Hematology

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One of the most interesting and fascinating activities which can be sponsored by any biology department is hematology. If we define hematology as that branch of medicine having to do with the study of the blood, the blood-forming tissues, and the diseases of the blood, it is obvious that the study of hematology is not on a high school level, so would seldom be found as a high school activity. However, our students chose hematology as the name for their activity because they felt that any studies about the blood could be classed as hematology. How do we, then, justify such an activity in high school? Two factors entered into the organization of the activity in our high school. First, most biology classes learn about some phases of human physiology, especially the blood and its circulation through the body. There are always some students interested in reading some extra information on this topic who become interested in Rh factor, coagulation time, or the types of blood. Questions arise about how these tests are made. The activity in our high school came largely from this natural curiosity. Second, in our city there is a blood bank. Fortunately, the high school gym was used by the mobile blood center when it visited the community to get blood for the blood bank. The interest in this community undertaking on the part of both parents and students added stimulus to the organization of the hematology activity.

The first year the activity was organized, the group met once a week after school. The group was so large, in spite of after school time required, that the next year the activity was placed on the regular activity schedule which meets at three o'clock once a week. The first year we performed three operations: determining type of blood, coagulation time of blood, and red blood-cell count. The second year, the white blood-corpuscle count and per cent of haemoglobin in the blood were added operations. The third year, the group also included determination of Rh factor and haemoglobin determination was improved by the use of an Hb meter instead of the Tallquist scale. Due to the lack of equipment, we could not make tests for more than two students during an activity period. At the beginning of the fourth year we felt that if we had two more counting chambers (haemacytometers) and more pipettes we could do blood studies for more students per period. A committee from the activity presented the problem of lack of funds to the Student Council. The Council granted the necessary funds.

Last year, which was the eighth year of operation, the students wanted to know if they could get a sphygmomanometer so that they could take blood pressures. The apparatus was quite expensive, and again we went to the Student Council. The profits from the coke machines were granted to the Hematology Activity provided the members of the activity took the responsibility of seeing to it that bottles were returned to the empty bottle rack. These funds made it possible for us to purchase a pipette shaker and supplies of sera for blood typing and Rh factor determination in addition to the sphygmomanometer. At present there is enough money in the activity fund to take care of all the supplies which will be needed next year.

Because best results have been obtained if the membership in the activity is limited to fourteen each day, only juniors and seniors are generally accepted. Those students interested in future work in medicine, nursing, laboratory technician, or related vocations are given preference. The work is divided so that each student has something to do each activity period. Work assignments are alternated so that a student does something different each week and repeats the various operations every seven weeks. Each member is

Students study different aspects of hematology.

given an assignment sheet which tells him what he is to do each time he comes to the activity period. These sheets have the following student responsibilities listed:

Director: Is in charge of students who come to have their blood studied. He directs them to the place where the tests are made and sterilizes the finger so that an aseptic puncture can be made with a lancet.

Supervisor: Supervises the operations and checks all results.

Recorder: Keeps a record of the results and also makes out the report which is given to each student whose blood is checked.

Rh Factor: Determines the Rh factor.

Typing: Determines the blood type.

Haemoglobin: Determines the haemoglobin per cent in the blood.

Red blood-cell dilution: Takes a sample of blood in a Thoma pipette and makes the proper dilution with Hayem's solution.

Red blood-cell count: Charges the haemacytometer and with the aid of a microscope counts the blood cells.

White blood-cell dilution: Procedure same as the red blood-cell dilution except uses white cell diluting fluid.

White blood-cell count: Same as red blood-cell count except uses the counting areas for white blood cells.

Coagulation time: Draws blood into a capillary tube and after 2 minutes breaks off a small piece every ½ minute until blood is coagulated.

Pressure: Takes blood pressure. One week the right arm is checked, the next time the left arm is used.

Clean pipettes: A suction apparatus is used to clean and dry the pipettes.

Supplies: Takes care of all supplies and sees to it that there are sufficient materials for all operations.

The supervisor grades each student on his particular assignment for the day and turns in all of the assignment slips to the teacher who goes over them and assigns special help to those students who might need it. Using the foregoing arrangement of work assignments, we can take care of four students for blood study each period. It is true that some of the operations are not very technical, never-the-less they are essential to the entire program. Students like the change of assignment each week and feel that this arrangement makes it possible for more members to join in the activity.

Students ask permission to come in to have the various tests. We ask them to come the same period on two successive weeks. For example, those students who come Tuesday at three o'clock one week, will also come on

Tuesday at three o'clock the following week. The first day blood pressure is taken, coagulation time is determined, and red and white blood-cell counts are made. The second day blood pressure is taken again, and Rh factor, haemoglobin per cent, and blood type are determined.

One objection to an activity of this type is the need for certain special equipment, but this may be partially overcome by having some of the equipment made by the students. For instance, an Rh typing box and capillary tubes for determining coagulation time can be made in the laboratory. Hayem's solution and white-cell diluting fluid can be made in the chemistry laboratory.

Some of the essentials for starting an activity are as follows: compound microscope; haemacytometer; Thoma pipettes; blood typing serum; Tallquist haemoglobin scale or Hb meter; Rh blood typing box and Rh serum; lancet or needle; small beakers; alcohol; cotton; medicine droppers; glass slides; tooth picks, etc.

When students who have been in for the tests are given the report of our findings, they are reminded that the results are obtained by students learning various techniques so the results are not guaranteed as absolutely accurate. Should we find anything which is not normal we recommend that the student consult a doctor. Some of the local doctors have been very helpful. They have given us books to read, and one sent his technician to school to demonstrate how the various tests are made. During an open house demonstration one of the doctors complimented the group on its work and even suggested other tests that could be included.

An activity of this nature can be started by any biology teacher who has had some teaching experience and is capable of supervising students in a laboratory. There must be effective laboratory descipline. Students must be impressed with the seriousness of their work or results will not be satisfactory.

After nine years of operation in our school we still have two groups meeting each week, and hematology continues to be one of the most popular activities. Once organized and running smoothly the activity advertises itself. There is always a waiting list. Students who were members as juniors will generally join again in their senior year. The second-year members are helpers for the new ones. This arrangement speeds up operations to such an extent that we can accomplish more than would be the case if everyone had to watch a demonstration and then wait his turn to perform an operation. The activity is popular because students feel that they are learning something which will help them in their future work.

Desmids

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Desmids have long been favorite objects of study for those delighting in beauty as seen through the microscope. Both the amateur and the professional alike are attracted by their symmetry and bizarre shapes. (Figs. 1-3) In addition to their beauty and uniqueness, they have invited investigation because of the ever present questions of evolution within their own group and their relationships to other algae. Whatever the reason, they continue to be an intriguing group of organisms to observe and study in biological research.

The name desmid comes from the Greek word *desmos* meaning a chain, and refers to the fact that many members of this group occur in chains, which are more properly called filaments. Many new genera were discovered which were closely related to those original members. Therefore, the term desmid has gradually become the common name of

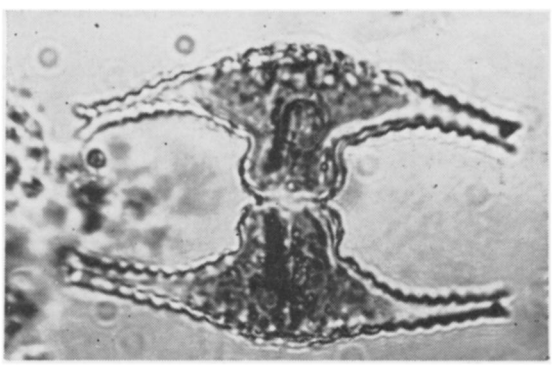

FIGURE 1—Front view of *Staurastrum cyrtocerum* var. major.