

Bamboo seedlings to yield a few more tri-  
generic hybrids of desirable characteristics.

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1. *Stenogramma*, *Flora-Bot. of Botany*, 5th Eng. Ed.,  
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### ON AKINETE FORMATION IN *ZYGNEMA TERRESTRIS* RANDH.

THE object of this communication is to de-  
scribe a peculiar method of akinete-formation  
in *Zygnema terrestris* Randh. from material  
collected near Dhakuri in Kumaon Himalayas,  
and to record the presence of this alga in  
Kashmir.

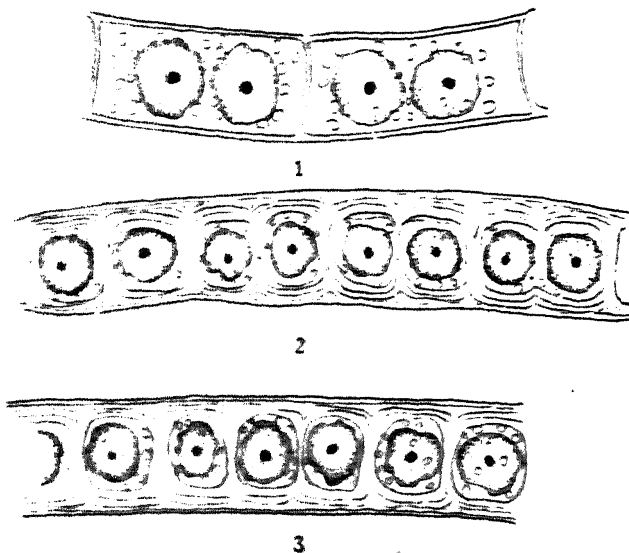
#### AKINETE-FORMATION

The following three modes of reproduction  
have been described by the present author<sup>2,3</sup>  
in this alga, so far.

1. Scalariform conjugation.
2. Lateral conjugation.
3. Aplanospore formation.

The material was collected by the author  
from near Dhakuri in Almora district at an  
altitude of about 9,000 feet above sea level in  
the middle of September 1939. In this mate-  
rial no conjugation lateral or scalariform was  
observed, and akinete-formation appears to be  
the exclusive mode of perennation.

Prior to akinete-formation cell-wall be-  
comes thickened and lamellated. In mature  
akinetes cell-wall is about  $6\mu$  thick, while in  
ordinary vegetative cells, it is only about  $2\mu$



*Zygnema terrestris* Randhawa

FIG. 1. Vegetative cells. Mark the thin cell-wall.  
FIG. 2. Early stages in akinete formation. FIG. 3.  
Mature akinetes. Mark the single chloroplast in each  
aki etc.

thick (Fig. 1). The peculiarity of this form  
lies in the fact that akinetes are not formed  
by the direct conversion of vegetative cells into

akinetes, as in *Zygnema giganteum* Randh. or  
other forms, but the vegetative cells divide into  
two more or less equal halves by the ingrowth  
of septa from the side walls, which ultimately  
meet in the middle (Fig. 2). So each half  
contains one chloroplast only surrounded by  
food-reserves, like starch and oil (Fig. 3).  
The cell-contents stain more or less black with  
iodine, and deep blue with Nile Blue. The  
akinetes are  $24-27\mu$  broad and  $18-21\mu$  long,  
i.e., half as long as an average vegetative cell.  
There is greater economy of material in this  
mode of akinete-formation, for double the  
number of akinetes is formed. Akinete-forma-  
tion is a mode of perennation in this alga in  
the high altitudes.

As regards the cause of their formation, it  
is very likely that low temperatures prevailing  
in high altitudes are responsible. This is partly  
borne out by the fact that no akinetes were  
ever observed in the material of this alga col-  
lected from the plains. According to Fritsch:  
in species of *Mougeotia* and *Zygnema*, which  
inhabit mountain-lakes in Europe with rela-  
tively low temperatures, akinete-formation is  
common. This alga too was collected from the  
alpine zone in the Himalayas and intense cold  
may be the cause of akinete-formation.

It is remarkable that this alga in the plains  
and at an altitude between 5,000 to 6,000 feet  
shows scalariform conjugation, between 7,000-  
8,000 feet shows lateral conjugation exclusively,  
and higher up shows akinetes only.

#### DISTRIBUTION

Originally collected from certain fields in  
Fyzabad district, in the plains of Oudh, this  
alga was later on collected from Kausani and  
Binsar in Kumaon Himalayas, Almora district.  
A laterally conjugating form of this alga was  
found near Dhakuri, at an altitude of about  
8,000 feet. The material showing akinete-  
formation described in this paper was collected  
higher up in the alpine zone above Dhakuri.

On 4th August 1941, the author collected  
this alga from the shores of Sheshnag, an  
alpine lake, with glaciers on two sides, at an  
altitude of about 12,100 feet. This lake which  
is the source of Sheshnag river, a tributary  
of Liddar, lies on the pilgrim route to Amar  
Nath Cave. There was a pure growth of this  
alga, visible from the bridle-path in the form  
of a yellowish-green belt contrasting with the  
turquoise blue water of the lake. It formed  
a mat-like covering over a huge area. It was  
found in a purely vegetative stage, and it is  
likely that akinetes or conjugating material  
may be found in September. It is of interest  
to find this alga so widely distributed in the  
Western Himalayas from Kumaon to Kashmir.

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Rae Bareilly (U.P.),  
November 28, 1942.

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