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***Bangia atropurpurea* (Roth) C. Ag Rhodophyta from Nomal and Naltar area near Gilgit, Pakistan**

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Abstract: The algal samples were collected from Nomal water channel and Naltar spring water about 20-25 km away from Gilgit on the right side of Hunza river. The Fresh water red alga *Bangia atropurpurea* were identified along with association of 7 species of Chlorophyta, 9 of Cyanophyta, 6 of Bacillariophyta were recorded. Among these Chlorophyta was the dominant.

Key words: Fresh water Rhodophyta; *Bangia atropurpurea* association with Chlorophyta and Cyanophyta in Northern area (Gilgit) Pakistan

Introduction

The Rhodophyceae *Bangia atropurpurea* (Roth) C. Ag is a clean water alga that can also thrive in polluted water. However it is sporadic in occurrence common in Europe and Northern America (Smith, 1950; Prescott, 1968). It is also reported from riverine water and lakes (Weik, 1977; Kishler and Taft, 1970). In Pakistan Nizamuddin (1988) reported *Elania atropurpurea* from hot water falls on way to Askari village in Chitral district. It was found growing attached to stones. Haga and Leghari (1995) described *Bangia atropurpurea* from Kunhar river at an elevation of 1470 m above the sea level in Mansehra district, N.W.F. Province. Present reports documents the occurrence of *Bangia atropurpurea* from the Nomal and Naltar water in Gilgit area of Pakistan.

Materials and Methods

The material was collected in August 1999 from the water channel and spring water of Nomal and Naltar area 20-25 km away from Gilgit and on the side of Hunza river at an elevation of 145.9 m. Water temperature was in the range of 16.5-19°C and material was fixed in 4% formalin solution. All the drawings were made with the help of camera lucida with magnification 8×40. Original photograph were compared with the work of Starmach (1966, 1977), Prescott (1961, 1968) and Desikachary (1959).

Description

***Bangia atropurpurea* (Roth) C. Ag.** (Fig. 1, 51-54) (Smith, 1950; Prescott, 1968; Starmach, 1977; Nizamuddin, 1988; Haga and Leghari, 1995). Filamentous, purplish red in colour, unbranched 1-3 cm long. Uniseriate becoming biseriate due to longitudinal division. Filament uniseriate; cell 36-39.6 µm broad 9-15 µm long. In apical region gradually 2-4 multiseriate cells series. Biseriate filament 48-52.8 µm broad. Cells 17.5 µm broad 6-9.5 µm long. Cells short ovate to oblong or ellipsoidal with stellate chloroplasts. Some time basal portion serves as a hold fast. **Habits:** It was found growing in cold, clean, soft drinking water associated with Mosses and *Cladophora glomerata*, *Ulothrix zonata* and *Rhizoclonium fontanum* also on the sides of slow water channels coming from spring and melted snow water, water temperature between 16.5-19°C. The specimen having close resemblance those described by

Nizamuddin (1988) and Haga and Leghari (1995).

Ulothrix zonata: Kuetzing (Ramanathan, 1964) (Fig. 26).

Filament inter mingled with other filament flattened. Cells cylindrical 45-49.5 µm broad, 49-60 µm long chloroplast with many pyrenoids. This species is dominant.

Ulothrix aequalis: Kuetzing (Ramanathan, 1964; Shameel, 1978, Fig. 2).

Thallus Filamentous. Cells 17.5 µm broad and 33-39.5 µm long. Chloroplast broad, griddle shape -containing one or more pyrenoid. It occurs in slow running water with small falls.

Rhizoclonium fontanum Kuetzing (Prescott, 1961) (Fig. 28).

Filamentous branched. Cells cylindrical 27-30 µm broad, 150-165 µm long found attached the bottom and mosses in shallow water and margin of the channel.

Cladophora glomerata Kuetzing (Fig. 45).

This species is very common attached with the stone and mosses on the margin of the channel and water falls.

Cosmarium occulatum Schmidle (Hirose and Yamagishi, 1977) Colony 30-35 µm long, 25-27 µm broad. Isthmus 7-8 µm. The species found free floating.

Vaucheria amphibia Randhawa (Venkataraman, 1961; Faridi and Hussain, 1977; Sarma and Rattan, 1990) (Fig. 46).

Filament 87-120 µm broad, Oogonia 120-132 µm broad lateral branches with terminal anthridium. Oospore completely filling the oogonia. Oogonia 90-120 µm long 90-112 µm broad dark in colour with small beak. Anthridium terminal slightly curved 40-45 µm broad.

Occurrence. Commonly occur on moist waterlogged soil or in water seeps and shallow water channels in Gilgit area, August 1999.

Result and Discussion

The fresh water red alga *Bangia atropurpurea* (Roth). C. Ag was found attached to moss plants and intermingled with the members of Chlorophyta, such as *Cladophora glomerata*, *Rhizoclonium fontanum*, *Vaucheria amphibia*, *Ulothrix aequalis*, *Ulothrix* (*zonata*), *Cosmarium occulatum*, *Closterium eboracense* and blue green algae like *Arthrospira platensis*, *Lyngbya sordida*, *Lyngbya limnatica*, *Microcoleus chthonoplasts*, *Phormidium ambiguum*, *Phormidium fargile*, *Oscillatoria princeps*, *Calothrix clavata* while *Chroococcus montanus*, *Lyngbya nordgaardii*

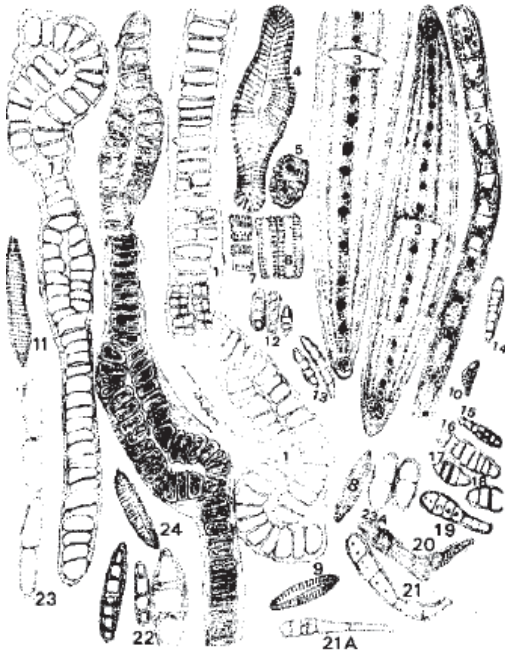


Fig. 1: *Bangia atropurpurea* (Roth) C. Ag
Fig. 3: *Closterium eboracense* (Ehr) Tr.
Fig. 5: *Cosmarium occulatum* Schmidle
Fig. 6-7: *Eunotia minute*
Fig. 10: *Amphora avails* Kautz
Fig. 12-23: Unknown fungal spores
Fig. 2: *Ulothrix aequalis* Kuetzing
Fig. 4: *Anomoeoneis sphaerophora* Kutz.
Fig. 8-9: *Navicula viridula* Kuetz
Fig. 11: *Hantzschia* sp.
Fig. 24-25: *Cymbella ventricosa* Kuetz

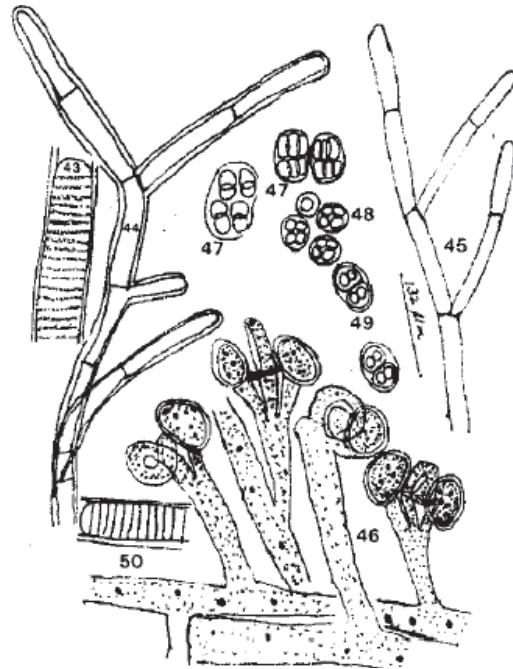


Fig. 43: *Lyngbya martensiana* Menegh
Fig. 44: *Rhizoclonium* sp.
Fig. 45: *Cladophora glomerata* (L) (Kutz)
Fig. 46: *Vaucheria amphibia* Randhawa
Fig. 47: *Chroococcus fimneticus* Lemm
Fig. 48: *C. minor* (Kutz.) Nag.
Fig. 49: *Gloeocapsa atrata* Ktuz.
Fig. 50: *Lyngbya confervoides* Ag.

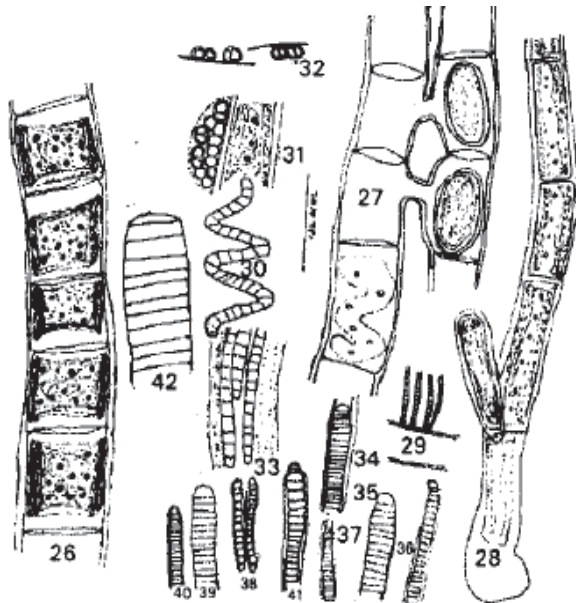


Fig. 26: *Ulothrix zonata* Kuetzing
Fig. 28: *Rhizoclonium fontanum* Kuetzing
Fig. 31: *Dermocarpa aquae dulcis* Geitler
Fig. 34: *Lyngbya sordida* Gom.
Fig. 35-36: *Oscillatoria nigra* Vaucher
Fig. 38-39: *Phormidium ambiguum*
Fig. 41: *Calothrix clavata* G. S. West
Fig. 27: *Spirogyra* sp.
Fig. 29: *Lyngbya nordgardhii* Wille
Fig. 30: *Arthrospira platensis* Gom.
Fig. 32: *Chroococcus montanus* Hans
Fig. 33: *Microcoleus chthonoplastes* Thur
Fig. 37: *Phormidium uncinatum* (Ag) Gomant
Fig. 40: *Phormidium fargile* Gomant
Fig. 42: *Oscillatoria princeps* Vaucher



Fig. 51-54: *Bangia atropurpurea* (Roth) Ag. x 400
Fig. 55: *Rhizoclonium hieroglyphicum* Kutz. 400
Fig. 56: *Dermocarpa aquaeduleis* Get. 400
Fig. 57: *Oedogonium* sp. x 400
Fig. 58-59: *Oscillatoria princeps* Vaucher 400

Sultan Mahmood Leghari: *Bangia atropurpurea* (Roth) C. Ag Rhodophyta from Nomal and Naltar area

found epiphytic belonging to Cyanophyta (Fig. 3-25).

Cymbella ventricosa, *Cymbella halvetica*, *Eipithema argus*. *Eipithema* sp. *Anomoeonens sphaerophora* and *Nivicula* sp. to Bacillariophyta. *Bangia atropurpurea* alongwith all associate species produced best development where bright sunlight is frequently present in clean cold water falls. (Kishler and Taft 1970; Weik, 1977). According to Geesink fresh water *Bangia atropurpurea* (Roth) C. Ag reproduced by spores. When *B. fusco-purpurea* (Dillowyn) Lyngbye could successfully adopt fresh water. *B. atropurpurea* (Roth) C. Ag. also survive to sea water (Geesink, 1973) and also demonstrated that adoption of *Bangia atropurpurea* to fresh water and marine environment takes places through spore formation (Fig. 26-42). *Bangia fusco-purpurea* (Dillowyn) Lyngbye is primarily a marine alga and has been reported from coastal water of Pakistan (Moazzam and Shameel, 1985). Its presence in the fresh waters of Northern areas, Gilgit and, N.W. F. province may be attributed to dispersal by birds (Fig. 43-59).

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