

#### COMBINATION VS. SEPARATE OPAQUE PROJECTORS

As long as standard makes of instruments are used there is little or no difference in the quality of projection between separate opaque projectors and combination opaque and lantern slide machines. Both are entirely satisfactory for ordinary purposes. However, the separate projector is good for one use only, namely opaque projection. The combination machine costs more than the separate instrument, but the price is considerably less than the combined prices of the opaque projector and projection lantern purchased separately. In the opinion of the writer the combination machine is well worth the difference in

price over the separate instrument. In this combination machine all the classroom equipment necessary for ordinary still projection is combined into a single compact unit. Lantern slides properly screened probably make the nearest approach to perfection in visual aids to instruction. Simple inexpensive attachments convert combination machines into satisfactory film slide projectors or microprojectors, instruments of unquestioned value in biological work. The combination unit for opaque materials and lantern slides, together with its various attachments, has so many advantages that it must be considered as perhaps the most versatile projection instrument available for use in the biology classroom.

## Arousing Interest in Senior High School Biology

JOHN E. SHOOP

New Rochelle Senior High School, New Rochelle, New York

The element of interest is most easily obtained in school work when the teacher can bring to the students subject matter that they can successfully master. It should be that type of subject matter which is going to be of immediate or of assured future value to them. That element of interest is most easily obtained when the teacher is willing to sacrifice time and energy to adapt the subject matter to the varying degrees of ability and capacity that make up the personnel of the class. That element of interest is gained when teachers begin to measure achievement not in terms of percentage or grades, but in terms of educational growth.

Interest can be aroused by offering as many allied educational experiences as the field can embrace. In this way each student becomes conscious of some one particular phase of the work, which, due to close correlation, creates interest in other phases and leads the student on to new fields of endeavor. Educational growth consists not merely in the acquisition of factual knowledge, but also in the application of the principles as they are learned. These principles, having once become part of the actual experience of the individual, have a definite place in his educational background and tend to modify his reactions.

In the New Rochelle Senior High

School the biology course is open to students in the tenth, eleventh, and twelfth grades. We recognize the different levels of ability by offering three separate courses in biology: Advanced Biology on two levels, and Elementary or Human Biology. Placement of students in these courses is dependent upon their ability, interest, and future educational plans. Near the end of the ninth grade, achievement tests are given in various subjects, for placement purposes in the tenth grade. Placement of students in the biology courses depends upon results of these tests, I.Q. ratings, and teachers' estimates, as well as educational plans. If a student placed in one of the courses shows evidence at any time of being incorrectly placed, he is changed to the proper course.

In the second week of school each student is given a Cooperative Test in Biology to show how much foundation he has in the subject matter before taking the course. These results are tabulated, explained, and posted, so that each student knows what percentile rating he has attained. In February and again in June similar tests are given, tabulated, and posted, to show the student what relative growth he has made in the subject.

A reference outline covering the entire course is given to the student instead of a textbook. The outline lists references to forty-seven different basic textbooks which are placed in the library for the use of the students. No student is required to do any of this work unless he wishes, because each and every assignment in the reference book is carefully gone over in class lectures to reinforce what the students have read. Although only three hundred students can be accommodated in this elective course, 12,732 biology books were borrowed from the school library during the school year

1937-38; 8,475 in 1938-39; and more than 7,000 thus far in the present school year.

The drop in the number of books borrowed in 1938-39 is explained by the fact that during that year we provided one library period per week for each student. Through the cooperation of the administration and the Librarian we have been able to build up the Biology Reference Library until it now comprises 683 volumes of 240 different titles. Also, there are magazines of a biological nature; such as "The Quarterly Review of Biology," "School Science and Mathematics," "Natural History," etc.

As soon as the pupils in the various classes are acquainted with each other, a representative is elected from each class to form what is known as the Biology Council. The purpose of this Council is to meet with the teachers of the Biology Department to decide the policies to be pursued throughout the year. Such questions as homework, reports, supplementary materials, grievances, poor teacher explanations, suggestions how to better the course, and subject matter content are considered in Council meetings. If any student feels he has a complaint or a suggestion to make, he tells the class representative who brings it to the Council for consideration.

The members of the Council also act as contact agents for the Biology Club. Membership in this club is not confined to biology students. It now has a membership of 168. No dues are charged; any costs are defrayed by the General Organization of the school. The officers are President, Vice President and Secretary-Treasurer, who have administrative authority under the supervision of the teacher in charge. The club has bi-weekly meetings throughout the school year. The program includes speakers

on various biological subjects. These speakers are generally eminent men in their particular field of interest. We find that they are usually willing to come without cost to a gathering of this kind.

Following are some of the topics that have been presented at club meetings: "Specialization in Reptiles" illustrated with thirty live snakes; "Nursing, its Advantages and Disadvantages"; "General Patterns of Problem Behavior"; "Where do we stand on Tuberculosis"; "Taking your Borings" (a talk on teeth); "Cancer" with an exhibit on display in the school; "The Evils of Marijuana"; "Bees." Other activities of the Club include field trips to various hospitals in New Rochelle and neighboring towns, to Children's Village (a corrective institution for boys), to Museums, to New York Medical Center, and to Boyce Institute of Plant Research. In the spring and fall we take morning hikes, leaving the school about 5:30 and returning in time to have breakfast, which is prepared by the lunchroom staff in our own school cafeteria. In addition to this we have several parties during the year, which create better social feeling between the pupils and between the pupils and teachers.

When possible the class lectures are illustrated by motion pictures, slides, charts, models and actual specimens, both preserved and alive. We are fortunate in having a room which is equipped with projection facilities, and also a connecting storage room where special display materials are available for instant use.

Various topics based upon the work covered throughout the year are suggested for term papers. The work on each term paper is done by a group of students interested in that particular topic. The best term papers are then selected, mimeographed, and made into

a booklet, a copy of which is given to the students contributing, and one copy is placed in the school and city libraries for future reference.

Closely correlated with the lecture work are a number of important laboratory experiments, about 60 in all. These experiments are performed individually by each student and a record of them is kept in a laboratory manual. The laboratory manual was especially prepared by the department for use in conjunction with the lecture material. The laboratory is open four afternoons a week after school for students wishing to do extra work not connected with the regular laboratory routine.

In the latter part of May a questionnaire is given to each student, which contains criteria for rating the course and the teachers and asks for criticisms and for suggestions on how to improve the course. This has definitely aided us in modifying the course and adapting it to student needs and interests.

At the end of the course several awards are given for outstanding achievement, based not only on mathematical computation of grades, but also on cooperation, leadership, and assumption of responsibility.

These activities have proved very successful in New Rochelle in arousing interest in biology to a point of enthusiasm. When the course was started seven years ago its membership numbered thirteen. Now we have a total enrollment of 279. Other factors which we consider would be very useful in arousing interest are: A Browsing Room for the use of biology students only; Additional courses in the field, such as Bio-Chemistry—for students specializing to be nurses, dietitians, laboratory technicians, medical and dental assistants, etc.; Consumers' Biology—a general information course for students not preparing for college;

Biological Appreciation—an appreciation of biological contributions, including current events, for avocational background.

By offering these new and varied courses we feel that the period of interest of biology students could be prolonged, and that many other students would become interested.

## THE BIOLOGY EXCHANGE IDEA

The establishment of a biology exchange service is one of the most interesting and educational activities that a biology club can undertake. The exchange idea allows boys and girls an outlet for a natural inclination to “swap” articles of all kinds.

One of the first projects to start after a club has decided to establish an exchange is to collect large quantities of local fauna and flora. The immediate project is to collect accurately labeled specimens in large numbers. The thought uppermost in collecting local material should be accuracy of data, specimen interest and conservation trends.

The data collected with each specimen should include exact location in terms of miles from a well established landmark. Jones farm is sufficient for local interest but “Jones farm” on the specimen record card should read three miles east and 1 mile south of Cherryvale school, Idabel, McCurtain County. These are termed “spot” locations and the range of an animal is often accurately mapped from such spot locations.

Specimen interest in its broadest sense should dominate field collecting. The animals or plants that do not interest one person or club might be the exact group wanted by another club. Interest in a particular group can usually be built up by systematic collecting designed to show

habitat relationships, genetic variations or other peculiarities. Rarity of a specimen in the local area can usually be overcome by specific exchange requests. The occurrence of a plant or animal within an area as determined by a check list does not guarantee that the local club will find that specimen.

### COLLECTING AND PRESERVING

The club, in preparing for a field collecting trip, sees that all supplies are ready and the carriers available. The type of equipment carried will depend upon the main objective of the trip.

In preparing data sheets to be recorded on the specimen card or index card in the museum, the club or trip manager sees to it that each collecting stop is a numbered station in the notes. After compiling the information for the card file the station number is all that is necessary to properly locate a given specimen. Field notes and remarks often prove very valuable in identification.

Special methods and techniques are employed for many animal groups. Most of the animals taken in the field can be preserved in formalin of five to eight per cent strength. Ethyl alcohol may be used for the same purpose. Opinion differs as to the best way of killing the animal to preserve it. It may be dropped directly into the formalin or chloroformed, or drowned. The latter technique has many advantages for reptiles and amphibians.

A specimen drowned in an air tight container has the advantage of being limp and flexible and easily handled. Amphibians and reptiles are injected or slits cut in the abdomen to allow the preserving fluid to penetrate the body cavities. Injection has the advantage of swelling the animal to normal size and giving a more natural appearance. The animal can then be pinned in any position and preserving fluid poured over it.