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# The Overhead Projector as an Aid to Laboratory Instruction

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During the past few years, more and more Iowa biology teachers have been able to incorporate the overhead projector into their teaching programs. Projectors are used for viewing both teacher-prepared and commercial transparencies, and



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as a tool in explaining difficult concepts. They can become an all-purpose "chalkboard" during discussion sessions. Teachers and students alike seem to be more at ease, and communication is promoted during these work periods.

Yet in many cases the science teacher overlooks the possibility of using the overhead projector *during laboratory sessions*. Projectors often are covered with dust jackets and shoved into a corner like some unwanted piece of old furniture as soon as a lab activity is started. With a bit of

planning these machines may become an integral part of almost any laboratory experience.

## *Some Modes of Use*

*Introduction and Motivation.* The teacher using an overhead projector can provide "telescopic vision" for all the students in his classes. Each student can see what is being demonstrated *at the same time*. A screen filled with color, moving organisms, or bubbling gases provides a compelling center of interest, even for a "sullen Sue" who would rather file her fingernails.

*Participation.* Often times it may be necessary to divide a class into work groups during a lab situation to investigate varied aspects of a problem. Students may send group members to the overhead with their results so that data can be collected for the entire class. Students may also present particular problems to the class for discussion.

*Supplementation.* The overhead, used with whole mounts, prepared transparencies, and "live demonstrations" can enable the teacher to relate supplemental data and allied principles to the students during a lab.

## *Specific Activities for Biology Labs*

*Blood Typing.* Demonstrate typing procedure first using the overhead. Let students type themselves, then

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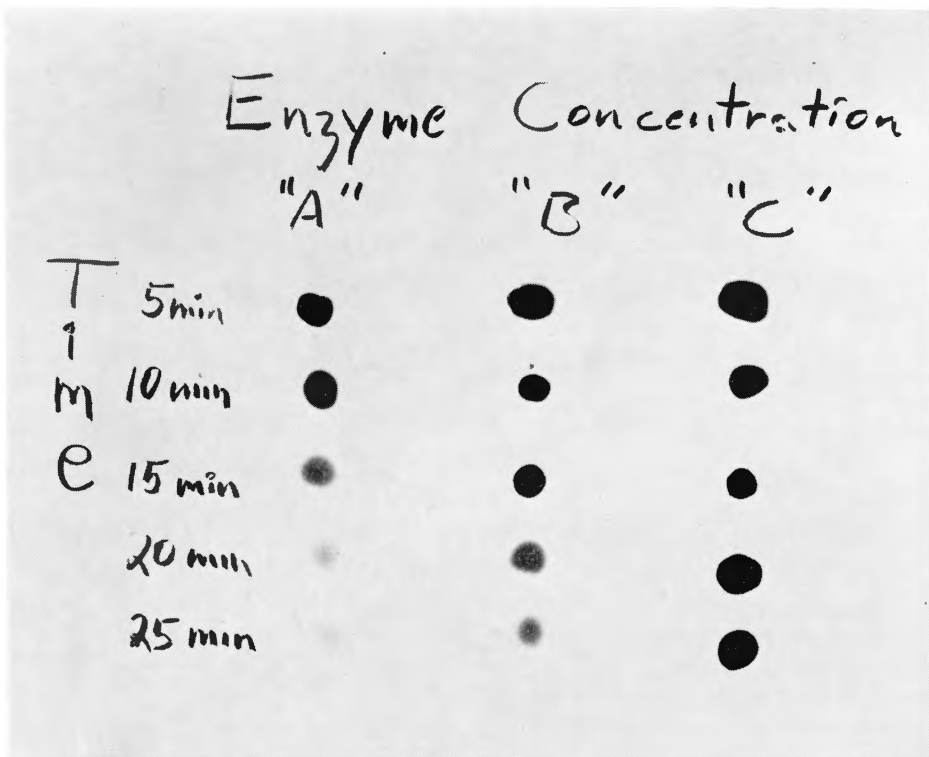


Figure 1  
Image of starch-iodine reaction as seen on projector screen

"collect data" (student slides) on the overhead stage to calculate population percentages for the various blood groups.

**Enzymatic Activity.** When investigating the activity of salivary amylase (or malt diastase) on starch substrate, place drops of iodine solution on the glass stage, and have student groups bring reacting samples to the front periodically. Everyone can then compare the rates of different reactions *instantly* as colors develop on the screen (See Figure 1).

**Toxic Response.** Place a Petri dish containing paramecia on the stage of the projector. They can be seen swim-

ming about on the screen in random manner. Dip the tips of some wires leading from a 1.5- or 6-volt battery into the solution. The animals will zip wildly back and forth between the wires as the polarity of the current is changed. Chemotaxic response may also be demonstrated using salts, acids, etc., and a micropipette.

**Acid-Base Reactions and Titrations.** Using glass or *transparent* plastic syringes, various amounts of acids and bases may be added to indicator solutions placed in Petri dishes. Particularly vivid reactions can be obtained with Bromthymol blue, Neu-

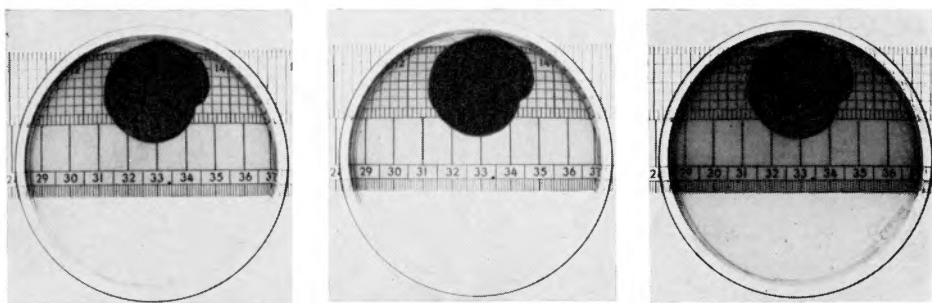


Figure 2  
Using the overhead as a colony counter

tral red, Phenolphthalein, or Alizarin yellow R.

**Bacteriology.** The overhead can double as a colony counter if Petri plates containing bacterial or fungal cultures are placed on the stage. Antibiotic zones of inhibition may be measured at the same time if a clear millimeter ruler is placed under the dish (See Figure 2).

**Growth and Development.** As a "warm-up" exercise, have students make careful observations of the following: Pour about 30 ml. of concentrated copper sulfate solution into a Petri plate placed on the stage of the projector. Drop a crystal of potassium ferrocyanide (CAUTION: poisonous) into the solution. Crystals will "grow" in amoeboid fashion and finally "die." (With emphasis on careful observation and interpretation of data, this is an excellent first-day exercise for a biology program.)

**Gas Production.** Attach a piece of glass tubing to a reaction flask using flexible tubing and a one-hole stopper. Introduce a drop of colored water into the glass tube and place the tube on the stage of the projector. Highly accurate quantitative data may

be collected by simply placing a clear millimeter ruler parallel to the tube and equating fluid position with time (See Figure 3).

Try this method with yeast respiration, peroxidase activity, etc., experiments. *Direct* comparisons of concentrations may be made if several set-ups are placed on the stage at the same time. Suitable modifications may be made to illustrate translocation rates of plants.

The overhead projector is also well used in labs concerned with taxonomic keys. Leaf types, fish scales and fins, insects, and many other items may be "keyed" by all students if instructor displays material on the stage of the projector. Embryology, plant growth and development, animal movement patterns, photo- and geotropisms in plants, chemical and enzymatic activity, osmosis, diffusion, variation, and statistical analysis of data can all be taught, in part, during laboratory sessions using the overhead projector. The overhead, in the hands of the imaginative and creative instructor, is perhaps the most versatile teaching tool devised since the blackboard.

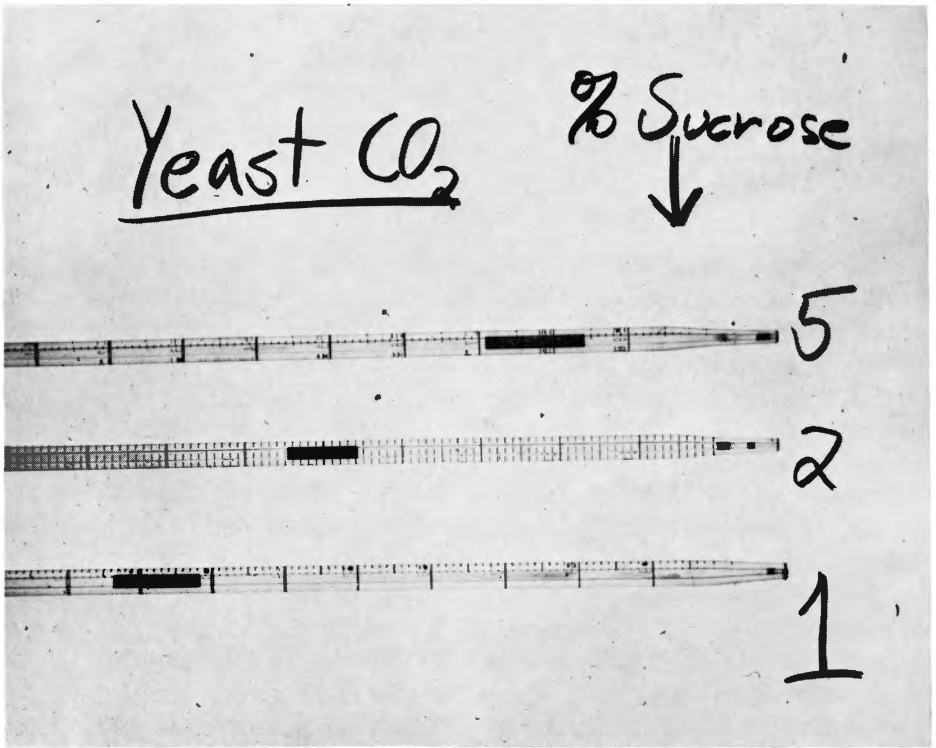


Figure 3  
Measuring  $\text{CO}_2$  production of yeast cultures

## CASMT CONVENTION A HUGE SUCCESS

During Thanksgiving vacation an Iowa delegation led by Professor Robert Yager, Vice-President and Convention Chairman, and Gerald H. Krockover, Chairman, Junior High Science Section, attended the annual convention of the Central Association of Science and Mathematics Teachers at the Sheraton-Jefferson Hotel in St.

Louis. Featured speakers included Supreme Court Justice William O. Douglas and Alan Shepard of the National Aeronautics and Space Administration. Sectional meetings emphasized the new elementary and secondary science programs. Short courses included the areas of elementary science and also computer-assisted instruction. If you are interested in joining CASMT, contact Gerald H. Krockover, 308 University Schools, Iowa City, Iowa 52240.