A New Species of *Uronema* from India.

BY

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With Fifteen Figures in the Text.

OF the genus *Uronema*, Lagerh., only three species have been recorded up to now. *U. confervicolum*, Lagerh., and *U. simplicissium*, (Reinsch) Lagerh., were described in 1887,¹ while *U. elongatum*, Hodg., was described in July, 1918.² In the beginning of March, 1919, I came across a species of *Uronema* which differed from all these three species. It was originally found growing on the walls of a narrow drain carrying dirty water from the kitchen in my house. The alga was taken in tubes in the original drain-water. In the laboratory it was washed in tap-water and examined. Numerous zoospores were seen to be given off, most probably on account of the change of environment. A few days afterwards fresh material was taken, and the same process was repeated. Again the result was the same. Some material was kept in a small jar filled with a mixture of tap- and the drain-water. This was placed near a window in the laboratory. In a week's time the walls of the jar were seen to be covered with young filaments produced from germinating zoospores.

The filaments are quite unbranched, and not enclosed in any mucous sheath. The mature ones sometimes reach a length above 7 mm. They are attached to the substratum by a rounded mucous disc found at the extreme tip of the basal cell. The basal cell shows a variety of forms. In mature filaments it is very long and attenuated, and is generally hyaline (Fig. 1). It may be straight or curved (Figs. 2 and 3). In young filaments it is much shorter and usually has a chloroplast, which, however, dies off as the filament grows (Fig. 4).

The apical cell also is, as a rule, gradually attenuated. Sometimes it is swollen at the base (Fig. 5). The tip is acuminate and usually slightly curved (Fig. 6). It may, however, sometimes be quite straight (Fig. 3) or very much curved (Figs. 7 and 8). The cell-wall in the apical part of the

¹ Lagerheim in *Malpighia*, 1, fasc. xii, 1887.

² Hodgetts, W. J.: *Uronema elongatum*. *New Phytologist*, July, 1918.

end cell was often found to be slightly thickened, and in a few cases the tip also ended in a dot-like thickening (Figs. 6 and 9).

The remaining cells are cylindrical and vary very much in size. In young filaments they are longer than they are broad, while in mature ones they are broader than they are long. At the time of zoospore formation, the width of the filament becomes considerably increased, sometimes two or three times the width found in the vegetative condition. The cells of a mature vegetative filament usually range between $16\ \mu$ to $22\ \mu$ in thickness and $10\ \mu$ to $18\ \mu$ in length (Fig. 10). A slight swelling is sometimes seen at the junctions of cells (Fig. 4). Each vegetative cell has a single band-shaped chloroplast, which runs through nearly the whole length of the cell and passes round about two-thirds of the cell circumference. Its edges are irregular and more or less incised. Pyrenoids up to four in number have been seen in some cells (Fig. 10). They are usually associated with numerous small grains of 'stroma starch'. These grains are more conspicuous in cells forming zoospores; in fact they seem to fill up the whole cavity of the cell at that time. Chloroplasts are very easily seen by staining the filaments with gentian violet. There is a single nucleus in each cell. It is not easily seen as it is generally covered by the chloroplast. Only rarely is it seen lying near the centre of the cell (Fig. 10, *n*).

The chief method of propagation is by 4-ciliate zoospores. In younger filaments the whole cell produces a single zoospore, but as the filament grows the cells form transverse and longitudinal septa, thus making the filament multiseriate (Figs. 3 and 11). Each of the cells thus formed produces one zoospore. The escape of zoospores is similar to that found in *Uronema elongatum*¹ (Fig. 12). Sometimes, however, it was observed that a zoospore while coming out through the pore became constricted and finally divided into two. Thus two zoospores were produced from one cell without a septum being formed at first. The zoospore is nearly rounded and about $10\ \mu$ in diameter (Fig. 13). It is characterized by possessing abundant starch grains, which conceal the nucleus and the chloroplast. No pyrenoid was observed, perhaps also on account of its being concealed by the starch grains. Very soon after its emergence the zoospore becomes active and swims away. Germination takes place as in *U. elongatum*.¹ Sometimes two or three zoospores germinate together, and their basal mucous discs become confluent (Fig. 14).

The chief interesting points about this alga are its great length and great variation in size. Sometimes the filament is packed with zoospores and attains a thickness of $40\ \mu$ (Fig. 15), while a young filament may be only $10\ \mu$ in thickness. Fig. 3 shows a filament about $13\ \mu$ in thickness, some cells of which are forming longitudinal septa also. Fig. 11 shows a part

¹ Hodgetts, W. J.: *Uronema elongatum*. New Phytologist, July 1918.

Uronema indicum sp. n.

of a filament, about $28\ \mu$ thick, in which some cells are forming septa, while others are empty.

The alga resembles *Uronema elongatum* very much, but differs from it in its comparatively greater size, in the chloroplast running through the whole length of the cell, and in the cells being generally broader than they are long. For these reasons I propose to give the alga a separate specific name, and term it *Uronema indicum*.

Diagnosing characters of the new alga :

Uronema indicum, sp. n. Filaments not enclosed in a mucous sheath, unbranched, straight or a little curved, up to 8 mm. in length. Basal cell attenuated and fixed by a mucous disc. Apical cell acuminate. Other cells cylindrical, generally $16\text{--}22\ \mu$ thick, but attaining a thickness up to $40\ \mu$ while forming zoospores. Chromatophore single, parietal, band-shaped, running through the whole length of the cell and passing round two-thirds of the circumference, with incised edges. Pyrenoids up to four in each cell. Nucleus single, median.

Propagation by means of 4-ciliate zoospores, about $10\ \mu$ in diameter, produced singly from one cell, or in a number from it after its forming transverse and longitudinal septa.

Habit. Found in Lahore, India, sticking to the walls of a dirty drain in the months of March, April, and May, 1919.

EXPLANATION OF FIGURES.

Figs. 1-2. Basal parts of two filaments, showing the elongated basal cell with the rounded mucous disc. $\times 500$.

Fig. 3. A complete filament, showing the beginning of septation in cells. $\times 500$.

Fig. 4. A young filament, showing swellings at the joints. $\times 500$.

Figs. 5-9. Apical parts of filaments, showing various forms of apical cells. $\times 500$.

Fig. 10. Part of a vegetative filament, showing the chloroplast nucleus and pyrenoids in its cells. $\times 500$.

Fig. 11. A medium-sized filament, showing the beginning of multiseriate structure, and some empty cells from which zoospores have escaped. $\times 500$.

Fig. 12. Part of a filament, showing the escape of zoospores. $\times 500$.

Fig. 13. A zoospore, showing four cilia and numerous scattered starch grains. $\times 800$.

Fig. 14. Three zoospores germinating together, with confluent basal discs. $\times 500$.

Fig. 15. Part of a large filament packed with zoospores. $\times 600$.

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