EPIBOLIUM POLYSPORUM DÜRINGER (CHLOROPHYCEAE, CHAETOPHORALES)—A RARE GREEN ALGA FROM INDIA

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ABSTRACT

The present paper describes the morphology of *Epibolium polysporum* Düringer and records it as an addition to the Indian algal flora. The important physico-chemical parameters of its growth, e.g. pH, temperature, dissolved oxygen, total alkalinity, alkalinity to phenolphthalein, total hardness, calcium, magnesium, carbonate, bicarbonate, chloride, free and saline NH_3, albuminoid ammonia, nitrate nitrogen, total nitrogen and total organic matter (COD) have been worked out over a period of one year, and periodicity and annual growth phases of the alga have been studied.

INTRODUCTION

The genus *Epibolium* was established by PRINTZ in 1916, with *E. dermaticola* as the type species. The same species was later recorded by BOURRELLY (1966), TELL (1977) and ISLAM AND AZIZ (1979) from France, Argentina and Bangladesh, respectively. A second species, *E. polysporum*, was described by DÜRINGER in 1958. There is also a record of a third species, *E. fonticolum* from Argentina by TELL (1972). Besides the above mentioned records, this rare alga does not seem to have been collected so far from any part of the world. The genus *Epibolium* is recorded and briefly described for the first time from India. Since it is a rare and scarce form, it was considered desirable to study the important parameters of the physico-chemical environment which promotes its growth as it might furnish a clue to its restricted distribution.

OBSERVATIONS

Growth of the alga was followed for a period of full one year (July, 1980-June, 1981) through regular periodic collections. The physico-chemical parameters of the growth location are summarised in table 1.

Epibolium polysporum consists of prostrate, irregularly creeping, usually uniseriate, branched filaments growing closely adpressed to the host leaves (Figs. 1 & 2). The region of older thalli becomes very nearly pseudoparenchymatous in organisation but remains single-layered (Fig. 3). The thallus may be up to 2,600 μm in length. The cells are irregular, quadratic, sub-squarish or cylindrical in shape, measuring 10-25 μm in breadth and 15-45 (55) μm in length. The cell wall may be 2-5 μm thick and unstratified. The chloroplast is single, parietal, massive, fills the entire cell and contains 1-3 pyrenoids (Fig. 4). Observations over a period of twelve months, from July 1980 to June 1981, did not clearly reveal the formation of any distinct specialised reproductive structure (s) (sporangia). However, some enlarged vegetative cells with divided contents forming a large number of spores (zoospores) were frequently seen (Figs. 5, 6). Some empty cells (Figs. 4-6) were also observed, suggesting that swarmers may have escaped out.

It may be mentioned here that DÜRINGER (1958) observed formation of about 32 zoospores in sporangiate structures of this species; the present observations are in con-

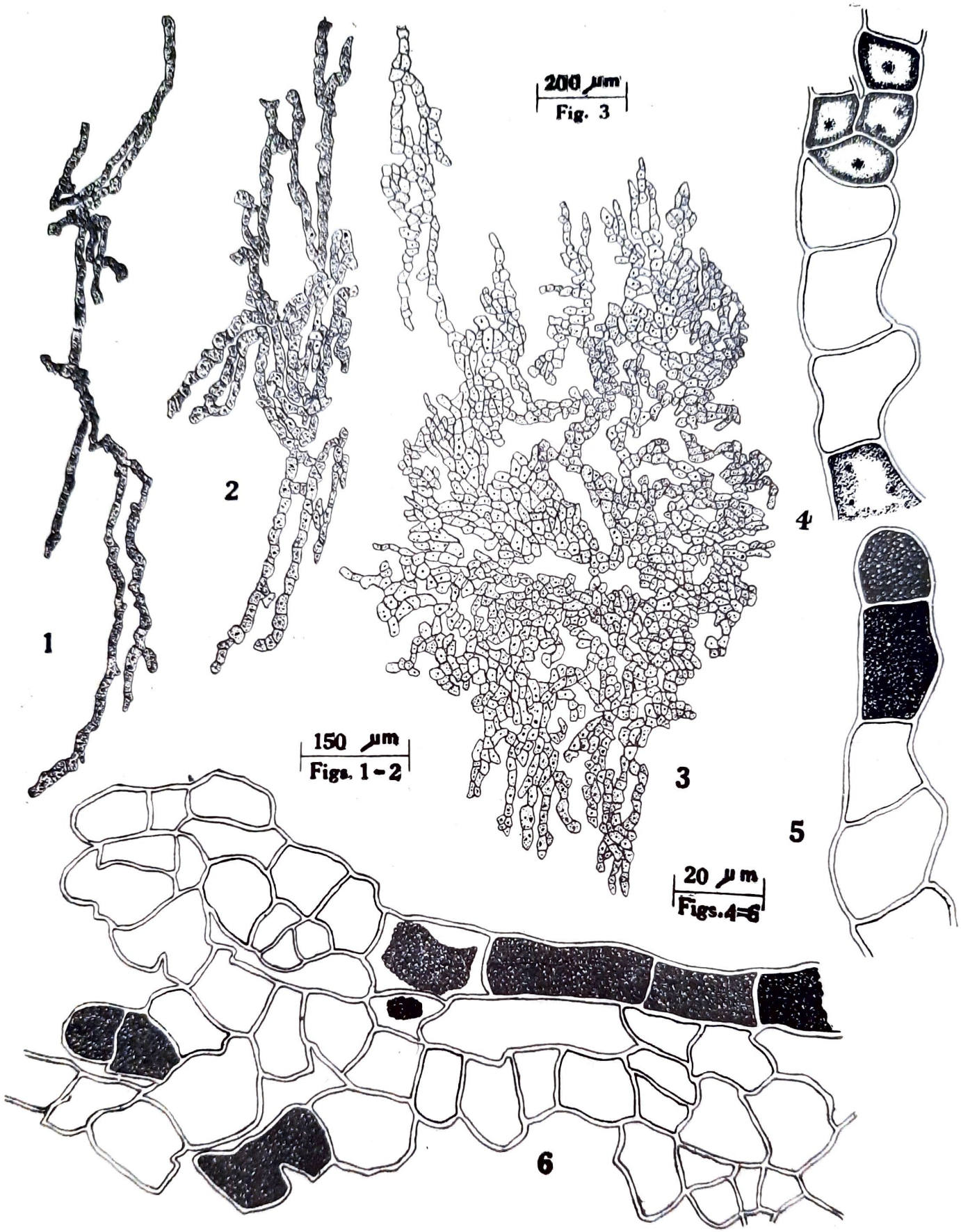
Table 1*

Serial number	Physico-chemical parameters	Conc. in mg/litre (except for 1 & 2)
1	pH	7.5—8.8
2	Temp.	19-34°C
3	Dissolved oxygen	3.2—10.4
4	Total alkalinity	56—152
5	Alkalinity to phenolphthalein	0—24
6	Total hardness	36—124
7	Calcium	28—68
8	Magnesium	1.944—16.524
9	Carbonate	0—24
10	Bicarbonate	73.2—219.6
11	Chloride	20—76
12	Total organic matter	15.841—80.769
13	Free & saline ammonia	0—10.8
14	Albuminoid ammonia	0—8.64
15	Nitrate nitrogen	1.776492—10.658952
16	Total nitrogen	10.658952—17.76492

*The methods followed for the analysis of items 3-12 were those in IS : 3025 (1964) and for items 13-16 were those in "Methods of Analysis" by Wilcox & Hatcher (1950).

formity with this observation, although in the present alga the number of zoospores formed per cell (sporangium) is much larger. No sexual reproduction or any other form of reproduction is known in the genus, nor was observed in the present study.

The annual periodicity of the alga was investigated over a cycle of twelve months from July, 1980 to June, 1981. The number of plants per 100 leaves of the host (*Hydrilla* sp.) were counted and the results are given in Fig. 7. It appears that the alga exhibits two peaks of optimum growth, in June and September, respectively. There are corresponding periods of near disappearance of the alga in July and December. The disappearance of the alga corresponds with near neutral pH (7.5) as found in July and December, low dissolved oxygen (4 and 3.2 mg/l), high chloride (48 and 76 mg/l), high free and saline ammonia (6.48 mg/l and 8.64 mg/l), high albuminoid ammonia (6.48 mg/l and 8.64 mg/l) and a low level of nitrate nitrogen (1.77649 mg/l). The combination of these extremes of certain chemical parameters seems to exert an overall influence against a vegetative flourish of the alga. It is also possible that in July, just after the onset of the monsoon season, a high turbidity and an abrupt rise in the water level may be counter-productive factors for the growth of the alga. Similarily, a low water temperature in December may be contributory to factors operating against



Figs. 1—6. *Epibolium polysporum* Düringer ; Figs. 1 & 2. Plants showing loose filamentous organisation, Fig. 3. Mature thallus showing pseudo-parenchymatous regions, Fig. 4. Filament showing cell structure and empty cells, Fig. 5. Filament with cells having divided contents & empty cells. Fig. 6. Pseudoparenchymatous region with divided contents & empty cells.

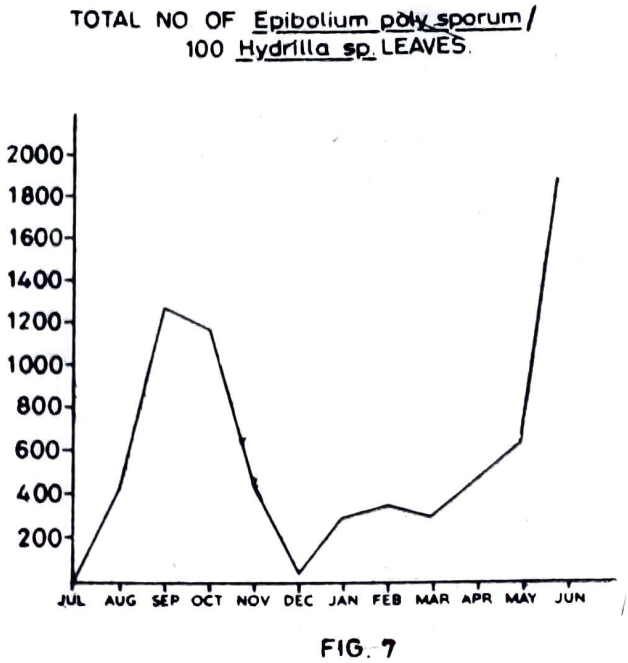


Fig. 7. Annual periodicity of *Epibolium polysporum* populations.

the growth of the alga. During the rest of the year, the chemicals, trubidity and temperature factors are more moderate and, under these conditions, the alga seems to have adapted itself for growth. Probably this is why the alga is found growing in nature during the rest of the period, except June and December. It is also possible that the growth cycle and vegetative span of the alga may be genetically conditioned for a period of six months to which its vegetative appearance and dominance conforms, but this could not be tested during the present investigation.

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*Not seen in original.