

For Cell Study: *Nitella* sp., A Common Green Alga

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The author, an Assistant Professor of Biology and Education and Coordinator of Science Education, offers a new approach to a “traditional laboratory” of beginning biology.

In designing laboratory exercises for teaching the structure and characteristics of the plant cell, teachers quite frequently turn to *Anacharis* (Elodea). Specimens of this genus are abundant—occurring in aquaria and in many fresh water pools. Not only are specimens plentiful, *Anacharis* has a number of characteristics which make it an acceptable specimen for studying the “typical” plant cell. Chloroplasts are clearly visible, the nucleus is readily identified, the vacuole fills much of the cell interior, cell walls are distinct—all characteristics to be desired for microscopic study. Microscopic study is enhanced also by the fact that the leaves of this flowering plant are only one or two cells thick, permitting light penetration.

Anacharis is an acceptable specimen for studying cell structure. However, it still leaves something to be desired. In the first place, leaves of *Anacharis* consist of tissues of cells; one of which is always getting in the way of seeing another with clarity. This, of course is not desirable if one is really interested in studying cell characteristics. A second very undesirable feature in using *Anacharis* is the fact that the student ends up studying it in junior high school, high school, and in college biology.

A specimen with a few desirable features, in addition to those of *Anacharis*, is the green alga, *Nitella* sp. The most apparent advantage of using *Nitella* rather than *Anacharis* is the fact that thalli consist of very large cells.

It is not at all uncommon for cells to reach a length of six centimeters. Another added advantage is the filamentous arrangement of cells. There is no overlapping of cells to clutter up the field of vision. Using *Nitella*, the student is actually studying *cell structure*.

The idea of using *Nitella* for cell study was a by-product of a general biology laboratory on the diversity of algal forms. While students were studying various algae, they noted particularly the large size of the cells of *Nitella* and cited this as the first observation which had brought home the fact that the cell is a distinct unit. The overlapping of *Anacharis* cells, studied while dealing with cell structure, was probably responsible for the fact that this point was missed. The students were also amazed by the fact that cytoplasmic streaming was so obvious. Again, there were no other cells interfering with observation.

One must also consider the value of using single large cells of *Nitella* for studying the physical phenomena so closely related to cellular function. The phenomenon of plasmolysis is quite striking with central clumping of the numerous chloroplasts, nuclei, and other cellular constituents. The diffusion of materials through the cell is lucidly demonstrated by dropping stains near the single cell and then watching progressive staining of the inclusions. There are, of course, other possibilities for demonstrating physical phenomena.

It is not the purpose of this paper to outline the steps in cell study. If one chooses to use the *Nitella* instead of *Anacharis*, all he need do is apply the cell study methods used with the latter specimen to the former. After all, the methods have been tried and have proven to be quite adequate. The substitution of *Nitella* serves simply to provide for single cell study rather than study of the cell as a part of a tissue.

The teacher who chooses to use *Nitella* will, undoubtedly, be interested in the source and culturing of the specimen. The genus is found in soft water streams and thrives in acid lakes (Prescott, 1954). Since the organism is found attached to a substrate, collectors probably will find it to their advantage to begin their search for specimens in local streams rather than lakes. In the streams, the thalli form long flowing arboreal patterns which give the rapids the appearance of a green carpet.

Once specimens have been collected, they are relatively easy to culture. Six months ago, culture dishes containing *Nitella* were placed

on a window sill in one of our laboratories. Upon present examination, it is found that the specimens are still in excellent shape for cell study of the type done in general biology laboratories. The culture medium used was Bristol's solution (Schwab, 1960).

The teacher who chooses to use *Nitella* for cell study will find that the genus is especially suited for this type of study. He will probably find that at least one of the thirty-four species of the genus (Wood, 1948) is easily obtained from his local environment and can be readily cultured in some corner of his classroom. A final advantage of using *Nitella* is that variety will be introduced into the study of the plant cell.

References

- Prescott, G. W., How to know the freshwater algae. Wm. C. Brown Co., Dubuque, Iowa, 1954.
Schwab, Joseph J., Biology teachers' handbook. John Wiley and Sons, Inc., New York, 1960.
Wood, R. D., "A review of the genus *Nitella* (Characeae) of North America." *Farlowia*. 3:331-398. 1948.

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