

TWO NEW FRESHWATER ALGAL RECORDS FROM DISTRICT KACHHI OF BALOCHISTAN, PAKISTAN

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Abstract

The present communication is a part of the study conducted from 10 different sites along the Bolan River, during the 2011-2013. Two new records for freshwater algal taxa in Pakistan were identified from district Kachhi. These species belong to phylum Volvophyta of division chlorophyte. Collections were made from different habitats along the Bolan River situated in district Kachhi of Balochistan province in Pakistan.

Keywords: Freshwater algae, Balochistan, New records, District Kachhi, Pakistan.

Introduction

The Kachhi district lies between north latitudes 29°24 and 29°10 and east longitudes 67°4 and 67°44 in Balochistan province, Pakistan (Fig. 1). It consists of both hills and plain areas. The district, in its north and west, has hilly regions. The hills that enclosed the Bolan Pass, though forming a single system, bear separate names in different localities.

Kachhi district includes all sorts of weather types. The hilly regions are moderate in summer and severely cold by snowfall during winter. Because of district's low altitudes, the plain region is tremendously hot and humid during summer. In plain areas, the climate is pleasant during winter, temperature differ significantly during day and night, with frequent dust storms. According to the weather station of Balochistan, the highest temperature can rise up to 50 °C whereas in some regions the temperature can even drop as low as -17 °C during winter. The annual precipitation of Kachhi district varies from 175 - 325 mm with a mean value of 210 mm.

The geological structure in spite of the numerous contortions and partial dislocations is extremely simple. The western ridges and at the same time, the highest ones are found in the Takatu hills, these are made up of cretaceous rocks, folded and raised into dome-shaped masses, showing a great deal of local disturbances. East of the highest part of the Bolan Pass, near Sir-i-Bolan and between that line and Kundalani, Eocene rocks of the nummulitica limestone faces prevail with a lower coal-bearing series (Ranikot beds).

According to the Directorate of Hydrology, 65-70% of the soil consists of alluvium (brought in by river, running water and flood water) and "Kacca" (flood plain and unmetalled), 30-35% is stony and 5% of less windblown.

Bolan River is by far the largest drainage for the district. It arises at Kolpur but the water makes its appearance at Sir-i-Bolan and again at Mach and its surrounding and again near Ab-i-gum disappears. Near Bibi Nani, the Bolan River is joined from the west by Sarawan River, known locally as Dardan on Kaur Bibi Nani, and from this point a perennial stream appears. A channel for irrigation purposes is taken to Kirtha village, a distance of about 12 miles. After flowing through the Lalegi plain past Kirtha, the river cuts its way and join at Kundalani from the west by the perennial waters of the Kumbela stream and emerges into the Dhadar plain near Pir Chauki. After passing Dhadar, the river is dissipated into the great plain of Kachhi. The total length of the river from Kolpur to its exit is 88 miles (Fig. 1).

Algae are present in all biologically active ecosystems (John et al., 2002). It has been studied worldwide. Algae from various habitats of Pakistan have been reported by many phycologists. Anjum and Hussain (1984); Zaidi and Hussain (2000); Sarim (2005) and Ali et al. (2008), reported many different algae from a variety of fresh water habitat of Balochistan. Marine diatoms and dinoflagellates were reported from Pakistan's Continental Shelf by Tabassum and Saifullah (2012) and Gul and Saifullah (2010). Shameel (2003) also worked on algae from fresh water habitats from Karachi.

The foregoing depiction of the freshwater algae of Balochistan from the literature survey exposed that information about detailed taxonomic description and systematic account of algae from District Kachhi Balochistan on the algal flora has been hitherto reported, it was felt enviable to study the algal flora of this region, therefore, a comprehensive research programme was developed in order to make a detailed study on the taxonomy of fresh water algae of various localities of this area. The present study contributes a major part to the

algal flora of this district. Among freshwater algae, genera belonging to the Phyla Cyanophycota, Volvophycota, Chlorophycota, Charophycota,

Euglenophycota and Bacillariophycota were found in the current study.



Fig. 1. Map of Kachhi District

Material and Methods

Various areas of the district, i.e., Sir-i-Bolan, Gonipera, Mach, Bibi Nani, Kirtha, Gokurt, Dhadar, Mithari, Bhag and Qazi Waga, were selected for collections. Planktonic, epilithic, epioikotic or Epipellic as well as epiphytic algae were collected from different freshwater habitats, e.g. rivers, temporary ponds, stream, tributaries, brooklets, water channel and permanent water reservoirs. The collected materials of algae were determined taxonomically with the help of standard literatures available (West and West, 1904; Heering, 1914; Pascher, 1925; Tiffany, 1930; Transeau, 1951;

Tiffany and Britton, 1952; Prescott, 1962; Pal et al., 1962; Ramanathan, 1964; Pankow, 1971; Abbott and Hollenberg, 1976; and other specific works (*lit. cit.*).

Results and Discussions

In the present study, a total of 248 species of algae were recorded. The detailed list of these species will be published later. Among these, after careful study and comparison with available literature (Anjum and Hussain, 1984; Zaidi and Hussain 2000; Shameel, 2003; Leghari et al., 2003; Leghari et al., 2007; Sarim et al., 2008; Lashari et

al., 2014), *Pediastrum simplex* var. *echinulatum* Wittrock 1883 in Wittrock et Nordstedt 1883 (Fig.2) and *Penium cucurbitinum* Bisset 1884 (Fig. 3) were observed as new records from Pakistan. They belonged to phyla Volvophyta (Aliya et al., 2009).

Kingdom: Protista

Phylum: Volvophyta

Unicellular, simple or well organised colonies; mobile or immobile; flagella 2, 4 or rarely 8; pigments being chlorophyll 'a' and 'b'; food reserves are typically starch; asexual reproduction by fragmentation, cell division, aplanospores or auxospores, sexual reproduction by iso-oogamy.

Class: Volvophyceae

Cells solitary or in colonial aggregates of definite or indefinite number of cells; chromatophores cup-shaped, discoid, or a variety of other shapes, pyrenoids with starch usually present; definite cell walls usually present, constituting cellulose.

Order: Chlorococcales

Cells solitary or aggregated in colonies, uninucleate or multinucleate, without vegetative cell division; chromatophores band-like, cup-shaped, discoid; pyrenoids 1 to many in a cell; zoospores usually biflagellate, aplanospores, iso-oogamy.

Family: Hydrodictyaceae

Cells united in radiate, plate-like or saccate colonies with a definite number of cells, mostly

multinucleate; chromatophores parietal, entire or reticulate; pyrenoids single or many in a cell; zoospores form new coenobium, aplanospores; isogamy. The only following genus was found in collected materials:

***Pediastrum* Meyen: 1829**

Thalli coenobia, flat, spherical - oval plate, one cell thick composed of 4-64-128-256 cells, 15-400 μ m in diameter; compact or perforate; Cell 8-32 μ m in diameter, coenocytic, with highly variable shape, internal cells usually polyhedral with 4 - many sides; marginal cells similar or differentially shaped with one or two processes; with smooth cells walls; diffused chloroplast, single parietal discs; pyrenoid one - more; asexual reproduction typically via coenobial formation after production of biflagellate zoospores; sexual reproduction rarely reported; isogamous.

***Pediastrum simplex* var. *echinulatum* Wittrock 1883 in Wittrock et Nordstedt 1883**

(Perez et al., 2009; Kim, 2013)

Coenobia typically comprised of 4-8, 16, 32 cells, cells arranged in a plate, in outer cells one elongated externally pointing process present; interior cells polygonal; teeth-like processes present on the surface of every cell; the external cells 10-57 μ m long, 6-38 μ m in diameter; the internal cells 6-40 μ m in length, 6-36 μ m in diameter (Fig. 2).

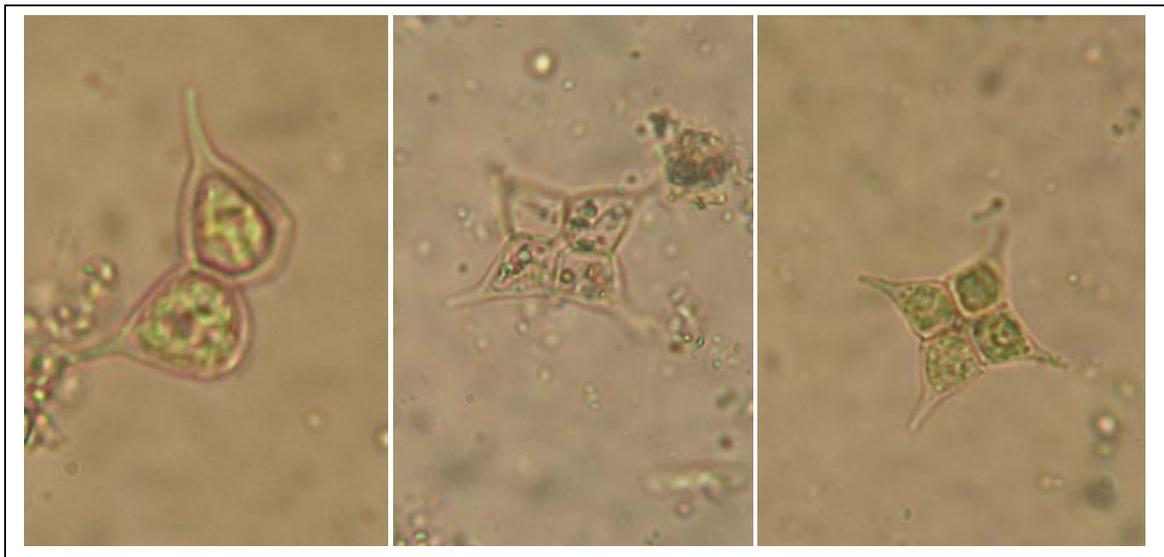


Fig. 2. *Pediastrum simplex* var. *echinulatum*

Class: Desmidiophyceae

Cells solitary, uninucleate, some form filament like colonies; have a homogeneous wall or have a wall composed of two compartments connected by a narrow isthmus, single plastid, have no flagella, reproduction by conjugation.

Order: Desmidiales

Unicellular, divided into two equal halves, variously shaped; many species grow as long filamentous colonies; without flagella; the chloroplasts are variable and can be complex, grass green, pigments chlorophylls a and b.

Family: Desmidiaceae

Cells uninucleate, variously shaped, incised or ornamented, solitary or forming unbranched filaments, rarely amorphous colonies; cell wall with pores and transversely segmented, often with two distinct and equal semicells separated by a constricted isthmus; chromatophores variable in appearance and number, with 1 or 2 or many pyrenoids in each semicell; aplanospores, parthenospores; amoeboid gametes uniting outside the gametangia and within a gelatinous envelope.

Penium Brebisson 1844

Unicellular, cylindrical, straight, median constriction absent, transverse suture or stitch lines may be evident near the middle of the cell, ends

broadly curved or truncate, 60 apices flat; with pores at the cell walls, either dispersed or in series, chloroplasts axial, in side view star-shaped, with longitudinal edge and few rounded or oval pyrenoids.

Penium cucurbitinum Bisset 1884: 197

(West and West, 1904)

Cells of medium size, sub cylindrical, 26 – 33 μ m broad, 63–83 μ m long, longer than their diameter; slightly tapering towards the apices which are broadly rounded, with a slight median constriction; cell-wall minutely and somewhat sparsely punctate; chloroplasts with about six longitudinal ridges and one large pyrenoid (Fig. 3).



Fig. 3. *Penium cucurbitinum*

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