

## EPILITHIC ALGAE FROM BALUCHISTAN

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### Abstract

Fifty two species of algae belonging to Cyanophyceae (18 spp.), Chlorophyceae (10 spp.), Bacillariophyceae (21 spp.) and Euglenophyceae (3 spp.), found growing upon stones or submerged stones in fresh water are reported from Baluchistan.

### Introduction

Stones, offer the worst habitats for the growth of ordinary plants even under submergence in water or mud. Yet, certain pioneer algae are capable of invading stony sites to gradually improve it not only for themselves but also for other species appearing successionaly on the same site. Although epilithic algae have been reported, (Fritsch, 1950; Fjerdingsstad, 1957) from elsewhere no report exists from Pakistan in general and especially from Baluchistan. Hussain & Anjum (1982). Hussain *et al.*, (1982, 1984), Anjum & Hussain (1983) reported some algae from Baluchistan. The present paper is a further contribution to the phycological flora of Baluchistan. The location, climatic and other ecological features of Baluchistan have been given elsewhere (Hussain, 1981).

### Materials and Methods

Submerged or partially submerged stones collected from fresh fast, or slow running water, streams, channels, river beds, from the tubewell ponds and other aquatic habitats from different parts of the province during 1980-1982 were rinsed with clear water to wash away any superficially attached organisms. Algae were carefully scrapped and preserved in FAA. The specimens have been deposited in the Herbarium at Peshawar University.

### Results and Discussion

A total of 52 species (Table 1) belonging to Cyanophyceae (18 spp.), Chlorophyceae (10 spp.), Bacillariophyceae (21 spp.) and Euglenophyceae (3 spp.), were identified to be growing upon submerged stones in waters of Baluchistan. Results agree with Fritsch (1950) and Fjerdingsstad (1957).

Table 1. Epilithic algae recorded from Baluchistan.

| S.No.      | Species                                      | Locality |     |     |     |
|------------|--|----------|-----|-----|-----|
|            |  | CHT      | GMB | NNB | SJB |
| <b>I</b>   | <b>CYANOPHYCEAE</b>                          |          |     |     |     |
| 1          | <i>Calothrix</i> sp.                         | —        | —   | —   | +   |
| 2          | <i>C. parietina</i> (Naeg.) Thuret           | —        | —   | —   | +   |
| 3          | <i>Chroococcus cohaerens</i> (Breb.) Naeg.   | —        | —   | —   | +   |
| 4          | <i>C. limneticus</i> Lemm.                   | —        | —   | —   | +   |
| 5          | <i>C. turgidus</i> (Kutz.) Naeg.             | —        | —   | —   | +   |
| 6          | <i>Dichothrix compacta</i> Born. et Flah.    | +        | —   | —   | —   |
| 7          | <i>Lyngbya martensiana</i> Menegh.           | —        | +   | +   | +   |
| 8          | <i>Merismopedia minima</i> Beck              | —        | —   | +   | —   |
| 9          | <i>Nostoc paludosum</i> Kutz.                | —        | —   | —   | +   |
| 10         | <i>Oscillatoria animalis</i> Ag.             | +        | —   | —   | +   |
| 11         | <i>O. amoena</i> Gomont                      | +        | +   | —   | +   |
| 12         | <i>O. princeps</i> Vaucher                   | —        | —   | —   | +   |
| 13         | <i>Phormidium corium</i> (Ag.) Gom.          | —        | —   | —   | +   |
| 14         | <i>P. fragile</i> (Menegh.) Gom.             | —        | —   | —   | +   |
| 15         | <i>P. purpurascens</i> (Kutz.) Gom.          | —        | —   | —   | +   |
| 16         | <i>P. tenue</i> (Menegh.) Gom.               | —        | —   | +   | +   |
| 17         | <i>Rivularia manginii</i> Frey               | —        | —   | —   | +   |
| 18         | <i>Spirulina meneghiniana</i> Zanard         | —        | —   | —   | +   |
| <b>II</b>  | <b>CHLOROPHYCEAE</b>                         |          |     |     |     |
| 19         | <i>Bulbochaete</i> sp.                       | —        | +   | —   | +   |
| 20         | <i>Chlorococcum gelatinosum</i> Arch. & Bold | —        | —   | —   | +   |
| 21         | <i>Cladophora crispata</i> (Roth) Kutz.      | —        | —   | —   | +   |
| 22         | <i>C. glomerata</i> (L.) Kutz.               | +        | —   | —   | —   |
| 23         | <i>Cosmarium leave</i> Rabenw.               | +        | +   | —   | +   |
| 24         | <i>Oedogonium</i> sp.                        | +        | —   | —   | —   |
| 25         | <i>Spirogyra condensata</i> (Vauch.) Kutz.   | —        | —   | —   | +   |
| 26         | <i>S. crassa</i> Kutz.                       | —        | —   | +   | +   |
| 27         | <i>S. punctiformis</i> Transeau              | —        | —   | —   | +   |
| 28         | <i>Zygnema mucigenium</i> Randhawa           | —        | —   | —   | +   |
| <b>III</b> | <b>BACILLARIOPHYCEAE</b>                     |          |     |     |     |
| 29         | <i>Cocconeis placentula</i> Ehrenb.          | +        | +   | —   | —   |
| 30         | <i>Cymbella affinis</i> Kutz.                | +        | +   | —   | —   |
| 31         | <i>C. cistula</i> (Hemprich) Grunow          | —        | —   | +   | —   |
| 32         | <i>C. naviculiformis</i> Auerawald           | +        | —   | +   | —   |
| 33         | <i>C. parva</i> (Wm. Smith) Cleve            | —        | —   | —   | +   |
| 34         | <i>C. prostrata</i> (Berkeley) Cleve         | —        | —   | +   | —   |

Table 1 Continued

| S.No. | Species  | Locality |     |     |     |
|-------|--|----------|-----|-----|-----|
|       |  | CHT      | GMB | NNB | SJB |
| 35    | <i>Diatoma elongatum</i> var. <i>tenuis</i> (Ag.)<br>Van Heurck. | +        | +   | —   | —   |
| 36    | <i>D. hiemele</i> (Lyngbye) Hei-berg                             | —        | —   | —   | +   |
| 37    | <i>D. vulgare</i> Bory   | +        | —   | —   | +   |
| 38    | <i>Diploneis elliptica</i> Kutz.) Cleve                          | +        | —   | —   | —   |
| 39    | <i>Gomphonema olivaceum</i> (lyngbye) C.A. Ag.                   | +        | +   | —   | —   |
| 40    | <i>Gyrosigma attenuata</i> (Kutz.) Cleve                         | —        | —   | +   | —   |
| 41    | <i>G. scalproides</i> (Rabenhm) Cleve                            | —        | —   | +   | +   |
| 42    | <i>Nitzschia</i> sp.   | —        | —   | —   | +   |
| 43    | <i>N. amphibia</i> Grun.   | —        | —   | +   | —   |
| 44    | <i>N. kuetzingiana</i> Hilse                                     | —        | —   | —   | +   |
| 45    | <i>N. vermicularis</i> (Kutz.) Hantzsch                          | —        | —   | +   | —   |
| 46    | <i>Pinnularia interrupta</i> Wm. Smith                           | —        | —   | —   | +   |
| 47    | <i>Stauroneis anceps</i> Ehrenb.                                 | —        | —   | +   | —   |
| 48    | <i>Synedra acus</i> Kutz.  | —        | —   | +   | —   |
| 49    | <i>S. ulna</i> (Nitzsch) Ehrenb.                                 | —        | +   | +   | +   |
| IV    | <b>EUGLENOPHYCEAE</b>  |          |     |     |     |
| 50    | <i>Euglena acutissima</i> Lemm.                                  | —        | —   | —   | —   |
| 51    | <i>E. sanguinea</i> Ehrenb.                                      | —        | —   | +   | —   |
| 52    | <i>Phacus pleuronectes</i> (Mueller) Dujardin                    | —        | —   | +   | —   |

(CHT = Chauter, GMB = Garmabe, NNB = Nanibibi, SJB = Sirajabad, + = Present, — = Absent).

Algae might anchor themselves upon stones by holdfast, or mucilaginous secretions. Stones exhibit a very sudden and wide range of temperatures and aridity. Primitive algae like Cyanophyceae might withstand such changes by harbouring the crevices which might retain some moisture for some time. *Chroococcus*, *Merismopedia*, *Nostoc*, *Rivularia*, *Calothrix*, *Phormidium* and *Chlorococcum* attach their entire thallus to the stony surface. Water-borne soil and organic matter might also accumulate in these depression which improves the habitat for the invasion of other algae. This might be considered as the pioneer stage and may be comparable to the crustose lichens stage. The algal and other secretions with acidic and solvent like reaction (Tiffany, 1951) upon the habitat corrodes the stony surface to provide a relatively better substratum where colonial or prostrate filamentous algae: *Dichothrix*, *Merismopedia*, *Chroococcus*, *Nostoc*, *Rivularia*, *Calothrix* appear which is followed by the growth of *Oedogonium*, *Bulbochaete* and *Cladophora* having erect thalli attach to the substratum by means of holdfast, rhizoid or disc-like structure only. The frequent occurrence of diatoms and other free-floating

forms might be due to their trapping in the algal masses. The epilithic growth of algae might be due to their preference for calcium rich substratum. Some algae have been previously reported from shells of snail and turtles (Anjum *et al.*, 1980; Hussain & Anjum, 1982). The stones lying in slow to stagnant waters had better algal growth than stones rolling in fast running waters.

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