CAMPYLONEMA LAHORENSE, A NEW MEMBER OF SCYTONEMACEÆ.

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[With Six Figures in the Text.]

In Lahore in the month of August during the rains, a very beautiful blue-green alga makes its appearance on lawns and waste grounds where water stands for a day or two and then slowly dries up. In damp places thus left after the evaporation of water, small, shiny, bluish-green, circular patches are seen amongst tufts of grass. These slowly extend on all sides and become irregular in outline till finally they run into one another and produce a very wide, woolly, bright bluish-green stratum on the surface of the damp soil. As the soil dries the stratum takes on a brownish tinge till finally when it is quite dry it becomes dark-brown. A healthily growing vegetative stratum is partly embedded in the mud and is partly above it (Fig. 1). In the subterranean part the filaments

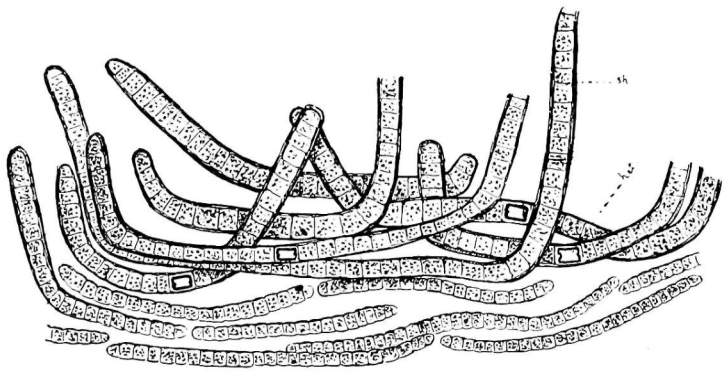

Fig. 1. A small portion of the thallus, showing the filaments in its embedded and aerial portions. *sh* sheath, *het* heterocyst × 286.

are straight, of lighter colour, run more or less parallel to one another and have no distinct sheaths. Those near the surface of the soil are generally curved in the middle and have the two ends abruptly ascending into vertical aerial arms. Each of these exposed arms is enclosed in a sheath, which is thin and hyaline at first, but which later on becomes thick and lamellose, and brown or yellowish-brown in colour (Fig. 2). As the soil dries the sheaths extend towards the middle of the filament and might finally meet so as to enclose the whole of it.

The filament. The filaments measure up to one and a quarter m.m. in length, the matureones being curved in a more or less semi-circular manner. Occasionally pseudo-branches are given off, either singly at the base of an heterocyst (Fig. 3) as in *Tolypothrix*, or rarely in pairs—generally in old filaments—between two heterocysts (Fig. 4) as in *Scytonema*. Trichomes 6-9μ thick, bluish-green, slightly constricted at the joints. Cells 5-11μ long, with coarsely granular contents. Dissepiments are generally not very distinct in mature filaments, but are easily seen in hormogones or young filaments.

The sheath. The sheath is at first thin and hyaline, but later on becomes thick, often lamellose and yellowish-brown, up to one micromillimeter thick. It is very inconspicuous in filaments or portions of filaments embedded in mud, but in exposed filaments or parts of filaments it is brown, firm, thick and tightly adhering.

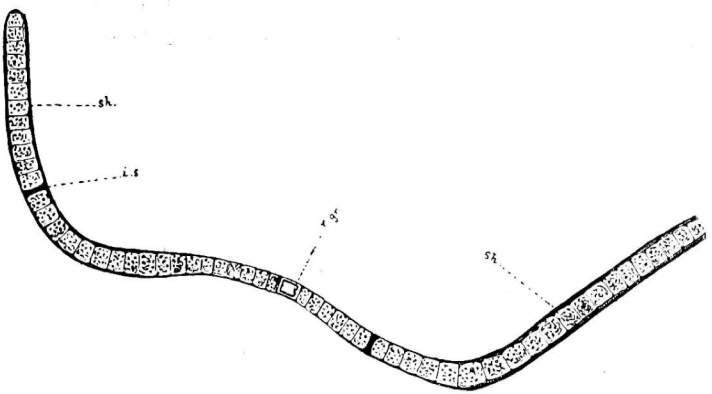

Fig. 2. A typical filament showing the incomplete sheath, median heterocyst, and inter-cellular substance. (*i.s.*) *r.g.* refractive granules × 286.

Heterocysts. One heterocyst is, as a rule, found in the middle of the filament (Fig. 2). Sometimes, however, two heterocysts are found side by side at this place (Fig. 5). Other heterocysts are situated at intervals through the whole length of the filament (Fig. 3). The heterocysts are at first pale yellow in colour and have some finely granular contents. Later on they lose these contents and become hyaline. The refractive granules situated adjacent to the pores at each pole, as mentioned by West (4) and Fritsch (1), are quite easily seen in most cases (Fig. 2). The heterocysts are 12-21μ long, 7-9μ broad, and rectangular or ellipsoid in shape.

Perennation and Multiplication. In unfavourable conditions such as drought, as a rule, the filaments lie enclosed in their thick sheaths, thus giving the stratum a dark-brown colour. They are very fragile in this condition. When the favourable conditions recur, trichomes, generally broken up into a number of hormogones, slowly come out of the sheaths and lie more or less parallel to one another, thus forming a fresh bluish-green stratum. These hormogones may consist of even one or two cells. They resemble the filaments of *Oscillatoria* in general appearance and may be easily mistaken for the latter. They are produced generally by the secretion of an inter-cellular substance or sometimes by the death of vegetative cells here and there. The inter-cellular substance is dark-green in colour and is in the form of a biconcave disc (Fig. 2).

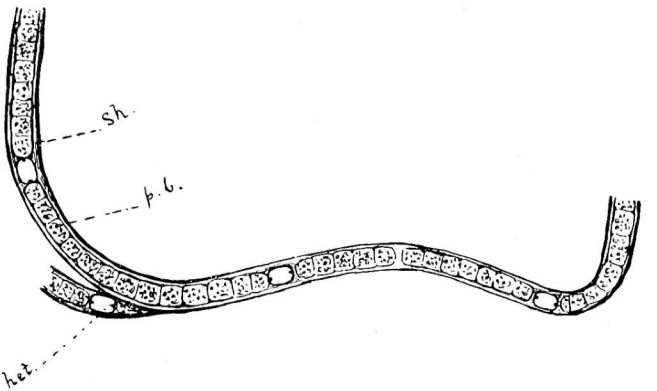

Fig. 3. A filament showing many heterocysts *(het.)*, and a single pseudo-branch *(p.b.)*, at the base of one of them. (× 450).

Rarely spores were seen forming a chain inside the sheath. The sheath in these cases was found to be thin and smooth, though firm and brown (Fig. 6). Each spore has a thick smooth outer membrane and a very thin inner membrane. It is about 8μ long and about 6μ broad and has homogeneous or very finely granular contents. The ejection and germination of these spores have not yet been seen by the writer.

Systematic. The alga described above, although to some extent it resembles *Tolypothrix arenophila* W. and G. S. West, and was to that species by the writer in a former paper (2), shows many characters which render it hardly possible of reference even to the genus *Tolypothrix*. Firstly, heterocysts are frequently found at intervals during the whole length of the filament as in *Scytonema*, and are seldom confined to the base of a

pseudo-branch as in *Tolypothrix*. Secondly pseudo-branches themselves are very rare, and as a rule, filaments are unbranched, though having one or more heterocysts. Even when pseudo-branches are present they are given off singly or in pairs as has been mentioned above, thus partaking of the characters of both *Tolypothrix* and *Scytonema*. A third characteristic is the curved shape of the filament.

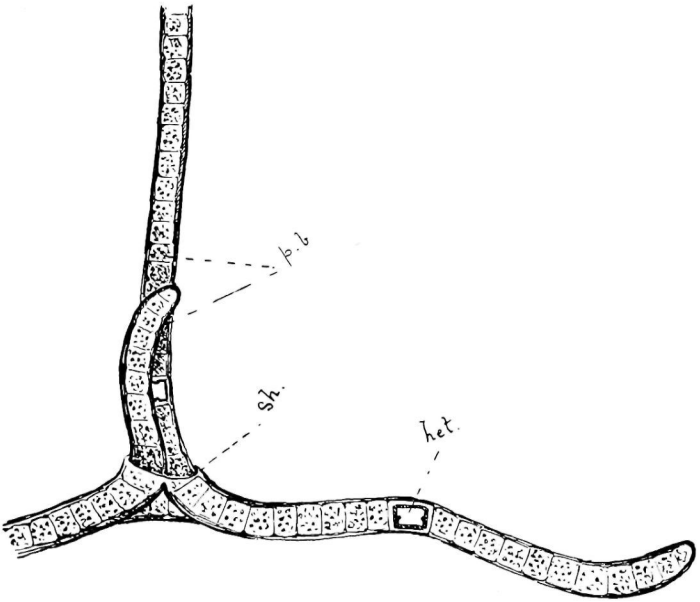

Fig. 4. An old filament showing the thick sheath and paired pseudo-branches. (× 450).

The genus *Campylonema* was monographed by Schmidle in 1900 (3) to include members of the Scytonemaceæ with generic characters resembling those of the alga described above, with the exception that no mention of the presence of spores was made. Only one species, *C. indicum* Schm. has been described from Bombay, from which the alga under discussion differs in many respects. It is not epiphytic on Hepaticæ like *C. indicum*, but occurs on damp soil forming a vast stratum. The thallus is thin and woolly and not fasciculate and crisp as in *C. indicum*. Trichomes are not very torulose and ramose upwards as those of *C. indicum*, and are not so thick as the latter.

For the above reasons I propose to refer the alga described in this paper to the genus *Campylonema* and to create a new species,

Campylonema Lahorense with the following specific characters:—Thallus woolly, bright bluish-green or bluish-brown, terrestrial, partly embedded in mud and partly above it; sheath inconspicuous, thin and hyaline in the embedded portion, and firm, thick, lamellose, tightly adhering, and brown in the exposed portion; filaments curved in a more or less semi-circular manner, up to $1\frac{1}{4}$ mm. in length; trichomes bluish-green, 6-9μ in diameter, slightly constricted at the joints, rarely pseudo-branched, pseudo-branches given off singly or in pairs; cells isodiametric or a little longer or shorter than the diameter; transverse walls scarcely conspicuous in older filaments; heterocysts median or found at intervals

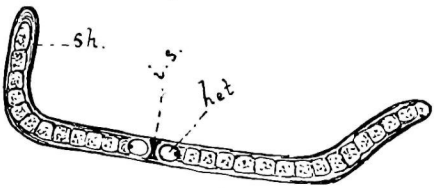

Fig. 5. A filament showing two median heterocysts. (× 400).

through the whole length of the filament, rectangular or ellipsoid, 12-21μ long and 7-9μ broad; spores 7-11μ long and 5-7μ wide, formed in a chain within the sheath, with brown thick and smooth episporium; cell-contents coarsely granular.

Habitat:—On damp lawns and waste grounds at Lahore, India.

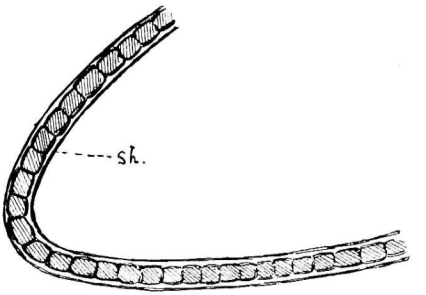

Fig. 6. A filament forming a chain of spores. (× 450).

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2. Ghose, S. L., ('19). The Myxophyceæ of Lahore. Journal of Indian Botany, Vol. I, No. 1. 1919.
3. Schmidle, W., ('00). Hedwigia, Bd. XXXIX, p. 181, 1900.
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