3.06 | 3.35 | 3.25 | 3.15 | 3.02 | 2.99 | 2.99 | 2.80 | 2.91 | 3.28  |
| Menhinick's index| 2.96 | 3.26 | 3.20 | 3.31 | 2.97 | 2.62 | 2.32 | 2.54 | 3.54 | 3.00  |
| Margalef's index | 6.38 | 7.41 | 7.24 | 7.34 | 6.02 | 5.95 | 5.30 | 5.12 | 6.00 | 7.17  |
| Equitability index| 0.89 | 0.93 | 0.91 | 0.88 | 0.91 | 0.88 | 0.91 | 0.88 | 0.92 | 0.91  |
| Fisher's alpha index| 14.36 | 17.35 | 16.84 | 17.65 | 14.05 | 12.17 | 10.11 | 10.79 | 20.25 | 15.57 |
| Berger-Parker index| 0.16 | 0.09 | 0.10 | 0.15 | 0.10 | 0.13 | 0.12 | 0.16 | 0.20 | 0.10  |

followed by Chroococcales (11 Taxa), Scenedesmaceae (9 Taxa), Zygmematales (6 Taxa), Closteriaceae (6 Taxa) and Chlorellaceae (5 Taxa). Among all taxa, Scenedesmus was mostly frequent genus in Chlorophyta, while *Merismopedia* in Cyanophyta, *Euglena* in Euglenophyta, and *Navicula*, *Pinnularia*, *Cyclotella* were in Heterokontophyta. Furthermore, as a single genus, *Euglena* possessed the highest number of taxa (13) throughout the survey, while the 27 genera reported with only single species.

Diversity measurements have many potential applications in any aquatic ecosystems as part of the ecological study. In this investigation, Station 8 and 9 indicates the more dominancy by species number than the other stations. And, the species abundance was found highest in the Station 2 according to Simpson and Shannon diversity index. As the evenness or Pielou’s index means how equal the community is numerically in an ecosystem, Station 2 and 9 showed greater results over the others. According to Menhinick’s index, Fisher alpha index and Berger-Parker index, the Station 9 demonstrated the highest richness of species. On the other hand, Station 2 demonstrated the best species richness according to Margalef’s index and Equitability index. However, assessing the nine diversity indices, the diversity of the listed phytoplanktons was more prominent in Station 2 and 9, whereas Station 8 earned lowest marks in five indices out of the nine.

In terms of species distribution through the stations, 56 taxa were found common regardless of rare and abundant frequency in several stations. On the other hand, 12 species were found only abundantly and 42 taxa were found rarely in some of the stations. The species *Teilingia exigua*, *Chlorella vulgaris*, *Planktosphaeria gelatinosa*, *Kirchneriella contorta*, *Kirchneriella irregularis*, *Korshikoviella limnetica* and *Euglena granulata* were found rarely only in Station 3, 10, 5, 7, 1, 4 and 9 respectively (Figure 3). On the other hand, the appearance of *Gloeothecae rupestris*, *Microcystis aeruginosa*, *Microcystis flosaquae*, *Oscillatoria formosa* and *Scenedesmus acuminatus* were common in maximum stations (Figure 3).
CONCLUSIONS

There was no new species report and all listed taxa were reported previously from different locations of Bangladesh by different authors. However, this is the first report on phytoplanktons community from the Barishal City of Bangladesh.

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