

OCCURRENCE OF BLOOMS OF BLUE GREEN ALGAE FROM THE COAST OF BULEJI, KARACHI, PAKISTAN

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ABSTRACT

The blooms of blue green algae have been growing at coast of Buleji. It was for the first time that the blue green algae in such an abundance that they form blooms in the pools of sandy area on upper littoral region. These blooms comprise of member of Oscillatoriales which included two species of *Oscillatoria* (*O. brevis*, *O. tenuis*) and one species of *Lyngbya* (*L. contorta*). These are taxonomically investigated. *O. brevis* is first time reported from the coast of Karachi.

KEYWORDS: Blooms, Blue-green algae, *Oscillatoria* spp., *Lyngbya* sp., Coast of Karachi.

INTRODUCTION

The blue green algae are categorized in phylum Cyanophycota. These are abundantly found in tropical and subtropical environment and able to photosynthesis (Moore, 1981). A part from its commercial and industrial value blue green algae are also consider as bio indicator of pollution (Patterson, 1996.), but very few and less information is available regarding blue green algae from Pakistan specially from Sindh. The coast of Buleji, Karachi is considered as less polluted and save environment for marine flora and fauna, where shore comprises of rocky ledges, rock pools, bay area and open sandy portion. From recent and repeated survey the blooms of blue green algae were recorded from sandy portion of upper littoral area and this indicate the increasing rate of pollution on the coast. The presence of cyanophycota members were reported time to time but mostly referred to mangrove area (Bano and Siddiqui, 2003; Shameel *et al.*, 1996; Saifullah *et al.*, 1997; Saifullah and Taj, 1995). In the present study blooms of blue-green algae were collected from non- mangrove area of Buleji coast.

MATERIALS AND METHODS

The samples of blue green algal mats were collected during Oct 2017- Jan 2018 in the form of blooms from sandy area of upper littoral region during low tide condition from Buleji coast Karachi. The samples along with water were collected in plastic bottles and brought to the laboratory for microscopic studies. Mats were washed in sea water and separated into filaments and scattered by using needle under microscope. The samples were preserved in 4% formaldehyde- seawater solution for microscopic studies.

RESULTS

The blooms of blue green algae comprise of the member of Oscillatoriales (Figs. 1 & 2). There are two species of *Oscillatoria* and one species of *Lyngbya* have been observed.

***Oscillatoria brevis* Kützing ex Gomont 1892: 229
(Figs. 3 & 4)**

Basionym: *Oscillatoria brevis*

References: Gomont, 1892: 229; Geitler, 1932: 977; Desikachary, 1959: 241; Starmach, 1966: 327).

Macroscopic characters: It was found as dense mucilaginous yellowish green mat having bubbles which covers the surface water of sandy pool at Buleji.

Microscopic characters: Trichomes very thin, forming mats of yellow green color, attenuated, not constricted or granulated, conical more or less bent, not capitates, 4.5-5.0 µm broad; cells broader than length, 2.0-3.5 µm long, obtuse at the end.

Reproductive characters: Nercridia and any other reproductive structures not recorded.

Habitat ecology: Thick mats from bloom at the surface of pool at sandy area.

Local distribution: (Buleji Leg, Sadia, 29-10-2017, 15-01-2018)

Geographical distribution: India, Pakistan.



Fig. 1. Bloom of blue green algae.



Fig. 2. Enlarge image of bloom with bubbling.



Fig. 3. *Oscillatoria brevis* showing attenuated part.



Fig. 4. Trichome of *Oscillatoria brevis*.

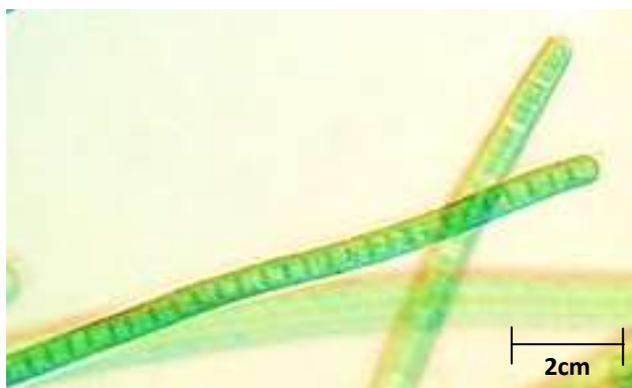


Fig. 5. *Oscillatoria tenuis* trichome.

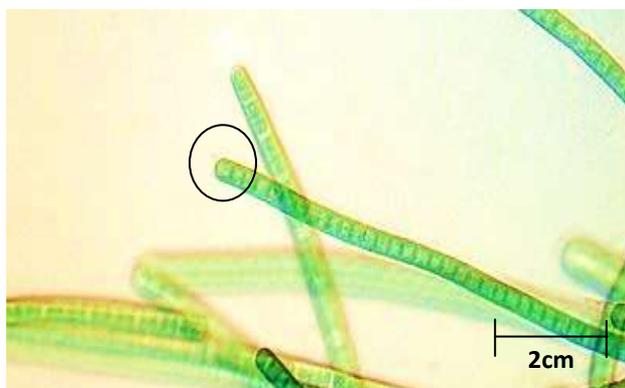


Fig. 6. *Oscillatoria tenuis* showing a-attenuated part.

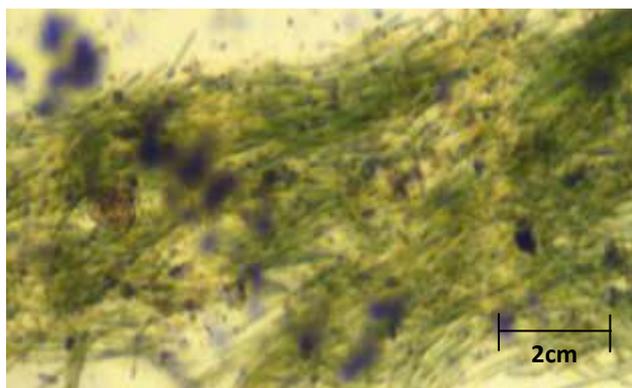


Fig. 7. Trichomes of *Lyngbya contorta*.

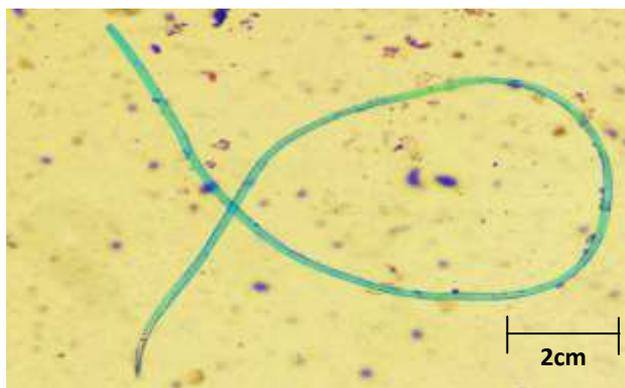


Fig. 8. Enlarge view of *Lyngbya*.

Figs. 1-8. Showing blooms and trichomes of blue green algae.

***Oscillatoria tenuis* C. Agardh ex Gomont 1892: 220
(Figs. 5 & 6)**

References: Gomont, 1892b; Geitler, 1932: 959; Desikachary, 1959: 222; Starmach, 1966: 338; Islam, 1976: 70.

Macroscopic characters: It was found as dense mucilaginous mat of yellow green color which covers the surface water of sandy pool, intermingled with *Oscillatoria brevis* species. The gas bubbles were distinct in the bloom.

Microscopic characters: Trichome blue-green or olive green, straight, fragile, 3-11 µm broad, apices not attenuated; cells 1.5-6.0 µm or up to 1/3 as long as broad, 4-5 µm broad; tips of trichomes rounded, more or less hemispherical with thickened outer membrane.

Reproductive characters: Nercridia and any other reproductive structures not recorded.

Habitat ecology: Blooms of blue green algae collected as thick mats from surface of sandy area.

Local distribution: (Buleji Leg, Sadia, 29-10-2017, 15-01-2018)

Geographical distribution: Myanmar, India, Sri Lanka, Pakistan.

***Lyngbya contorta* Lemmermann 1898: 202
(Figs. 7 & 8)**

References: Geitler Kryptogamenflora, 1932. Fremy Cyano. Cotes. d' Eur. 1933. Desikachary, 1959.

Macroscopic characters: The specimens were found as dense mucilaginous mat which cover the surface water of sandy pool, found with species of *Oscillatoria*.

Microscopic characters: Filament straight hollow and slightly curved, color dark to bright green, cross walls slightly curved. Apical cell non-capitate, rounded; cell in width 2.4-2.7 µm, cell in length 3.7-3.9 µm; sheath absent.

Habitat ecology: Collected as thick mats from bloom formed inside the pool of sandy area.

Local distribution: (Buleji Leg, Sadia, 29-10-2017, 15-01-2018)

Geographical distribution: Bangladesh, India, Pakistan, Nepal, Taiwan and Iraq.

DISCUSSION

During this study the presence of members of cyanophycota in the form of bloom was observed from the sandy pool of the Buleji coast Karachi. The study revealed presence of two species of *Oscillatoria* and one species of *Lyngbya*, out of which *Oscillatoria brevis* (Figs. 3 & 4) is first time reported from the coast of Karachi. The other two species were previously reported by Bano (1998); Bano and Siddiqui (2003); Shameel *et al.* (1996); Saifullah *et al.* (1997); Saifullah and Taj (1995), but not in the form of blooms. The species of *Oscillatoria* described in this paper were identified basically on the measurement of their width and the apical cell (Anagnostidis, and Komárek, (1988); Desikachary, (1959).). In case of *Oscillatoria brevis* (Figs. 3 & 4) the apices were found attenuated and the width of the cell 4-5 µm broad while on the other hand *Oscillatoria tenuis* (Figs. 5 & 6) had much more broader cells in comparison with *O. brevis* (Figs. 3 & 4) i.e., up to 11 µm while the apical cells were also found attenuated. Filaments of *Lyngbya* (Figs. 7 & 8) are straight hollow and slightly curved, with dark to bright green coloration while the cell width is around 2.4-2.7 µm, whereas length recorded to 3.7-3.9 µm without any sheath.

These blooms showing presence of gases in the form of bubbles (Figs. 1 & 2). The important thing which was noticed during the survey that these blooms are associated with pollution caused by dumped oil bags and packets which may introduce by anthropogenic activity. On both survey the cause of pollution is persistent which was not recorded with any other form. These oil contaminations may facilitate the growth of blue green algae specially *Oscillatoria brevis* (Figs. 3 & 4) which was observed for the first time on that area. The repeatedly occurrence of blue green algae on coast is an alarming sign of pollution in marine water, if it is not seriously undertaken; might be create worse condition for flora and fauna of Buleji by covering the substratum for attachment, anoxic conditions and production of cyanotoxins. The present study may play an initial key role in identification of marine blue green algal blooms for control of coastal degradation and control.

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