On the morphology of Bostrychia tenella (Vahl) J. Agardh

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Introduction

Boergesen (1937) reported *Bostrychia tenella* (Vahl.) J. Ag. from Indian waters. Some details regarding the morphology of the alga are available to some extent by the works of Montagne(1828),Falkenberg (1901), Post (1936), Tseng(1942)and Joly (1954). The detailed structure of the alga and the development of the reproductive structures are not known completely. Advantage was taken of the occurrence of *Bostrychia tenella* in the Gulf of Mannar at Mandapam to study the morphology of the species both from living specimens and from material fixed in 4% formalin and formalin-acetic-alcohol. Suitable preparations were stained in eosine and mounted in glycerine for microscopic examination. Sometimes the material had to be softened by placing in 1 % acetic acid or 1 % lithium chloride solution. While thin sections were used frequently, most details could be observed on whole mounts and squashes of suitable pieces of the thallus of the alga.

Habit and Habitat

The alga is attached to the surface in shaded crevices (fig. 1) of sandstones at a level of +0.05 to +0.62 m. above zero of chart datum by means of discoid haptera which may attain a fairly large size and may often be lobed, clutching particles of sand or rock. The thallus is prostrate and decumbent (fig. 2, 6). The axis is branched in a pinnate manner, the branches being indeterminate, alternate and curving upwards and towards the parent axis. The main axis itself is curved upwards at the tip. Branching may proceed up to the third order. Frequenntly adventitious determinate branches develop interspersed with the normal branches. These adventitious branches are exogenous, often remain uniseriate and may retain this character throughout. More frequently the basal parts of these branches become certicated.

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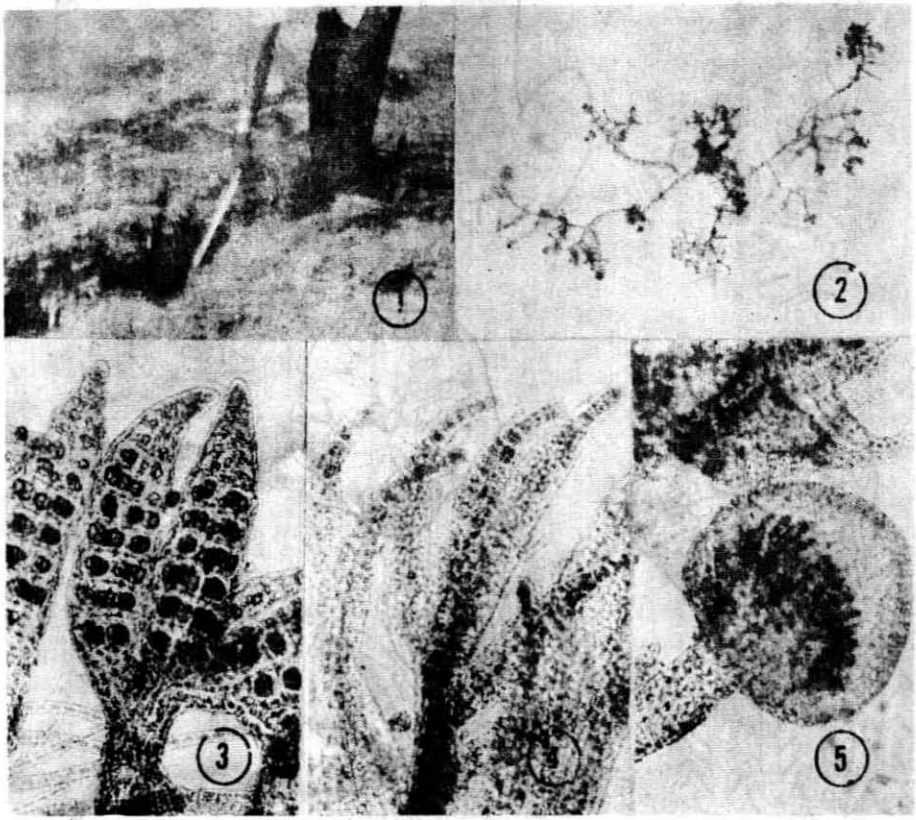

Figures 1-5: *Bostrychia tenella* (Vahl.) J. Ag.

1. Habitat at Mandapam. 2. Habit of the plant. 3. Fertile branch of a tetrasporic plant. 4. Fertile branch of an anteridial plant. 5. Fertile branch of a female plant showing mature cystocarp.

In all, about two hundred plants were collected and sorted out into tetrasporic, cystocarpic and spermatangial plants. It was found that tetrasporic plants outnumbered the sexual plants at the time of collection consisting of 60 % of the total number of plants against 32% cystocarpic and 8% spermatangial plants.

Tetrasporic palnts:

Tetrasporangia were found in stichidia (fig. 3,11)formed by the transformation of entire laterals of the fertile axis. Each stichidium has a cylindrical stalk, and an anatomical structure similar to that of an axis with five pericentral cells and two cortical layers (fig.10). The tip of the stichidium tapers to a point but may be seen to possess mature tetrasporangia even in the terminal segment (fig. 12). Sometimes a lateral may become branched and give rise to a compound stichidium in which each branch of the lateral may develop into a stichidial unit (fig. 11). Frequently uniseriate laterals may be produced from the stalk of the stichidium, thus indicating the morphological equivalence of the stichidium to a branch

Tetrasporangia are produced on every segment of the stichidium. The number of fertile pericentral cells in each segment is constantly five (fig. 10). The tetrasporangium is formed in the manner typical for the Rhdomelaceae. The fertile pericentral cells give rise in addition to two cortical cells to a third cell also at its distal end. This is a cover cell. After differentiation of the cortical cell and the cover cells, the fertile pericentral cell undergoes a transverse division into an upper larger cell and a lower smaller flat cell. The upper cell forms the tetrasporangium while the lower cell functions as the stalk cell. Sometimes a second cortical layer is formed from not only the primary cortical cell but also from the cover cell. The contents of the tetrasporangium divide tetrahedrally to form four tetraspores. The tetrasporangia are more or less spherical.

Spermatangial plants:

Spermatangia were found in spermatangial clusters (fig. 4, 13) formed by the transformation of the laterals of fe tile branches, much in the same way as in the case of tetrasporic stichidia. Each lateral has a basal stalk bearing a long cylindrical cluster of spermatangia. Each segment of the spermatangial cluster consists of an axial cell and five pericentrals. Each pericentral cell gives rise to a number of spermatangial mother cells. Each mother cell delimits the spermatangia by means of oblique divisions. While the development of these takes place, the axial cells of the spermatangial cluster become elongate to accomodate the increasing number of spermatangia.

Cystocarpic plants:

The cystocarpic plants examined showed all stages of development from a young procarp (fig. 16-18) to a fully matured cystocarp (fig. 5, 15) from which carpospores were being shed. The procarps are formed in acropetal succession on a fertile branch which corresponds to the fertile branch of an antheridial or tetrasporic plant. The fertile branch shows early formation of pericentral cells upto a maximum of five. One of the pericentral cells functions as the bearing cell of the carpogonial branch. In the fertile branch, the bearing cells of the suceessive segments and therefore the procarps arise in spiral sequence. The bearing cell gives rise to (1) the carpogonial branch which is four-celled (2) two lateral sterile cells and (3) one basal sterile cell (figs. 16, 18). The auxiliary cell is formed after ferlization and is just below the fertilized carpogonium. Fusion takes place between the fertilized carpogonium and the auxiliary cell. Subsquently the sterile cells and the cells of the carpogonial branch are also incorporated in a large fusion cell from which gonimoblasts are formed, but the details of developement of the gonimoblasts have not been worked out.

Of the sevaral procarps on a fertile branch, only one usually develops into the mature cystocarp and when fully formed fhe mature cystocarp is subglobse (fig. 5, 15) and is borne on a long multiseriate stalk and often bears on one side the apical portion of the fertile branch as an appendix. Occasionally the fertile branch may be divided, each part bearing a cystocarp. The mature cystocarp usually has only a limited number of carpspores enclosed within a pericarp which is several layers of cells in thickness. The carpospores are more or less club shaped.

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