CYANOSTYLON GEITLER (CYANOPHYTA) FROM PUNJAB, INDIA

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During the course of studying cyanophycean forms from various habitats of Punjab, authors collected a rare genus *Cyanostylon* Geitler (Cyanophyta, Chroococcales). Only few species of *Cyanostylon* are known so far. These have been reported from China, Brazil, Scandinavia, Greece, Central Europe and India. Existing literature reveals that this genus is of rare occurrence. Although it has earlier been reported from India (Goyal, 1984; Ampili *et al*., 1989), this is the first report from the Punjab state.

Key words: *Cyanostylon*, Cyanophyta, Punjab, India.

Cyanoprokaryotes (cyanobacteria or blue-green algae) occupy a twilight zone in the evolutionary scale, sharing characters of the bacteria on one hand and higher plants on the other. Cyanophycean diversity has been extensively studied throughout India (Tiwari *et al*., 2001; Pattanaik and Adhikary, 2002; Chatterjee and Keshri, 2005). *Cyanostylon* Geitler is a rare cyanoprokaryote of order Chroococcales. So far epilithic, planktonic and aeroplytic species of *Cyanostylon* have been reported from China (Chu, 1952), Scandinavia, Greece and Central Europe (Hindak, 1988), India (Goyal, 1984 & Ampili *et al*., 1989) and Brazil (Azevedo and Sant'Anna, 1994).

Komarek and Anagnostidis (1986) placed this genus in family Hydrococcaceae but in the revised classification, it was included in family Chroococcaceae (Komarek and Anagnostidis, 1999; Komárek and Hauer, 2004). To the best of our knowledge this genus has not been earlier reported from Punjab, and is being recorded for the first time from here.

Punjab, the food bowl of the country, is located between 29°30'N to 32°32'N latitude and 73°54'E to 76°50'E longitude. *Cyanostylon* was collected from the study site in Ralla (District- Mansa) located in south- west Punjab, India. This area has sandy soils and warm to hot climatic conditions.

MATERIAL AND METHODS

Colonies of *Cyanostylon* were collected from a roadside puddle in Ralla, Mansa in Punjab in the month of May 2005. The puddle water was slightly alkaline (pH-7.5). Sample was preserved in a solution of 4% formalin and 1% glycerin. Identification was done after Komarek and Anagnostidis (1999) and Komárek and Hauer (2004). The sample (Collection No: PAN -210) has been deposited in the PAN herbarium, Panjab University, Chandigarh, India.

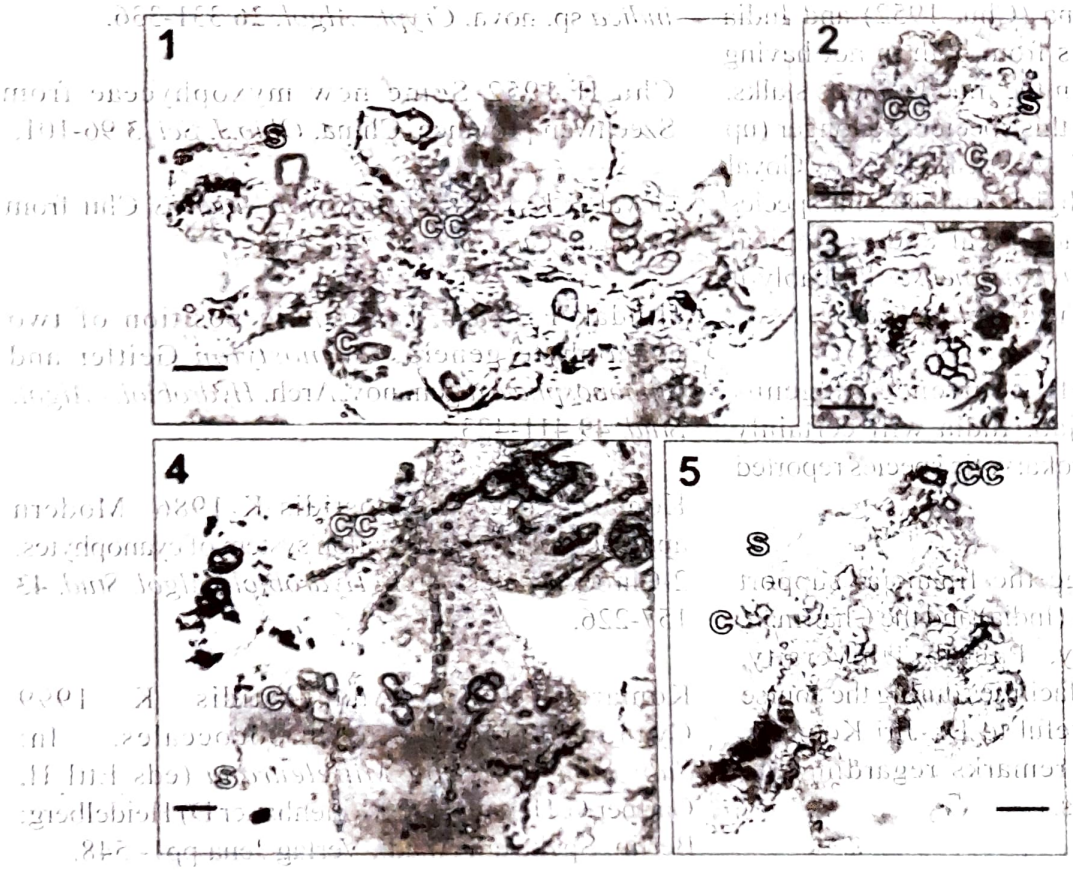
RESULTS

Taxonomic position:

Class- Cyanophyceae
Order- Chroococcales
Family-Chroococcaceae
Genus- *Cyanostylon*
Cyanostylon Geitler- *Arch. Protistenk*. 60: 441. 1928

Description:

Colonies epiphytic on submerged fallen leaves, mucilaginous, composed of several radially or irregularly arranged, colorless, rough, thick and wavy gelatinous strands of equal or unequal length



Figures 1-5. *Cyanostylon sinense* colonies (s: mucilaginous strands; cc: colonial center; c: cells). 1. An old colony of *C. sinense* with radially arranged mucilaginous strands arising from colonial center, undivided solitary cells (c) present in the terminal part. 2. A very young colony of *C. sinense* with few mucilaginous strands and solitary cells. 3. Single strand with cell division in various planes. 4. Colony with cell division in two planes 5. Mucilaginous strands folded like umbrella. **(Scale bar-10 µm)**

arising from the colonial centre (Fig. 1). Number of strands 5-6 in younger colonies (Fig. 2) whereas the number increases up to 10 or more in mature colonies (Fig.1). Mucilaginous strands were found to be 17 µm wide, 3-5 times as long as wide (up to 90 µm long). Some colonies changed into amorphous mass (old colonies). Cells spherical to oval, 6-7 µm broad, 8-10 µm long, present solitary (Figs. 1-2) or in small groups of 2-8 in the terminal parts of strands (Figs. 3-5). Cell content pale blue-green to greyish with visible chromatoplasm, granules present. Cell division was found to be in two planes perpendicular to one another in successive generations, to produce hemispherical to angular *Chroococcus* like cells (Figs. 4-5), irregular division in more planes was also observed in some of the cells (Fig. 3).

DISCUSSION

The taxon under consideration resembles genus *Cyanostylon* Geitler in morphology as per Komarek and Anagnostidis (1999), Komárek and Hauer (2004). This *Cyanostylon* species was found growing as epiphyte on submerged angiosperm alongwith a green alga *Stigeoclonium* Kuetzing. It was found different from *C. cylindrocellulare* Geitler recorded from India (Ampili *et al.,* 1989) in having narrower cells and mucilaginous stalks (24.5-35 µm wide stalks in *C. cylindrocellulare* Geitler whereas 17 µm or less than in the species under consideration). This species was also found different from *C. microcystoides* Geitler as later has very small cells (2.5-3µm in diameter). This *Cyanostylon* species has cell dimensions of *Cyanostylon sinense*

Chu reported from China (Chu, 1952) and India (Goyal, 1984) but differs from both in not having transverse lamellations in the mucilaginous stalks. Mucilaginous strands in this species are longer (up to 90 µm) than those of *C. sinense* reported by Goyal (24.5 to 35 µm). Except slight variations, this species presents several morphological and ecological similarities with *Cyanostylon sinense*. Probably it is a different variety of *Cyanostylon sinense*.

This first report of occurrence of genus *Cyanostylon* from Punjab, India will certainly enlarge the list of cyanoprokaryotic species reported from the state.

Authors acknowledge the financial support given by UGC, New Delhi (India) and the Chairman, Department of Botany, Panjab University, Chandigarh for providing facilities during the course of this study. We are grateful to Dr. Jiri Komarek and Dr. Haur for their remarks regarding the identification of this genus.

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