

## MORPHOLOGICAL DIVERSITY OF DIFFERENT STRAINS OF *WESTIELLOPSIS* UNDER CULTURAL CONDITIONS

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Members of the order Stigonematales are highly evolved and complicated group among blue-green alga. They show great diversity in their forms and structure. In present communication three strains of *Westiellopsis* (*Westiellopsis prolifica*, *Westiellopsis iyengarii*, *Westiellopsis interrupta*) have been studied. All (*Westiellopsis prolifica*, *Westiellopsis iyengarii*, & *Westiellopsis interrupta*), are multiseriate but *Westiellopsis iyengarii* showed conspicuous and early multiplication than others. These strains showed very characteristic and peculiar type of thallus structure on solid agar medium under culture conditions *Westiellopsis prolifica* forms cushion shaped structure, *Westiellopsis iyengarii* forms cushion like thallus with concentric ring at maturity whereas *Westiellopsis interrupta* forms star like radiating thallus. They also show great diversity in branching pattern, cells structure as well as in growth pattern. Akinetes are formed in all strains in very peculiar pattern in long chain.

**Key words:** *Westiellopsis* growth pattern, taxonomic status, perennation, germination

The genus *westiellopsis* was created by Janet (1941) with single specie i.e. *W. profifica* from a garden soil in Madras. He described that the primary filament of *Westiellopsis* like *Hapalosiphon* consisting of thick horizontally creeping main filaments with short barrel shaped cells and erect laterals with narrow cylindrical cells. These laterals represent true branches.

The present study deals with three different strains of *Westiellopsis* which were available in the Phycology laboratory, Department of Botany, University of Allahabad. These strains were isolated from rice field of U.P. The exact identification of *Westiellopsis* only on the basis of morphological observation always presented problem because all the genera of Stigonematales show complicated morphology and filamentous organization. These problem have already been detailed by Padmaja and Desikachary (1967), Present communication studied in detail the different characteristic features of these strains under culture conditions in laboratory.

### MATERIALS AND METHODS

Three strains of *Westiellopsis* were

selected for present study for their morphological characterization such as *Westiellopsis prolifica*, *Westiellopsis iyengarii*, *Westiellopsis interrupta*. These strains of *Westiellopsis* were available in Phycology laboratory, Department of Botany, University of Allahabad. The morphology of these selected strains were studied with their isolation in unialgal and axenic cultures because cultural studies make it possible to assess the morphological variability in strains (Stam and Hollman 1979, Komarek 1972, Whitton 1977) and cultures also permit the study of the development of blue-green algae over a longer period of time (Kantz and Bold 1969, Stulp and Stam 1984). The use of standard culture conditions may make it possible to distinguish strains that are very much similar under natural condition, whose identification is practically impossible in fields (Dor and Homoff 1985). These strains were maintained in our germplasm collection of Cyanobacteria under controlled laboratory conditions. These strains were axenic and cloned from single few celled colonies. It was grown in BG-11 medium (Stanier *et al.* 1971) solid and liquid nitrogenous and nitrogen deficient medium to study its morphology and growth behaviour under culture conditions.

After incubation into culture tube and agar plates it was incubated in culture chamber under controlled laboratory condition (14: 10 h, L: D 28 ± 2°C at 3000 lux light intensity provided by fluorescent tube). Culture was maintained for one year for regular observations. Growth, development and other morphological observations were closely mentioned. Such observations were made with the help of Nikon Labaphat-2 Microscope and Nikon - 35 camera from freshly prepared slides.

## RESULTS AND DISCUSSIONS.

Morphological characteristic of different strains of *Westiellopsis*

***Westiellopsis prolifica***:- Thallus dull blue-green changed yellowish blue-green at maturity, cushion like, composed of loose aggregation of bushy colonies, broken margin (in solid), initially attached later free floating (in liquid), filament uniseriate, multiseriate at maturity, multiseriation less and late, branches long, uniseriate (initial stage), multiseriate

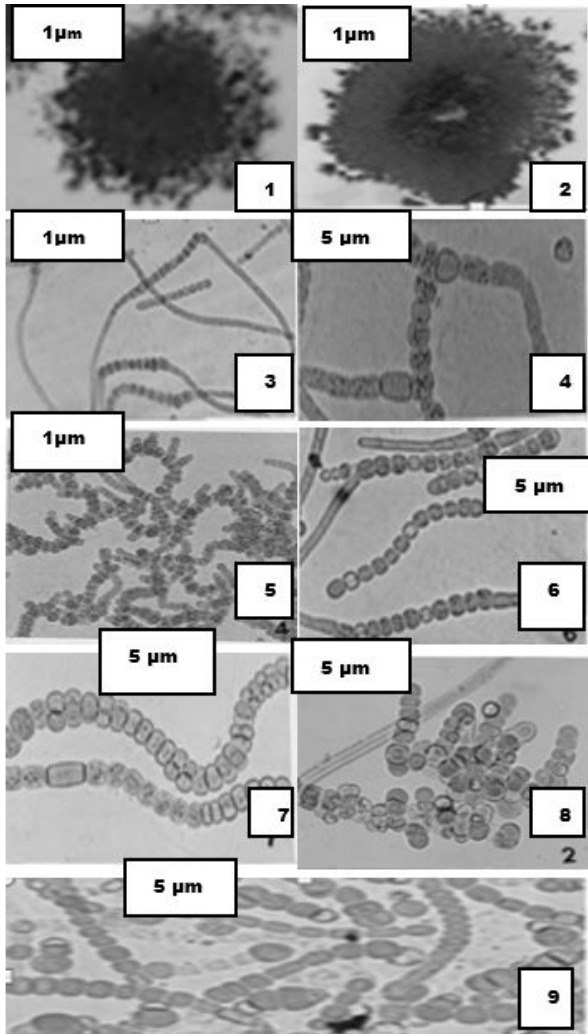
(*Stigonema* type) at maturity, heterocyst intercalary, terminal, three pored intercalary heterocyst, juvenile filaments crescent shaped with big sized heterocysts at the base of lateral arms either at one or both the ends, akinetes in multiseriate chain, germinate to liberate germling.

***Westiellopsis iyengarii*** :-Thallus dark blue-green changed yellowish brown at mature, cushion like in young but forms concentric rings at old stage, filaments uniseriate, multiseriate at maturity, multiseriation very conspicuous and early, branches long, uniseriate (initial stage), multiseriate (*Stigonema* type) at maturity, heterocysts intercalary, akinetes in Gloeocapsoid stage, single large heterocyst intercalated the multiseriate chain of akinetes, juvenile filaments crescent shaped or spiral, akinetes germinate to liberate germling.

***Westiellopsis interrupta***:- Thallus dark blue-green change yellowish at maturity, expanded small star like radiating colonies, fringed margin (in solid), attached to the wall as well as

**Table-1:** Comparative morphological characteristics of different strain of *Westiellopsis*

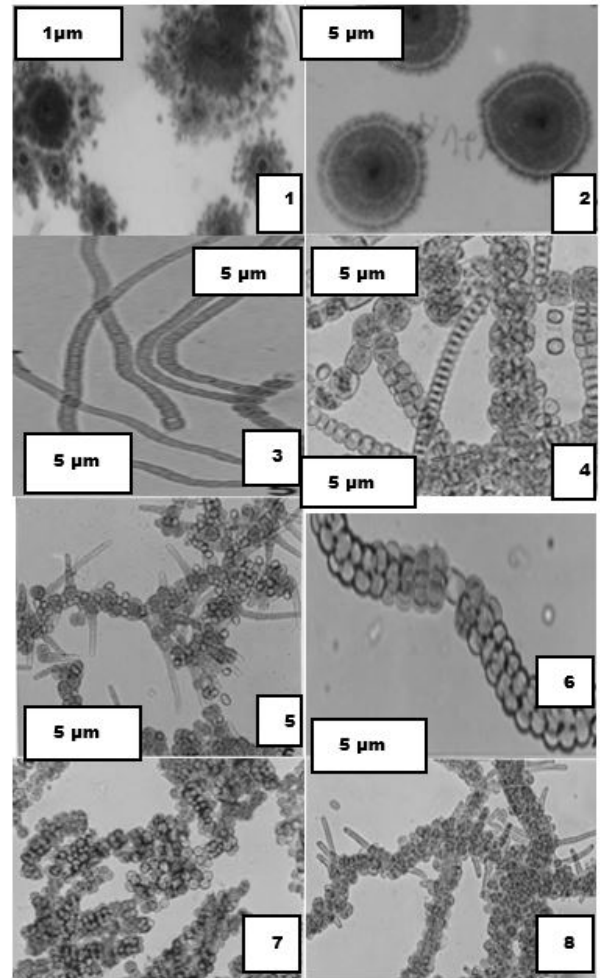
Feature		<i>Westiellopsis prolifica</i>	<i>Westiellopsis iyengarii</i>	<i>Westiellopsis interrupta</i>	
Thallus	Colour	In young stage	Dull blue- green	Dark blue- green	
		At maturity	Yellowish blue -green	Yellowish blue -green	
	Growth pattern	Solid medium	Cushion like loose aggregation of bushy colonies	Cushion like in young, forms concentric ring at maturity	Expanded star like radiating colonies
		Liquid medium	Initially attached but later free floating small bushy colonies	Initially attached but later free floating	Attached on wall as well as bottom
Margin		Broken	fringed	Fringed	
Filaments		Uni or multiseriate, but multiseriation late and less	Uni or multiseriate, but multiseriation conspicuous and early	Uni or multiseriate, but multiseriation late and less	
Branches		<i>Stigonema</i> type	<i>Stigonema</i> type	<i>Stigonema</i> type	
Heterocysts		Intercalary, three pored, lateral sessile at the base	Intercalary, three pored, lateral sessile at the base	Intercalary, three pored (frequent), lateral sessile	
Homogones	Shape	Straight	Straight	Straight	
	Size(Celled)	5-16 celled	8-10 celled	8-10 celled	
	Liberation	Terminally	Terminally	Terminally	
	germination	Isopolar and heteropolar	Isopolar and heteropolar	Isopolar	
Akinetes	Shape	Spherical or subspherical in multiseriate chain	Spherical or rectangular in multiseriate chain	Spherical or oblong in multiseriate chain	
	Size	8.5µm in diameter	5 µm long , 7.5µm broad or 8.5µm in diameter	8 µm in diameter	
	Colour	Pale yellow	Pale yellow	Pale yellow	
	germination	Germinate to liberate endospore od directly liberate germinling	Germinate to liberate endospore od directly liberate germinling	Germinate to liberate endospore od directly liberate germinling	



**PLATE-1 (*Westiellopsis prolifica*):** 1. Growth of thallus on solid agar plate (in -N medium) 2. Growth of thallus on solid agar plate (in +N medium) 3. Hormogones showing their germination (Camptylonemoid stage) 4. Vegetative filament showing intercalary heterocyst at the base of a branch. 5-6 & 8. Different stages of akinete germination. 7. Showing multiseriation 9. Germinating akinetes showing terminal heterocyst.

bottom (in liquid), filaments uniseriate, multiseriate at maturity, multiseriation less and late, branches short, uniseriate (initial stage), multiseriate at maturity (Stigonema type), heterocysts intercalary, akinetes in multiseriate chain.

In present communication three strains which were selected for their morphological observation resemble with the three species of *Westiellopsis* such as *Westiellopsis prolifica*, resemble *Westiellopsis iyengarii* and



**PLATE-2(*Westiellopsis iyengaria*):** 1. Growth of thallus on solid agar plate 2. Growth of thallus on solid agar plate Showing concentric rings 3. Vegetative filament showing Hapalosiphon stage 4. Showing multiseriation in prostrate filament and in branches (Stigonema type branches) 6. Multiseriate chain of akinetes intercalated by single intercalary heterocyst. 7. Showing Gloeocapsoid stage 5 & 8. Different stages of akinete germination.

*Westiellopsis interrupta*

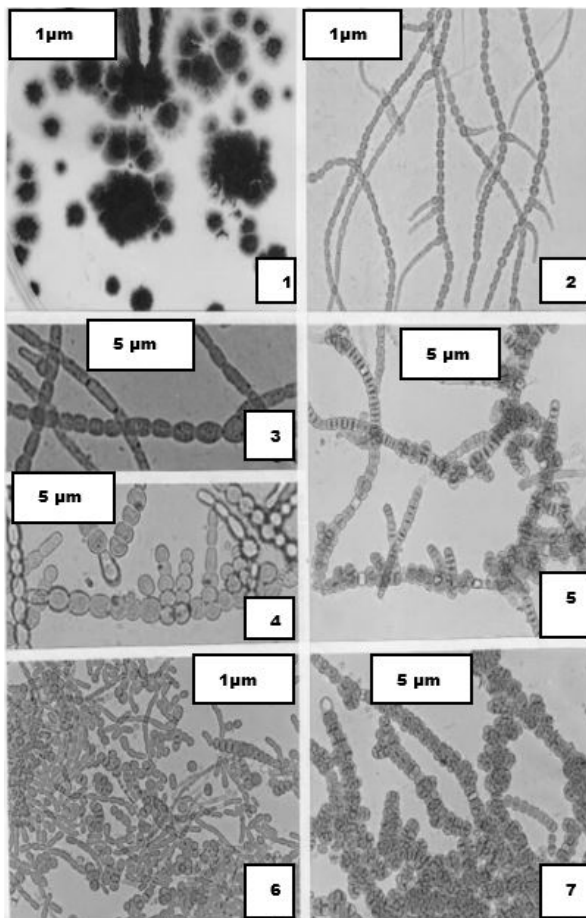
**Taxonomic Criteria:**

Heterotrichous filamentous habit.....Stigonematales

Multiseriate filament.....*Westiellopsis*

(i) Conspicuous and early multiplication.....

(i) Thallus form



**PLATE-3 (*Westiellopsis interrupta*):** 1. Growth of thallus on solid agar plate. 2. Vegetative filament showing branches. 3. Filament showing three-pored heterocyst. 4-5. Showing akinetes. 6. Filament showing dissociation of packets of akinetes. 7. Showing multiseriation in prostrate filament and in branches.

concentric ring.....  
*Westiellopsis iyengaria*  
(ii)Thallus form small star like colony..... *Westiellopsis interrupta*  
(iii) Less and late multiseriation.....  
*Westiellopsis prolifica*

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